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Architecture Planning Built Environment Studies

Chief Editor

Ashraf M. Salama

Collaborating Editors

Farzad Pour Rahimian
Remah Y. Gharib

Includes

- Original Research Articles
- Book Review

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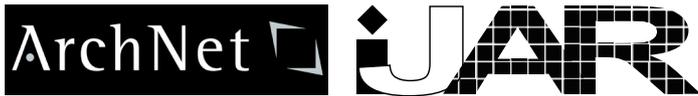
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post occupancy and facility performance evaluation; and social and cultural factors in design.

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Essays that cover the above topics; critically discussing projects in use; after they have been designed, built and occupied. Articles are preferred to utilize the case study approach as a critical method in built environment research.

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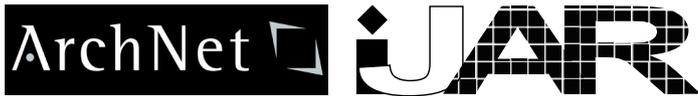
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RESEARCH UTILIZATION IN THE DESIGN DECISION MAKING PROCESS

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Abstract

This article summarizes findings from a national survey of interior design practitioners in the United States (N=366). The study explored interior design practitioners' current preferences for conducting project research including: activities conducted and sources used, attraction to and recall from sources, and ideas for communicating research findings. Responses suggest that interior designers do value research, yet have little time to utilize research. While cross-tabulation analyses indicate no major differences in research activities between the study's demographic groups, collectively, only 12% of the sample indicated they utilized academic journals and, at times, even incorrectly identified those sources. Open-ended responses allowed designers to offer ideas for communicating research and four key themes emerged, including: topic selection and relevancy, ideas for new dissemination methods, ideas for presentation style, and perceptions of the written language used. It is hoped that this study's findings may help design researchers better communicate their own findings to design practitioners.

Keywords: *Design Research; Research Utilization; Interior Design; Peer Review; Knowledge Acquisition*

INTRODUCTION

A similar scenario unfolds each day: an interior designer is designing a busy social services office. The project's lobby needs to accommodate anxious clients waiting for their appointments. The designer understands this may be a stressful experience. However, he/she is unaware of available research findings on how to mitigate environmental stressors. Even if the designer is aware, he or she feels too busy to read a lengthy journal article, so they briefly discuss options with a colleague, then follow their intuition, and hope for the best outcome. If the best decisions are not made, it will likely be the anxious clients who feel the repercussions.

It has been stated that the format and availability of information are "key variables in the success of design" (Wild, McMahan, Darlington, Liu & Culley, 2010, p. 46). While contemporary discourse has focused on the importance of knowledge, designers with the best of intentions may lack the time and awareness necessary for making informed design decisions. While information is widely available, it is often widespread and decentralized (Mays & Kossayan, 2011). Moreover, interior designers may be working on multiple projects and are concerned with the number of hours billed to their respective clients (Hill, Hegde, & Matthews, 2014). These concerns can truncate research efforts, as emphasis may be placed on the rapid production of contracted deliverables. Given time constraints and multiple project-related stressors, a designer must quickly evaluate an information source in terms of usefulness and decide how much time they will devote to information comprehension.

Previous studies have explored interior designers' perceptions of research (Dickson & White, 1993), its importance relative to professionalism (Birdsong & Lawlor 2001), and its application in design education (Dickinson, Anthony, & Mardsen, 2012). However, studies have yet to explore current methods of designers' knowledge acquisition given the newfound availability of information from internet sources. Further, few studies have been conducted to understand their perceptions of research and their preferences surrounding information sources. This study sought

to understand how interior design practitioners utilize research, the sources of information they prefer, and to identify their ideas for communicating research findings. A thorough understanding of these factors might influence the creation of effective formats to disseminate empirical findings to practitioner audiences.

LITERATURE

Perceptions of Research

There are several key studies which have examined interior designers' perception of research, and resulting evidence does suggest practitioners recognize the importance of project-related research. In a quantitative study of interior designers' perceptions of professionalism, Birdsong and Lawlor (2001) found 64.9% of their sample felt research was an *important* component of the design profession. Dickinson, Anthony, and Marsden's (2012) survey of interior design practitioners indicated that 93% agreed that undergraduate students should know how to use research results during their design process. The same study found younger, more educated interior designers who practiced commercial design were significantly more likely to value research. Yet, in Dickson and White's (1993) survey, only 34% of the sample indicated they researched an interior design problem 100% of the time, and another 27% indicated they researched a design problem less than 25% of the time. These studies suggest the degree to which research manifests in the interior design process likely depends on the scale, scope, and specific needs of the project at hand. While it is unlikely that interior designers perform the types of explorative, open-ended means of *problem seeking* as noted by Maturana (2014, p. 36), the value of research to design is likely increasing in the Knowledge Age. Yet, there remain many variables in the types of knowledge acquisition activities conducted and how information is used.

Research Utilization

The degree to which research influences decisions is commonly referred to as *research utilization* (Wiess, 1979). The literature on the utilization of research spans diverse fields including health, education, and human services (Backer, 1991). Literature suggests three types of research utilization strategies, including: instrumental, conceptual, and symbolic (Pelz, 1978). Instrumental research provides knowledge in specific and direct ways. This type of knowledge would be sought after and applied to a specific problem at-hand. Conceptual strategies involve the use of research for one's general enlightenment. This type of knowledge is less likely to influence decisions. Whereas, symbolic utilization strategies involve the use of research to legitimize predetermined notions (Beyer, 1997).

Scholars from the field of environmental and behavioural research have long lamented designers' avoidance of research (Seidel, 1985; Sommer, 1997). To counter this tendency, they offered strategies for increasing research utilization. Seidel (1985) identified three such strategies, including: clarification and dissemination, linkage theories, and collaboration. Clarification and dissemination strategies place emphasis on making relevant information readable and available through presentation style (i.e., graphics, format), approachable language, and the accessible methods for reporting results. Backer (1991 & 1993) suggested that to increase the utilization of knowledge, researchers should seek a user-orientated transformation of knowledge. Such tactics include the elimination of jargon and unnecessary statistics. Going further, linkage strategies suggest the use of an approachable middleman to convey information (Seidel, 1985), and collaboration strategies emphasize the benefits of researchers and research users working together, thus removing communication barriers (Seidel, 1985). While decades have passed since these recommendations were made, it appears little may have changed. More recently, Popov (2009) noted a need for new professional interactions and communication patterns to increase research utilization in design domains. Additionally,

Sommer (1997) suggested factors that may increase research utilization such as prompt and easy implementation of findings, visual appeal, and the use of vivid numbers and verbatim comments. Conversely, factors that may diminish the use of research can include the lack of technical knowledge by viewers (Sommer, 1997). While scholars continue to tout the importance of research utilization, few studies within environmental design research have attempted to identify the characteristics of research knowledge that influence adoption or utilization by design practitioners (Imeokparia, 2005).

Relative to interior design, research suggests varied but often cursory research utilization practices. Some interior designers may strictly utilize existing research, while others may conduct inquiries intended to generate new knowledge. Phares' (2011) survey asked healthcare interior design specialists if they *usually* conducted design research according to predetermined definitions; 79% indicated they followed research literature; 68% measured outcomes; 29% indicated that they shared what they had learned; and only 12% indicated they submitted their findings for peer review. Martin's (2014) interviews of non-healthcare design practitioners suggested that their definitions of research were generally in accordance with information gathering practices. While all her interviewees had some knowledge of Evidence-Based Design (EBD) and all subjects claimed that their firms used research findings, subjects often lacked understanding of actual EBD practices. Dickson and White's (1993) survey indicated that practitioners generally conducted research that reviewed the technical aspects of design (88%), or drew on traditional and past experiences (84%). In fact, only 33% of their sample said they frequently reviewed social or scientific research. This may indicate that while practitioners are apt to use research in their design process, their methods are aimed at instrumental or symbolic utilization strategies. Moreover, they are not likely to conduct original inquiries.

Sources of Information

There are several studies regarding the sources of information interior design practitioners use to acquire knowledge. Findings suggest these sources of information support the pragmatic nature of their research efforts. Dickson and White's (1993) survey indicated information sources most commonly used by designers were product catalogues, design magazines, *Architectural Graphic Standards*, and textbooks. Further, 47% of their sample indicated they *never* consulted scholarly journals for their research. This led the authors to conclude that interior designers have traditionally been reliant on *soft sources* (e.g., periodicals, trade literature) for project-related information (Dickson & White, 1993). This tendency is not unique to interior design. The University of Minnesota's College of Architecture's Dean, Thomas Fisher (2004) jokingly suggested that architects were "allergic to data tables and descriptive statistics" (p. 1), and in her 1999 essay, Susan Roth suggested that much of the knowledge created at universities is not being channelled to industrial designers.

However, several recent cross-disciplinary paradigms have increased the value placed on more rigorous design research efforts. The popularization of the Design Thinking movement (Brown, 2009; Dohr & Portillo, 2011; Dorst 2011; Lockwood, 2009) provided designers with an approachable, yet systematic methodology for collecting data through pre-design observations. Additionally, EBD (Hamilton & Watkins, 2009; Nussbaumer, 2009) strategies have increased the demand for useable empirical evidence as an antecedent to design decision making (Bosch & Nanda, 2011; Cama, 2009). In fact, the aforementioned survey by Phares (2011) found that 72.9% of healthcare designers were "very interested" (p. 51) in evidence-based design practices.

As a result of technology and changing paradigms, there are many information sources available to designers. In addition to scholarly articles, large design firms (Cannon Design, 2013; Gensler, 2014; Perkins & Will, 2013) and contract furniture manufacturers (Herman Miller, 2013; Knoll, 2013; Steelcase, 2013) are engaging internal scholars to generate their own proprietary research. These findings are often disseminated through graphic white papers, presentations,

and at trade shows; yet, constraints on time and competitive business conditions may limit submission for external peer review. Professional organizations (IIDA Knowledge Network, AIA Knowledge Net, ASID Knowledge Center) and strategic partnerships (InformeDesign) have attempted to enhance practitioners' connection to academic findings by providing research directories populated with succinct descriptions of empirical studies. However, the extent to which these are currently used by designers is unclear.

While previous studies have highlighted a reliance on soft sources for information, these studies were conducted prior to the wide-spread adoption of the Internet. Thus, it has not yet been determined if the increased availability of research offered by internet sources, or the growing attention to research resulting from EBD and Design Thinking paradigms have altered which sources designers seek in their research efforts.

Scholarly Sources in Design Practice

In order to understand the context of research within the profession of interior design, it is important to recognize the legal requirements for practicing in that field. While these vary by jurisdiction, in the United States, 27 states have requirements that are typically comprised of examination, experience, and training (ASID, 2013), the latter of which typically consists of a 4-year bachelor's degree (NCIDQ, n.d.). This differs from other professions such as medicine and law that do require advanced degrees. Moreover, Bosch and Nanda (2011) noted that only a few design firms have doctoral researchers on staff. As such, an interior designer's exposure to academic literature is likely to be relatively limited as compared to other professions. That being the case, their educational experience may influence their decisions concerning the breadth and depth of their information-gathering efforts.

In his book *Spatial Design Education*, Salama (2015) analysed multiple pedagogical strategies from an array of architecture programs and concluded they generally adopted a research paradigm that placed little importance on developing or analysing current theories. This examination led him to infer design pedagogy as generally emphasizing "high advocacy and low inquiry" (p. 315). Salama's (2008, 2015) design-based 'Trans-Critical' pedagogy theory was offered to address the integration of knowledge across disciplines (Disciplinary Component), the methods by which knowledge is acquired (Inquiry-Epistemic), and how students assimilate new knowledge (Cognitive-Philosophical). Other scholars have proposed tools and methods which emphasize the collection and analysis of information (Bose, Pennypacker & Yahner, 2006; Marinic, 2010; Orthel, 2015; Oxman, 2004), and the integration of knowledge (Deshpande & Khan, 2010). Yet, the pervasiveness of these integrative models is unclear – especially in interior design – and confusion remains amongst students surrounding the role of research in interior design practice (Dickinson, Marsden, & Read, 2007).

In addition to training, other reasons for an interior design practitioner's avoidance of academic sources may be due in part to work pressures and current modes of communication. Journal articles are of course a form of written communication. Yet, in a multiple domain study, Adler, Gujar, Harrison, O'Hara, and Sellen (1998) indicated that linear continuous reading is an "unrealistic characterization" (p. 248) of how people read at work. Their analysis of worker diaries and subsequent interviews found that reading tended to "co-occur" (p. 245) with writing, either in creation of new documents, amending existing documents, or providing clarity to what was being read (e.g., note taking). Their analysis also revealed that "cross referencing" (p. 245) across multiple documents was common. These findings may indicate workers typically apply their reading directly to the task at hand—thus, suggesting instrumental research utilization strategies. While outwardly efficient, this direct application could limit internalization of the information and reduce the likelihood of reading the entire source, tasks which are often necessary in reading academic articles. Further, Wild et al.'s (2010) study of engineering designers' research processes found documents were often utilized as quick references, with 42.1% spending less

than 10 minutes examining specific documents such as correspondences, journals, drawings, and standards, among others. Additionally, current journal articles also typically contain relatively little imagery, yet this type of communication is normative to design practice (Ching, 2009; Lawson, 2005). Although methods by which interior designers might leverage visual communication strategies in design research has garnered little attention from researchers.

The sources of information used while making design decisions are of utmost importance, and evaluating information sources for validity and appropriateness is imperative (Hamilton & Watkins, 2009). Consequently, it is important to note the nuances between peer-reviewed findings and research studies situated within businesses domains. While many design-related businesses conduct valid and meaningful research, these studies often do not undergo the scrutiny of an external peer review. The peer-review process limits potential bias and efforts are made to share all findings, even those that do not necessarily support the hypothesis of the researcher (Hamilton & Watkins, 2009). Due to competitive factors, this level of transparency would be challenging to replicate within design domains, especially in settings where the research is based on a paid deliverable (i.e., design solution), and sharing any potential project shortcomings can be detrimental to the firm's business development opportunities. Moreover, architecture and design firms are not afforded the types of protections and incentives offered by U.S. patent law (Levin et al., 1987), nor do they have access to the non-biased funding agencies that are available to health and science disciplines. Collectively, these factors potentially deter their peer review efforts.

As such, there are likely advantages for practitioners who use peer-reviewed research. First and foremost, they would be equipped with non-biased foreknowledge to inform their design decisions. Secondly, their more informed design decisions may lead to improved outcomes which may have long-lasting, positive influences on their clients and end users. Third, the profession of interior design itself would likely be advanced by application of research findings.

Summary

While literature suggests that interior designers do value research, they may hold inaccurate perceptions of what research entails, and subsequently be unlikely to utilize empirical research findings. Moreover, literature suggests that the information sources used by interior designers are often pragmatic in nature and could be considered indicative of instrumental and symbolic research utilization strategies. While strategies to increase research utilization have been offered, including clarifying findings and offering new dissemination channels, these recommendations have yet to be implemented and tested in design disciplines. Thus, effective clarification and dissemination strategies for those conducting instrumental research has yet to be documented; in their absence, persuading designers to enact conceptual research strategies is likely difficult. While a few studies have been conducted to better understand interior design practitioner perceptions of research and sources used, these are becoming dated. Moreover, researchers have yet to determine how these designers utilize and conduct research, and their preferences for receiving information, especially given the enhanced availability of information sources. Thus, further study is needed.

METHODS

This study sought to understand interior design practitioners' current preferences for conducting and utilizing research by establishing baseline data regarding the way in which designers currently conduct design research-orientated tasks. It was grounded in the following research questions:

- What types of research are conducted?
- What sources of information do practitioners utilize?

- What preferences do they have regarding information sources (attraction and recall)?

The survey utilized an online questionnaire (Qualtrics) for data collection, took less than 20 minutes to complete, and consisted of two sections. The researcher obtained approval for the study, HSC # 2014.12212, by the Institutional Review Board at Florida State University on March 13, 2014.

Survey Design

As this phase of data collection was exploratory in nature, no previously generated survey instruments were deemed appropriate, thus necessitating a new instrument. To minimize possibility for error, this instrument was reviewed by two distinguished researchers, a statistical consultant, American Society of Interior Designers' Director of Market Research, and subsequently pre-tested by three separate groups of either researchers or design practitioners.

The first portion of the survey contained demographic questions. The second section of the survey began by asking respondents if they conducted project related research. The following definition was used for research "the identification of important design questions and the development and use of organized problem-solving methods" (Thompson, 1992 p. 47). While more contemporary definitions have been offered, this was used by the researcher as it included more pragmatic approaches and did not focus on the generation of knowledge. This was important as definitions and perceptions of design research vary (Dickinson et al., 2007) and previous studies have indicated designers do not typically associate research with original discovery (Dickinson et al., 2012). If participants indicated they did not conduct project related research they were asked reasons why and exited the survey. Those that indicated they conducted research answered questions about their research activities and continued to the final section of the survey which queried how they processed information. Survey items were both quantitative and qualitative and several items allowed for open-ended responses to expand upon answers.

Validity and Reliability

Statistical checks of reliability included inter-rater reliability for open-ended responses and a check for overall response agreement between practitioner pre-test and final survey responses. The researcher sought to establish content, predictive, and construct validity (Creswell, 2009, p. 149) through the writing of the questions themselves and subsequent series of pre-tests and revisions. Whenever appropriate, questions allowed for both closed and open-ended responses to test for predictive validity. However, to maintain overall survey brevity and attain a high response rate, there was limited retesting of items. The pre-test responses by the practitioner group allowed for establishing predictive validity by examining responses against previously published research findings where possible, and comparing their responses to known information about their research practices. Following final revisions to the instrument, construct validity was verified through a final crosscheck of the instrument with the research questions.

Sampling

The target population for the study was interior designers who are actively involved in design projects within the United States. The participants were recruited from membership lists of the American Society for Interior Designers. This organization was selected because it is the oldest professional organization for interior designers in the United States, has the largest body of

membership, and it traditionally represents designers practicing both residential and commercial design. A recruitment email was sent to a random sample of 6849 Allied¹, Associate², and Professional³ members. These membership types infer that the designer has met necessary requirements to qualify for these levels. Thus, using these membership types helped the research to better target practicing designers—and filter out responses from interior design educators, product representatives, and students. The invitation email included a link to the survey. After the initial email was sent to the designated sample, two email reminders were sent to addresses of those who had not yet responded. The only identifier to each completed questionnaire was an IP address, unless participants offered to share their email addresses for a follow-up interview.

Survey Analysis

Responses to closed-ended questions were analysed using descriptive statistics (e.g., frequencies and percentages). Inferential statistics were used to understand if demographic characteristics were associated to varying types of research activities conducted and research preferences. This examination included: cross tabulation analysis with *Chi*-square statistics, and ANOVA tests. Additionally, when ANOVA distribution and variance assumptions were confirmed, a post-hoc Tukey's Range Test was used to determine specific differences for those variables where significant p-values were calculated. Open-ended responses were inductively coded by keyword and grouped by theme, a second reviewer then coded the responses and inter-rater reliability was deemed sufficient (<.7) using Cohen's Kappa.

FINDINGS

Three hundred and sixty-six ASID members responded to the survey (a response rate of approximately 5.3%). Fifty-nine percent of participants were aged 51 or above. Sixty-three percent of respondents had over 10 years of professional design experience. Forty percent reported that they were principals/owners of their firm, and 47% reported they worked in a sole proprietorship. Participants were primarily residential designers (67%), and most respondents held a design-related Bachelor's degree (64%), while 18% held an advanced degree. Table 1 provides a summary of demographic information from the survey respondents. While the respondents represented a reasonably large sample population for interior design, it is important to note that they represented a relatively large percentage of older, residential practitioners, who owned their own firms; hence, generalizing this data to the entire spectrum of interior design professionals is inappropriate.

¹ ASID Allied Membership: "practicing interior designers who have completed 40 semester or 60 quarter credit hours in interior design education from an accredited institution" (ASID, n.d.a. para 1)

² ASID Associate Membership: "practicing interior designers who can demonstrate six years of full time interior design experience and provide a college transcript reflecting a minimum of an associate's degree in a subject other than interior design" (ASID, n.d.b, para 5).

³ ASID Professional Membership: "requires proof of passage of the NCIDQ examination. (ASID, n.d.c, para 1).

Table 1: Sample demographics

Variable	Response	%
Current age (n=358)		
20-30 years	57	16
31-50 years	93	26
51-65 years	163	46
Over 65 years	45	13
Years of experience (n=358)		
Less than 2	35	10
2-5	43	12
6-10	54	15
11-20	68	19
Over 20	158	44
Current position (n=358)		
Junior Designer/Architect	26	7
Interior Designer/Architect	105	29
Senior Designer/Architect	38	11
Design Director	7	2
Project Manager	7	2
Principal/Owner	143	40
Other	32	9
<i>Other positions included: Project coordinators, program managers, product development, librarians, consultants, sales, and managers</i>		
Size of firm (n=350)		
Sole Proprietorship	164	47
2-5 Designers	124	35
6-20 Designers	40	11
21-50 Designers	11	3
51-200 Designers	6	2
Over 200 Designers	5	1
Primary Market Sector (n=356)		
Commercial/Corporate Interiors	58	16
Health & Wellness	15	4
Residential	237	67
Retail/Hospitality	15	4
Education	10	3
Other	21	6
<i>Other included: Food & Beverage, Senior Housing, Textile Design, Government, Historic Preservation, Aviation, Collegiate Bookstores</i>		
Level of Education (n=352)		
Certificate	25	7
Associates Degree	36	10
Bachelor's Degree	225	64
Master's Degree	61	17
Ph.D.	5	1
Non-design related Bachelor's degrees included: <i>Marketing, Art, Journalism, Business, Visual Communication, Textile Marketing, English, Accounting, Business Management, Early Child Education, Communication, Political Science, Fine Art, Advertising, Public Relations, Psychology, Religious Studies, Industrial Design, Graphic Design, Business Education, Sustainable Management, English</i>		
Non-design related Master's degrees included: <i>Project Management, Speech Pathology, Business Administration, Educational Psychology, Gerontology, International Art & Architecture, Early Childhood Education, Social Work</i>		
Non-design related PhD. Degrees: <i>Allied health</i>		

Research Activities

Following demographic questions, participants were asked questions regarding their current research practices. Eighty-nine percent of respondents indicated they conducted design research in accordance with the Asher Thompson definition.

Table 2 illustrates the types of research tasks the respondents conducted, when multiple answers are permitted. *Analysis of design trends, product research or prototyping, and client-based research*, received the greatest number of responses. Generally, these responses suggest that most of the research tasks conducted are application-based, focusing on trends, client-based information gathering, and product specifications. Conversely, on-site observations and studies of human behaviour were indicated by relatively few participants. This may suggest that the research types conducted represent areas where the designer may already have high familiarity and are normative to their regular activities. In the open-ended prompts, respondents also indicated conducting research focusing on aging in place solutions, and trends focused more specifically on product development.

Table 2: Types of research conducted

<i>Type of research conducted (multiple responses allowed)</i>	<i>n=307</i>	<i>%</i>
*Analysis of design trends <i>Monitoring works of competing firms</i>	228	74
*Product research or prototyping <i>Reading product literature</i> <i>Building Fabricating Mock-ups</i>	211	69
*Client-based research <i>Examining client's business plan, goals, or lifestyles to inform programming</i>	203	66
Sustainability <i>Exploring better systems, methods or product specifications with a goal of sustainable outcomes</i>	166	54
*Monitoring business & lifestyle trends <i>Exploring broad topics which may influence design decisions</i>	166	54
Interviews and/or Focus Groups with project stakeholders <i>Meeting with key stakeholders to better understand project requirements</i>	147	48
On-site Observations <i>Observing patterns, preferences, workflows</i>	106	34.5
Studies of human behaviour & Environmental Psychology <i>Exploring relevant psychological, behavioural, or sociological phenomena</i>	105	34
Post Occupancy Evaluations <i>Formalized research regarding project successes & failures after project completion</i>	96	31
Other <i>Aging in place, product development</i>	4	1

Comparison of Research Types

As indicated on Table 3, *Chi-square* analysis of demographic information against key variables including: type of research conducted, sources of information, attributes which draw attention, and time allocation indicated relationships only between age and attributes which draw attention (i.e., source of attraction), and between market sectors to type of research conducted.

Table 3: Demographic associations

Variable	Chi-Square	p-Value
Age		
Type of research conducted	16.88	.97
Sources of information	19.62	.55
Attraction to sources	23.94	*.02
Time allocation	17.15	.51
Years of Experience		
Type of research conducted	29.89	.88
Sources of information	19.05	.90
Attraction to sources	13.34	.65
Time allocation	28.81	.23
Size of Firm		
Type of research conducted	38.99	.87
Sources of information	21.79	.96
Attraction to sources	12.28	.91
Time allocation	34.00	.28
Market Sector		
Type of research conducted	81.32	*<.001
Sources of information	23.17	.94
Attraction to sources	9.56	.98
Time allocation	26.34	.66

*p-values significant at the 0.05 level

ANOVA analysis indicated a significant difference in the mean number of research types across all market sectors ($p < .001$). A post hoc Tukey's range test was then used to test for multiple comparisons. As shown on Table 4, on average commercial designers conducted more types of research than residential designers ($p < .001$), and those practicing in education ($p = .17$). Further, retail designers conducted more research activity types than residential designers ($p = .035$), and somewhat more than educational designers ($p = .41$).

Table 4: Types of research conducted (*Measured in Quantity of types of research performed*)

Market Sector	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Commercial	58	5.21	3.013	.396	4.41	6.00
Retail/hospitality	15	5.47	3.091	.798	3.76	7.18
Residential	237	3.30	2.554	.166	2.97	3.63
Health & Wellness	15	4.53	3.182	.822	2.77	6.30
Education	10	2.20	2.394	.757	.49	3.91
Other	21	4.00	3.271	.714	2.51	5.491

Sources of Information

Designers were asked to specify the types of sources used during their research, allowing for multiple answers. As shown in Table 5, respondents typically utilized non-scholarly information sources; only 12% indicated they used Academic Journals. Interestingly, when those who indicated they did read academic journals were asked to share titles of those used, respondents often listed non-peer reviewed sources such as: *New York Times*, *Interior Design Magazine*, and textbooks. This suggests interior designers may inaccurately classify publications as having gone through peer-review. Respondents indicating *other* sources of information listed several internet based sources (e.g. blogs, and daily email blasts) and catalogues, in addition to product specifications and internally generated sources produced by their firms.

Table 5: Sources of information

<i>Sources of information (multiple responses allowed)</i>	n=305	%
Product literature	270	88.5
Attend conferences/tradeshows/CEUs	255	84
Professional organizations, knowledge-focused web sites	226	74
Discussing topics with colleagues	205	67
Trade publications	192	63
*Academic journals	38	12
Other	34	11
<i>General Internet Searches</i>		
<i>Firm's own research/library</i>		
<i>Online Magazine, Catalogues, or forums</i>		
<i>Company representatives</i>		

*indicates scholarly source

Respondents who did not indicate using academic journals for research were asked reasons for their avoidance. Many respondents indicated lack of knowledge or lack access to relevant academic journals. Time constraints were also attributed to their avoidance. Yet, 9% of respondents indicated *other* reasons including: not knowing which journals would be relevant, an indication that journal articles were too long, a preference for other sources, or a general perception that academic research topics were irrelevant and either: too vague, limited, or “overly academic” in nature. One respondent indicated: “My perception of them [academic journals] is that the information would not be a quick real world solution and therefore a waste of my time.” Few respondents indicated they did not understand how to process the information from academic sources.

Table 6: Reasons for not using academic journals

<i>Reasons (multiple responses allowed)</i>	n=260	%
Does not know about relevant journals	77	30
Time constraints	63	24
Unsure how to find or access relevant journals	46	18
Does not have access to relevant journals	46	18
Other	24	9
<i>Not sure which are relevant</i>		
<i>Competition from other sources</i>		
<i>Forgetting them</i>		
<i>Do not need them</i>		
<i>Topics</i>		
<i>Article length</i>		
<i>Unsure if they use them or not</i>		
I do not understand them	4	1.5

Preferences for Information Sources

Interior designers were asked about their preferences for information sources in terms of their attraction to sources and what they could later recall from information sources. This was used to help determine how interior designers judge an information source and determine its worth.

Attraction

Survey participants were asked what specific attributes that would attract them to sources of information (n=238) responded, allowing for multiple answers. Responses outlined in Table 7 indicate that after topic, graphics, and the source of the article were deemed important.

Table 7: Attraction to specific information sources and processing tools

<i>Attributes that attract design practitioner attention (multiple responses allowed)</i>	<i>n=238</i>	<i>%</i>
Topic of the article	222	93
Graphics contained in the article	119	50
Source in which the article was published	100	42
Pre-existing knowledge of the authors	35	15
Other reasons (<i>themes listed below</i>)	8	3
<i>Use of humour in writing</i>		
<i>Catch phrases & captions</i>		

Recall

In an effort to understand the types of information most likely to be recalled, survey respondents were asked what kinds of information they are most likely to be remember the next day on a scale ranging from 1=Strongly disagree (won't remember) to 4=Strongly agree (will remember) (see Figure 1). Respondents felt most likely to remember big ideas and conclusions, research stories or methods, and specific images and graphics. Conversely, respondents indicated they were most likely to *not remember* details such as statistics.

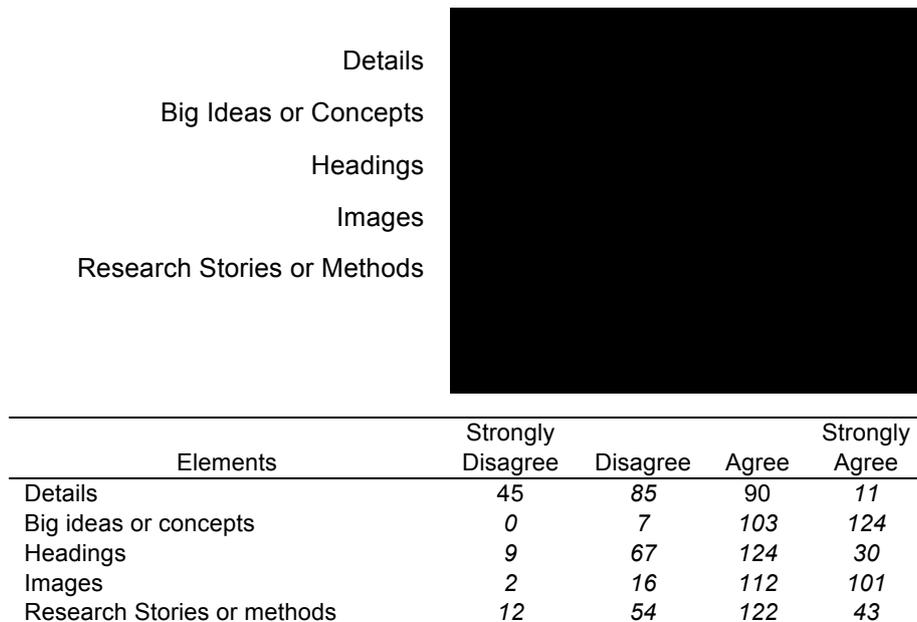


Figure 1. Types of information most likely to be recalled.

Time Allocation to Specific Sources

Designers were asked how much time they would devote to reviewing specific sources of information. As indicated on Table 8, of 279 respondents, 49% percent indicated a time span of less than 10 minutes. Those who responded that their time allocation may vary, indicated they would decide how much time to spend based upon perceived topic relevance, article length, and written style.

Table 8: Time Allocation to Sources

Time spent	n=279	%
Less than 10 minutes	136	49
10-20 minutes	50	18
More than 20 minutes	19	7
Depends on the source	33	12

Qualitative Responses

The practitioners were also asked their ideas for how research is used or may be received. Respondents answered this question in one of two ways; either how they would best receive information or how they would use information during their design process. As indicated on Table 9, emerging themes included: topic selection, dissemination methods, presentation style, and written language. The relatively high quantity of responses in Themes 1 & 2 (i.e., topic selection and dissemination methods) may indicate that barriers in accessing research and that usability of the research are common concerns amongst interior designers.

While elaborating on their responses to dissemination ideas, some designers further demonstrated issues with accessibility of academic research. In fact, some stated using proprietary sources in the belief that these were peer-reviewed. For example: "In my experience, the most accessible academic research on corporate design can be found on major furniture manufacturer's websites, such as Steelcase, Knoll, and Herman Miller." Others commented more directly on the presentation style, for example:

Many designers are visual people, white papers with lots of text and few images will discourage engagement of information. Personally, I prefer text that's supported with images/graphics. I also find it much easier to get information from a film than a book.

Still others briefly mentioned how they judged sources of information, inferring that the social context may influence research habits, "Designers are networkers, and if one designer recommends a specific research tool, that is typically the one I will use". Finally, other designers indicated problems in having to pay for information access.

Last, designers were simply asked if there was anything else they would like to share regarding research style and preferences. While the broad nature of this question does make inductive coding difficult, many of the responses were illuminating in terms of the perceived deep and ongoing disconnect between academic research and practice-based needs.

For example:

There is a lot of research that seems pointless to the ordinary person. Unfortunately, this kind of work undermines the perception that research adds something useful to design knowledge.

and,

I realize that every profession has its jargon and academic writing can be filled with important data that is mainly for other academicians. However, if I, as a practitioner, can't glean what I need in a clear and coherent way, and in an efficient way, I am not going to waste my precious time on it.

Others used the opportunity to provide communication ideas,

As a designer, most everything is visual. So, an image, diagram, or drawing of something is far more informative. Sometimes the author is not clear, or the wording is complex. Keep it simple.

Table 9: Themes from Ideas for Communicating Research (n=71) K= .029

Theme 1-Topic Selection & Use of Research (average $f=29$)
<i>Subthemes-listed in order of highest frequency</i>
Resolve issues with usability of research
Resolve issues with purpose of research
Provide tangible examples
Seek interdisciplinary scope
Designers may use of research to (see below):
Improve client relations
Gain ideas
Enhance projects
Confirm priori ideas
Theme 2-Dissemination Methods (average $f=24.5$)
<i>Subthemes-listed in order of highest frequency</i>
Remove barriers to access and increase availability of research
Provide interactive options
Utilize professional organizations
Utilize trade journals
Create CEU classes
Utilize video
Create discussion groups /networks
Create a physical design library
Theme 3-Presentation Style (average $f=8.5$)
<i>Subthemes-listed in order of highest frequency</i>
Increase visual components
Use of keywords
“Presentability”
Theme 4-Written Language (average $f=6.5$)
<i>Subthemes-listed in order of highest frequency</i>
Use concise writing
Quality perceptions
Elucidate clear results & outcomes
Use of bullet points
Uncategorized ($f=3$)

LIMITATIONS

As with any exploratory research design, these findings have limitations. These include: lack of a previously tested survey instrument, and limited internal consistency testing. Additionally, the respondents represented older, residential designers who owned their own firm, thus limiting generalizability to all interior design populations.

As with any survey, situational influences are lacking and respondents may not have answered questions according to their actual task performance. Future research should seek other data collection methods to ascertain how practitioners conduct design research – including on-site observations and protocol studies – as they may allow for contextual nuances. Also, a content analysis comparing attributes of “soft sources” against academic journals may be useful in clarifying any distinctions which may deter design practitioners from using academic sources. Last, experimental research should seek to understand what, if any, physical attributes (e.g., colour, layout) might best garner the attention of design practitioners while conveying the appropriate meaning of information (i.e., message comprehension).

DISCUSSION

Despite the fact that, 23 years ago, Dickson and White (1993) observed that “interior design educators and practitioners must change their perceptions to achieve greater understanding and respect for research and the generation of new knowledge” (p. 10), findings from this study may suggest little has changed. However, while this study confirms earlier literature, it may also provide insight into a means to achieve this change by establishing interior designers’ preferences for acquiring knowledge by ascertaining the types of information they currently access, what attracts them to an information source, what they then recall about the source and, lastly, their ideas regarding design research. Collectively, this information may enhance research utilization within design practice.

Perceptions of Research

While findings suggest the age of participants may influence what attracts them to specific information sources and that some market sectors conduct more types of research activities, it should be noted that, overall, these interior designers were inclined to value design research efforts. Eighty-nine percent of respondents indicated they conducted some type of research-orientated activity. This suggests that interior design practitioners do value these activities and supports earlier studies by Birdsong & Lawlor (2001), Dickinson, Anthony, and Marsden (2012), and Martin (2004). However, some of those surveyed surmised that the majority of academic research was not useful to interior design practice. This may imply that research translation efforts continue to be lacking and supports Sommer’s (1997) assertions surrounding the importance of prompt and easy implementation of findings.

RESEARCH UTILIZATION

Respondents indicated they were most likely to conduct tasks involving *analysing design trends*, *client-based research*, and *product research*. From these types of research-orientated activities, it could be inferred that designers would be apt to conduct instrumental research utilization strategies (i.e., those applied directly to the task at hand) or symbolic research utilization strategies (i.e., those supporting their own pre-existing paradigms). Moreover, open-ended responses supported Seidel’s (1985) recommendations regarding the clarification of research and the necessity for designer-orientated dissemination strategies. In this study, participants noted specific clarification strategies such as enhancements to visual presentation and written style, while their suggestions for enhancing dissemination included removing barriers to access, providing interactive research documents, and finding additional channels with which to share information (e.g., trade periodicals, CEU, and conferences).

Participant responses also suggested that the range of research and information gathering activities in which they most frequently engaged was largely pragmatic in nature, with a focus on the application of knowledge and not its creation. These findings support earlier studies (Dickson & White, 1993) and could likely be attributed to a practitioner's current work environment and their possible need to directly apply information to a project at hand. Further, design practitioners may not recognize a benefit from theoretical research projects that do not yield explicit implications and practical recommendations.

Respondents indicated a preference for graphics in terms of both attraction to and recall of respective information sources. Additionally, when solicited via open-ended questions, their ideas could lead one to conclude that more attention needs to be given to both the format of research documents and how they are disseminated. Since the designers surveyed did note an interest in conducting research and information gathering activities, one could also infer that they may find benefit from newfound sources, including those that have been peer reviewed, given the applicability of information and their ease in obtaining it.

Sources of Information

Dickson and White's (1993) findings related to practitioner reliance on soft sources were supported by this study. Responses suggested that this is due to several factors: time pressures, a perception of topic irrelevancy, presentation style, and language used. Additionally, 30% of this survey's sample indicated they were unaware of relevant journals and 18% did not know how to find them. This may suggest that when available, practitioners would prefer to use peer-reviewed information; however they may be willing to settle for what's easily available, or what they may have time to obtain and review.

When comparing survey responses to studies conducted in allied disciplines, several commonalities emerge. The confounding responses received when asking which academic journals are used may indicate that Roth's (1999) statement identifying industrial designers' uncommon use of scholarly sources may also be true for interior designers. Additionally, survey responses relative to time allocation on specific sources align with some findings from Wild et al. (2010). In their sample, 42% of engineers spent less than 10 minutes with a specific document, and 22% indicated 10-20 minutes, while 38% indicated spending over 60 hours. However, in their study, their range of documents included design drawings, which was not a focus of this study. Given the general length of academic journal articles, these responses may indicate that designers generally lack the time required to process information from such articles without aid from a condensed summation.

IMPLICATIONS

In his aforementioned book, Salama (2015) posited the design process as a merging of "intuition, experience, and the application of skills and knowledge gleaned from traditional training methods" (p. 115). As such the design process is shaped by many factors and that, collectively, these factors influence how designers utilize research when making design decisions. In this case, while the perception of research was seemingly important to the respondents, given the fact that few referred to academic literature or knew how to find these sources, suggests the validity of their sources was seemingly of little concern. This could be due to their educational background or the communication strategies with which empirical studies are traditionally disseminated. However, these findings may provide direction and suggest an effective two-part strategy, one focused on integrative educational paradigms and a second on generating practitioner-orientated research documents.

EDUCATIONAL STRATEGIES

In Dickson and White's (1993) aforementioned article, they stated that the primary role of interior design educators was to "advance the profession through the generation of research that adds to the body of knowledge, to place this research into a contextual framework that can be used by the design profession, and to convey the existing body of knowledge to students" (p. 10). Yet, it appears that educators may still not be placing information into a usable contextual framework. As such, pedagogical models that focus on the integration of knowledge should be emphasized, as should helping students identify, analyze, and utilize peer-reviewed research findings.

On the whole, survey results indicated practitioners are not educated as to the role of scholarly research and the peer review process. While interior design educators do advocate the use of research in studio projects (Dickinson et al., 2009), students can still be reliant on soft sources of information (Dickinson et al., 2007). If these students are graduating from school thinking that browsing the Internet is research, it is then understandable that as practitioners, they would still not know what academic journals are.

The author of this study would like to offer the following recommendations for design educators:

- Seek pedagogical models that focus on the holistic integration of knowledge.
- Provide more experiences that help students identify academic journals; recognize their value, and how to locate these sources.
- Seek ways to expose students to post occupancy evaluation methods and the benefits of sharing these findings beyond the project itself.
- Refrain from inappropriately using the term *research*.
- Discuss issues surrounding bias and the importance of validating sources.

Yet, there are many interior designers who were taught under a paradigm less focused on research, and educating them on the benefits of research is also important, as is communicating research findings in a manner that will be perceived as approachable and accessible.

PRACTITIONER-ORIENTATED RESEARCH DOCUMENTS

Findings from this study suggest the need for a continued and ongoing dialogue surrounding best practices for translating research findings. Researchers interested in sharing findings with design practitioners may look to create two sets of documents: one academically oriented, with the goal of communicating replicable research methods, and one practice-oriented, aimed at sharing applicable findings in a manner allowing for rapid evaluation and application. This author is not advocating for a decrease in the level of research rigor, but rather to effectively share applicable findings with those who may be able to use them directly within the design of built environments.

In this case, recommendations for design scholars would include:

- Create audience-focused research products.
 - *Consider one academically-oriented and one practice-oriented.*
- Produce documents that balance imagery with words
 - *This may allow for more effective information processing by those with little time to process information or for those who frequently communicate via drawings and sketches.*
- Find ways to layer information.
 - *Explore media types that may allow choice in the intensity of information engagement.*
- Illustrate potential connections between empirical findings and project application.
 - *This may include more use of contextual graphics (diagrams, project imagery) and succinct, pragmatic design suggestions.*

- Consider how designers may communicate research findings to their own clients.
 - *Designers may be more apt to use information that can be easily shared.*
- Consider the approachability and availability of findings.
 - *Acknowledge that there is a multitude of information options available to practitioners, and knowledge of how one comes to find information and validate sources is important.*

SUMMARY

While this study is exploratory and only a first step in a multi-faceted research plan, its intent is to further discussions aimed at lessening the perception of a deep and ongoing rift between practice-based design processes and peer-reviewed research findings. This is an important step, as the goal of design research should be to improve the design of space, thus encouraging responsive environments and enhancing the lives of those using these spaces.

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APPENDIX

Survey Instrument.

PART 1 Demographics

1. What is your current title/position?
 - Jr. Designer
 - Interior Designer
 - Senior Designer
 - Design Director
 - Project Manager
 - Principal/Owner
 - Other (if other please describe)
2. In what market sector do you primarily practice?
 - Commercial
 - Health & Wellness
 - Residential
 - Retail/hospitality
 - Education
 - Other
3. What is your current age (years)?
 - 20-30
 - 31-50
 - 51-65
 - over 65
4. How many years of professional design-related experience do you have (years)?
 - 0-1
 - 1-5
 - 5-10
 - 10-20
 - over 20
5. What is the highest level of education you have completed?
 - No degree
 - Certificate (not-design related) *please list*
 - Certificate in a design related field
 - Associate's degree (not design related) *please list*
 - Associate's degree in a design related field
 - Bachelor's degree (not design related) *please list*
 - Bachelor's degree in a design related field
 - Master's degree (not design related) *please list*
 - Master's degree in a design related field
 - Ph.D. (not design related) *please list*
 - Ph.D. in a design related field
6. How large is your firm in terms of size of design staff?
 - Sole Proprietorship
 - 2-5 Designer
 - 6-20 Designers
 - 21-50 Designers
 - 51-100 Designers
 - Over 100 Designer

PART 2 Research Activities & Preferences

This research uses a definition of design research as the following....

"the identification of important design questions and the development and use of organized problem solving methods. It is a process for seeking and finding answers." Thompson, 1992

7. Using the above definition do you currently conduct design research to improve your design solutions?
Yes or No

If the answer is Yes to item 7...

8. What type of research do you take part in? (Mark all that apply)
- Client research
 - Examining a client's business plan, strategic goals and/or lifestyles to inform programming
 - Interviews/Focus Groups
 - Meeting with key stakeholders to better understand project requirements
 - Observation
 - Observing patterns, preferences, workflows, etc. of clients or end-users while in their current space
 - Precedent Studies
 - Systematic analysis of previous projects
 - Human Behavior & Theory
 - Exploring relevant psychological, behavioral, or sociological phenomena
 - Business/Lifestyle Trends
 - Exploring broad topics that may influence your designs
 - Design Trends
 - Understanding what is being done on other projects by competitors
 - Sustainability Issues
 - Exploring better systems, methods, or product specifications with a goal of sustainable outcomes
 - Product Research/Prototyping
 - Reading product literature, building or fabricating mockups for projects
 - Post Occupancy Evaluations
 - Formalized research regarding project successes and failures after project completion and move in
 - Other (if other please describe)

9. What types of information are accessed?

(Select all that apply)

- Academic Journals
if selected which
- Professional organization knowledge sites (e.g. IIDA Knowledge Network, ASID Knowledge Center)
if selected which
- Trade Publications
if selected which
- Product Literature
- Attend conferences/CEUs
- Discussing topics with colleagues
- Informedesign
- Other

For those that don't select Academic Journals

10. What is the primary reason you don't use Academic Journals?

- I don't know about them
- I don't know how to access them
- I don't have access to them
- I don't have time for them
- I don't understand them
- Other? *Please explain*

11. How much time would you dedicate to reading one specific article?

- Less than 2 minutes 2-10 minutes 10-20 minutes more than 20 minutes

12. What attracts you to a specific article? (Mark all that apply)

- The topic
- The graphics
- The author
- The source in which it is published
- Other

13. After completing the reading rank what you are most likely to remember the next day? Likert

- details such as statistics
- big ideas/conclusion
- specific headings
- specific images and accompanying graphics
- stories behind the research-what led researchers to conduct the study, how it was conducted etc.

14. Are there any ideas you would like to share regarding how designers may use or receive research findings?

Open-Ended

15. Is there anything else you'd like to share regarding your research styles/preferences?

Open-Ended

Thank you for your participation

(Exit)

ICT-ENABLED BOTTOM-UP ARCHITECTURAL DESIGN

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Abstract

This paper aims at discussing the potentials of bottom-up design practices in relation to the latest developments in Information and Communication Technologies (ICT) by making an in-depth review of inaugural cases. The first part of the study involves a literature study and the elaboration of basic strategies from the case study. The second part reframes the existing ICT tools and strategies and elaborates on their potentials to support the modes of participation performed in these cases. As a result, by distilling the created knowledge, the study reveals the potentials of novel modes of ICT-enabled design participation which exploit a set of collective action tools to support sustainable ways of self-organization and bottom-up design. The final part explains the relevance of these with solid examples and presents a hypothetical case for future implementation. The paper concludes with a brief reflection on the implications of the findings for the future of architectural design education.

Keywords: *Bottom-up; Participation; Architectural Design; Crowdsourcing; Crowdfunding; Self-organization.*

INTRODUCTION

In his seminal book “The City Shaped”, Kostof (1991, p.43) identifies two different kinds of cities in history: planned and unplanned. The first one, *ville créée* refers to an urban pattern designed by an authority in a top-down manner. A clear example from the middle ages is the *nieuwestad* (new city) Naarden in the Netherlands with a grid plan dating from 1350.

The second kind is a city which grows dominantly from the bottom-up in a spontaneous manner: *ville spontanée*. It emerges as a result of unplanned evolution without a master plan, as a result of centuries of daily struggles and bottom-up spatial interventions of the citizens. Numerous cities fit in this description such as Cappadocia in the Göreme Valley, Turkey, dating from 1800 B.C. and Thera, Santorini in Greece, 3000 B.C (Rudofsky, 1964, p.58). In this context, bottom-up participatory architectural practices can hardly be considered as novel.

For thousands of years, architecture was an evolving and emergent communal work, in other words, a spontaneous and continuous activity of people with a common heritage, *acting under a community of experience* (Belluschi, 2012). Vernacular architecture was produced through the collective work of ordinary inhabitants through the use of local materials. Their simplicity and harmony with the environment made them sustainable.

Indeed, some examples with antecedents dating from 6000 B.C. are still occupied and functional today (Figure 1). Instead of trying to challenge the nature, these practices welcomed and made use of the climate. However, the most powerful affordance of the vernacular architecture was the *direct and unself-conscious translation into the physical form of a culture, its needs and values, as well as the desires, dreams, and passions of a people* (Rapoport, 1969, p.2).



Figure 1. Architecture without architects: Self-built vernacular Houses in Harran, Sanliurfa, Turkey (Source: Author).

Overall it is clear that vernacular architecture examples around the world have close associations with durability, versatility, flexibility, adaptability accompanied with a strong sense of community, identity, and place (Rudofsky, 1964, p.13).

However, as a result of the professionalization of architectural design beginning with the Renaissance as well as the industrialization in the following centuries, these essential priorities started to be replaced by cost-cutting mass-production approaches. Besides the loss of essential characteristics of spaces, *modernity* caused a significant shift in the understanding of the relationship between time and space. This transformation was in the form of the rejection of contingency *through the assumption of a state of perfection to be reached tomorrow* (Bauman, 2000, p.25, p.29). It was this moment when space and time became separated in the minds of the producers. The communal building aspects of architecture and collective endowment were deteriorated in favor of massive individualization and privatization of nearly all aspects of life. The architecture serving to its users' needs and values was no more.

As a reaction to the developments above, participatory bottom-up architectural practices were brought onto the agenda of architectural design prominently after the Second World War and gained traction with the movements of 1968 (Jencks, 2011). The following decades witnessed the emergence of alternative approaches to architectural design. A bottom-up pluralist strand became popular in Western Europe, the Americas and many other regions around the world as an alternative to state-centered and top-down models (Bowns and da Silva, 2011).

In this paper, I will make a brief review of these approaches with examples from specific cases which can be claimed to be the frontiers of bottom-up participatory design. This review will be followed by two antecedent projects: Medical Faculty Housing by Lucien Kroll (1976) and Cedric Price's unrealized Fun Place (1965) through which a wide range of participation forms were conceived. In both of these projects, the designers attempted to use various industrial and computational methods for augmenting participatory design processes. However, the capacity and potentials of these were limited at the time.

Acknowledging this gap, this paper aims to discuss the potentials of modes of participatory design in relation to the latest developments in Information and Communication Technologies (ICT). Regarding this aim, the research questions to be explored in this paper are:

1. What are the participatory design strategies used in the prominent bottom-up cases?
2. Which forms of ICT use were conceived in these?
3. Can these serve as a basis for a novel approach that incorporates state-of-the-art ICT?

In this context, the first part of the study (Section 2) involves the extraction of basic strategies and principles from the antecedents of bottom-up participation. Building on the findings of this case study, the second part (Section 3), reframes the existing ICT tools and strategies in terms of space and time and elaborates on their potentials for supporting the revealed modes of participation. The following section introduces a framework for ICT-enabled design participation which exploits a set of digital and non-digital collective action tools to support sustainable ways of self-organization and bottom-up design. As a result (Section 4), by distilling these findings, the last part of the study reveals the future potentials of ICT-enabled bottom-up participation including novel methods such as crowdsourcing, crowdfunding and emergent technologies such as smart structures and fabrication.

BACKGROUND: LEARNING FROM THE PAST

As briefly introduced above, it is possible to identify two main strands of city-making from the perspective of governance. Top-down approaches are based on the conception of citizen participation as a state-centered practice. In contrast, bottom-up approaches are characterized by social activism and civic engagement in the absence of higher level direction (Bowns and da Silva, 2011). Although these models seem to be conflicting with each other, bottom-up and top-down practices are often used in combination during the production processes of the cities. It is impossible to find a practice which purely fits in one category (Salingaros, 2005, p. 223).

After the beginning of the twentieth century, with the introduction of the modernist approaches, authorities in the Western World increasingly adopted strict predefined territorial boundaries and zones, and predominantly top-down planning methods which increasingly disabled the community participation (Nour, 2015, p.21). At the beginning of the 1960s, architecture was in a severe crisis. The problems of modernist functionalism and bland architecture emerged as a consequence of economically-driven utilitarianism and these became more and more evident in the media (Blundell-Jones, 2005). A monumental example was the Pruitt-Igoe Housing located in St. Louis, Missouri, USA, in which the living standards started to decline only after two years and eventually, in less than eighteen years, it had to be demolished due to its social and physical unsustainability (Larsen and Kirkendal, 2004).

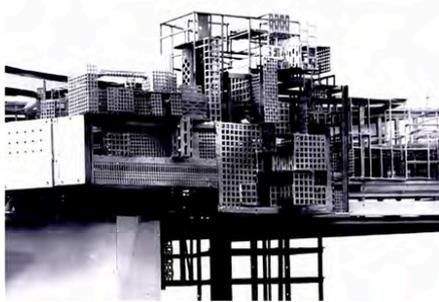
The decades that followed these developments gave birth to new approaches criticizing modernist top-down practices. Through specific design cases, the architects aimed at the bottom-up involvement of users in alternative ways and made extraordinary experiments which served as a model or stimulus for later developments. In this section, I will make an attempt to relate these cases to each other and extract the common strategies behind these.

Frontiers of Bottom-up: Experimental Practices after the 1960s

Habraken (1961) was one of the first to introduce the idea of spatial self-determination as a citizen right. In his book "Supports: an alternative to mass housing" he suggested a participatory design method based on the decoupling of the support infrastructure and the "infill". In this method, while the infrastructure is framed as a static and long-term investment, individual habitation units were envisioned to be customized by the users with the help of an architect.

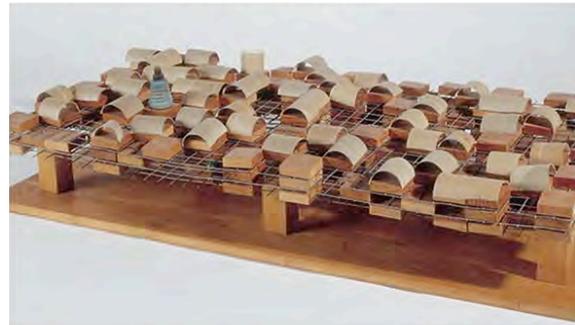
Habraken's concept of a supporting/enabling megastructure was not novel at that time (Figure 2); it can be traced back to Nieuwenhuys' New Babylon experiments between 1956 and 1978, Friedman's Mobile Architecture in 1958 and Fuller's structural designs in 1955 (Lobsinger,

2000). His ideas also resonated with Jane Jacob's (1961) coeval critique of planning practices in the USA and the Situationists (Mathews, 2006).



Constant Nieuwenhuys, *New Babylon*, 1959-1970

Yona Friedman, *Spatial City*, 1959



Buckminster Fuller, *Airplane Hangar*, 1955

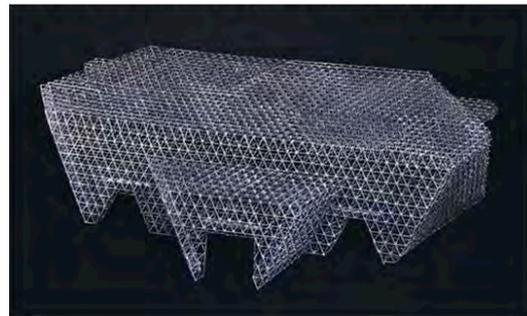


Figure 2. The exploration of the idea of supporting/enabling megastructure in various experimental practices after the Second World War (Source: Author).

The real contribution of Habraken was his ability to combine the criticism of modern architecture and bottom-up participatory practices with an alternative industrial vision. The methodological studies of Habraken's office SAR (Stichting Architecten Research) that followed the lines set in his book increased his impact on the world of architecture and inspired several architects including Lucien Kroll. Even today, this school of thought is still active under the name of "open building network" in close collaboration with the building industry (Kendall, 2015).

The most classic example following a similar design approach as Habraken's supporting/enabling structure was Le Corbusier's Unité d'habitation, in Firminy France (1962). This design employed a "bottle rack" principle: an open structural frame infilled with different housing types (Schneider and Till, 2007, p.168). However, the central focus of this project was not necessarily on bottom-up design but rather on creating variety and opening up possibilities for choice

In Poland, Oskar Hansen, a member of the group of architects Team X, was one of the first critical voices regarding the orthodoxy of modern Athens Charter and the followers of Le Corbusier. He presented his "open theory" to the founding meeting of the group Otterlo in 1959 (MACBA, 2015). This "attitude" (rather than a theory) was conceived initially as a tool for the design of architectural projects, although evolution and its application in the fields of education, editing films, the games and visual performance practice led to broad set experiments that were interacting with each other, sharing and socializing through art objects. Hansen experimented with strategies open to uncertainty, flexibility and collective participation. He coined the term "open form" to describe architecture open to the possibility of continuous transformation, open to the influence of nearby practices as well as to the approval of the users (MACBA, 2015). One of

the most memorable products of Hansen was the design of adaptable furniture which allows almost infinite uses of a rectangular living room.

In parallel with these contributions, in 1962, Walter Segal developed a low-cost housing solution suitable for self-build, while trying to address his own problem of providing a temporary home for his family. This practice evolved into the development of “The Segal Method” and several participatory design projects in which 27 families worked with architects to design and build their own homes (Broome, 1995).

One of the most interesting bottom-up cases in the same era was the building of the Gladsaxe playground in 1969 (Gehl and Svarre, 2013). Led by Jan Gehl’s team, residents from Høje Gladsaxe, a newly built public housing complex in a suburb of Copenhagen, Denmark and the students from Copenhagen universities ventured into an unauthorized construction of a large playground on an empty stretch of gravel in front of the multi-story complex (Figure 3). According to Gehl and Svarre (2013) the playground was perceived as quite successful while it was being built and for many years later. This case was recorded as one of the earliest examples of truly bottom-up design and construction of a public space in the Western world, triggered by an architect/ urban designer.



Figure 3. Høje Gladsaxe Playground (1969) built in only one day by the residents and university students (Gehl and Svarre, 2013).

Around the same time period (1969-1978), Lucien Kroll orchestrated the design of the Medical Faculty of the Catholic University of Louvain (UCL) with the student organization “La Maison Medicale-La Mémé”. In the following text, I will make an in-depth review of this case.

LA MÉMÉ (IN-DEPTH CASE 1)

The project was initiated when the Catholic University of Louvain (UCL) decided to move its Medical Faculty to Brussels, Saint-Lambrechts-Woluwe. The university authorities made an exceptional decision and presented the preliminary design of the Medical Faculty Housing to the student committee. The students rejected the project and contacted Kroll for his services (Kroll, 1987). As a close follower of Pierre Bourdieu, Kroll took the task and questioned every aspect of the institutionalized practices with the contributions of the spirited students of UCL. He intended to create an open design process, “an action open to new necessities and to decisions that are always provisional and incomplete” (Kroll, 1987). He aimed at establishing an intellectual climate through which a kind of friendly organization would emerge to result in a homeopathic kind of architecture (Kroll, 2005).

Kroll organized meetings with the committees and discussion groups. In these meetings, he received conflicting ideas. Instead of flattening out all the differences of approach and attitudes he tried to incorporate them into the design process (Kroll, 1997). This was a creative refutation

of the idea of “consensus”. Throughout the project, the students were empowered to participate in two forms: through getting involved in the design process and through the participation opportunities provided by the architectural design *per se* (Figure 4).



Figure 4. Medical Faculty Student Housing by Lucien Kroll. The users participated in the decision process, and the architectural product enabled them to shape and reshape their surroundings (Source: Author).

Kroll developed a flexible structure system which he called “wandering columns” based on a loosely defined grid. He collaborated with a professor of computer engineering to manipulate the grid to support the irregular and heterogeneous shell of the building. He designed the artificial ground around the project to provide raw space for further development (the aspects of wandering columns and his long-term vision for expansion are more evident in the Alma Metro Station, which was built as an extension of the project).

The “infill” –inherited from Habraken– is hypothetically removable: demountable window frames, moveable partitions, and prefabricated sanitary units. The architect used his own interpretation of the Habraken’s SAR module but refuted the idea of functional zones (Kroll, 1987). According to the principles of co-habitation, the infill can be torn down by the users, which encourages them to take initiative in planning and re-planning their environments. The plan would always be incomplete.

In La MéMé, Kroll did not see aesthetics as the central point of design. Through this project, he strongly criticized what he called the “easel architecture”: aesthetically pleasing but isolated from the people, culture, and community. In his book “Architecture of Complexity”, Kroll (1987) reserved a whole chapter to the computers. Instead of computer-aided design (CAD), he suggested computer use in design (CUD) as a more appropriate term for describing his vision. He stressed the importance of open-endedness and heavily criticized the inflexible artificial intelligence practices of the time that led to self-contained, closed and repetitive results.

In contrast, Kroll envisioned the drafting software as a potential tool that allows open-endedness through which the architectural product and the social relationships can be involved in the design and manufacturing process. However, the communication technologies were not developed enough to realize fully the social part of the potential.

The computer-based social interactions he foresaw were limited to three-dimensional drawings which he found useful for the communication of early ideas to the inhabitants. He

suggested that infinite interactions were required to deal with the infinite diversity of the real world.

In close contact with the users, he employed various algorithms to create diversity and differentiation and presented a library of components that can be combined according to user needs (Kroll, 1987). He tested a computational method –anthropomorphism– to allow a type of architecture with variant building programs and devised the role of the architect as a developer of “types” which can be varied by the inhabitant. The diversity of the outcomes was unmanageable due to the technological limits of the time. As a result, he worried that the process would lead to the Taylorist practices that he criticized (Kroll, 2013).

In the same chapter relating to the ICT use, Kroll (1987) described another possible role for the computer: evaluation and modification. During the design process, a custom program provided comparisons between the choices of components designed by the architect and enabled rapid updates of these particular components throughout the process. Furthermore, by creating associated representations of the components, Kroll used a computer to generate façade drawings to be revised and detailed by the designer. However, he stressed that this process can never be reliant on automation, which Kroll found “an absurd and unhealthy claim”.

In conclusion, Kroll created an ambitious piece of “anarchitecture”, challenging every possible aspect of the architectural practices of the time. It became an “icon of democratic architecture” (Poletti, 2010) for Kroll’s alteration of the usual hierarchical relationship between the architect and the user during the process –and most importantly– the development of novel design interventions to enable bottom-up participation. As Jencks (2011) suggests, although his ideas were not realized to the anticipated extent (both in terms of the process and the product) Kroll’s importance in participatory design history can never be exaggerated. For some critics, La MéMÉ was the absolute denial of architecture (Kroll, 1997). However, Kroll was not the only architect who made a significant effect on the future bottom-up practices.

THE FUN PALACE (IN-DEPTH CASE 2)

In the intellectual climate of the 1960s described above, director Joan Littlewood commissioned Cedric Price to design an informal and dynamic entertainment center: the Fun Palace. It was conceived to be permanently under construction meant to empower the ordinary citizens to be active participants in a never-ending and reflexive play (Banham et. al. 1969). The extraordinary nature of the project came from the wide range of interdisciplinary contributions of Gordon Pask (cybernetics), Buckminster Fuller (structural design), Yehudi Menuhin (symphonic music) and Reyner Banham (architectural theory) (Lobsinger, 2000).

The project aimed at fusing information and communication technologies and industrial building principles “to produce a machine capable of adapting to the needs of users” (Price, 1965). In contrast with Kroll’s refutation of Le Corbusier’s metaphor of architecture as a “machine-to-live-in”, Cedric Price adopted and developed it further. The project was an attempt at exploring improvisational architecture with the means of cybernetics and information technologies (Mathews, 2005).

Fun Palace did not have a fixed floor plan and intended to “encourage random movement and variable activities” (Lobsinger, 2000). Mobile components such as flying escalators, walkways, and activity enclosures were carried by a megastructure and transported by a crane when necessary (CCA, 2015). The suggested time and place specific facilities covered jam sessions, dance and science playgrounds, teaching film, drama therapy, modeling and making areas and music stations with instruments on loan (Landau, 1984). Similar to La MéMÉ, Fun Palace was not primarily an aesthetical exploration. The building was conceived to be super-functional and adapt to the people’s needs in a sustainable manner (Figure 5).

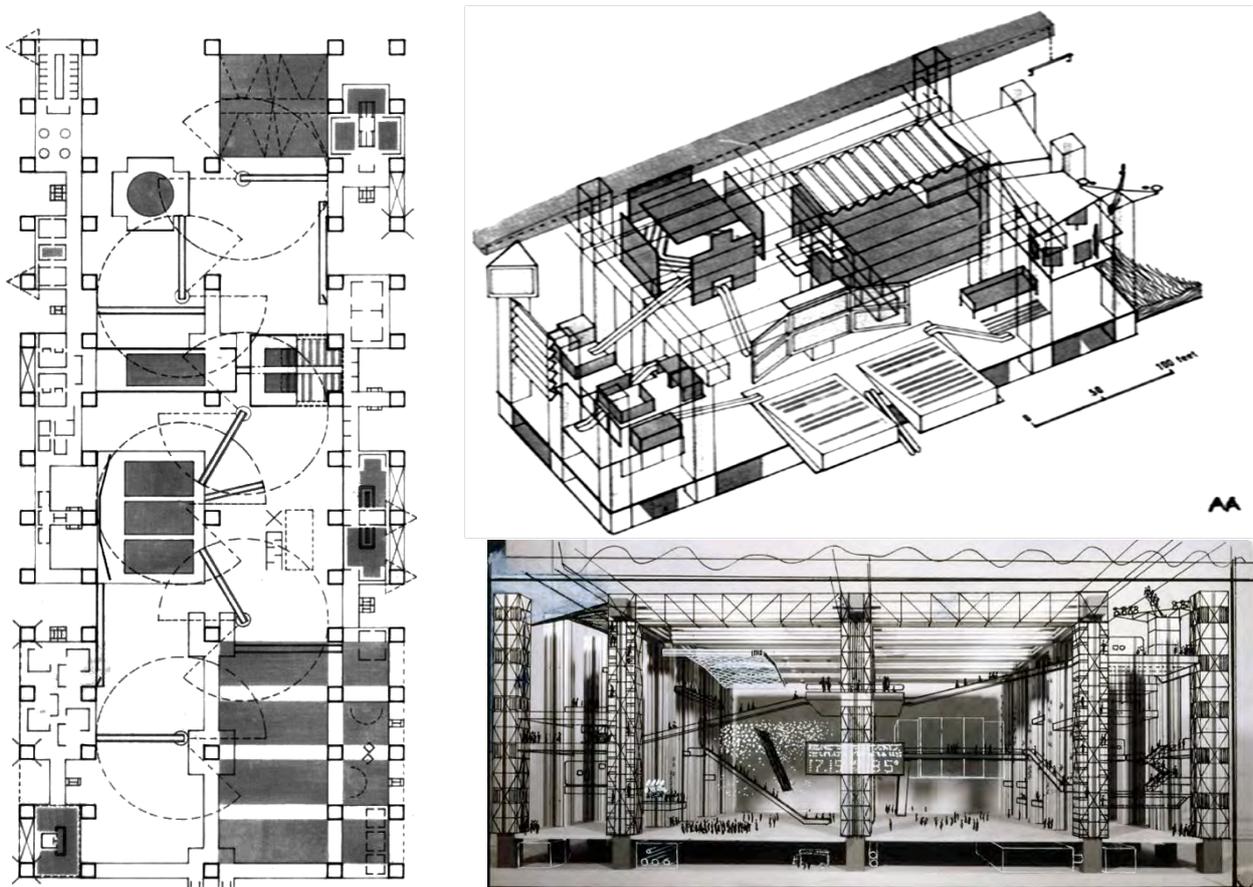


Figure 5. The Fun Palace project by Cedric Price and Joan Littlewood proposed a dynamic program that joins ICT and industrial building principles to produce architecture capable of adapting to the needs of the users. Illustrations: CCA Library Database (2015).

As introduced in the previous section, the interdisciplinary design team which Price collaborated with included an English cybernetician and psychologist, Gordon Pask. During the project, several practices were proposed by Pask for the cybernetic regulation of day-to-day activities (Mathews, 2006). In this sense, Fun Palace would be an ongoing conversation between the building and its users – “an assemblage of interactive systems of interaction” (Harding, 2008).

Pask (1969) defined a number of domains of interest for cybernetic interventions. Among those were the Fun Palace and environment, visiting patterns, mechanical and architectural considerations, provision of specific participant activities, interactive activities, individual participant situations (teaching machines), controlled group activities, conditioning systems and cybernetic art forms (Mathews, 2005). As a proof of concept, Pask created an apparatus to collect feedback from the users after the realization of the project. The proposed tool was a physical communication system which he planned to be used informally in one of the theaters to “accommodate an invited audience” (Pask, 1969). The audience would be responding to a variety of activities using this tool and would be able to transform the theater based on their preferences. Through this exercise, Pask questioned to role of the users and explored novel ways of participation in an open-ended and performative manner.

The Fun Palace was never realized, but it is still known as one of the most prominent participatory design cases to inspire numerous architects including Richard Rogers’ and Renzo Piano’s Pompidou Center (1976) which closely resembles the initial sketches of Price.

In conclusion, Kroll's and Price's works can be considered as *prototypes* of participatory, bottom-up architectural design. However, it is necessary to differentiate between these two projects. First of all, Price and his team failed to realize the Fun Palace. Although it was designed to be built, it can be seen as a *proof of concept* for a utopic project. On the other hand, La Mémé was partially realized and served as a *semi-functional prototype* through which many inspiring ideas were experimented. It still stands in Brussels as a *heterotopia* between the ideal and the real, frozen in time.

DISCUSSION: MODES AND STRATEGIES FOR BOTTOM-UP PARTICIPATORY DESIGN

Reflecting on the typical characteristics of vernacular architecture reviewed in Section 1, it is possible to claim that there are significant similarities between the basic principles employed in vernacular architecture and bottom-up participatory design practices after the 1960s. Among these, the most recurrent ones are *flexibility, adaptability, and self-organization*. However, the nature of these practices is quite different.

The vernacular cases illustrate ventures of collective bottom-up activity leading to an anonymous construction. On the other hand, in the latter cases architects play a central role as a "co-designer-enabler". From this perspective, in these cases architects aimed to combine top-down and bottom-up activities and facilitate a bottom-up participatory design process. In parallel, they intended to empower users through the design itself through some form of consultancy. In this sense, it is possible to derive two interconnected modes of participation from the reviewed cases:

1. Participation {in} the design process
2. Participation {through} the design product

These two modes were significant in the ways they enable the users and architects to co-produce architectural designs in a sustainable and participatory manner. To start with, Participation {in} the design process is similar to today's widely recognized interpretation. It involves practices that "allow various actors to contribute to the overlapping phases of the planning and decision-making" (Horelli & Wallin, 2010).

In the case of La Mémé, Kroll has arranged numerous meetings with committees and discussion groups to empower the student groups (although the level of participation and openness were challenged in the following years). Price, on the other hand, did not believe that the user needs can be precisely forecasted. The user participation model he conceived would take place post-occupancy. However, he shared his authority with several intellectuals such as Littlewood, who acted as an essential part of the design team. Instead of pursuing traditional consultation meetings, he asked for the participation of an interdisciplinary committee to collaboratively design an enabling type of architecture that facilitates participation to the greatest known extent.

In this context, action research orchestrated by Jan Gehl in the Høje Gladsaxe Playground was one of the extreme cases. The design emerged directly from the user needs and built by the residents in the area. It was a constructive revolt on top-down planning approaches which created a long-term impact on public space. The second and the most interesting mode observed in the presented cases is participation {through} the design product. This kind of empowerment takes place when various spatial qualities of the architecture enable the inhabitants to shape and reshape their own living environments. As reviewed in the previous section, several terms were used to describe this kind of participatory approaches, among those were: "open form", "open design process" or "open building".

In both of the in-depth cases presented above, Kroll and Price aimed at the participatory creation of infinitely flexible interactive spaces which represent the diversity of the needs of the inhabitants. The forms of their designs were intended to be altered to accommodate the changing needs of the users. In the La Mémé case, the dynamic elements were the "infill": demountable

window frames, moveable partitions, and prefabricated sanitary units. The Fun Palace project envisioned mobile components such as flying stairs, walkways, and modular activity enclosures.

Furthermore, in both of the cases, a structure independent from the infill was used for facilitating the dynamism of the architectural program. Besides the participatory modes discussed above, it is possible to identify several strategies for recurrent in the bottom-up practices. Among those the most prominent ones are:

- Orchestrated self-organization
- Intense focus on the impact which architecture can make on the users
- Incorporation of user variety and differences into the architectural design process and the product
- Incomplete, dynamic program as an enabler for the continuous representation of the user needs
- Embracing spontaneity and improvisation in the design process
- Development of design rules or systems that “regulate” the building in an open-ended way
- Long-term vision: flexibility, adaptability, and polyvalence
- Reflexivity in terms of viewing the everyday life as a site for transformative spatial practice

In the next section, I will discuss how these can be strategies which can be employed in an effective manner using cutting-edge ICT tools and methods.

FUTURE POTENTIALS OF ICT-ENABLED BOTTOM-UP PARTICIPATION

Building on the strategies and the participation modes introduced above, participation can be understood as a reflective self-organization practice which includes interactions {in} the design process as well as {through} the design product. In this approach, ICT tools fuse two cycles of cooperation in which the output of one process is transformed by a second process and transferred to the other one as input. In contrast with completely digitalized mode of operation this suggests the augmentation and enhancement of traditional participatory practices through the use of ICT tools and strategies.

The first cycle involves a type of social knowledge construction, building social capital. This capital is transferred to the second cycle through which the users gather resources, take action, accumulate experience and give feedback to the first cycle. This open-ended process involves several techniques which can be supported by different types of novel ICT-enabled participation accessible today:

- Crowdsourcing
- Crowdfunding
- Responsive structures
- Fabrication and low-cost manufacturing

Each participation technique is appropriate for specific levels of civic engagement (Megahed, 2014, p.104). In the following part of this paper, I will try to explain the relevance of the above with solid examples.

Crowdsourcing: Collecting Feedback, Ideas, and Information from the Users

The last decade has witnessed the proliferation of new web-based social software and information aggregation services which facilitate social knowledge construction. These are commonly put under the umbrella of the term “Web 2.0” which has been described in the manifesto of O’Reilly issued in 2005 as “*practices in which web is used as a platform for harnessing collective intelligence, delivered as a service, not a product, based on lightweight programming models, backed by a specialized database, supporting PC and non-PC devices and providing a rich user experience*” (O’Reilly, 2005). Relying on a combination of web 2.0-based social software and information aggregation services, Geoweb 2.0 technologies stand as a strong

alternative to the traditional linear and hierarchical knowledge production methods. They are loaded with constructivist learning, and production principles applied both in the making of the facilitating open-source environments, and the ways they enable social knowledge construction. In this sense, they are well positioned to act as a medium for facilitating dialogue and learning as well as bottom-up communicative action. The real power of Geoweb 2.0 comes from the way it is utilized for the inclusion of knowledge acquired through lived experience or experiential knowledge; which had been granted less legitimacy in the past (Elwood, 2006).

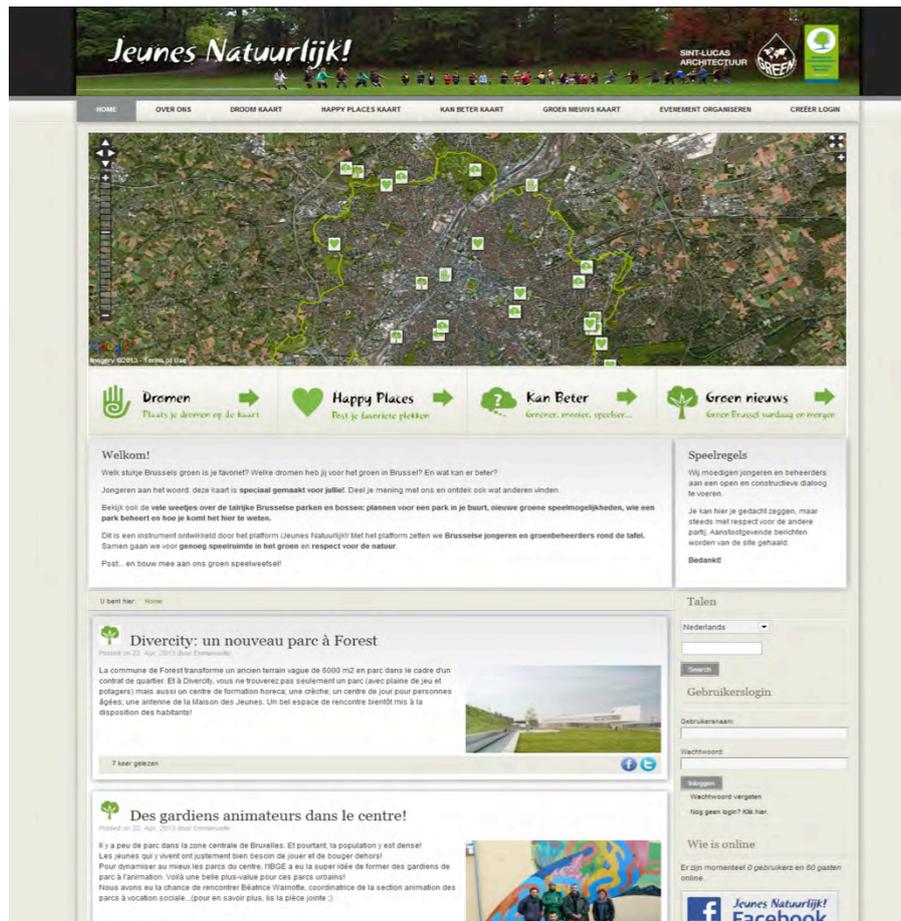


Figure 6. An example of a crowdsourcing interface for collecting user ideas, preferences, and socio-spatial problems from the perspective of the users (Pak and Verbeke, 2014).

The democratic promise of crowdsourcing practices is that complex problems can be adequately addressed by harnessing the wisdom of the crowds, such as by allowing the general public to formulate their needs, problems, opinions (Figure 6), and even solutions themselves (Surowiecki, 2004).

Crowdfunding: Gathering Resources and Endorsement

Crowdfunding is an emerging method which provides novel ways to empower users and designers over the internet to obtain funding for the projects they want to endorse. During the recent years several community-based web applications have successfully managed to accomplish this goal. For instance, according to the Architizer website (2015), since 2009, Kickstarter Crowdfunding platform has collected more than \$660 million to support various types of projects, ranging from film productions to food industry to the design and development of

technology and devices. In this sense crowdfunding had significant potentials for activating bottom-up change, specifically the *resources* and *intervention* steps referenced in Figure 6.

In order to gather resources in a bottom-up manner, at least four types of crowdfunding are identified (UK Crowdfunding Association, 2015):

- Donation crowdfunding: The users invest because they believe in the cause and donate without the expectation of anything of tangible value in return.
- Reward crowdfunding: In this model simple rewards are offered such as early access to the endorsed products.
- Debt Crowdfunding: Investors receive their money back with interest. Also called peer-to-peer (p2p) lending.
- Equity crowdfunding: People invest in an opportunity in exchange for equity.

These provide a wide space for action for the bottom-up practices, ranging from communal living and joint ownership ventures to the use of endorsements as an indication commitment to the suggested ideas.

Responsive Structures: Dynamic Interventions adapting to user needs

Reflecting on the latest developments in ICT, it is possible to claim that sensor networks and smart structures can play an important role in the gathering of feedback as well as the support of user interventions. Responsive structures is an emerging field which involves measuring actual environmental conditions via sensors and adapting their form, shape, color or character responsively via actuators (d'Estrée Sterk, 2009).

The biggest potential of these technologies is the establishment of an ongoing conversation between the building and its users as described by Pask (1969) as “an assemblage of interactive systems of interaction”. In this sense such structures can afford to encourage random movement and variable activities as well as time and place specific facilities foreseen by Cedric Price in the Fun Palace Project reviewed in the previous section.

Fabrication and low-cost robotic manufacturing: enabling user interventions

Low-cost robotic manufacturing methods have a potential to unlock self-production practices, which can also be integrated into the proposed model after the crowdfunding step. In this sense, 3D printing can change the way we produce buildings and building components. These methods involve the assemblage of units by depositing thin layers of material such as plastic, metal, concrete and even ceramics, therefore making it possible to build product structures that are strong yet lightweight which can be carried around by the users.

In this context, the ability to produce and reproduce the “infill” can empower the users to shape and reshape their living environments. The dream of a dynamic plan would be possible as a result of this evolution.

However, at the moment, these technologies are far from being affordable. Different low-cost techniques are still under development. Moreover, existing regulations also poses a challenge to these practices since they are based on a static understanding of space. Technologies such as radio-frequency identification (RFID) can help to keep a dynamic representation of building elements. This will be possible through the wireless use of electromagnetic fields to transfer data and automatic location and identification of tags attached to objects. These can be components such as walls and windows, as well as furniture. These will enable a new way of designing through “a plan that draws itself” as the users continuously reshape their living environments.

A Hypothetical Use Case in Practice

This part of the paper takes a large-scale housing project as a hypothetical case for demonstrating the potential of the ICT-enabled participation techniques presented above.

Following the cooperation cycles introduced in the previous section, the participatory design process starts with **crowdsourcing** through which the needs and requirements are collected in a structured manner. Then, these are converted into several alternative design **ideas** and **integrated** into the context by the architect, with the continuous ICT-enabled feedback of the users.

Afterwards the users are asked to fund the project through **crowdfunding**. If the process succeeds, the project gets transferred to the second cycle and constructed with the contribution of the users. If the funding process fails, the design process cycle is repeated: through a new crowdsourcing practice, the user feedback is collected to identify the problems of the design, and to develop new alternative projects, which will then be asked to be **crowdfunded** by the users.

The contribution of the model becomes more evident **after** the construction of the architectural project. Following the experiences of the residents, **post-occupancy feedback** is collected through crowdsourcing.

When necessary, novel ideations on how to improve the architectural design are created with the continuous ICT-enabled feedback of the users and integrated into the existing context. Examples of these ideas can be making interventions regarding the communal or personal spaces, removing/adding partitions or reconfiguring the rules for co-habitation.

Afterwards, the users are again asked to fund the changes through crowdfunding. If there is enough support, the process moves to the second cycle and suggested interventions are made. Following the intervention, the user feedback is collected, and the participation continues to take place when necessary. In this context, it becomes possible to develop habitats which can adapt to the users' needs in a sustainable manner.

Reflections on the Future of Architectural Design Education

While the strategies and tools presented above have the potential to empower the citizens in design practices, they can also serve to facilitate and augment novel educational approaches in design education. For instance, a **crowdsourcing** platform can be utilized as an infrastructure to implement the "community-based design learning model" introduced by Salama (2015, p.116). The first possibility to accomplish this goal is to position the referenced platform as an interface enabling learning from the inhabitants, non-governmental organizations and local experts (Pak and Verbeke, 2012). Such practices can enable learning through various research tracks:

- Understanding the socio-spatial complexity through online participatory mapping
- Learning about the spatial issues relevant to a specific area by a geo-located analysis on how people manifest their identities and appropriate spaces
- Creating simple challenges to motivate users to respond and act; and identification of their needs through this practice (Salama, 2015, p. 171)
- Stimulation of rigorous research strategies combining personal observations with participatory data and interviews (triangulation) (Loopmans et al., 2011)

Specifically, in urban contexts such as Brussels, London and Istanbul super-diversity brings many challenges to spatial design and creates conflicts due to the overlapping needs (Vertovec, 2007). In this sense, crowdsourcing can specifically be fruitful for students to address this complexity and help them in the design process.

A second possibility is to position crowdsourcing platforms as an interface for the mediation of the dialogue between the design students and studio teachers. Particularly in design studios with a large number (50+) of students, the platform can be configured to support, augment and enrich the reflective learning processes (Pak and Verbeke, 2014) by enabling students and teachers to provide feedback to each other to improve their performance (Salama and El-Attar, 2010).

Furthermore, following crowdsourcing, through **crowdfunding**, design ideas produced by the students can be opened up to public for endorsement and developed further through the cycles

introduced in the previous sections. In the case of relatively small scale interventions (e.g. urban furniture, simple artistic interventions, parklets) raised funds can be sufficient enough to realize these ideas. For larger scale projects (e.g. public squares and community centers), public endorsement can be interpreted as support from the public and used as leverage to promote further the projects to the authorities.

Finally, low-cost fabrication tools such as laser cutters can enable the students to make prototypes and test in a real-world context, gather feedback from the users and improve their designs (Nys, 2015). Specifically, in disadvantaged urban areas and the developing world these kinds of practices can provide the students and local citizens various opportunities to participate in the shaping of the urban environment with the contributions of the civil society as well as other relevant actors.

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THE PHENOMENOLOGICAL EVALUATION OF TEACHING PROFESSIONALISM IN THE ARCHITECTURE DESIGN STUDIO CULTURE: A Case at the University of Kansas

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Abstract

This paper explores the phenomenology of professional teaching in the design studios of the School of Architecture at the University of Kansas. In contrast to previous general research, this study seeks to improve understanding of design studio instructors' teaching by employing a qualitative phenomenological methodology based on the theory of constructivism. The use of developed analytical analysis approach in ATLAS.ti 7 reveals two main themes and their sub-categories related to studio instructors' teaching professionalism, including four styles of teaching, four teaching methods, various teaching features, and factors that potentially influence teaching performance. Despite variations among studio instructors, the theoretical framework developed to assess teaching professionalism in the design studio characterizes instructors as street-level bureaucrats and as negotiators, shaping the quality of instruction provided. In bringing to light how studio instructors negotiate and develop their day-to-day professional teaching practices, the study aims to contribute to educational reform in support of the professional development of studio instructors.

Keywords: *Teaching Professionalism; Teaching Style; Teaching Methods; ATLAS.ti 7; Design Studio Culture; Architectural Education*

INTRODUCTION

Professional teaching and learning have been the subject of several extensive studies of higher education in undergraduate programs, encompassing lecture-type classrooms, laboratory settings and even distance learning settings (Crow, 1980; Eble, 1980; Mosston & Ashworth, 1990; Grasha, 2002; Taylor, 1993). However, there have been no such studies regarding design studios in architecture schools. Based on the traditional approach of the École des Beaux-Arts in France (Boyer & Mitgang, 1996), studios are commonly considered to be the focal point of the discipline (Pearce, 1995), but the role of instructors as educators and their professional teaching styles and methods have rarely been questioned or investigated.

This study seeks to enhance understanding of the lived teaching experiences of studio instructors in the School of Architecture at the University of Kansas, focusing on the teaching styles and strategies they develop in response to studio needs and how these strategies influence the quality of instruction that teachers are able to provide. These investigations then are developed into a theoretical framework based on two metaphors of instructors: as street-level bureaucrats and as negotiators. As professional teaching practice in higher education occurs in a natural context—in this case, the design studio environment—a qualitative and practical or experiential phenomenological approach is adopted, based on constructivist theory. For the purpose of triangulation, three data collection techniques—literature review, observations, and interviews (both formal and informal, with students and studio instructors)—will support an in-depth exploration of the phenomenon of professional design studio teaching.

Using this approach, the theoretical framework developed here describes professional instruction within the design studio culture as an accommodation between teaching styles and teaching methods. The themes emerging from this phenomenological study characterize studio teaching professionalism in terms of four teaching styles (studio instructor as facilitator, as delegator, as master or expert, and as formal authority) and four teaching methods (case-based, project-based, problem-based, and inquiry-based), along with other potential factors that include the context or school, lack of time and resources, and fear of unknowns and failures). These themes provide a framework for assessing essential differences among studio instructors and their possible impact on students' learning. The study provides an advanced (or new) horizon for studio instructors to rationalize their work in terms of producing the best possible teaching outcomes in order to maintain their self-esteem and identity as a teacher.

This paper is divided into four parts: 1) a brief overview of teaching professionalism in the design studio; 2) elaborations of the research design and analysis; 3) explanation of the derived teaching methods, teaching styles, and teaching features; 4) a brief discussion of the developed theoretical framework as representative of teaching professionalism in the design studio.

BACKGROUND

The idea of the architecture design studio (arch-design) was first developed at the École des Beaux Arts in France in the eighteenth century, as an archetype of teaching attitude: theory in the classroom and design in the ateliers (or studios) (Eigbeonan, 2013). The current system of teaching studios dates back to the period 1900–1914, when this alternative mode of design education departed from the previous tradition of pupillage, and universities became the only providers of architectural training (Ockman, 2012). According to Eigbeonon (2013), although there are similarities in the curricula of training architects all over the world, educators go about them in their own convenient and suitable ways and styles. This is leading to inadequacy in the standards of teaching in arch-design studios today.

Crinson and Lubbock (1994) suggested that academic teaching in studios currently engages in “avant-garde elitism,” which is more theoretically-based than education research-based. While scholars and practitioners like Westfall (2008; 2011), Kelbaugh (2004; 2006), and Nabih (2010) have vehemently argued for and against future architects or students' training in the Beaux Arts style, this study hypothesizes that the stand any school takes should be acceptable based on the idea of educationally research-based styles of teaching.

Moore (2001, p. 60) explains that pedagogical discussions and studies of teaching are not very popular in schools of architecture. At best, research typically focuses on such teaching methods as lectures (Quinlan et al., 2007), service learning (Salama, 2015), and so forth. For example, Babin and others (2002, p. 198) mentions that design studios essentially provide “a structured context for open-ended activity”, based on the interplay between autonomy and collaborations of both instructors and students interactions. Design studio teachers attempt to support and enhance students' learning through their own teaching approaches and learning styles (Demirkan & Demirbas, 2008), fostering a learner-centered education (Huba & Freed, 2000). In recent years, several scholars have noted the absence of discussion among studio instructors and the relative lack of scholarly research in relation to the phenomenon of studio teaching. Ochsner (2000, p. 194) addresses the issue as follows:

“The character of the interaction between students and instructors will best enhance the students' learning of design. Little is written on how faculty might enhance such an interaction or how they might improve the quality of their design studio instruction. Instead, as they begin to teach in design studio, the assumption seems to be that they will go through a process of “learning by doing” and everything will work out.”

Nevertheless, the value of research in teaching studios has remained theoretical and did not inform professional teaching practice at all in design studios where Shulman (2005) described them as “signature pedagogy”. Most of the studies conducted in the field of architectural

education are not necessarily practice-oriented (i.e., describing and clarifying the nature of instructor-to-student interactions). For example, the quantitative research of Quinlan et al. (2007) recall studio instructors to be reflexive on their teaching practice and aware of their presence as educators in the design studio.

Improving the quality of professional teaching practice in design studios could help architecture undergraduate students to gain lifelong learning skills (Boyer & Mitgang, 1996; Taylor, 1993), to become independent and competent citizens as well as productive architects, and to promote social efficiency. Hansen and Stephens (2000) elaborated the moral basis of collaborative learning as the critical essence of studios, based on the high quality of instructor-to-student interaction. In her book entitled *Design Juries on Trial*, Anthony (1991, p. 50) noted that because faculties do not receive or engage in any formal training in how to practice teaching, they remain unaware of their teaching style, teaching method, and the impact of their educational role on students' development. Instead, the majority of studio teachers have traditionally thought of themselves as professional educators, despite the absence of any apparatus for evaluation of their own teaching. In a number of studies, Salama (2015) highlighted several common negative factors among design instructors. Among these was the view that their teaching attitudes were unquestionable: "we have been teaching like this over and over and we produced high quality professionals (Salama, 2008, p. 105–106)." Other findings related to the low level of instructors' awareness and their discomfort in stating their teaching preferences and styles.

Sometimes, most scholars concern themselves with the nature of teaching methods rather than considering the importance of teaching styles. For example, Chu (2009) says that although students prefer to work alone, teachers should endeavor to encourage team spirit among students. He states that in the process of teaching practice, the teacher needs to cultivate team spirit among students. Again, in a more recent study, Carmel-Gilfilen (2012) demonstrated that students reflect on the actions of their instructor and the instructor reflects on the actions of the students—these mutual reflection activities form the critique process.

Although some studio instructors may, up to a point, be willing to introduce changes in their studios by collaborating in specific research approaches for educational purposes (Demirbas & Demirkan, 2003; Demirkan & Demirbas, 2008), the main current concerns of studio instructors relate explicitly to the relevance of social concerns in the design process and consideration of more realistic issues in the design studio rather than to the contribution of their own role as educators to students' learning (Wingler & Stein, 1969; Crinson & Lubbock, 1994). According to Wilkinson (2007, p. 75), the main differences to improve the quality of teaching in design studios have so far focused on responding to the problems of the profession, the rising demand for architectural services (e.g., design for user groups Canizaro, 2012), and the changing role of the architect in society.

Despite several scholarly efforts to reconsider the current culture of the design studio by emphasizing architects' social role and contribution to the community (Boyer & Mitgang, 1996; Salama & Wilkinson, 2007; Salama, 2008), the project-based or problem-solving learning process remains central to the concerns of instructors and to design studio structure.

Schwab (2013; 1969) defined the act of teaching as the "arts of the practical," reconciling theoretical issues with the demands of specific situations. Joyce and Weil (2000) insisted that the act of teaching—"the artistry aspect of teaching"—needs continuous adaptation and new learning about the dimensions of teaching on the part of instructors to equip them for a wide range of situations. The similarities between teaching and disciplined forms of artistic expression were described as follows by Dewey (1934, cited in Flinders & Eisner, 1994): "any endeavor that displays consummate skill and imaginative thought—that is practiced with interest and affection, and that offers satisfaction in a job well done—may be regarded as artistic in the full sense of what art involves."

Finally, a number of architectural education scholars (Moore, 2001; Attoe & Mugerauer, 1991; Green & Bonollo, 2003; Quinlan et al., 2007) have suggested that teachers' knowledge of teaching studios typically stems from three principal sources. The first of these is instructors' own past experiences as architecture students as taught by their mentors. On the basis of interviews with "highly admired" teachers, Jackson (1986) concluded that teachers tend to approach teaching intuitively, to hold an uncomplicated view of causality, to react closed-mindedly to alternative teaching practices, and to assign rather narrow definitions to complex teaching process and concepts. A third source of teaching knowledge is what teachers themselves have gradually learned through their cumulative experience of teaching over years when involving in the higher education. Consequently, they operate on the basis of an "internalized" model of teaching, distilled from their previous experience. Such practical knowledge, widely viewed as a subjective phenomenon, has often been excluded from the conventional scope of educational research on teaching (Shulman, 2005, p. 5). It could be concluded that while some studio instructors may have some sense of their teaching characteristics, they may find it difficult to identify them because there are no guiding literatures and resources that describe what instructors really do within the design studio culture.

RESEARCH DESIGN AND METHODOLOGY

Substantial parts of this paper are extracted from an ongoing PhD dissertation, which includes work based on the initial analysis of one year of data collection in the School of Architecture at the University of Kansas from Fall 2014 to Spring 2015, based on a practical phenomenological approach.

First, a framework was conceptualized to locate this phenomenological research design within the latest qualitative research literature (see Table 1). Lancy's framework (1993) explicitly acknowledges that the definition of qualitative research relies systematically on three perspectives: theoretical framework, strategy or method of inquiry, and tactics used to gather and analyze the data, and brings the researcher's own experience to bear on the study (Bloomberg & Volpe, 2008, p. 13).

Table 1. The research design: theoretical framework, method of enquiry, data collection (Source: Author, 2014).

The Process of inquiry	Rational and illustrative phases	This qualitative research study
Theoretical framework	The constructivist view of teaching can point towards a number of different teaching styles and methods in the studio environment. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing.	Constructivism
Strategy/method/or convention of inquiry The methodology	"A strategy of inquiry consists of a package of assumptions, skills, and the practices the researcher uses as moving from paradigm to the empirical world. Research strategies put paradigms of interpretation into practice." (Denzin& Lincoln, 2000, p.22)	Practical or experimental phenomenology
Data collection techniques The tactic(s)	"Research strategies also unite the researcher to specific method of analyzing gathering empirical materials." (Denzin& Lincoln, 2000, p.22)	Review of pertinent documents (e.g. teachers' portfolios, NAAB accreditation document as essential guide to teaching at KU). Structured observation in three different fourth-year studios-ARCH 608; Semi-structures phenomenological interviews with 7 faculty members and 7students

Choosing “constructivism” as a theoretical framework was an essential part of the early stage of the research process in order to interpret and compare the emerging findings and themes with the principles of this theoretical framework. According to Schunk (1996, p. 234–238), the assumptions of constructivism are based on three dimensions: (a) reality, which is constructed through human interaction; (b) knowledge, which is socially and culturally constructed through interactions; and (c) learning, which occurs through participations in social activities. In general, the main assumption of constructivism (or constructivist learning; Nabih, 2010) is that no universal truth can be discovered; instead, there is an interaction between individuals and their physical and social environment, supporting the collective creation of truth by the learners (Crotty, 1998).

Rossmann and Rallis (2003) discussed the philosophical origins of phenomenology as a tradition in German philosophy focused on the essence of lived experience. According to Van Manen (1990, p. 72), the aims of phenomenological investigations are description, interpretation, and critical self-reflection on the “world as world”.

In general, phenomenology has taken three routes that are relevant to social science (Aspers, 2004). The first of these is the approach taken by Schütz and his followers, which is essentially non-empirical. The second is ethnomethodology, which is only remotely related to phenomenology. Third and perhaps best-known is the integration of phenomenology into prevailing trends in social science. The present research takes a fourth route—empirical phenomenology, which is distinct from the other three approaches in that it is both grounded in philosophical conventions and encompasses basic insights from the social sciences such as unintended consequences.

Because the nature of education in design studio does not lend itself to immediate answers regarding the reality of teaching practices and process, full and meaningful interpretation of how an instructor teaches will require researcher engagement over a significant period of time, involving observations (see Figure 1) and in-depth phenomenological interviews with students and instructors (both informally and formally), in attempting to analyze the particular teaching task demands which comprise the teacher's work, count specific teaching behaviors, acknowledges personal values and record how teachers describe what they do.



Figure 1. (Left) Interim critique, SADP ;(Right) Formal or final critique, SADP (Source: Author, 2014).

RESEARCH APPROACH

Clearly, the task of assessing the nature, quantity, and quality of teaching is a highly complex activity. A transactional view of teaching demands is needed to explain how studio instructors manage their work in light of different working conditions and their own perceptions and character. The research plan (see Figure 2) includes several concurrent steps toward characterizing professional teaching as phenomenon and enhancing the quality of its results. To this end, two critical stages (observations and interviews), each built upon the other during a one-

STUDIO OBSERVATION WEEK: TIME:		OBS.NUMBER: DATE:		
STUDIO PROCESS				
Lectures	Critiques	Juries	Reviews	Pin-ups
Notes: _____				
MORPHOLOGIES OF TEACHING				
Instructional roles and content provide contexts for learning	[• Questions and presentations	_____	_____
		• Complex, ill-structured, open-ended real-world problems	_____	_____
		• Major projects and reading	_____	_____
Types of activities in studio routines	[• Case studies	_____	_____
		• Students complete and submit conceptual exercises electronically or manually; Instructor adjusts lessons according to their responses	_____	_____
Social interactions with instructors	[• Collaborative/ Cooperative (team-based)	_____	_____
Sequence of methods or features in a section? _____				
Notes: _____				

Figure 4. The designed observation sheet (Source: Author, 2014).

The observations of three fourth-year studios (ARCH 608) revealed that different instructors have various approaches to programming and structuring their studios based on their teaching styles, which were considered to be discovered through the development of interview questions. In this study, the structuring and programming of a design studio or “instructional knowledge” is defined as the arrangement of teaching methods, critiques’ deadlines, class activities, readings, goals and objectives of the studios, and the consideration of any additional activities for students to facilitate their learning progress. For example, one observed instructor arranged his studio in such a way that students could gain a coherent experience of a variety of design issues during the semester. In this sense, for him, several interrelated projects were main milestones that facilitated students’ learning process more effectively than other activities like critiques and readings. Furthermore, conducting unstructured and semi-structured interviews with seven students seemed important because understanding the student’s learning experience corresponded to understanding the teacher’s experience of teaching.

At the third stage of data collection, seven in-depth semi-structured interviews were conducted with faculty members during Spring 2015, including those whose studios I had previously observed. Studio instructors varied according to length of tenure and level of experience as studio instructors and as practitioners. Their ages ranged from about 35 to 80 and their teaching status varied (instructor, associated professor, and professor). Reasoning by abduction in this stage means the process of dealing with unexpected facts, mainly during the interview process, and analyzing them conventionally first on the basis of known premises that advance the research towards final development of a data analysis technique in ATLAS.ti 7, and further theoretical frame work development.

The researcher posited the interview questions in a framework that asked what and how an activity takes place based on the commonality of instructors’ syllabus (Kvale, 1996) by consulting and reviewing a critical friend (Foulger, 2010; Gibbs & Angelides, 2008). This was because these types of questions are more likely to motivate the participants to first fully engage with the researcher in a discussion of actual behaviors and secondly to elicit participants’ descriptions of specific situations and actions sequences rather than their opinions. The participants’ differences emerged through indirect and follow-up questions.

The priority of the questions was changed from a more interpretive to a more descriptive question form, including instructors’ self-perception of teaching, quality of teaching, teaching knowledge, rationale, and goals behind teaching in certain ways, and typical studio routines and

structures (objectives of studio, time allocations, arranging critiques, materials, activities of students and learning, supporting different students with various abilities). Kvale (1996) suggested that the later-developed method of computer-aided qualitative phenomenological data analysis should be taken into account when preparing the interview questions to structure the transcription texts prior to coding.

DATA ANALYSIS PROCEDURE

ATLAS.ti has been rightly acknowledged as an essential tool that facilitates researchers' ability more effectively to undertake well-organized, systematic, effective and efficient data analysis in many social studies than qualitative research in architecture does (Lewis, 2004; Lu & Shulman, 2008; Konopásek, 2007; Friese, 2014;2011, Rambaree & Fixelid, 2013). In the present study, ATLAS.ti 7 was used as a project management tool to make the thinking part of qualitative data analysis visible, adding transparency to the research work. ATLAS.ti 7 enables the researcher to work in a systematic manner to ignore partial and biased analysis. In this, a link between the code and the coded text is maintained so that by retrieving the code, the original words can be displayed (this is easily done on a computer, but is traditionally done by the extraction of file cards on which the text was written).

Four types of data emerged from the reviewed documents and interviews which were transferred to ATLAS ti.7 for the final coding and the derivation of themes: structured (including syllabus, articles, brief written summaries of books, NAAB documents), unstructured (including informal field notes from certain observed activities and observation sheets, conversations with students, copies of documents, transcriptions of interviews); audio recordings; and video recordings. The Seidel (1998) model (See Figure 5) was used as a useful guide to understand the nature of different cycles of coding approaches.

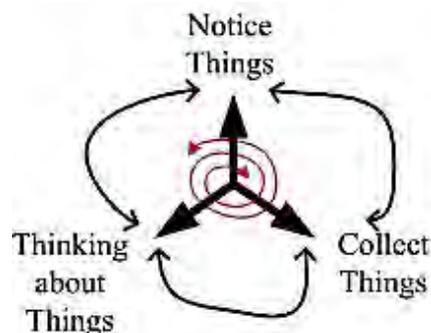


Figure 5. The cyclic process of data analysis, reproduced after Seidel (1998) by Author (2014).

However, the analysis and coding procedures for phenomenological research might appear in a somewhat different light (in comparison with constant comparative methods of ground theory). These more phenomenological approaches typically challenge the researcher to set aside or “bracket” all subjective preconceptions so that they can work inductively with the data to generate entirely new descriptions and conceptualizations. To do this, an advanced analytical model of phenomenological analysis was developed (see Figure 6) to minimize researcher subjectivity by staying at the text level rather than at the interpretation and reflection level of researcher. This showed that topic coding and open coding are essential steps in the progressive focusing of the analysis cycles in any phenomenological research. According to this developed model, the process of phenomenological analysis first starts by de-contextualizing the data. In this, the first cycle of phenomenological analysis started by listening to the entire collected data or topic coding. The researcher gradually becomes familiar with the reality and various dimensions of the phenomenon under study.

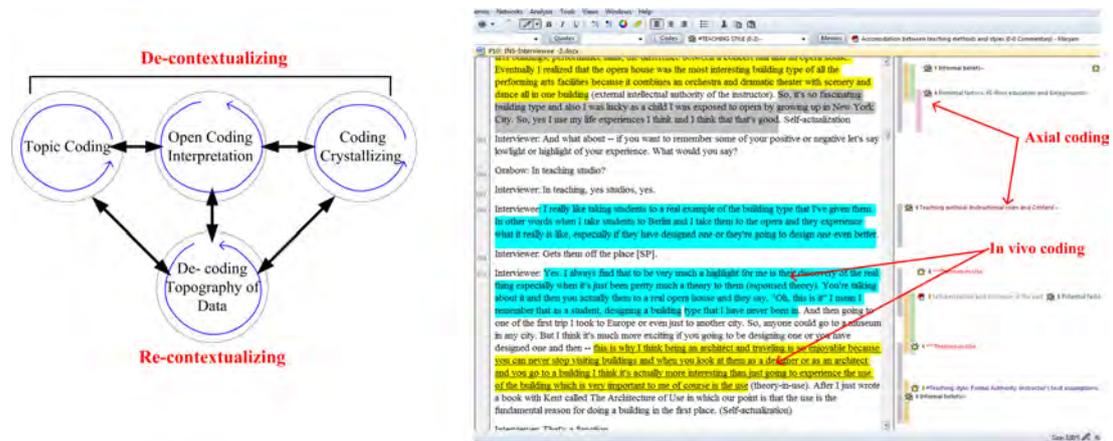


Figure 6. (Left) The developed analytical model of phenomenological analysis for computer-aided qualitative data analysis software; (Right) (Source: Author, 2015).

The second cycle consists of open coding whether by using “In vivo coding” or highlighting the text phrases through the text editor in the Atlas.ti 7 environment (see Figures 6 right and 7). The third step is crystallizing or main type of coding (axial coding in this study) by merging the highlighted texts. Axial coding (Saldaña, 2012) is then used to understand core categories and emerged themes (namely “Core Phenomenon”) like different types of teaching styles. At this level, sometimes, it is necessary to more narrowing down by merging codes. In this phenomenological research, coding was done through hybrid coding strategy—that is, fusing codes from earlier open coding into the codes derived from the literature review in the field of education.

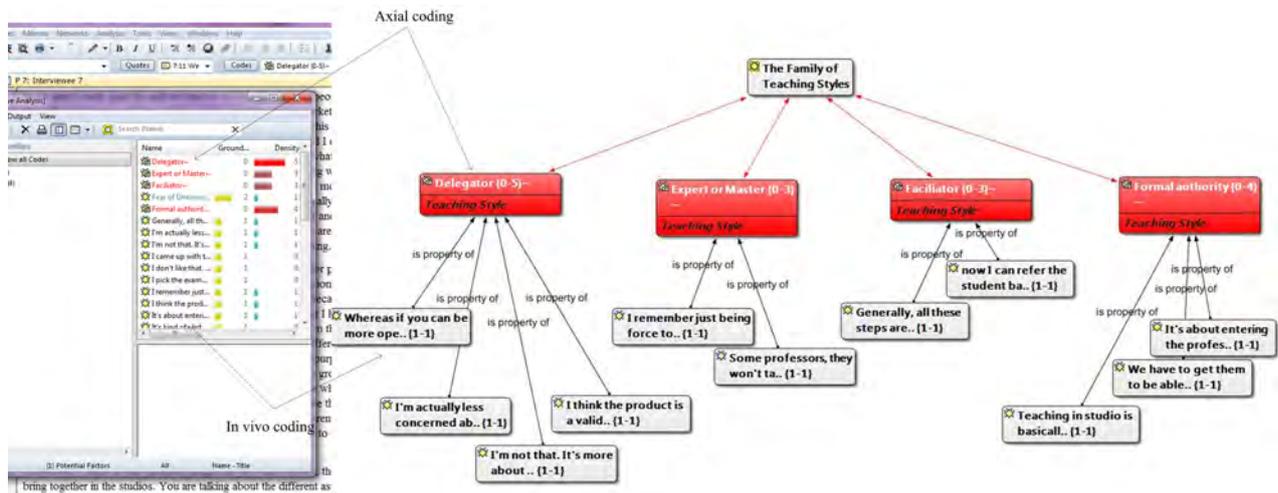


Figure 7. View of ATLAS.ti code manager and Network view showing the process of derivation of themes based on linked axial coding codes (Source: Author, 2015).

The final cycle involves re-contextualizing the data by using selective or “theoretical” coding (see Figure 8); these are teacher-centered and student-centered approaches of teaching styles. The derived core categories (teaching methods and styles) and their related sub-codes (e.g. instructor-as facilitator) are connected to create a final storyline of “teaching professionalism” in

phenomenon gradually (findings are built upon each other). 4) Confirmability means the findings of a study are shaped by the respondent and collected data than by researcher bias or interest. In this, Lincoln and Guba (1981) employed audit trail and triangulation as the techniques explained above.

An additional method that was employed in this study to increase the credibility and dependability of the study was based on Krefting's idea (1991) of a minimum of two weeks interval should be given to the data (after coding a segment of data) prior to recoding it over again, as if one is coding it for the first time. Consequently, codes were derived deductively. This procedure was performed during the different data analysis phases of the study based on a code-recode procedure during de-contextualizing of data (based on the developed analytical model) which was helpful in bracketing researcher's own thoughts, bias and judgment during data analysis.

The additional useful tools including the appropriateness of interpretation based on the constructivism perspective, the use of in-depth interview techniques and phenomenological methods (that is compatible to answer such an education question) may ensure the overall quality of the research findings. Finally, the emerging themes categories were organized and sorted in order to analyze the conceptual relationships using the "Network view" feature in ATLAS.ti (see Figure 8). Network views of the study facilitated the process of writing descriptions of the research by displaying linkages between the various sort of data. These networks visualize the findings of the researcher and become especially useful in this study, which contribute to the final theoretical framework building.

RESULTS

Commonality of teaching methods and styles within the design studio culture

For present purposes, the nature of teaching professionalism in the design studios was considered by focusing on the lived and weekly experiences of studio instructors at the University of Kansas. Specifically, an attempt was made to identify any shared dimensions of professional teaching among studio instructors in managing their task demands or teaching needs.

During the coding process, two main themes emerged in respect of instructors' communication with students; these were teaching styles and teaching methods. It is important to clarify that teaching styles are not teaching methods or techniques. A teaching method comprises various principles and features used for instruction, based on instructors' beliefs and values; a teaching style is a framework that includes various teaching methods and features. In this study, teaching style is viewed as the transmission of a studio instructor's personal character or identity, through which they are present to the students.

It is also important to note that the study captures more than teaching styles and methods. And while all participants can be said to have a teaching style, individuals may be found to possess more than one teaching style, depending on students' needs and studio situations. Although, teaching styles and teaching methods are paired and inseparable, more research is needed to establish whether or not any relationship exists between a specific teaching style and certain teaching methods.

TEACHING METHODS

Inductive teaching methods are referred to here as an umbrella term, encompassing a range of derived instructional methods within the design studio culture that including "inquiry teaching," "problem-based teaching," "project-based teaching," and "case-based teaching." These methods have many features in common other than the fact that they all qualify as inductive. For instance, they are all *learner-centered* (also known as *student-centered*) methods, meaning that they impose more responsibility on students for their own learning than does the traditional, teacher-based, deductive approach. According to constructivist assumptions, learning cannot accidentally

occur but follows from cooperative interactions involving the use of different strategies and features by instructor and learners to support the collective process of learning or knowledge construction. Table 2 summarizes teaching methods, teaching features, and frequency of associated features according to teaching methods.

Table 2: Derived teaching methods and associated features of design studio teaching based on the observation sheet (Source: Author, 2014)

Features that provide context for learning	Guided inquiry	Problem-based	Project-based	Case-based	Just-In-Time
Open-ended questions/ real problems/ill-defined problems	1	2	2	2	
Major projects	4	1	1	3	
Case studies	4	4	4	1	
Discovering the content of course for themselves	2	4	2	3	
Working on conceptual exercises both physically and electronically	4	3	1	4	
Primary self-directed learning	4	3	3	3	
Active learning	2	2	2	2	
Collaborative/ cooperative	4	3	3	4	

1.By definition; 2.Regularly; 3.Generally; 4.Probably.

Inquiry method

Given questions to be answered, problems to be solved, or a collection of observations to be elaborated (Bateman, 1990), students are required to work in a mostly self-directed manner to finish the given assignment in such a way that they “discover” the desired factual and conceptual design knowledge through their own learning process. If this teaching method is used effectively, by the end of the design studio, students should be able to develop good questions, to identify and collect relevant evidence, to demonstrate findings constructively, to analyze and interpret outcomes, to draw conclusions, and to evaluate the significance of those conclusions (Lee, 2004).

Problem-based method

This is the commonest form of design projects and other assignments within the studio culture. As a teaching method, instructors typically use it to confront students with an open-ended, ill-defined, authentic (real-world) problem, and teachers must work to determine what is needed (in terms of learning of students) and to propose a viable solution based on design standards. Instructors act as facilitators rather than primary sources of information (Barrows, 1980; Norman & Schmidt, 1992; Weiss, 2003). Most of the available studio time is likely to be allotted to: (a) groups reporting on their progress on previous learning issues and listing their current learning issues and plans of work collaboratively and cooperatively; (b) mini-lectures providing information on issues being dealt with by all groups, simplifying prevalent difficulties, and suggesting additional learning; and (c) whole studio discussion (Duch et al., 2001).

Project-based method

The instructor arranges for students to submit projects throughout the semester in addition to their final design assignments. These usually consist of one or more sub-projects leading to the construction of a final design product—a conceptual design, a model, a report, or a computer rendering. Students are often divided into teams during such tasks for presentation of reports (oral or written) summarizing the procedure implemented to generate the product.

Case-based method

Students are asked to examine either historical or hypothetical case-studies that may also contain problem-solving and/or decision-making learning situations for students provided by the instructor. Importantly, the given cases should be authentic or representative of situations that students are likely to encounter in their own professional practice or during design projects (Prince and Felder, 2007). This method is typically used in the design studio to require students to analyze precedents and work through readings. They are given case studies and prescribed texts involving ill-defined problems to be solved or which are generally considered unresolved. This method essentially relies on the problem-based nature of the design studio culture.

Features of inductive teaching methods

The design instructor will habitually use a certain number of activities with a certain frequency (ranging from *usually* to *always* to *seldom*) to manage and systemize the studio process. These can be based on different teaching methods, involving features such as open-ended questions, instructional roles and content, types of activities and physical facilities, skills, use of ill-defined problems, and social interactions (e.g., teamwork) (Joyce, Weil, & Calhom, 1972). These teaching features almost always involve the students in discussing questions and solving problems in the design studio (activities referred to as active learning) while working either inside or outside the studio, collaboratively or cooperatively.

These features provide the context for active constructivist learning through a combination of teaching methods. According to Prince and Felder (2007), a just-in-time approach might involve a combination of web-based technology (e.g. online homework, computer-based communication between and among instructor and students (e.g., Facebook, Virtual Studio, Blackboard). Just-in-time is a teaching characteristic applicable to all types of derived instructional methods and features; it can be defined as any live, in-class teaching activities that have not been preplanned by the instructor (e.g., course-related demonstrations, descriptions of familiar phenomena). This approach is typically employed without any prior planning by studio teachers during instructor-to-student interactions such as weekly discussions and critiques in response to teaching task demands or students' needs.

TEACHING STYLES

In this context, teaching styles generally embody the idea of the studio instructor as the source of knowledge, informed by their personal attitudes in their teaching interactions with students. This paradigm entails a sense of the instructor's personal conduct, which is about acting in a way that reflects their position as an educator. The four identifiable teaching styles are: 1) instructor as expert/master; 2) instructor as formal authority; 3) instructor as facilitator; and 4) instructor as delegator.

These teaching styles provide a degree of flexibility that allows the task of teaching to shift from more teacher-centered to more student-centered. These styles vary in their degree of compatibility with the essential principles of constructivism—for example, the instructors as a master or as a formal authority does not provide for a collective process of student learning and does not encourage students to become active learners as advocated by constructivism.

Instructor as expert or master.

Such teachers ("the studio master") are seen to possess knowledge, expertise, and some degree of power. One student described his experience of such an instructor as follows: "I remember just being forced to do my project in a certain way...I hated it and I fought the whole time." In his fourth year of study on the architecture program, another student said: "...some professors, they won't talk online or they won't be available to talk one-on-one ever, and that's just unfair..."

This deductive method of teaching contrasts sharply with the *constructivist* method, which builds on the widely accepted principle that students construct their own reality rather than simply

absorbing their instructors' versions. One of the interviewed instructors indicated that it is not uncommon to find one such teacher in every school, suggesting that the teacher-centered "master" model of teaching that originated at the École des Beaux-Arts has not yet been erased.

Instructor as formal authority

This kind of teacher is mainly concerned with correct and acceptable processes for completing design projects. They focus mainly on standards (e.g., building codes) that incline towards rigidity and standardization. One student in the third year program explained her experience of such an instructor as follows:

"... there's so many times I would do something and then the instructor said like, "Okay, how wide this door needs to be?" and I look at the nearest door and I say, "Okay, that will be too small," or, "That will be too big." So learning how to compare with scales that I see around me and just understanding people's convenience, like, "Okay, I want this to be a nice open space, so then maybe I'll make the hallway seven, eight feet instead of four," something like that..."

Most studio instructors are strongly aligned to this model of teaching ("I have this to teach.") One of the interviewed instructors described how his teaching approach proceeded from his developed framework:

"I have them work backwards, when I say, "Here's the program, I've done it for you but now I just give areas, square feet I say, "I want you to tell me what shapes and what sizes" in other words, to how square feet is not to say what the size of..."

The main difference between the *master* and *formal authority* styles is the amount of unconscious control exerted by the instructor over the students' learning process in the partnership between student and teacher, especially in the master style of teaching. In directing students' design projects, these instructors actively engage in teaching-oriented tasks because they have a great deal more knowledge than their students. In fact, the use of standards is the easiest way for studio teachers to deliver knowledge, establishing prototypes for how to think and act as well as what to do during the project process. This becomes apparent in one interviewee's description of her experiences with such an instructor:

"...So many times I would do something and then professor would be like, "But how it the car, the car is going to hit, and it's a wall," and he would like joke about it and it make you not feel bad that you have done something wrong because he knows that we don't know and we're learning from him. So that kind of helps us remember things and understand like whenever I'm saying, ..."

The use of this teaching style encourages architecture students to implement the given codes and to correct anything that fails to conform. In this approach, students often blindly follow their teacher's instructions without questioning *why*, and some students may be left feeling inadequate if they cannot meet these expectations. This style of teaching can be traced back to the evolution of teaching from the system of apprenticeship in the medieval society to the standardized university system of lectures and studios (Ockman, 2012, p. 89).

Instructor as facilitator

As facilitators, instructors do not base their studio teaching on their own knowledge; instead, they rely on students to take the initiative in their own learning process. Such instructors do not intervene in students' active learning process, but they do make comments, cooperate, and advise on any difficulties that the students may encounter. This teaching style commonly involves students in discussing questions and solving problems in the studio (whether individually or in groups). One fourth-year student characterized her studio professor as follows:

"..., for this instructor, what I like about him is that, as far as design goes, he's not forcing his design philosophy on anyone. He's laying it out and encourages it, and he references it a lot and everything, but ultimately, like you have a separate idea from his, as long as you can back it up, he's fine with it."

As mentors, these teachers encourage the students to actively and physically produce a final product by using the students own insights rather than the instructor's beliefs and framework to guide them. One such interviewee described his teaching approach:

"... , I try to develop the next step of the process on an individual basis. So depending on the idea the student has, we discuss, ... I think each student is very unique. So, you cannot have a kind of blanket teaching approach to [all] students..."

Involving continuous discourse between and among instructor and students in an exploratory mode of learning, this style of studio teaching is unlike the other styles in that it is not based on the transmission of facts from instructor to students. Although time-consuming, this teaching style focuses mainly on students' needs and goals and on a willingness to explore alternative courses of action autonomously rather than under instructions from the studio teacher.

Instructor as delegator

This teaching style mainly develops students' ability to function independently. For example, one interviewee was characterized as a delegator instructor because of his very loosely planned approach to studio teaching, to which he replied:

"I'm not that. It's more about a voyage of discovery. I'm actually less concerned about the destination in some ways. No, I'm actually concerned about the destination when we get there..."

Such instructors enable their students to perceive themselves as independent and resourceful, developing autonomous abilities that may be suppressed by other styles of teaching. As a delegator, the instructor can exchange roles with students, accommodating mutual needs.

To sum up, while some might consider teaching styles minimal, in fact it reflects the instructor's values and beliefs, which may be hidden or actively espoused through instructors' teaching methods. For example, while delegator instructors are more likely to employ an inquiry-based teaching method, facilitator types tend to favor project-based and case-based methods. Status is another characteristic that varies from the master to delegator instructors, and the instructor's authority varies from formal to superficial according to their personal perspective. Interestingly, neither of the two extreme teaching styles is essentially compatible with the constructivist perspective in aiding students' understanding of how and what to do. While teaching for understanding is a central concern in current educational research (Walker, 1995), instructors with master, delegator, or formal authority styles do not press students to think much beyond what they already know. The findings of the present study suggest that the facilitator style may be the only way for studio instructors to teach more effectively; this style is entirely compatible with the tradition of constructivism.

DISCUSSION

The alternative perspectives of task-oriented and studio-oriented teaching practices are considered to reflect studio instructors' primary attitudes, which can be further described and clarified by a theoretical framework (see Figure 9) based on the developed context of two metaphors: 1) studio instructors as street-level bureaucrats and 2) studio instructors as negotiators.

Design studio instructors as street-level bureaucrats

The notion of street-level bureaucrats has been used to describe the interaction of public service workers with their clients (Lipsky, 2010), in which they have substantial discretion in deciding how such interactions are to be carried out in practice. Integral to these workers' activities is the issue of the *task demands* of providing a given service.

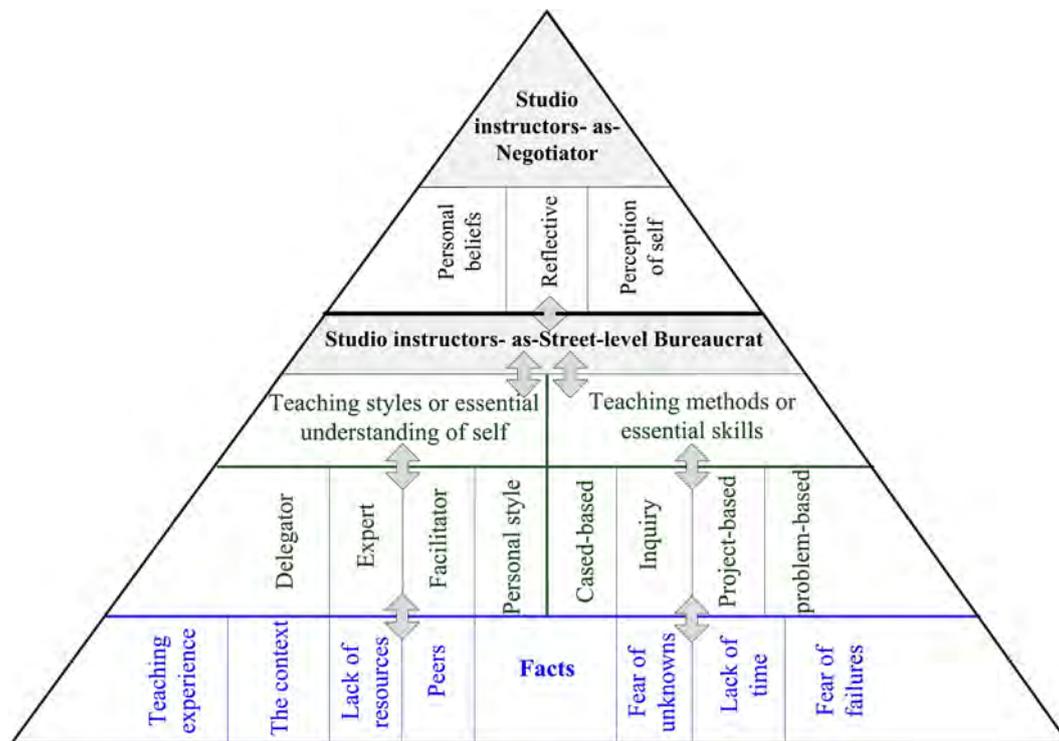


Figure 9. Development of a theoretical framework for teaching professionalism in the design studio based on the metaphors of studio instructors as street level bureaucrat and negotiator (Source: Author, 2015).

Within the studio culture, instructors may be considered primarily as street-level bureaucrats because they can vary the extent to which they enforce the curriculum in their typical teaching activities or weekly studio routines. This open-ended characteristic of studio teaching reflects available resources and the demands of teaching tasks, including the specific “chemistry” with students of varying ability.

The use of various teaching methods and styles reveals an analogous “processing” mentality in teaching practice that helps teachers to perform more efficiently and to develop a relationship with their students. This processing mentality can be understood as a consequence of the notion of street-level bureaucracies (Lipsky, 2010, p.130–157), and it is hardly surprising that studio instructors might view instructional quality as a matter of daily task demands for curriculum processing rather than in terms of intellectual engagement or the professional egos of being an instructor. The teaching methods and styles discussed above can in fact be called “survival teaching practices” used by the participating studio instructors at KU. As those teaching methods are established by studio instructors over years of teaching, design studio instruction becomes a matter of plugging in the appropriate information or following a known sequence. The majority of interviewed instructors have stuck to certain teaching methods and processes over the years without questioning their teaching approaches.

Interestingly, during interviews, they also described several factors that have influenced their experience of professional teaching over the years, including their “personal background,” “colleagues,” “teaching experiences since the beginning,” “the lack of time,” “fear of unknowns,” “the lack of resources,” “fear of failures,” “colleagues,” “the context (or the culture of school).” Choosing among the teaching methods mentioned above is a response to the practical demands of studio instructors’ actual work environment, which is embedded within the larger institutional life and context of the school. Consequently, design instructors at KU have developed a more

task-oriented mentality to fulfill their teaching responsibilities rather than a student-oriented mentality (i.e., negotiating with themselves).

Design studio instructors as negotiators

The previous section suggests that the various teaching methods and features simply enable studio instructors to process their instructional task demands (that is, to operate in the design studio) as street-level bureaucrats. In contrast, studio instructors as negotiators are those street-level bureaucrats who additionally develop their teaching practice beyond fulfilling only their task demands. The metaphor of teacher as negotiator entails those interpersonal strategies (e.g., teaching styles) that involve greater give-and-take between and among instructors and students. As negotiators, studio instructors systematize or negotiate their teaching in such a way as to strike a balance among several additional dimensions such as being a reflective practitioner (Schön, 1983), instructor's perceptions of self (e.g., self-observer, self-efficacy, self-responsive), and personal beliefs as a teacher.

Negotiation strategies (such as including students in studio decision making and providing opportunities for one-to-one interaction) depend on flexibility, both in the use of studio time and in instructional planning through appropriate decision-making. Such flexibility also highlights the responsiveness of studio instructors through their teaching style to context-bound qualities and the dynamic of the studio culture. As one interviewee described it,

“...the process [of my teaching]...actually evolved over time. I try to develop the next step of the process on an individual basis...but I think each student is very unique as a person. So, you cannot have a kind of blanket teaching approach to students...”

He is in fact backed up by this more cooperative approach, reflecting on how his own teaching strategies provide opportunities for individual recognition and student participation.

This in-depth consideration of teaching styles may additionally be used as a tool to examine more fundamental assumptions in instructors' views of themselves and their students, and their representative roles in the organic teaching-learning process. In this regard, Crow (1980) also mentioned that how teachers teach reflects their personal values, beliefs, and philosophy. For example, studio instructors using the expert and formal authority styles of teaching may be viewed as truly ineffective negotiators whose hands are tied by a rigid procedure and predefined outcomes. The facilitator studio instructors may play a fuller educational role as negotiators of knowledge, with themselves as well as with their audience. Alternatively, the studio teacher as negotiator brings a teaching philosophy to life to the extent that they convey a vivid portrait of a person who is reflective in their teaching practice and committed to their career.

Although the interviewed instructors at KU are characterized by differing attitudes toward teaching, none of them could clearly define their teaching styles or methods, precise teaching objectives, or advance or detailed planning of their teaching activities, and they typically reported deviating from their teaching plan. This does not imply a simple lack of preparation for assignments and weekly activities; instead, as street-level bureaucrats, they characterize their teaching strategies as based on more flexible and practical responses to the demands of their immediate studio environment—that is, to just-in-time needs. Most of these participants can be seen as street-level bureaucrats rather than as negotiators, whose rationale for teaching has evolved over years.

CONCLUSION

Studio instruction is central to architectural education. As the culture of the design studio evolved, instructors in the School of Architecture, Design, & Planning at the University of Kansas have sought a more actively adaptive process, modifying their teaching attitudes and materials to accommodate their own needs and the specific needs of their students.

The phenomenon of teaching professionalism centers mainly on two dimensions—teaching methods and teaching styles—that provide a constructivist learning context for students within the

design studio culture. In developing these two main themes, studio instructors as street-level bureaucrats typically use any available resources to process the curriculum and to meet studio needs. In contrast, studio teachers as negotiators have developed their teaching skills beyond studio routines to incorporate student-oriented teaching and learning, based on additional factors like time allocation, personal beliefs, and decision making.

This study aims to contribute to a phenomenology of teaching as professional practice to help studio instructors to understand how they might better relate to their students by understanding how they typically teach. This research also attempts to describe how studio instructors may vary in terms of their teaching qualities and dimensions, enabling instructors themselves to identify their own styles and to compare methods and types. However, it is limited to the three dimensions of design, development, and implementation of instructional design, excluding evolution and assessment of students in the design studio culture.

Finally, the theoretical model developed here can be used for a more general conceptual orientation toward educational change, which may require a deliberate shift of focus from physical studio issues to the occupational facts of teaching professionalism, including the teaching styles and methods of studio instructors and their correlation with other factors. This research may offer a foundation for educational policy makers, school administrators, and curriculum specialists in the search for a clearer understanding of the resources needed to enable studio instructors to redefine and develop their teaching professionalism. Future studies may focus on how instructors with different teaching styles are developing assessment criteria and evaluating their students in the design studio culture. The developed theoretical model can also be used as an action research framework for improving professional teaching practice within the design studio culture.

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PARTICIPATORY DESIGN: AN INTERSUBJECTIVE SCHEMA FOR DECISION MAKING

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Abstract

The focus of this paper is participatory design (PD); a field that has been in existence since the 1960s. Reflections on a PD project in which the author played a central role revealed that existing literature does not engage adequately with intersubjective decision-making in PD processes. In this paper, appropriation and re-imagination of the Nordic framework for performance-based standards results in a novel multidimensional schema with five mutually related steps. Analysis indicates that the schema has a capacity for enhancing intersubjectivity in PD decision-making while also rendering the process more malleable to multiple viewpoints and their fusion into progressively definitive shared outcomes. In the conclusions, prospects for projective and reflective application of the schema explore its transformative capacity for professional and lay participants and its potential role in engendering critical design pedagogy.

Keywords: *Participatory Design; Sustainability; Public Space; Nordic Framework for Performance-based-Standards*

PROBLEM STATEMENT

Participatory decision-making is gaining in significance in addressing the contemporary socio-ecological challenges of sustainability and development (Becker, 2005; Bowns and da Silva, 2011). Participatory design is seen as a means to relevant and satisfactory outcomes.

Predominant participatory design (PD) discourse falls into three broad themes. The first is about the theoretical underpinnings and historical development of PD (e.g. Spinuzzi 2005). The second is on the methods (tools and toolkits) for facilitating the PD process (e.g. Sanders et al 2010, Muller 1993, Sanoff 2000, Fischer 2004, Charrette Centre 2011). The third is descriptive-analytical discourse on the processes and outcomes of particular PD applications in real projects

(e.g. Harris 2010, Frauenberger et al 2010, Binder and Brandt 2008, Merkel et al 2004, Björngvinsson et al 2010, Kwok 2004). PD is applicable to a variety of tangible and intangible ends in fields as diverse software engineering, workflow planning and architecture. Sanders et al (2010) categorise PD according to purpose. They propose that the purpose of PD may be: probing participants, priming participants, getting a better understanding of participants' experiences, or generating ideas/scenarios for the future. The project from which this paper arises was centred on generating ideas for the materialisation of a small public space. Henceforth, PD in this paper is used in relation to form-space design at the scale of a small public space. Referring to the taxonomy of PD practices by Muller (1993), this project falls under envisioning future solutions – specifically the future workshop.

The need for an explicit synthesising PD framework becomes greater with increase in number and variety of participants and in brief complexity. In the case of a single lay participant or few participants with a lot in common, it is relatively easy to agree on PD solutions. For example, participatory design of a house (a relatively well-defined design object) is readily achievable by offering a single spatial module, such as 2.5m cardboard model cubes, to a prospective owner to stack together and configure his or her own house. But where there are

multiple participants drawn from diverse users with substantial but varied stakes in the final outcome, and where the brief constitutes as such are variable, the case for a synthesising framework in the PD becomes much stronger. In this case, multiple participants are united by a common need but they may have significant differences in backgrounds, resource- and power-bases, interests, competencies and modes of communication (see Hamdi 2004). This variety brings richness, but if not well-facilitated, can precipitate counterproductive dynamics (Metze 2009). In reflecting on the processes of a PD project in which I was involved, literature review revealed that while there are many well-tested tools for generating ideas from multiple participants, explicit *intersubjective* decision frameworks for ranking and choosing amongst diverse participants' inputs to realise progressively definitive but representative outcomes are not well researched. Fischer (2004) theories how conceptual barriers in PD can be overcome using "boundary objects" – designed situations that provide "back-talk" to enable communication between participants and trigger creativity. Ostensibly, the boundary objects are a synthesis of initial ideas from all participants but it remains unclear how this synthesis is achieved in the first place. It also remains vague how the insights resulting from the subsequent interaction with the boundary object are synthesised. This is perhaps attributable to the fact that PD combines design and participatory knowledge types, each of which has a significant implicit content (Niedderer, 2007, Spinuzzi 2005). In the absence of such a decision framework, the PD processes are susceptible to undue influence by those who are relatively advantaged e.g. due to higher formal education levels, more power, and institutional resources or better rhetorical skills – to the disadvantage of relatively disenfranchised participants and possible forfeiture of the richness inherent in PD variety. Hence the question of a synthesising framework for PD is an important one. This paper aims to investigate this question by proposing an intersubjective framework for participatory design decision-making.

THE PROJECT

The PD project that is the background to this paper was collaboration between a team of academics and SUN-VPUU¹. Before the project SUN-VPUU, through extensive participatory mechanisms came up with proposals for in-situ slum upgrading for Monwabisi Park - an informal settlement of 24 000 people in 2009 (Sikhula Sonke 2010) located in Cape Town. This settlement was one of the five identified for upgrade by the City of Cape Town administration (CoCT). The vision of the programme is to build safe integrated communities by upgrading the settlement without moving people out of the area. Central to the SUN-VPUU approach are the urban design principles of Crime Prevention through Environmental Design (CPTED) (Newman 1973, Jeffrey 1977) which were encapsulated in a Spatial Reconfiguration Plan (SRP) for Monwabisi Park. The SRP further informed a package of plans ranging in scale from urban design concept plans, through to precinct level, and to detail and building plans. In these plans, the role of safe walkways and urban parks in crime prevention was highlighted along with the need to reconceptualise pre-school facilities in line with violence prevention principles to contribute to early childhood development (more information: www.vpuu.org.za). Aspects of early childhood education were proposed to occur in small public spaces known as *Emthonjeni*. The *Emthonjeni* concept was co-developed by SUN and Sikhula Sonke (a local NGO) using participatory methods. The genesis of the word is rural Xhosa land in the Eastern Cape Province of South

¹ VPUU: Violence Prevention through Urban Upgrading (a large-scale collaborative programme for slum upgrading between the City of Cape Town Administration and the German Ministry of International Affairs). SUN: Sustainable Urban Neighbourhoods (an urban design consulting firm which is the executing agent for VPUU). More info: www.vpuu.org.za SUN is used in this paper in its capacity as implementing consultant for VPUU.

Africa, where it traditionally describes a well-point – a place where women and children come to fetch water and do laundry. As transposed to an urban area in the SRP, the *Emthonjeni* is embedded in the finer-grained small-public spaces as a place to protect young pre-school children from crime when parents are away at work. The background to this is that research indicated that children were most vulnerable to crime precisely during working hours when their parents were absent (Sikhula Sonke 2010). In Monwabisi Park, as in other many Cape Town informal settlements, a public tap and ablution facilities at 200m centres are usually provided for sharing by a number of families. Because of their capacity to attract people, the spaces around the taps have a potential to be active outdoor spaces. This potential is however not fully realised because they are in a general state of disrepair (Figure 3). Thus the spaces around the taps are ideal for site repair (see Alexander et al 1977) with the intention of transforming them into attractive public spaces. It is these spaces that under the SRP were to be designed into *Emthonjenis* - places of meeting, and child play and safety through active surveillance.

In 2011, SUN-VPUU granted the UCT team permission to undertake PD for upgrading one such water-point into an urban *Emthonjeni*. The UCT team consisted of four academics (3 architects and a landscape architect). SUN was represented by an urban designer and a community facilitator. Collectively the SUN-UCT team is henceforth referred to as the “designers”. On the basis of criteria jointly developed by SUN and the UCT team, 30 participants were selected from the community (these are hence referred as the “participants”). The processes and constructed outcomes of the PD are detailed in a poster (see Sanya et al 2015)

METHOD: A MULTIDIMENSIONAL SCHEMA

The aim of this paper is to investigate an intersubjective framework for decision-making that channels the varied views and inputs from diverse PD participants into progressively definitive but representative design choices in such a way that the inherent PD variety enriches outcomes of the process. The Nordic framework for performance-based standards allows both specificity and open-endedness in the design process. It is hierarchically arranged to allow for a diverse range of design solutions to definitive higher-level intentions (Foliente et al 1998). The versatility of the Nordic framework is because it specifies design objectives and attributes instead of designed products (Foliente et al 1998 and Foliente 2000). Attributes are stated in qualitative terms (as functional statements) and in quantitative statements (as performance requirements). Objectives frame the definition of a set of congruent attributes. In turn attributes, are the basis for generation and evaluation of proposed solutions. Under the Nordic framework, any designed product is considered satisfactory so long as it fulfils the specified attributes.

This paper adapts the Nordic framework by nesting within it processes for brief definition, alignment with budget, proposed solution ranking and temporal prioritisation to define a multidimensional schema for PD. In the schema, the attributes are refined into firmatas (structural and constructional integrity, utilitas (functional efficacy), venustas (aesthetics) and sustainability. Firmatas, utilitas and venustas are borrowed from Vitruvius’s tripartite articulation of architecture (see Rowland I.D. and Howe T.N 1999). Sustainability is aimed to focus on aspects that have not traditionally been explicit components of architecture but that have attained in relevance in contemporary times. Nested within the attributes are processes for brief definition, budgeting, proposed solution ranking and temporal prioritisation. A possibility for exclusion of out-of-scope elements is offered. The resultant multidimensional schema is shown in Figure 1 below. Brief constitutes depend on the client’s requirements but are framed by the attributes.

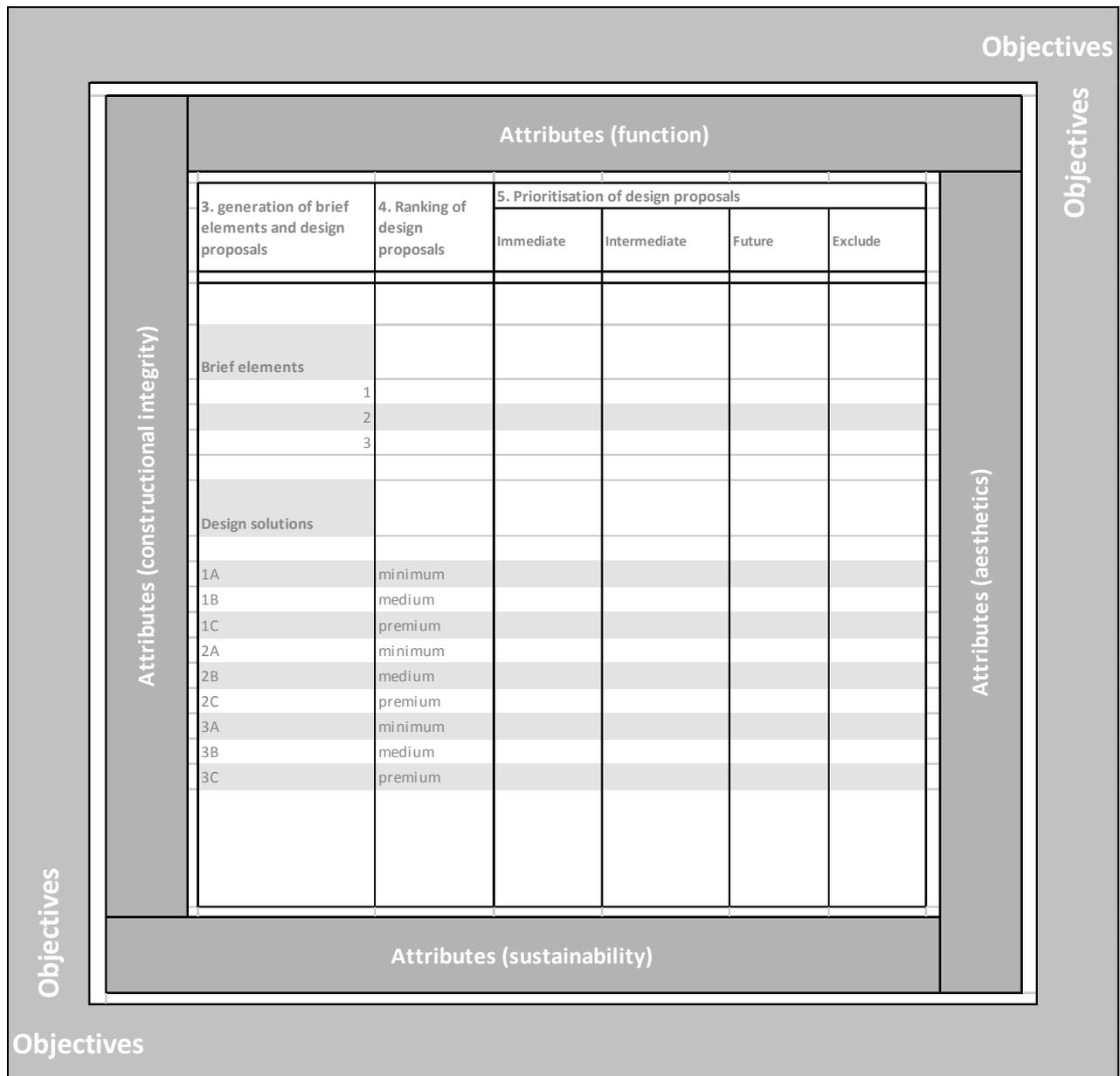


Figure 1: an Intersubjective Decision Making Schema for Participatory Design (Source: Author)

RESULTS: USING THE SCHEMA

The value of PD discussions comes from cross-pollination of participants' and designers' knowledge. Where designers have acquired knowledge via formal education and work experience, the participants possess tacit knowledge derived from a long immersion into context and experiential understanding of their own needs (Spinuzzi 2005). The PD discussions should therefore be extremely well-facilitated to ensure that participants and designers alike bring their knowledge and experiences to bear. The multidimensional schema facilitates intersubjective decision-making in five steps:

- definition of objectives,
- formulation of attributes,
- definition of brief constitutes,

- generation and ranking of design proposals
- temporal prioritisation of design proposals.

The sine qua non for the success of this schema is that each step is clear in intention and executed in a discursive transparent manner with every participant having a fair chance to engage. The discussions and decisions of each step should also be recorded. Whereas the process is *presented* below as sequential, it should have inbuilt mechanisms to facilitate iterative refinement of each stage.

First, *objectives* are defined in terms of requirements and goals in relation to broader society. Objectives are strategic in nature and go beyond the scope of a single project. They should be defined in a large scale participatory process using a method like Community Action Planning – CAP (Hamdi, 2004). Objectives are formulated long before any project is conceived. Goal setting is normative and hence objectives defines what ought to be done (Becker 2005). Therefore, objectives are ultimately underpinned by values, value negotiations and choices (Marini, 2015).

In the second step, *attributes* are formulated according to the categories of firmitas, utilitas, venustas and sustainability. Defining attributes at this stage constrains the subsequent discussions to those relevant to the project objectives while remaining accommodative to different kinds of proposals in terms of brief constitutes and design solutions. It is crucial at this stage to ensure that (i) what might seem rather obvious to designers is made explicit, explained to the participants and included in the attributes (e.g. aspects relating to technical performance, functionality etc.) (ii) less obvious concerns are carefully teased out from the participants and explicitly co-opted into the attributes. This can for instance be through Appreciative Inquiry (AI) (See Salama, 2008) where participants choose existing artefacts/urban spaces and then disaggregate them into attributes.

The third and fourth stages are nested within the attributes and objectives. The two stages will be much more productive if each is foregrounded by exercises aimed at familiarising the participants with a range of existing solution options (Kensing and Munk-Madsen, 1993) in order to immerse them into the domain of interest (Sanders et al 2010). Depending on the skills level of the participants and available budget, this can be done through case-study field visits, videos, lectures and literature. The third stage of the PD involves *generation of brief constitutes*. In the fourth stage *design proposals* are defined to fulfil the brief using any of the available PD tool/s or by the designers. Furthermore, in reference to the project objectives and attributes, the generated proposals are ranked into minimum, medium and premium ones.

The fifth stage is embedded in the third and fourth stages above. It involves *temporal prioritisation* of brief elements and design proposals. This yields those proposals that must be realised in the immediate term on the one hand, and those that could be attained in the intermediate and future terms on the other hand. It also highlights brief and design proposals that are incommensurate with project attributes and objectives for exclusion. Apart from the attributes and objectives, other criteria for temporal prioritisation in the PD reference the available budget; the capacity of the proposals to leverage high-impact future activities; and the proposals' characteristics in terms of cost/benefit allocation between private and communal users. Immediate priority should be given to proposals of a public-benefit nature – even where they are relatively high cost – so long as they have great capacity to trigger diverse kinds of communal appropriation and emergent private enterprise in the longer terms (see Hamdi 2004). It should be noted that for some brief constitutes, suggested proposals may not be feasible in the immediate term – whether be they minimum, medium or premium solutions. And yet for others, it might be imperative to implement premium solutions in the immediate term. A further dimension to be noted is that a solution can start off as minimum in the immediate term but be upgraded into a medium/premium one in the longer term. Thus, with inclusion of the temporal dimension,

minimum, medium and premium proposals from participants are not necessarily mutually exclusive but can be a basis for phased qualitative and functional growth improvement.

The above is the complete suite of steps in the schema. However, for the schema to be useful, it is not always necessary that every given PD process executes all the steps. For instance in the PD of a school, certain brief constitutes such as a given number of classrooms to cater for a specified number of children in certain age-cohorts, could be inherent in the project itself. Auxiliary facilitates such as ablutions and offices could likewise be implied. And yet, if the intention of the PD is to reimagine what a school can be, it might actually be advantageous to start off by defining objectives and attributes in order not to be stultified by convention in generation of the brief elements and design possibilities. For the project that stimulated this paper, the client's project requirement of a small public space is of such a nature as to be amenable to different brief constitutes and material manifestations. Hence, in this case, definition of the brief constitutes became a discursive process in which the schema presented in this paper can add great value to the PD process. Thus an advantage of this schema is that a choice can be made, where, with the given time and resources, participants' abilities, nature of design problem, to focus the PD discussions. Being clear which particular stage(s) of the schema to focus the discussions clarifies the intentions – thereby safeguarding relevance of PD outcomes.

RETROSPECTIVE REFLECTION ON THE EMTHONJENI PROJECT

The experiences in execution of the *Emthonjeni* PD project are what spurred the author to rethink how the project could have better been executed. The multidimensional schema is primarily meant for application to future projects. But in a retrospective application of the schema (Figure 5 in Appendix A), the PD outcomes are analysed to uncover some lessons. It should be noted that some of the design proposals and rankings into minimum, medium and premium are more analytical than factual in this section. Structuring the outcomes in the schema reveals immediate term prioritisation of the ranked design decisions as per Table 1 below.

Table 1: Immediate Term Prioritisation of Ranked Design Decisions (Source: Author).

Solutions for implementation in the immediate term	
Minimum	upgraded tap; washing platforms; benches; shelter; lighting; play facilities
Medium	ground cover;
Premium	drainage

The decisions of what was to be prioritised did not take place in the PD. Rather, sketchy proposals (in words and drawings) were taken from the participants and enhanced by the designers. The academics in consultation with SUN-VPUU, came up with an initial proposal for the *Emthonjeni*. The proposal centred on the existing tap to respond to pedestrian movements along an existing road, and worked with the sloped site to retain the ground and provide multi-functional platforms on a stepped concrete slab. An adjacent softer area was provided for child play. The above proposal was presented as a balsa model (see Figure 4) to SUN-VPUU and the participants for discussion and approval. Subsequently, the proposal was handed over to an architect for final design, working drawings and contract management. The final solution as detailed and constructed was subterranean drainage; a stepped floor slab and an adjacent softer play area; two curved retaining walls; a wider multi-functional platform; and another platform adjacent to the tap. The material palette was limited to concrete and plastered brickwork (see Figures 2 and 4) – two cost-effective but robust materials with which a local SMME contractor would be familiar.

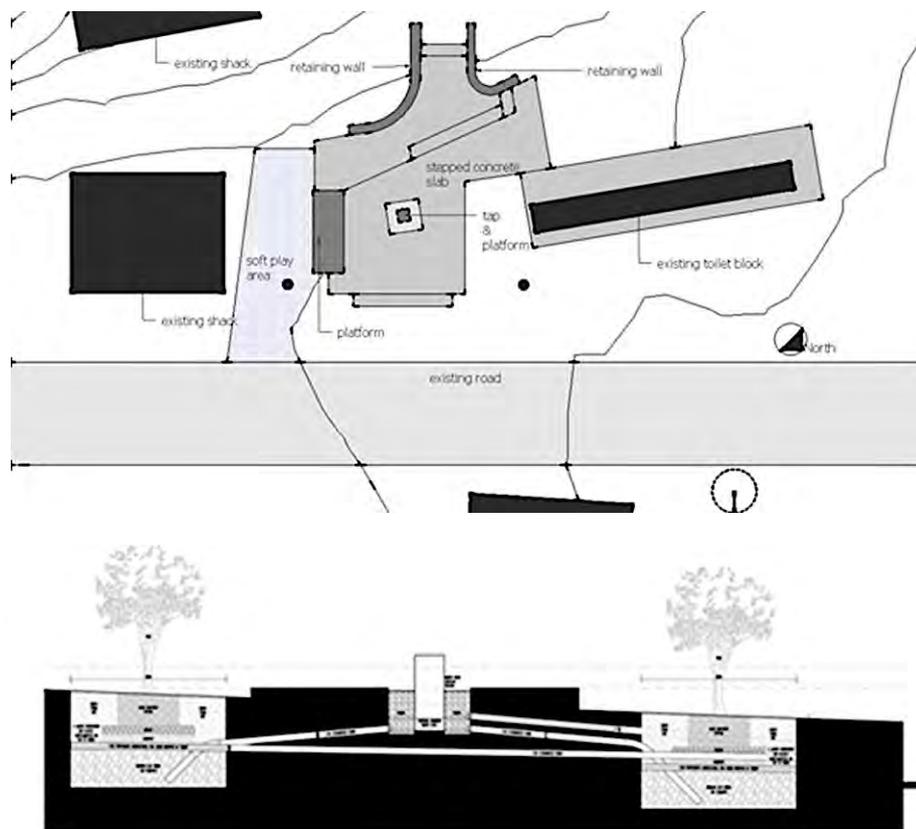


Figure 2: Sketches of the Small Public Space as Finally Designed (Plan and Section).
(Section drawing credit Jacob Parker Architects)

The retaining walls are shaped to define entrance to the Emthonjeni, and are at such a height that they can also serve as seats while doing laundry, having a chat, or playing board games. The wide platform can also be used as a seat for the same functions. Moreover, careful placement of elements and sizing of the Emthonjeni makes the space suitable for public functions. This was demonstrated during the handover ceremony where 50 people were accommodated with room for many more. The slope and stepped slab makes it possible to see and hear the speaker. On that day, the broad platform was used as a table for refreshments. From what was essentially a rubbish dump with a run-down water-point, the space was transformed into a positive outdoor space. Aesthetically disposed in pinwheel composition around the water point, the azure blue platforms promise to become and remain an integral and utile component of the evolving urban environment (Figure 4).

The above retrospective exercise using the multidimensional schema reveals some noteworthy observations in the Emthonjeni project:

- The final design and construction outcomes of this project are hard permanent elements and are of medium or premium quality. The hard elements are: the subterranean drainage system, the stepped slab, the two platforms and the two retaining walls. They are prioritised for the immediate term. Characteristically, these are high cost and of a public-use nature.
- In the intermediate and future terms, softer clip-on elements, such as such as trees, a jungle gym (public benefit), vegetable planters and a soup kiosk (private benefit), can be added. Thus, the time dimension in the schema enables scaffolding whereby the immediate solution can leverage future public and private investment initiatives.

- Hence, it is advantageous to design the above permanent elements as leverage bases for phased improvement through public and private driven design appropriation. Embedding in the PD the capacity for add-on interventions offers prospects for co-option of different proposals over time. This way, the multi-dimensional schema may facilitate well-balanced discussions as it readily manifests how diverse users' needs and interests may be accommodated in the chosen solution. Therefore, the permanent zone embodies definitive design and investment choices but should be conceived as catalytic so that, though marking closure of one PD and construction phase, it also heralds the beginning of new possibilities.



Figure 3.a
 Emthonjeni participatory design workshop
 (Source: Author)



Figure 3.a
 The site before intervention (Source: Author).



Figure 4.a
 Design Model
 (Source: Author)



Figure 4.b
 Site after intervention (before trees are planted) (Source: Author).

REFLECTIVE AND PROJECTIVE APPLICABILITY OF THE SCHEMA

The multidimensional schema offers prospects for *projective* application in envisioning future solutions and *reflective* utilisation to draw lessons from constructed artefacts.

Projectively, the multidimensional schema facilitates productive PD engagement by enhancing intersubjectivity and also due to the flexibility it adds by inclusion of budget alignment, solution ranking and temporal prioritisation. Significantly also, by framing brief and design

proposals within attributes and objectives and ultimately their underpinning values, the schema challenges participants and designers to deeply deliberate on what are appropriate design ends for investment of scarce societal resource.

Reflectively, the multidimensional schema opens up prospects to deconstruct spatial artefacts into attributes and their underpinning objectives and values. The schema is seen to be a mechanism to increase the scope of post-occupancy evaluation (POE) and precedent study beyond mere space and form to encompass the objectives and values that underpin spatial artefacts. Drawing from Appreciative Inquiry (AI), the schema can be used to deconstruct artefacts perceived as desirable by diverse participants into attributes and objectives; which in turn can spur deliberations on latent values. The empirical manifestation of shared values in desirable actions and artefacts may also trigger deliberations on questions of justice and fairness in the allocation of resources to different societal segments. In this way, the tool can be enable PD deliberations that are both critical and transformative.

Applied separately or together, projective and reflective use of the multidimensional schema offers immense capacity for enhanced engagement between design professionals and served communities. Current building PD methods are predominately focused on enabling the layman to manipulate form and space. In contrast, by foregrounding objectives and attributes as frames for design and construction this schema offers prospects for a deeper engagement with the values that underpin the normative objectives. In this way, congruent and divergent values can be uncovered to trigger deeper discussions around such questions as: is this what the community really needs? Are there important values that have been excluded? Is the opportunity cost of achieving the desired artefacts worth the values we might lose? And subsequently to agree on a set of values to inform a new set of objectives and attributes to shape the design process. Furthermore, interim outcomes of the PD process can be subjected to reflective evaluation as a means of testing the design proposals against agreed attributes and objectives.

Notably also, using AI in the schema allows designers and participants to uncover and communicate desired attributes and to use them in the subsequent stages of the process. This is particularly important considering that PD participants may struggle with articulating their tacit knowledge and in understanding designers' proposals. AI can therefore allow for intersubjective discussion of deconstructed boundary objects. Moreover, inclusion of budgetary alignment in the multidimensional schema offers the possibility for participatory budgeting. Experience in Brazil suggests that participatory budgeting can be immensely empowering (Bowns and da Silva). It gives participants a voice in determining what spatial-aesthetic objects ultimately get to be constructed. Even where the budget is fixed, participatory budgeting enable participants to have a say in determining the percentage portions of the funds for allocate to different outcomes.

The PD schema offers prospects for a critical design pedagogy that goes beyond focus on the aesthetised spatial object. The narrow focus of current education models begets ill-prepared professionals who are increasingly seen as superfluous in the eyes of society (Salama, 2008). Salama attributes this to an education that has lost touch with the needs of vast sections of society. Studio projects typically start off with a design brief to which students respond with largely abstract manipulation of spaces and form. In this paper's schema, the brief is seen to be nested within attributes, objectives and, ultimately, values. Hence, the schema opens avenues for a critical pedagogy to challenge students to analyse and evaluate underpinnings of design briefs and designed buildings. Using the schema, students can be facilitated to experience deep learning by engaging in such questions as what and whose values do design objectives and objects prioritise? Furthermore, the intersubjective schema can be used to engage students with societal constituencies to confront the values and objectives of the communities that building ought to serve. Similarly precedent analysis can go deeper than the extraction of tricks for design manipulation to problematize spatial artefacts and reveal the interests they serve and ignore. In

an active learning environment therefore, the schema can be used projectively and reflectively to develop in students the higher order skills.

DISCUSSION AND CONCLUSION

Design, even by professionals, will always have a high implicit component. But to foster and safeguard the trust that underpins successful PD processes and products, it is essential to adopt an intersubjective framework for decision-making in the PD. This paper proposes a multidimensional PD schema which fuses ideas from the Nordic framework for performance-based standards with deliberations on budget alignment, proposal ranking and temporal prioritisation. The schema acts at a meta-level to facilitate intersubjective discussion of even the highly implicit proposals in the PD. By making explicit how participants' contributions shape choices, priorities and future possibilities, use of this paper's schema can contribute to cultivating trust and optimism in the PD process, and channel PD variety into design outcome richness. Where project stakes are high, it could also serve to deflect the ardour of opposed viewpoints from negative opposition to constructive engagement.

Moreover if applied with rigour in the PD process, the schema can enhance mutual consistence between objectives, attributes and design outcomes. The deliberations and outcomes of the multi-dimensional schema, if recorded as recommended, constitute an audit-trail against which various PD proposals and outcomes can be judged both during the PD processes and afterwards in future review.

Where it is not possible to execute all the five steps of the schema, it does seem that focussing the PD process on setting objectives and definition of attributes is much more empowering to lay participants than engaging in the more detailed specialised aspects of design. That is, it is more empowering to set the rules of the game, than to play. With this framework also, opportunity is availed for lay participants to act as arbiters of the professionals' design proposals under rules which they themselves (the participants) contributed to defining. The objectives and attributes serve as a basis by which participants can hold the designers accountable. This way, justification of professionals' viewpoints and proposals can cease being exclusively based on abstruse notions of scientific or professional knowledge.

The schema originates from reflections on spatial-aesthetic PD. It therefore has a degree of generalisability in spatial-aesthetic PD. More broadly, to the extent that the Nordic framework for performance based standards is applicable to product design, this paper's schema could be of relevance to PD of other products. To the author's knowledge, this is the first time that the Nordic framework has explicitly been used as part of a decision-framing mechanism for PD. The multidimensional intersubjective schema is novel and has significant implications for participatory design, design pedagogy, professional practice and research.

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Objectives: defined by SUN-VPUU as building safe integrated communities and encapsulated in a Spatial Reconfiguration Plan (SRP) for Monwabisi Park.

Attributes(function): e.g. ergonomics and comfort; safety; security; health and hygiene; functional mutability		5. Prioritisation of design proposals				
		Immediate	Intermediate	Future	Exclude	
Objectives Attributes (constructional integrity): structural and material integrity, robustness as a piece of public furniture; durability; maintainability; constructional malleability	3. Definition & sorting of brief constitutes	4. Generation & ranking of design proposals				
	Taps					
	Laundry platforms					
	Drying lines					
	Drainage					
	Benches					
	Swimming pool					
	Soup kitchen					
	Play facility					
	Toilets		O&M plan only			
	Showers					
	Shelter					
	Storage					
	Light					
	Fence					
	Ground cover					
	Rainwater harvesting					
	Trees					
	Vegetable garden					
	Tap	Minimum: Leave existing as is Medium: Upgrade existing tap improve ergonomics of water fetching by building a platform around existing tap Premium: New tap elsewhere on site				
	Laundry platforms	Minimum: fetch water, sit on adjacent platform & wash Medium: laundry at fixed trough with a tap Premium: none defined				
	Drainage	Minimum: leave as is Medium: slab to falls Premium: surface and subterranean drainage as per good engineering practice specs				
Benches	Minimum: basic bench; no backrest Medium: Ceramic mosaics applied to concrete bench. Premium: bespoke bench					
Shelter	Minimum: from sun and wind (trees and other vegetation) Medium: Trellis + roof Premium: a complete small building (with soup kiosk inclusive)					
Light	Minimum: sun light Medium: solar powered night light Premium:					
Ground cover	Minimum: Concrete screed on compacted soil Medium: Concrete slab and screed Premium: Terrazo on concrete screed					
Play facility	Minimum: open space Medium: Jungle gym Premium: Digital facilities					
Attributes (sustainability): e.g. affordability; environmental conservation; capacity for job crea						

Attributes(aesthetics): e.g. aesthetics of spaces and forms; sensitivity to community tastes

Appendix A - Figure 5: Retrospective Application of the Multi-dimensional Schema to the Emthonjeni Participatory Design Project [O&M = operation and maintenance plan]

EVALUATION OF A POPULAR SHOPPING MALL BUILT TO ACCOMMODATE PREVIOUS STREET VENDORS IN DOWNTOWN PORTO ALEGRE

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Abstract

The objective of this paper is to evaluate a popular shopping mall, named the CPC, focusing on its location, use, aesthetics and security. The global and local integration values of streets surrounding the CPC and the former Square XV Camelódromo are compared in order to evidence their level of accessibility. Concerning use, the following specific objectives are investigated: retailers' and CPC users' preference for a popular shopping mall type and CPC users' knowledge and shopping routines in the former Square XV Camelódromo; retailers' and CPC users' levels of satisfaction with the CPC, evaluations of the CPC building and shops location regarding sales, assessments of the existence of a food court and a bus terminal in the CPC building. In relation to aesthetics, retailers' and CPC users' evaluations of the internal appearance of the CPC, and retailers', CPC users' and architects' assessments of the external appearance of the CPC are revealed. Moreover, retailers' and CPC users' evaluations of security in the bus terminal in the CPC building and in downtown Porto Alegre are identified. Data gathering methods included archival surveys, physical measurements, behavioral observations, and questionnaires. Data were analyzed through non-parametric statistical tests and space syntax methods. Results corroborate findings of other studies regarding the need for movement of people and visibility of shops at ground level, in order to achieve a satisfactory sales performance. Moreover, the CPC external appearance tends to be differently evaluated among retailers, CPC users and architects.

Keywords: Shopping Mall; Location; Use; Aesthetics; Security.

INTRODUCTION

Informal street trade in Brazilian cities has been a concern to local governments due to its competition with nearby formal business and its obstruction of movement of people in the public spaces (Rigatti, 2003). Thus, in order to remove street vendors from downtown public spaces the implementation of popular shopping malls has been among the goals of redevelopments of urban areas in several Brazilian cities such as Porto Alegre, Belo Horizonte, Fortaleza and Joao Pessoa (Prefeitura Municipal de Joao Pessoa, 2010; Neves, Jayme, Zambellini, 2006; Dantas, 2005). Similarly, local governments of cities such as New York and Bogota have relocated street vendors to liberate public spaces for pedestrian circulation (p. ex. Donovan, 2008, 2002; Ya-Ting Liu, 2007; Devlin, 2006).

In order to achieve a successful outcome, such street vendors relocations and the consequent change of their condition to retailers in the new developments must consider shopping requirements (Zambellini, 2006). Shops need to be located in areas with a significant flow of people and/or activities that provide social gathering, as demand for products that are not basic necessities, such as toys and electronic equipments, depends on the opportunities created by meetings (Vargas, 2001; Rigatti, 2003). The less needed the products are, the more strategies are needed to encourage occasional purchases made by impulse. In this sense, a former study already emphasized the importance of shop location in order to reach as many customers as



possible and increase sales (Lay and Oliveira, 2007). Early research shows that shops tend to be located along the most spatially integrated (accessible) streets (Hillier et al., 1993) and in streets with a high degree of connectivity to nearby streets (Hillier, 1999). Additionally, sales also depend on adequate visibility of the shops and on buildings configurations that do not divide the flow of customers (Vargas, 2001).

Nonetheless, distinct buildings configurations and locations were used in Brazilian cities to accommodate former street vendors. The local government of Belo Horizonte used an old brewery to relocate street vendors in the new Oiapoque Shopping (Figures 1 and 2). Shops were distributed on two floors and in the building courtyards and a public transport terminal was built to attract more people to the Shopping (Zambellini, 2006). The original building configuration and direct relationship with the public open spaces have been preserved, allowing pedestrians to visualize the shops.



Figure 1. View of Oiapoque Shopping. (Source: Google Earth, 2014).



Figure 2. Access to Oiapoque Shopping. (Source: Google Earth, 2014).

In others Brazilian cities, such as Porto Alegre and Joao Pessoa, new buildings were specifically designed to accommodate previous street vendors. Varadouro Shopping Center (Figure 3), located near a bus station in Joao Pessoa, consists of a two storey building with shops distributed on each floor (Prefeitura Municipal de Joao Pessoa, 2010). The configuration of a popular

shopping mall in Porto Alegre (CPC – ‘Centro Popular de Compras’), in turn, shows two blocks, three storeys high, connected by covered walkways crossing over Julio de Castilhos Avenue, with shops located on the second floor (Figures 4, 7,8 and 14).



Figure 3. Varadouro Shopping. (Source: Google Earth, 2011).



Figure 4. CPC. (Source: Celina de Pinho Barroso, 2009).

So far, however, no conclusive evidences from studies regarding the location, use, aesthetics, and security of buildings with different configurations used to accommodate previous street vendors, were found. This applies to the Popular Shopping Mall (CPC) in Porto Alegre, although press reports (Zero Hora, 2009a; Zero Hora, 2009b; Daroit, 2009) pointed out several problems, such as poorly built construction of buildings, tenants' arrears, small number of customers and

occurrence of vandalism. Moreover, it is not known if the CPC distinct downtown location comparing to the former Square XV Camelódromo location (the early street vendors area; Figure 5) may have had any effect on movement of people and sales in the CPC.



Figure 5. Square XV Camelódromo – former main location of street vendors in downtown Porto Alegre, before the construction of the CPC. (Source: Celina de Pinho Barroso, 2009).

Therefore, the objective of this paper is to evaluate the popular shopping mall in downtown Porto Alegre, namely the CPC ('Centro Popular de Compras' - Popular Shopping Mall; Figure 4), focusing on its location, use, aesthetics and security. Regarding location, the global and local integration values of streets surrounding the CPC and the former Square XV Camelódromo (Figure 11) are compared in order to evidence their level of accessibility. Concerning use, the following specific objectives are investigated: retailers' and CPC users' preference for a popular shopping mall type and CPC users' knowledge and shopping routines in the former Square XV Camelódromo; retailers' and CPC users' levels of satisfaction with the CPC; retailers' and CPC users' evaluations of the CPC building and shops location regarding sales; retailers' and CPC users' assessments of the existence of a food court in the CPC; and retailers' and CPC users' evaluations of the incorporation of a bus terminal to the CPC building. In relation to aesthetics, retailers' and CPC users' assessments of the internal appearance of the CPC, and retailers', CPC users' and architects' appraisals of the external appearance of the CPC are revealed. Moreover, retailers' and CPC users' evaluations of security in the bus terminal, in the CPC building and in downtown Porto Alegre are identified.

METHODOLOGY

The object of this study, a popular shopping mall (CPC) located in a busy downtown area in Porto Alegre (Figure 6), characterized by services and commerce, was licensed by the Local Department of Industry and Commerce and inaugurated on February 9th, 2009. The CPC intended to accommodate 800 former street vendors previously working at the Square XV Camelódromo (Figure 6), also located in the city center of Porto Alegre. The building has an area of 20,000 m² (twenty thousand square meters), constituted by two blocks (A side and B side) divided in three floors: in the ground floor (Figure 7) there is a bus terminal for more than 50 bus lines and by the time of this investigation there were 28 city bus lines on A side and 21

metropolitan lines on B side; in the second floor (Figure 8) there are shops (rented to retailers that were previous street vendors), a food court and other services; and the third floor is constituted by 216 parking spaces, a restaurant and the administration sector (Prefeitura Municipal de Porto Alegre, 2009).



Figure 6. Location of CPC and the former Square XV Camelódromo (main location of street vendors in downtown Porto Alegre, before construction of the CPC). (Source: Adapted from Google Earth by Celina de Pinho Barroso).

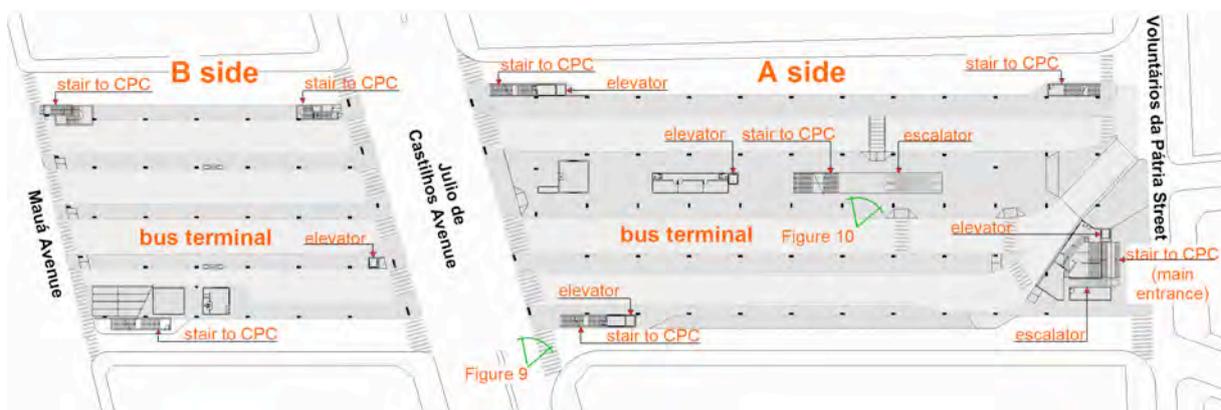


Figure 7. CPC ground floor plan. (Source: Adapted from Prefeitura Municipal de Porto Alegre, 2009).

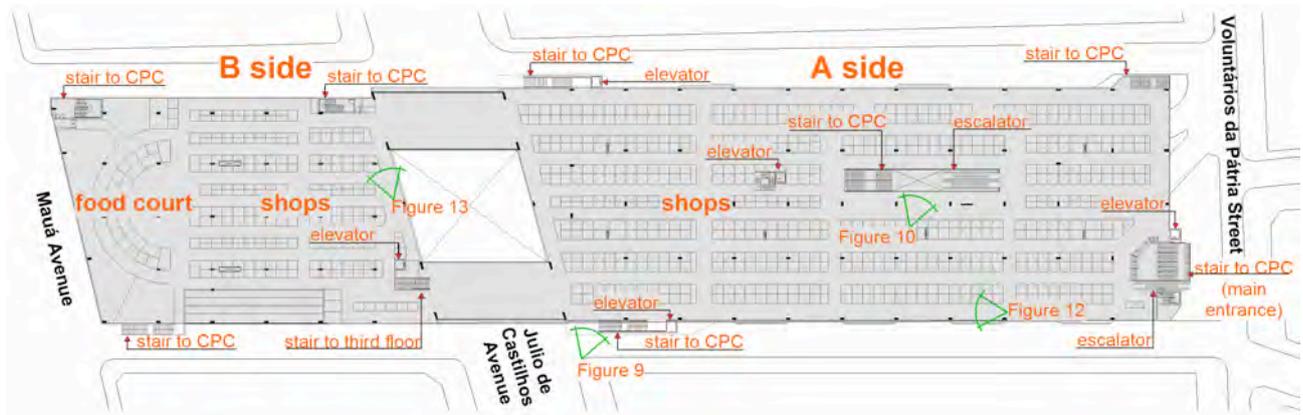


Figure 8. CPC second floor plan. (Source: Adapted from Prefeitura Municipal de Porto Alegre, 2009).

The access to the shops located on the second floor of the CPC occurs via stairs (Figures 7 and 9), escalators (Figures 7 and 10) and elevators; there are six staircases (five on A side and one on B side), two escalators on A side and five elevators (four on A side and one on B side; Figures 7 and 8). Universal accessibility for people with disabilities and reduced mobility is provided by the five elevators.

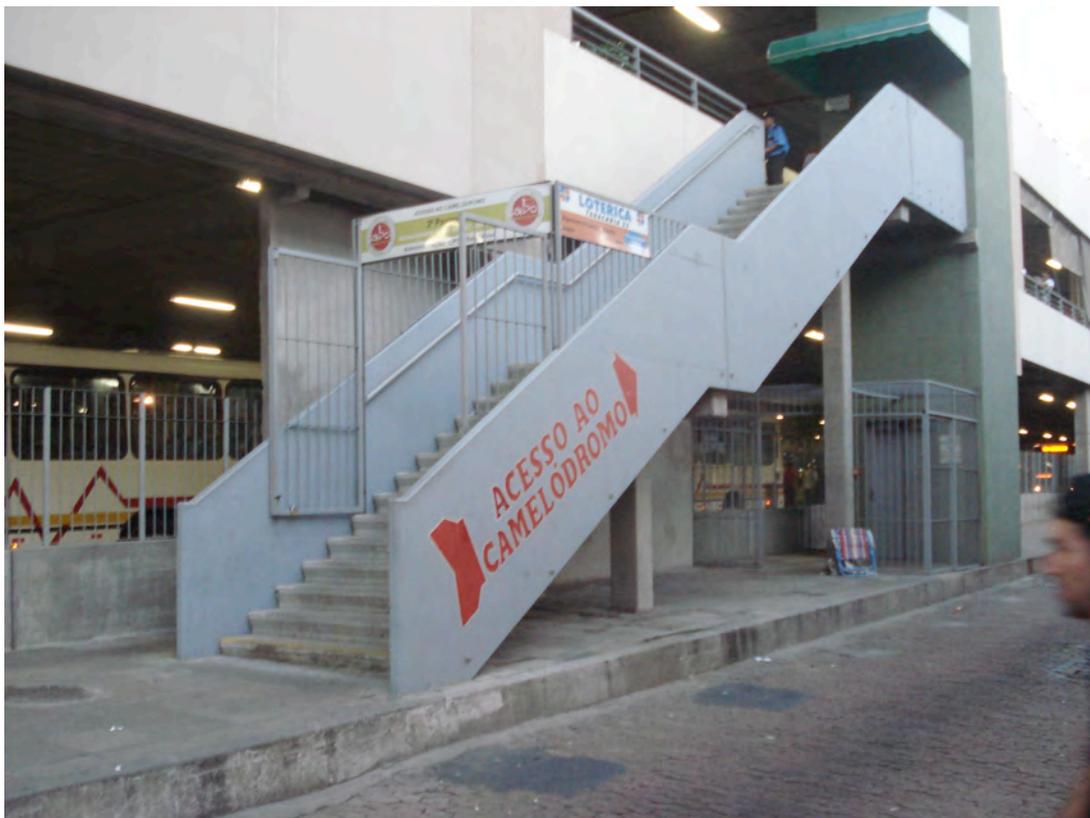


Figure 9. External access to the shops on A side. (Source: Author, 2009).



Figure 10. Access to the shops on A side by the bus terminal. (Source: Author, 2009).

Physical measurements, archival surveys, and behavioral observations were carried out, and questionnaires were administered to a sample of 128 respondents (Table 1), by the end of October and beginning of November 2009, nine months after the inauguration of CPC. Visits were made to the CPC during the morning of 22nd October in order to apply a pilot questionnaire. The final questionnaires were specific for each of the four groups (Table 1) and were applied during mornings and afternoons of the 29th and 30th October and morning of 5th November 2009 to CPC users (customers of shops and food court, and users of the bus terminal) and retailers. During this period questionnaires were also applied to architects at the Faculty of Architecture (UFRGS – Federal University of Rio Grande do Sul), at Porto Alegre City Council, and to city center users.

Table 1: Groups, subgroups and number of the respondents (Source: Author, 2012).

GROUPS	SUBGROUPS	NUMBER OF THE RESPONDENTS	TOTAL
Retailers (previous street vendors)	Retailers A side	17	31
	Retailers B side	14	
CPC users	Customers of shops	11	32
	Customers of food court	11	
	Users of the bus terminal	10	
Architects		33	33
City center users		32	32
TOTAL		128	128

Questionnaires including questions related to all the investigated variables were applied to retailers and CPC users; questionnaires with questions related to CPC external appearance were applied to architects and questionnaires with questions about shopping in the CPC and in the former Square XV Camelódromo were applied to city center users.

The external appearance of the CPC was evaluated considering the view from Julio de Castilhos Avenue - View 1 (Figure 14) and by comparison to a simulated view from the same observation point excluding the CPC building - View 2 (Figure 15), since these views reveal the major aesthetic impact produced by the CPC on the urban landscape. The quantitative data from the questionnaires were analyzed in SPSS (Statistical Package for the Social Sciences).

Nonparametric statistical tests such as Mann-Whitney U, Kruskal-Wallis and Spearman were performed with groups of respondents with, at least, 30 subjects (Table 1), which is considered an acceptable sample size to carry out nonparametric statistical tests [e.g. Reis, 1992, referring to Leedy's (1989) considerations].

Space syntax analysis was used in order to reveal location attributes through the global (considering all the other lines from each line in the urban system; in this case, the axial map of Porto Alegre) and local (considering only two steps, or two lines, from each line in the system) integration values of axial lines giving access to CPC and to the former Square XV Camelódromo. Higher integration values mean higher accessibility whereas lower integration values mean lower accessibility or higher segregation (Hillier and Hanson, 1984).

RESULTS AND DISCUSSION

Following the objectives, results are shown according to the main aspects of location, use, aesthetics and security.

Location - CPC and the former Square XV Camelódromo level of accessibility

In order to evidence their level of global accessibility, a comparison between the global integration values of streets giving direct access to CPC and to the former Square XV Camelódromo shows that these values are very similar, indicating a high level of accessibility in the urban system of Porto Alegre in both cases (Table 2; Figure 11). Moreover, although both are highly locally integrated, lines giving direct access to the CPC are slightly more locally integrated than those giving direct access to the former Square XV Camelódromo. This indicates that the first is a bit more accessible in downtown Porto Alegre than the second, suggesting that the location of CPC is very similar to the former Square XV Camelódromo in terms of being benefited by the movement of people (Table 2).



Figure 11. Axial map of CPC and former Square XV Camelódromo. (Source: Google Earth; axial map by Fábio Lúcio Zampieri, 2015).

Table 2: Global and local integration values of axial lines giving access to CPC and to former Square XV Camelódromo (Source: Author, 2015).

Line number	Street name	Global Integration	Local Integration R2
LINES GIVING DIRECT ACCESS TO CPC			
13803	Rui Barbosa Square	0,41752291	3,2369771
13804	Rui Barbosa Square (1)	0,41101205	2,8957148
13870	Mauá Avenue	0,41580322	4,5189767
13938	Senhor dos Passos Street	0,42479992	3,8564856
13941	Dr. Flores Street	0,4294745	4,120677
14199	Julio de Castilhos Avenue	0,4113082	4,605505
14200	Voluntários da Pátria Avenue	0,42542589	4,514534
Mean values		0,41933524	3,96412431
LINES GIVING DIRECT ACCESS TO FORMER SQUARE XV CAMELÓDROMO			
13940	Otávio Rocha Street	0,41462445	3,0307732
14196	Marechal Floriano Street	0,41774726	3,9872499
14197	Pereira Parobe Square	0,41047582	2,208734
14200	Voluntários da Pátria Avenue	0,42542589	4,514534
14201	Quinze de Novembro Square	0,40465194	2,3684211
14202	Jose Montauray Street	0,41892192	2,8350682
14205	Marechal Floriano Street	0,42969987	5,0405025
14254	Montevideo Square - Quinze de Novembro Square	0,4194065	5,3495517
Mean values		0,417619206	3,66685432

Use – Retailers’ and CPC users’ preference for a popular shopping mall type and CPC users’ knowledge and shopping routines in the former Square XV Camelódromo

Considering the former Square XV Camelódromo, the CPC and other type of a popular shopping mall specified by the respondent, 92.96% of CPC users (27 out of 29) prefer the CPC (Table 3). The main reasons are the sheltered space of the building (40.7% - 11 out of 27), organization (33.3% - 9 out of 27) and security (18.5% - 5 out of 27). The clear preference of users for the CPC demonstrates the importance of having adequate space for shopping with protection from the weather, organized and safe. However, when questioned about types of popular shopping malls, many respondents were unable to think about any other type apart from the CPC itself.

Table 3: Preference for a popular shopping mall type including the CPC and the former Square XV Camelódromo (Source: Author, 2015).

	retailers A side	retailers B side	retailers (total)	customers of shops	customers of food court	bus terminal users	CPC users (total)
total	15 (100%)	14 (100%)	29 (100%)	10 (100%)	10 (100%)	9 (100%)	29 (100%)
Camelódromo	8 (53.3%)	4 (28.6%)	12 (40.9%)	0	0	1 (11.1%)	1 (3.7%)
CPC	6 (40.0%)	3 (21.4%)	9 (30.7%)	10(100%)	9 (90.0%)	8 (88.9%)	27(92.96)
Shop in square	1 (6.7%)	2 (14.3%)	3 (10.5%)	0	0	0	0
Square Ughini	0	1 (7.1%)	1 (3.55%)	0	0	0	0
CPC ground floor	0	2 (14.3%)	2 (7.15%)	0	0	0	0
On the street	0	2 (14.3%)	2 (7.15%)	0	0	0	0
None	0	0	0	0	1 (10%)	0	1 (3.33%)

Nonetheless, the expressive majority of CPC users (90.6% - 29 out of 32) knew the former Square XV Camelódromo and 65.6% (21 of 32) used to shop there (Tables 4 and 5). Therefore, most CPC users were able to compare the CPC and the Square XV Camelódromo.

Table 4: Knowledge about the Square XV Camelódromo (Source: Author, 2015).

	customers of shops	customers of food court	bus terminal users	CPC users (total)
total	11 (100%)	11 (100%)	10 (100%)	32 (100%)
yes	10 (90.9%)	10 (90.9%)	9 (90.0%)	29 (90.6%)
no	1 (9.1%)	1 (9.1%)	1 (10.0%)	3 (9.4%)

Table 5: Shopping in the former Square XV Camelódromo (Source: Author, 2015).

	customers of shops	customers of food court	bus terminal users	CPC users (total)
total	10 (100%)	10 (100%)	9 (100%)	29 (100%)
yes	8 (80.0%)	9 (90.0%)	4 (44.4%)	21 (71.4%)
no	2 (20.0%)	1 (10.0%)	5 (55.6%)	8 (28.5%)

On the other hand, only 30.7% (9 out of 29) of the retailers (former street vendors at Square XV Camelódromo) prefer the CPC, while 40.9% (12 out of 29) prefer the former Square XV Camelódromo (Table 3) due to higher sales (75% - 9 out of 12), direct access from nearby streets (33.3% - 4 out of 12) and the presence of more people (33.3% - 4 out of 12). The main reasons for the preference for the CPC are security (66.7% - 6 out of 9), a better ambience (44.4% - 4 out of 9) and organization (33.3% - 3 out of 9). Therefore, the main reasons mentioned by retailers to justify preference for the former Square XV Camelódromo reveals the great importance for them of sales number, access and movement of people.

Use – Retailers’ and CPC users’ levels of satisfaction with the CPC

Regarding satisfaction with the CPC in general, a significant percentage of respondents (31.48% - 19 out of 63) considers it unsatisfactory or very unsatisfactory. Nonetheless, a statistically significant difference (Mann-Whitney U, sig.=.000) was found between retailers’ and CPC users’ degree of satisfaction with the CPC. Most retailers (56.30% - 17 out of 31) were dissatisfied or very dissatisfied, while the clear majority (90% - 29 out of 32) of CPC users (customers of shops, customers of food court and users of the bus terminal) evaluated the CPC as satisfactory or very satisfactory (Table 6). Hence, these results are consistent with retailers’ and CPC users’ preference for a popular shopping mall type.

Table 6: Degree of satisfaction with the CPC (Source: Author, 2015).

GROUPS	v.sat.	sat.	n.n.	dis.	v.dis.	m.r.	Total
Retailers A side	0	6 (35,3%)	4 (23,5%)	3 (17,6%)	4 (23,5%)	-	17
Retailers B side	0	0	4 (28,6%)	6 (42,9%)	4 (28,6%)	-	14
Customers of shops	4 (36,4%)	7 (63,6%)	0	0	0	-	11
Customers of food court	2 (18,2%)	9 (81,8%)	0	0	0	-	11
Users of bus terminal	0	7 (70%)	1 (10%)	2 (20%)	0	-	10
Retailers - total	0	6 (17,65%)	8 (26,05%)	9 (30,25%)	8 (26,05%)	19,74	31
Users of CPC - total	6 (18,2%)	23 (71,8%)	1 (3,33%)	2 (6,66%)	0	43,88	32

Note. v.sat.= very satisfied; sat.= satisfied; n.n.= neither satisfied nor dissatisfied; dis.= dissatisfied; v.dis.= very dissatisfied; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (32).

Retailers’ opinions reflect their knowledge about the CPC as a result of their daily experience and long stay in the shops during the day in different seasons of the year. However, retailers near the main entrance to the building on A side (Figure 8) are less dissatisfied with the CPC (41.1% dissatisfied or very dissatisfied - 7 out of 17) than the retailers on the B side (71.5% dissatisfied or



very dissatisfied - 10 out of 14). The number and location of alternative entrances to the CPC (on the second floor of the building) generate differences in the number of customers in A and B sides, greater in A side as observed during visits to the CPC. So, this may justify the existing difference in the degree of satisfaction between retailers in A and B sides. While A side has eleven points of access (Figures 7 and 8), with escalator (Figure 8), staircases (Figures 7 and 8) and elevator, B side has only two, of which one access occurs via staircase when entering from Maua Avenue and the other access is via elevator adjacent to Julio de Castilhos Avenue (Figures 7 and 8).

Although CPC users are much more satisfied with CPC than the retailers (Table 6), according to the responses of 32 City Center users the number of these who usually buy in the CPC is 17 % lower than the number that used to buy in the former Square XV Camelódromo, revealing that the first has attracted fewer customers than the second used to attract. Nonetheless, the most mentioned reasons given by customers of shops in CPC are the low price of merchandise (52.3% - 11 out of 21) and the fact that they were passing by (33.3% - 7 out of 21), what supports the importance of location and people moving around a popular shopping to improve sales performance.

Use – Retailers’ and CPC users’ evaluations of the CPC building and shops location regarding sales

According to 81.3% (26 out of 32) of CPC users, the CPC building contributes to sales (Table 7) due to weather protection and comfort (76.9% - 20 out of 26), and safety (26, 9% - 7 out of 26), considered as improvements in comparison to the exposed open space of the former Square XV Camelódromo (Figure 5).

Table 7: Evaluation of the CPC building regarding sales (Source: Author, 2015).

contributes to sales	retailers A side	retailers B side	retailers (total)	customers of shops	customers of food court	users of bus terminal	users (total)
yes	9 (52.9%)	4 (28.6%)	13 (41.9%)	10(90.9%)	8 (72.7%)	8 (80%)	26(81.3%)
no	8 (47.1%)	10 (71.4%)	18 (58.1%)	1 (9.1%)	3 (27.3%)	2 (20%)	6 (18.8%)
total	17(100%)	14 (100%)	31 (100%)	11 (100%)	11 (100%)	10 (100%)	32 (100%)

On one hand, 58.1% (18 out of 31) of the retailers think that the CPC building does not contribute to sales, due to: the difficulty of access and low visibility of the shops located at the second floor (27.7% - 5 out of 18); the fact that shops would be better located at the street level (27.7% - 5 out of 18); and to the thermal discomfort (hot and humid, no cross ventilation) inside the building (16.6% - 3 out of 18). On the other hand, health problem caused by exposure to weather and thermal variations was the major complaint streets vendors’ had regarding the Square XV Camelódromo (Machado, 2003). Nonetheless, despite the protection from the weather in the CPC building, according to many retailers, this feature does not replace the benefits of the being connected to the street regarding amount of people and sales. In total, 80.6% (25 out of 31) of retailers were dissatisfied or very dissatisfied with the sales in the CPC (Table 8). When asked to compare sales in CPC to sales in the former Square XV Camelódromo (Figure 5), 82.5% (18 out of 23) of all retailers and 100% of those located on B side said sales have decreased a lot in the CPC.

As expected, the correlation between the degree of retailers’ satisfaction with the CPC and the degree of retailers’ satisfaction with sales (Spearman, $c=.635$, $sig.=.000$), confirms that satisfaction with sales affects retailers’ satisfaction with the CPC. The main reasons associated with dissatisfaction with sales by retailers are: low movement of people (32% - 8 out of 25); high costs of rent and tax (28% - 7 out of 25); and poor access to shops on the second floor of the CPC (20% - 5 out of 25). This result is in accordance with the evaluations of Oiapoque Popular Shopping Mall in Belo Horizonte which shows that sales tend to be drastically reduced when shops are not on the ground floor (Zambellini, 2003).



Table 8: Retailers' satisfaction with sales in CPC and comparison to sales in the former Camelódromo (Source: Author, 2015).

DEGREE OF RETAILERS' SATISFACTION WITH SALES IN CPC						
	v.sat.	sat.	n.n.	dis.	v.dis.	Total
Retailers A side	0	3 (17,6%)	2 (11,8%)	5 (29,4%)	7 (41,2%)	17
Retailers B side	0	0	1 (7,1%)	4 (28,6%)	9 (64,3%)	14
Retailers - total	0	3 (8,8%)	3 (9,4%)	9 (29,0%)	16 (52,7%)	31(100%)
SALES IN CPC COMPARED TO SALES IN THE CAMELÓDROMO OF SQUARE XV:						
	g. incr.	incr.	n.n.	decr.	g. decr.	Total
Retailers A side	0	2 (14,3%)	2 (14,3%)	1 (7,1%)	9 (64,3%)	14
Retailers B side	0	0	0	0	9 (100%)	9
Retailers - total	0	2 (7,15%)	2 (7,15%)	1 (3,55%)	18(82,5%)	23(100%)

Note. v.sat.= very satisfied; sat.= satisfied; n.n.= neither satisfied nor dissatisfied; dis.= dissatisfied; v.dis.= very dissatisfied; g. incr. = greatly increased; incr.= increased; n.n. = neither increased nor decreased; decr. = decreased; g. decr. = greatly decreased.

Additionally, a statistically significant difference (Mann-Whitney U, sig.=.000) was found between retailers' and CPC users' perception about the convenience of shops location at the second floor (Table 9). Among retailers, 83.3% (25 out of 31) believe that this configuration is unfavorable or very unfavorable to sales. The responses are also in line with newspaper news (Rodrigues, 2009) which revealed that, since the early days of CPC functioning, retailers were not satisfied with its infrastructure and asked for improvements to facilitate access by customers in order to boost sales. According to some retailers, sales decreased more than 50% since they moved from the former location in the streets to the CPC (Rodrigues, 2009), reinforcing previous results. The problem was acknowledged by Local Authority and as an alternative to improve sales in June 2009, the City Council and the CPC Administration took the initiative of changing CPC (Popular Shopping Mall) name to 'Porto Shopping - Camelódromo' (Zero Hora, 2009c) as this name was supposed to convey a better or refined CPC image. However this expectation of attracting more customers to the site did not occur, as revealed by the results of the CPC evaluation.

The percentage of dissatisfied CPC users (25% - 8 out of 32) with this configuration is substantially lower when compared to retailers' dissatisfaction; however, it is still significant the fact that a quarter of the CPC users who answered the questionnaire were dissatisfied with the location of shops on the second floor (Table 9).

Table 9: Evaluation of the location of shops on the second floor regarding sales (Source: Author, 2015).

	m.conv.	conv.	n.n.	inconv.	v.inconv.	m.r.	Total
Retailers A side	0	1 (6,3%)	2 (12,5%)	4 (25%)	9 (56,3%)	-	16
Retailers B side	0	0	2 (14,3%)	2 (14,3%)	10 (71,4%)	-	14
Customers of shops	0	2 (18,2%)	8 (72,7%)	1 (9,1%)	0	-	11
Customers of food court	0	6 (54,5%)	2 (18,2%)	3 (27,3%)	0	-	11
Users of bus terminal	0	5 (50%)	1 (10%)	3 (30%)	1 (10%)	-	10
Retailers (total)	0	1 (3,3%)	4 (13,3%)	6 (20%)	19 (63,3%)	19,37	30
Users of CPC (total)	0	13 (40,6%)	11 (34,4%)	7 (21,9%)	1 (3,1%)	42,88	32

Note. v.conv.= very convenient ; conv.= convenient; n.n.= neither convenient nor inconvenient; inconv.= inconvenient; v.inconv.= very inconvenient; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (30) and the group of CPC users (32).

Use – Retailers' and CPC users' evaluations of the existence of a food court in the CPC

The existence of the food court in the CPC was considered as positive or very positive by 77.65% of respondents (49 out of 63). Among the CPC users, 87.5% (28 out of 32) positively evaluate the existence of places for meals and snacks and 82.1% of these (23 out of 28) mentioned the convenience of these areas as the main reason. However, 43.3% of CPC users (13 out of 30) do

not use the food court and 20% (6 out of 30) used it at most once a week. In turn, 72,7% (8 out of 11) of customers of food court shop at the CPC.

Among the retailers, 67.7% (21 out of 31) consider as positive or very positive the existence of a food court and 58.1% (18 out of 31) assume that these spaces contribute to sales. Moreover, 35.4% of retailers (11 out of 31) understand that the existence of a restaurant and snack bars facilitates their meals and 25.8% (8 out of 31) think that the food court attracts the public, while 12.9 % (4 out of 31) believe these places do not attract the public and do not affect sales. No further explanation was found for retailers in B side being much less satisfied (50% satisfied) with the nearby food court (Figure 8) than the retailers in A side (82.4% satisfied; Table 10). Nonetheless, the existence of correlation between levels of retailers' satisfaction with the existence of the food court and with the CPC (Spearman, $c=.393$, $sig.=.029$), shows that retailers' satisfaction with the CPC is influenced by the existence of places for meals and snacks in the building.

Table 10: Evaluation of the existence of the food court in the CPC (Source: Author, 2015).

	v. positive	positive	n.n.	neg.	v. neg.	m.r.	Total
Retailers A side	7 (41.2%)	7 (41.2%)	3 (17.6%)	0	0	-	17
Retailers B side	2 (14.3%)	5 (35.7%)	6 (42.9%)	0	1 (7.1%)	-	14
Customers of shops	2 (18.2%)	8 (72.7%)	1 (9.1%)	0	0	-	11
Customers of food court	4 (36.4%)	7 (63.6%)	0	0	0	-	11
Users of bus terminal	1 (10%)	6 (60%)	3 (30%)	0	0	-	10
Retailers - total	9 (29%)	12 (38.7%)	9 (29%)	0	1 (3.2%)	30.47	31
Users of CPC - total	7 (21.9%)	21 (65.6%)	4 (12.5%)	0	0	33.48	32

Note. v. positive= very positive; n.n. = neither positive nor negative; neg. = negative; v.neg.= very negative; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (32).

Use – Retailers' and CPC users' evaluation of the incorporation of the bus terminal to the CPC building

The strategy of locating the bus terminal at the ground floor of the CPC building might be in accordance with the idea of using the movement of public transport users to promote sales in the CPC. However, it is evident that the terminal operates independently, with almost no visual integration (Figure 10) and with limited physical connection on B side (only one elevator and one stairs) to the shops at the second floor (Figures 7 and 8). Hence, the architectural features appear to explain why only 30% (3 out of 10) of users of the bus terminal purchase goods at the CPC.

In turn, a significant percentage of respondents (28.7% - 18 out of 63) are dissatisfied or very dissatisfied with the incorporation of the bus terminal to the CPC building (Table 6). However, there is a statistically significant difference (Mann-Whitney U, $sig.=.002$) between retailers' and users' levels of satisfaction with such integration. Among the retailers, 38.7% (12 out of 31) are dissatisfied with the integrated CPC building, and 56.6% (17 out of 31) consider that this integration does not contribute to sales. Moreover, 50% (6 out of 12) of dissatisfied retailers consider that it does not attract public and 41.6% (5 out of 12) believe that it would be better if the shops were located at street level. On the other hand, the main reason mentioned by satisfied retailers (35.5% - 11 out of 31) with the integrated CPC building was convenience of having the shops and the bus terminal in the same building (54.5% - 6 out of 11).

Among CPC users, 75% (24 out of 32) are satisfied or very satisfied with the incorporation of the bus terminal to the CPC building (Table 11), the main reason being the convenience of having the shops and the bus terminal in the same building (50% - 12 out of 24). Despite this positive evaluation, 53.1% of CPC users (17 out of 32) do not use the terminal and 9.4% (3 out of 32) use the bus terminal at most once a week.



Table 11: Evaluation of the incorporation of the bus terminal to the CPC building (Source: Author, 2015).

	v.sat.	sat.	n.n.	dis.	v.dis.	m.r.	Total
Retailers A side	1 (5.9%)	8 (47.1%)	5 (29.4%)	1 (5.9%)	2 (11.8%)	-	17
Retailers B side	0	2 (14.3%)	3 (21.4%)	6 (42.9%)	3 (21.4%)	-	14
Customers of shops	3 (27.3%)	4 (36.4%)	1 (9.1%)	3 (27.3%)	0	-	11
Customers of food court	1 (9.1%)	7 (63.6%)	0	2 (18.2%)	1 (9.1%)	-	11
Users of bus terminal	1 (10%)	8 (80%)	1 (10%)	0	0	-	10
Retailers - total	1 (3.2%)	10 (32.3%)	8 (25.8%)	7 (22.6%)	5 (16.1%)	25.27	31
Users of CPC - total	5 (15.6%)	19 (59.4%)	2 (6.3%)	5 (15.6%)	1 (3.1%)	38.52	32

Note. v.sat.= very satisfied; sat.= satisfied; n.n.= neither satisfied nor dissatisfied; dis.= dissatisfied; v.dis.= very dissatisfied; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (32).

The impact of the incorporation of the bus terminal to the CPC building on levels of satisfaction with the CPC building is supported by the existence of a correlation between such levels of satisfaction, either in the group of users (Spearman, $c=.378$, $sig.=.033$) or in the group of retailers (Spearman, $c=.378$, $sig.=.036$).

Aesthetics – Retailers’ and CPC users’ evaluations of the internal appearance of the CPC

The internal appearance of the CPC is negatively evaluated by 40.3% (25 out of 62) of the total respondents and no statistically significant difference between the evaluations of retailers and users was found. It was negatively evaluated by 51.6% (16 out of 31) of the retailers and by 29% (9 out of 31) of the total CPC users (Table 12).

Table 12: Evaluation of the internal appearance of the CPC (Source: Author, 2015).

	v. beautiful	beautiful	n.n.	ugly	v. ugly	m.r.	Total
Retailers A side	2 (11.8%)	2 (11.8%)	7 (41.2%)	4 (23.5%)	2 (11.8%)	-	17
Retailers B side	0	2 (14.3%)	2 (14.3%)	6 (42.9%)	4 (28.6%)	-	14
Customers of shops	2 (18.2%)	3 (27.3%)	4 (36.4%)	2 (18.2%)	0	-	11
Customers of food court	1 (9.1%)	2 (18.2%)	4 (36.4%)	2 (18.2%)	2 (18.2%)	-	11
Users of bus terminal	0	3 (33.3%)	3 (33.3%)	2 (22.2%)	1 (11.1%)	-	9
Retailers - total	2 (6.5%)	4 (12.9%)	9 (29%)	10 (32.3%)	6 (19.4%)	27.44	31
Users of CPC - total	3 (9.7%)	8 (25.8%)	11 (35.5%)	6 (19.4%)	3 (9.7%)	35.56	31

Note. v.beautiful=very beautiful; n.n.= neither beautiful nor ugly; v.ugly=very ugly; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (31).

The main reasons given by retailers for a negative evaluation of the internal appearance of CPC are: poor construction and the unfinished look of the building (31.5% - 5 out of 16); the lack of color (31.5% - 5 out of 16); the ugly architectural appearance (31.5% - 5 out of 16) and the inadequate appearance for a shopping center (18.7% - 3 out of 16). The poor construction is related to leaks and spills, problems that delayed the opening of the CPC and remained till this investigation was carried out (Zero Hora, 2009a). The absence of color (also pointed out by 4 of the 9 users that evaluated the internal appearance as negative) refers to the fact that the CPC internal walls and roof are in grey of exposed concrete (Figures 12 and 13). Moreover, the inadequate look for a shopping center seems to be related to lack of paint or coating on the walls and floor, to the nonexistence of ceiling and to the exposed electrical and plumbing.

A statistically significant difference (Mann-Whitney U, $sig.=.000$) was found between the evaluations made by retailers and CPC users, specifically regarding the quality of construction and materials used in the CPC. While these aspects were positively evaluated by only 16.1% (5 of 31) of the retailers and negatively evaluated by 61.3% (19 of 31) of them, 67.7% (21 of 31) of CPC users evaluated them as satisfactory or very satisfactory (Table 13). The main reasons given by retailers for the negative evaluations are: spills and leaks (42.1% - 8 out of 19); bad

materials (31.5% - 6 out of 19); and lack of finishing (15.7% - 3 out of 19), aspects that also tend to affect the evaluation of internal appearance, as already mentioned.



Figure 12. Internal view of CPC. (Source: Author, 2012).



Figure 13. Internal view of CPC. (Source: Author, 2012).

The main reasons given by CPC users who positively evaluate these aspects are the fact that the CPC was well built (19.0% - 4 out of 21) and its simplicity (14.3% - 3 out of 21).

According to these users, the ordinary materials used are appropriate since the CPC was built with public funds. So far, the differences between retailers and CPC users may be explained by the far greater familiarity and knowledge of CPC space by the retailers, comparing to CPC users.

Table 13: Evaluation of the quality of construction and materials used in CPC (Source: Author, 2015).

	v.sat.	sat.	n.n.	uns.	v.uns.	m.r.	Total
Retailers A side	0	3 (17.6%)	5 (29.4%)	4 (23.5%)	5 (29.4%)	-	17
Retailers B side	0	2 (14.3%)	2 (14.3%)	5 (35.7%)	5 (35.7%)	-	14
Customers of shops	1 (9.1%)	7 (63.6%)	2 (18.2%)	1 (9.1%)	0	-	11
Customers of food court	0	7 (63.6%)	3 (27.3%)	1 (9.1%)	0	-	11
Users of bus terminal	0	6 (66.7%)	0	2 (22.2%)	1 (11.1%)	-	9
Retailers - total	0	5 (16.1%)	7 (22.6%)	9 (29.0%)	10 (32.3%)	21.95	31
Users of CPC - total	1 (3.2%)	20 (64.5%)	5 (16.1%)	4 (12.9%)	1 (3.2%)	41.05	31

Note. v.sat. = very satisfactory; sat. = satisfactory; n.n. = neither satisfactory nor unsatisfactory; uns.= unsatisfactory; v.uns.=very unsatisfactory; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (31).

The existence of correlation (Spearman, $c=.297$, $sig.=.019$) between retailers' and CPC users' levels of satisfaction with the CPC internal appearance and with the CPC indicates that satisfaction with the CPC is influenced by its internal appearance.

Aesthetics – Retailers’ and CPC users’ evaluations of the external appearance of the CPC

Regarding the external appearance of the CPC, 20.8% (20 out of 96) of the respondents (retailers, CPC users and architects) negatively evaluated View 1 (Figure 14), while 50% (48 out of 96) evaluated it as attractive or very attractive (Table 14). However, there is a statistically significant difference (Mann-Whitney U, $sig.=.000$) in the evaluation of View 1 among retailers, CPC users and architects. View 1 is evaluated as ugly or very ugly by 33.3% (11 out of 33) of the architects, by 25.8% (8 out of 31) of the retailers, and by only 1 (out of 32) user (Table 14). Therefore, View 1 is negatively evaluated by expressive proportions of architects and retailers.

View 2 (Figure 15; Table 14) is positively evaluated by 38.5% (37 out of 96) of respondents and negatively evaluated by 22.91% (22 out of 96) of them, with no statistically significant difference being found between retailers', users' and architects' evaluations. View 2 was negatively evaluated by 25.8% (8 out of 31) of retailers, by 24.2% (8 out of 33) of architects, and by 18.75% (6 out of 32) of CPC users.



Figure 14. View from Av Julio de Castilhos with the CPC - View 1. (Source: Vanessa Dorneles, 2009).



Figure 15. View from Av Julio de Castillos without the CPC - View 2. (Source: Vanessa Dorneles, 2009).

When comparing the two views (Table 14), a significant percentage of the total respondents (33% - 32 out of 96) considers View 1 (with the CPC) uglier or much uglier than View 2 (without the CPC). A statistically significant difference (KW, $\text{Chi}^2=10.94$, $\text{sig}=.004$) was found in the evaluation of View 1 compared to View 2 between retailers, CPC users and architects, which shows that architects are the most dissatisfied with View 1 (Table 14), with 54.6% (18 out of 33) considering it uglier or much uglier than the View 2, followed by CPC users (25% - 8 out of 32) and by retailers (19.4% - 6 of 31). The main reason for 33.3% (6 out of 18) of architects and 50% of CPC users (4 out of 8) is the visual barrier created by the CPC, which negatively affected the landscape.

Table 14: Evaluation of the external appearance of the CPC (Source:Author, 2015).

	very beautiful	beautiful	n.b.n.u.	ugly	very ugly	m.r.	Total
EVALUATION OF VIEW 1: View from Av Julio de Castillos with the CPC							
Retailers	0	15 (47.2%)	8 (26.6%)	5 (15.9%)	3 (10.1%)	45.65	31
CPC users	1 (3.1%)	26 (81.3%)	4 (12.5%)	1 (3.1%)	0	65.38	32
Architects	2 (6.1%)	4 (12.1%)	16 (48.5%)	9 (27.3%)	2(6.0%)	34.82	33
total	3 (3.1%)	45 (46.8%)	28 (29.2%)	15 (15.4%)	5 (5.36%)		96 (100%)
EVALUATION OF VIEW 2: View from Av Julio de Castillos without the CPC							
Retailers	3 (9.7%)	7 (22.6%)	13 (41.9%)	6 (19.4%)	2 (6.5%)	45.66	31
CPC users	4 (12.5%)	14 (43.8%)	8 (25%)	6 (18.8%)	0	56.91	32
Architects	0	9 (27.3%)	16 (48.5%)	7 (21.2%)	1(3%)	43.02	33
total	7 (7.4%)	30 (31.2%)	37 (38.4%)	19 (19.8%)	3 (3.1%)		96 (100%)
EVALUATION OF VIEW 1 COMPARING WITH VIEW 2							
	m.m. beautiful	m. beaut.	n.n.	uglier	m. uglier	m.r.	Total
Retailers	4 (12.9%)	17 (54.8%)	4 (12.9%)	2 (6.5%)	4 (12.9%)	54.6	31
CPC users	5 (15.6%)	16 (50%)	3 (9.4%)	7 (21.9%)	1 (3.1%)	55.28	32
Architects	1 (3%)	9 (27.3%)	5 (15.2%)	15 (45.5%)	3 (9.1%)	36.2	33
total	10 (10.5%)	42 (44%)	12 (12.5%)	24 (24.6%)	8 (8.3%)		96 (100%)

Note. n.b.n.ugly = neither beautiful nor ugly; m.m.beautiful = much more beautiful; m.beaut.= more beautiful; n.n.= neither more beautiful nor uglier; m.uglier= much uglier; m.r.= mean rank values obtained through Kruskal-Wallis non-parametric statistical test among the groups of retailers (31), CPC users (32) and architects (33).

Security – Retailers’ and CPC users’ evaluations of security in the bus terminal of CPC, in the CPC building and in downtown Porto Alegre

The percentage of respondents (retailers and users of the CPC) that considers the bus terminal (42.37% - 25 out of 59) and the CPC (22.58% - 14 out of 62) as unsafe or very unsafe clearly decreases in relation to those (79% - 49 out of 62) that consider downtown Porto Alegre as unsafe or very unsafe. No statistically significant difference between such evaluations by retailers and CPC users was found. Downtown Porto Alegre is considered unsafe or very unsafe by 80.6% of retailers (25 out of 31) and by 77.4% of CPC users (24 out of 31) (Table 15). The CPC is considered unsafe or very unsafe by 25.8% of the retailers (8 out of 31) and by 19.4% of users (6 out to 31). In relation to the bus terminal, the results indicate that 44.4% of retailers (12 out of 27) and 40.7% of CPC users (13 out of 32) regard it as an unsafe or a very unsafe place. Therefore, considering that the former Square XV Camelódromo was in downtown Porto Alegre, it seems that the security of users and retailers has been improved in the new location in the CPC. However, perception of insecurity in the CPC building and, mainly, in the bus terminal is not negligible. Results suggest that the main reason for the difference in the perception of security in the CPC building and in the bus terminal is the perception of darkness in this terminal.

Table 15: Perceived safety of retailers and users of the CPC (Source: Author, 2015).

	very safe	safe	n.n.	unsafe	very unsafe	m.r.	Total
EVALUATION OF SECURITY IN DOWNTOWN PORTO ALEGRE:							
Retailers	1 (3.2%)	3 (9.7%)	2 (6.5%)	15 (48.4%)	10 (32.3%)	30.97	31
CPC users	0	3 (9.7%)	4 (12.9%)	15 (48.4%)	9 (29.0%)	32.03	31
total	1 (1.6%)	6 (9.7%)	6 (9.7%)	30 (48.4%)	19 (30.6%)		62 (100%)
EVALUATION OF SECURITY IN THE CPC BUILDING							
Retailers	3 (9.7%)	15 (48.4%)	5 (16.1%)	5 (16.1%)	3 (9.7%)	30.37	31
CPC users	0	22 (71.0%)	3 (9.7%)	6 (19.4%)	0	32.63	31
total	3 (4.8%)	37 (59.7%)	8 (12.9%)	11 (17.7%)	3 (4.8%)		62 (100%)
EVALUATION OF SECURITY IN THE BUS TERMINAL OF CPC:							
Retailers	1 (3.7%)	7 (25.9%)	7 (25.9%)	9 (33.3%)	3 (11.1%)	28.81	27
CPC users	0	12 (37.5%)	7 (21.9%)	11 (34.4%)	2 (6.3%)	31.00	32
total	1 (1.8%)	19 (31.7%)	14 (23.9%)	20 (33.8%)	5 (8.7%)		59 (100%)

Note. n.n. = neither safe nor unsafe; m.r.= mean rank values obtained through Mann-Whitney U non-parametric statistical test considering the group of retailers (31) and the group of CPC users (32).

CONCLUSIONS

The results obtained from the evaluation of the CPC configuration confirm the findings of other studies (e.g. Vargas, 2001; Rigatti, 2003; Zambellini, 2006) regarding the need for movement of people and visibility of shops to achieve a satisfactory sales performance. This study further corroborates results obtained by Lay and Oliveira (2007) showing that the way people buy goods and services and the way sellers try to reach their potential customers seems to depend on the spatial configuration of an urban grid. Similarly to the location of shopping streets along the highly locally integrated streets, Lay and Oliveira (2007) showed that even low-income residents (predominantly illiterates or with poor education) understand that accessibility and consequent visibility is a location attribute needed to successfully perform income-generating activities that require visibility and tend to instinctively locate such activities along these streets.

Based on the opinion of retailers, it was evidenced the need for location of shops at ground level, since their location on the second floor is disconnected from the movement of people on the streets. This is supported by Zambellini’s (2006) findings that shops on the second floor of the Oiapoque Popular Shopping Mall in Belo Horizonte did not achieve satisfactory sales performance. These findings also are in tune with Gehl’s (2011; p.99) arguments presented in his book “Life between buildings: using public space”: “In principle it is a bad idea to attempt to assemble activities by placing them above one another on different levels”. Moreover, the fact



that the CPC is located in an area slightly more beneficial to the movement of people than the former Square XV Camelódromo was not enough to prevent a reduction in CPC sales, due to its architectural configuration.

According to the results obtained, it can be inferred that the existence of the bus terminal in the CPC does not contribute to sales because the shops and the bus terminal operate independently, in different floors, with a small number of accesses on B side and very restricted visual connections that do not act as attractors to the shops on the second floor. As already mentioned, the success of sales, mainly those that are not basic necessities, depends on shops being visible and located in places with movement of people (Vargas, 2001).

The enclosed space of the CPC building is satisfactory for users due to the weather protection, comfort and safety, further contributing for shopping. The existence of the food court on the same floor of shops is a positive design characteristic, both for retailers and for users, by giving them the possibility of having meals without leaving the building, although the contribution of such food court to boost the sales is less evident.

The evaluation of CPC's overall appearance shows that internal appearance negatively affects retailers' and users' satisfaction with the CPC, mainly, due to poor quality of construction and materials used, the type of floors, walls and ceilings finishings and the lack of color, revealing the importance of these internal design attributes to user's satisfaction with a popular shopping mall. Complementary, the evaluation of CPC external appearance reveals a difference between architects and non-architects' aesthetics assessment, supporting results of some studies (e.g. Groat, 1982 apud Garling and Evans, 1991; Santos et al., 2011) but contrary to others (e.g. Reis et al., 2011) regarding the effect of type of college education on aesthetic evaluations. Nonetheless, the CPC creates a visual barrier for those in one of the busiest downtown streets and affect the urban aesthetics, which tend to be a negative design aspect for architects.

Considering that architecture and urban design deals with adequate relationships between elements in a building, between buildings and between buildings and open spaces, one can understand why the relationship of the CPC to other buildings and to the open spaces clearly tends to be negative for architects. Nonetheless, this clear tendency is not replicated for retailers and, especially, for users. While retailers do not have a clear negative or positive evaluation, the group of users has a clear tendency to positively evaluate the external appearance of the CPC. This may be, at least, partially explained by symbolic aesthetics. The CPC building, comparing to the former Square XV Camelódromo and even to the external appearance of buildings that constitute the built environment where many retailers and users live, may be associated with greater economic and social status, apart from its novelty (Santos et al., 2011).

Although perception of security in the bus terminal is negatively affected due to the lack of lighting, the enclosed space of the CPC building positively affects retailers' and users' perception of security in the building, when compared to perception of security in urban open spaces in downtown Porto Alegre.

Concluding, the results obtained in this study emphasize the need of understanding how buildings' location and configuration respond to users' requirements concerning use, aesthetics and security. Specifically, it shows the importance of assessing the impacts generated by current urban interventions such as popular shopping malls. The relocation of street vendors from downtown public open spaces in Brazilian cities to specific buildings, and the consequent liberation of public open space, seems to be satisfactory for city users. However, the configuration of popular shopping malls must conform to shopping requirements, taking advantage of the movement of people and creating meeting opportunities (e.g., Gehl, 2011; Ujang, 2014; Maimani, Salama, Fadli, 2014). Moreover, the design of a popular shopping mall must meet the needs and expectations of retailers and users as well as others, regarding its use, aesthetics and security.



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AN EVALUATION OF STAIRWAY DESIGNS FEATURED IN ARCHITECTURAL RECORD BETWEEN 2000 AND 2012

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Abstract

This paper discusses an evaluation of stairway designs featured in Architectural Record, a leading architectural professional journal, over a thirteen-year publication period (2000 to 2012). Images of stairways were classified as either hazard-free or hazard(s)-present using a hazard identification checklist, and the frequency of visible design hazards was tabulated. A total of 578 stairways were scanned in articles and advertisements, of which 78 (13.5%) were product advertisements. Sixty-one percent of the stairways had at least one visible design hazard including nearly half (47%) in product advertisements. The three most common hazards in stairways were inadequate handrails (161, 27.8%), excessive length of stairway flights (74, 12.8%), and low visual contrast on tread edges (73, 12.6%). The high prevalence of stairway design hazards in the professional literature indicates a need for improved professional education and media attention to safe stairway design.

Keywords: *Architecture; Stairway Safety; Evaluation Research; Hazard Identification Checklist; Environmental Design; Design Education.*

INTRODUCTION

Designing stairways is a ubiquitous part of architectural design. By today's standards, stairways should be designed and constructed to prioritize safety and usability for people of all ages and abilities. In the U.S., stairway trips, slips, and falls result in nearly 1,900 deaths (NSC, 2011) and 1,300,000 hospital emergency room visits per year (Pauls, 2011a). The high incidence of stairway accidents is common not only in the US but also in many other countries including Canada (Pauls, 2011b), the U.K. (Roys, 2011a), Japan, and Sweden (Templer, 1992; Scott, 2005). In all these countries, building regulations include many requirements for safe design and construction of stairways yet there are still a large number of accidents. What are the causes of this public health problem? Can architectural research do anything about it?

Causes of stairway falls include risky behaviors, poor maintenance, and design failings (Templer, 1992). Risky behaviors include running, using electronic devices on stairways, and carrying things that obscure one's view or change the dynamics of balance. Maintenance causes include defective stairway features (e.g. loose treads, broken lighting), unsafe materials on the tread surface (e.g. ice, worn surfaces), and poorly conceived countermeasures intended to reduce falls (e.g., peeling of applied non-slip surfaces). Behavioral causes can be reduced by raising awareness of the risks of using stairways and thus increasing user caution, but experts argue that such actions may not be sufficient to mitigate the risks posed by design and construction of stairways since these risks are often not noticeable to users (Roys, 2001). Examples include ungraspable handrails and irregular step geometry.

A reasonably safe and usable stairway is defined in the literature as one that meets safety standards for three basic criteria: step geometry, handrails, and stairway visibility (Pauls, 2013). Step geometry should be uniform in shape and dimension and facilitate gait (Novak et al., 2016; Pauls & Barkow, 2013; Johnson & Pauls, 2010; Jackson & Cohen, 1995); handrails should be both reachable and graspable (Maki, 2011; Dusenberry et al., 2009), and stairway components, i.e., steps, handrails, landing and headroom, should be clearly visible and perceivable to users (Archea et al., 1979; Sloan, 2011). These basic features are even more important for people in need of additional stair climbing support, i.e., people with physical, sensory, or cognitive limitations. Incorporation of these features leads to a universal design approach that would be safer for a wide range of people (Steinfeld & Maisel, 2012; Pauls, 2012).

Stairway design plays an important role in health promotion due to the health benefits of stair climbing as a form of exercise - improved weight control, lowered cholesterol levels, and improved cardiovascular fitness (Lee et al., 2012; Lewis & Eves, 2001). Research has demonstrated that building design can promote more frequent bouts of walking (Boutelle et al., 2001; Nicoll, 2007; City of New York, 2010), but stairways are believed to have a higher potential for increasing light to moderate physical activity in part due to their presence and potential for use in every multistory building (Mansi et al., 2009; Cohen, 2013). This has led to the development of policies to improve the appeal of stair climbing, particularly in the U.S. where more than 66% of adults are obese (Brown et al., 2009). Policies include New York City Mayor Michael Bloomberg's executive order for architects to use "Active Design" strategies by designing highly visible, easy to access, and attractive stairways in new and renovated city buildings (City of New York, 2013). However, experts have also cautioned that increased stairway use could increase the number of stair-related injuries (Pauls, 2012), thus architects and builders need to pay careful attention to the design details and construction of stairways as they encourage use of stairways to improve fitness.

Despite some advances in knowledge of stairway safety, potentially hazardous stairway design practices seem to be prevalent. This suggests that the knowledge available on design of stairways is not being utilized. A scan of stairway images across a broad spectrum of media, including popular professional journals and internet blogs, will uncover many recently constructed stairways with identifiable and well known safety hazards that increase a person's risk of tripping, slipping, or falling. The stairways found in the media often have features that clearly do not meet safety standards, yet they were somehow not only constructed but also highlighted in feature articles and websites as exemplars of architectural design practice. Building codes in the U.S., including the International Building Code (IBC), American National Standards Institute (ANSI), and ADA Accessibility Guidelines (ADAAG), have made stairways in newly constructed public buildings safer by requiring architects to design stairways that are part of a means of egress to meet highly technical requirements; however, the criteria for stairways that are not part of a means of egress or in private dwellings are less stringent. With few exceptions, the IBC requires at least two general means of egress and not less than one that is "accessible" in buildings (ICC, n.d.), which means that stairways that are not part of a means of egress in any multistory building could have design features that would be considered hazardous and still comply with building regulations. Many unusual features are being incorporated into stairways such as glass stair treads, interactive sound and light, treads at acute and obtuse angles, etc. that are not addressed by regulations at all. These stairways are often centerpieces of the design, or "feature stairways," the most visible and most likely to be used by building inhabitants and visitors. The implications of these contemporary practices on safety are currently unknown.

We conducted a literature scan of stairways using *Architectural Record*, a leading professional architectural journal to investigate trends in stairway design practices. Professional journals are important to the field of architecture because they are a source of contemporary design ideas, product reviews, and continuing education for professionals and are often referenced during the research phase of projects (Borg & Gall, 1989 cited in Waugh, 2004). The purpose of this study was to examine current practices in stairway design as featured in the architectural press, assess the degree to which safe design practices are present, and identify issues that have not yet been addressed in stairway research. The results of this study suggest that safe stairway design practices should be supported by improved professional education and more media coverage on this topic. Several knowledge needs were also identified for further research in this field.

METHODS

Sample

We evaluated images of constructed stairways that were published in *Architectural Record* articles and advertisements between 2000 and 2012. *Architectural Record* was chosen because it is the oldest and most established professional architectural journal in the U.S. with a circulation of 115,155 (Ulrichsweb, 2014). This journal is considered an essential resource to architectural education and is included on the Association of Architecture School Librarians (AASL) Core List of 53 periodicals (2009 edition) (AASL, n.d.) – a list that is used as an evaluative criterion in the process of accrediting architecture degree programs by the National Architectural Accrediting Board (NAAB). Furthermore, *Architectural Record* has an h-index of 4 in the citation database produced by Scopus (SJR, 2014), which is the highest rating of any trade journal in architecture on the list (see Table 1).

Table 1: H-index of professional architecture journals on the AASL Core List covered in the Scopus database (Source: Authors).

Professional architecture journal*	h-index
<i>Architect</i>	2
<i>Architectural Record</i>	4
<i>Architectural Review</i>	1
<i>Landscape Architecture</i>	3
<i>Lotus International</i>	1
<i>Planning</i>	6
<i>Preservation</i>	1

*The Scopus database does not cover all titles on the AASL Core List. Note that *Planning* is the journal of the American Planning Association and does not have significant content related to building design.

Design

The study began as a class project by twenty-one graduate students in an ergonomics course at the University at Buffalo Department of Architecture. The class was divided into teams and assigned to scan the literature of different publication years. Each team developed a unique method of collecting and analyzing the stairways, including use of rating scales and checklists. Consequently the results of the project varied, but each team identified a significant number of stairways with safety hazards that provided insight into contemporary stairway design practices. These findings indicated that a more controlled study would be fruitful for identifying a gap in the application of research knowledge to practice. The authors used the student work to develop a new method to quickly identify common stairway design hazards, referring to the literature on stairway safety to validate the items on the list. A hazard identification checklist was organized into four categories: railings, steps, visibility, and other (see Figure 1). A systematic review was then conducted by a single researcher (the first author).

Railing	
Handrail(s) not fully extended at top/bottom of flights	
Missing/inadequate balustrade(s)	
Missing/inadequate handrail(s)	
Handrails too large/too thin	
Steps	
High/low riser-to-tread ratio	
Irregular riser height and/or tread size	
Narrow stairway width	
Short tread depth	
Visibility	
Low visual contrast on tread edges	
Open risers	
Poor stairway lighting	
Distracting pattern on steps	
Other	
Excessive length of stairway flight	
Inconsistency within the top/bottom steps	
Oblique stairway shape	
Obstruction on stairway	

Figure 1. Stairway Design Hazard Checklist (Source: Authors).

Procedure

Every page in each issue of the journal was manually reviewed for images of stairways constructed in the U.S. Images that were readily discernible were documented using a scanner and/or digital camera. Small prints lacking sufficient details, and stairways located outside of the U.S. were excluded. Each image was cropped and inserted into a page template using graphic representation software. Evaluations were based solely on image content and guided by two principles: if a stairway image showed at least one condition listed in the hazard identification checklist, then it was classified as unsafe and 'hazard(s)-present'; if the image did not show any of the conditions listed, then it was considered reasonably safe and classified as 'hazard-free'. For each stairway, information on conditions observed, setting (public or residential) and image type (article or advertisement) was recorded on the checklist in spreadsheets, and the frequency of each condition on the list was tabulated. Some of the conditions in the checklist require precise measurements to ascertain their presence if deviations are only slight, e.g., high/low riser-to-tread ratio, irregular riser height and/or tread size. In this study, we only could identify obvious evidence of such conditions. Thus the results clearly understate the presence of unsafe conditions but a conservative estimate of frequency of problems is sufficient to achieve the goals of the research.

RESULTS

A total of 578 stairways were scanned over a thirteen year publication period between 2000 and 2012—of these, 78 (13.5%) were in product advertisements. The majority of the stairways in our sample were located in public settings (72.8%, $n = 421$).

Sixty-one percent of the total sample of stairways ($n = 355$) had at least one obvious design hazard and were classified as 'hazard(s)-present'—thus less than 40% of stairways in this study were considered reasonably safe ($n = 223$). Of those classified as hazardous, 62% were public ($n = 219$) and 38% were residential ($n = 136$) (see Figure 2). The results of the evaluation are presented in Tables 2 and 3. In advertisements, nearly half of the stairway products exhibited hazards (47%, $n = 37$) (see Figure 3).

The most frequently observed hazard category was railings, comprising 36% of all hazards documented. Visibility was the second most frequently observed hazard category (29.1%), followed by other hazards (19%), and steps (16%).

The three most common design hazards were missing or inadequate handrails (27.9%), excessive length of stairway flights (12.8%), and low visual contrast on tread edges (12.6%) (see Figure 4). While the vast majority of stairways showed only one (48%), two (32%), or three (15%) hazards out of sixteen that were included in this study, the number of hazards should not be used to rate stairway safety since a misstep or a fall can be caused by even one condition. Moreover, grievous and obvious conditions, like a steep stairway, with a long flight, lacking both handrails and balustrades, could be so obvious that users adopt a more cautious and attentive behaviour while using it or avoid using it. Evaluating the severity of problems on stairways in the sample was beyond the scope of this research.

The remainder of this section summarizes an evaluation of stairway design practices that were most commonly observed with references to the International Building Code (IBC)—the primary model building code adopted in the U.S. These building regulations are an indication of safety issues that are well known to governmental agencies and violations of design standards.

Missing or inadequate handrail(s)

Handrails serve multiple functions: visual cues to the stairway's presence, directional guidance, postural stability, fall mitigation, and reducing conflicts in ascent or descent by cueing stair users to stay to the side, usually to the right on stairways in North America (Templer, 1992; Jackson & Cohen, 1995; Dusenberry et al., 2009). Best practice recommendations include the provision of handrails on both sides of stairways. The International Building Code (IBC) has exceptions to the requirement for handrails on both sides of stairways. Notably, residential stairways and spiral stairways; decks and patios are not required to have handrails at all; a single elevation change at an egress door and changes in elevations of three or fewer risers in dwelling units also do not require handrails (ICC, 2011). Compliance only with minimum standards and taking advantage of exceptions in the codes can pose significant safety risks, especially for people who require additional support for balance, like children and elderly people.

Table 2. Public stairways: result of an evaluation of stairways featured in *Architectural Record* (n = 421). (Source: Authors)

Year	Hazard-free		Hazard(s) present	
	n	%	n	%
2000 (n = 35)	21	60.0%	14	40.0%
2001 (n = 30)	17	56.7%	13	43.3%
2002 (n = 40)	15	37.5%	25	62.5%
2003 (n = 37)	17	45.9%	20	54.1%
2004 (n = 36)	16	44.4%	20	55.6%
2005 (n = 26)	12	46.2%	14	53.8%
2006 (n = 39)	14	35.9%	25	64.1%
2007 (n = 26)	15	57.7%	11	42.3%
2008 (n = 27)	15	55.6%	12	44.4%
2009 (n = 38)	12	31.6%	26	68.4%
2010 (n = 21)	8	38.1%	13	61.9%
2011 (n = 29)	16	55.2%	13	44.8%
2012 (n = 37)	23	62.2%	14	37.8%

Table 3. Residential stairways: result of an evaluation of stairways featured in *Architectural Record* (n = 157). (Source: Authors).

Year	Hazard-free		Hazard(s) present	
	n	%	n	%
2000 (n = 15)	1	6.7%	14	93.3%
2001 (n = 14)	1	7.1%	13	92.9%
2002 (n = 11)	0	0.0%	11	100.0%
2003 (n = 13)	3	23.1%	10	76.9%
2004 (n = 12)	3	25.0%	9	75.0%
2005 (n = 13)	1	7.7%	12	92.3%
2006 (n = 13)	3	23.1%	10	76.9%
2007 (n = 18)	1	5.6%	17	94.4%
2008 (n = 22)	4	18.2%	18	81.8%
2009 (n = 10)	2	20.0%	8	80.0%
2010 (n = 5)	0	0.0%	5	100.0%
2011 (n = 5)	2	40.0%	3	60.0%
2012 (n = 6)	0	0.0%	6	100.0%

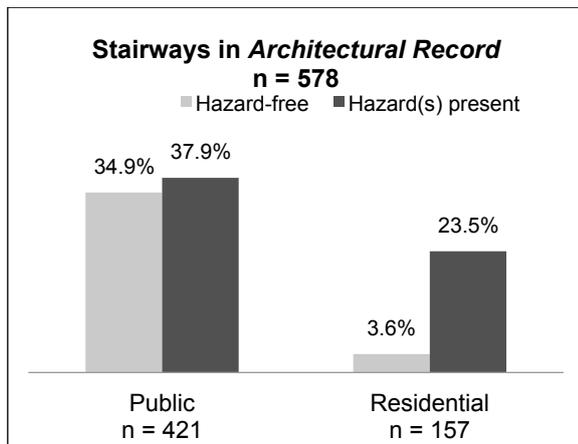


Figure 2. An evaluation of stairways featured in *Architectural Record* by setting. (Source: Authors).

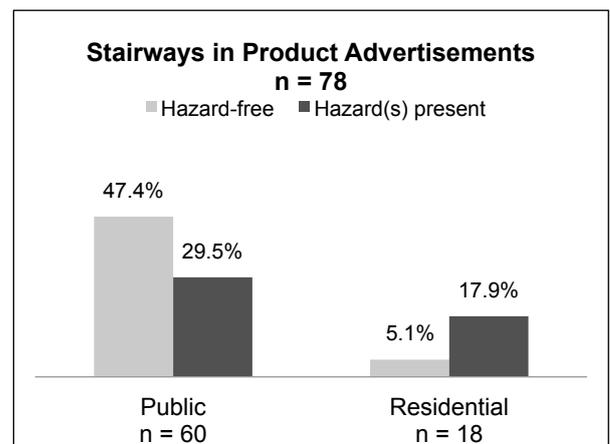


Figure 3. An evaluation of stairways featured in *Architectural Record* product advertisements by setting. (Source: Authors).

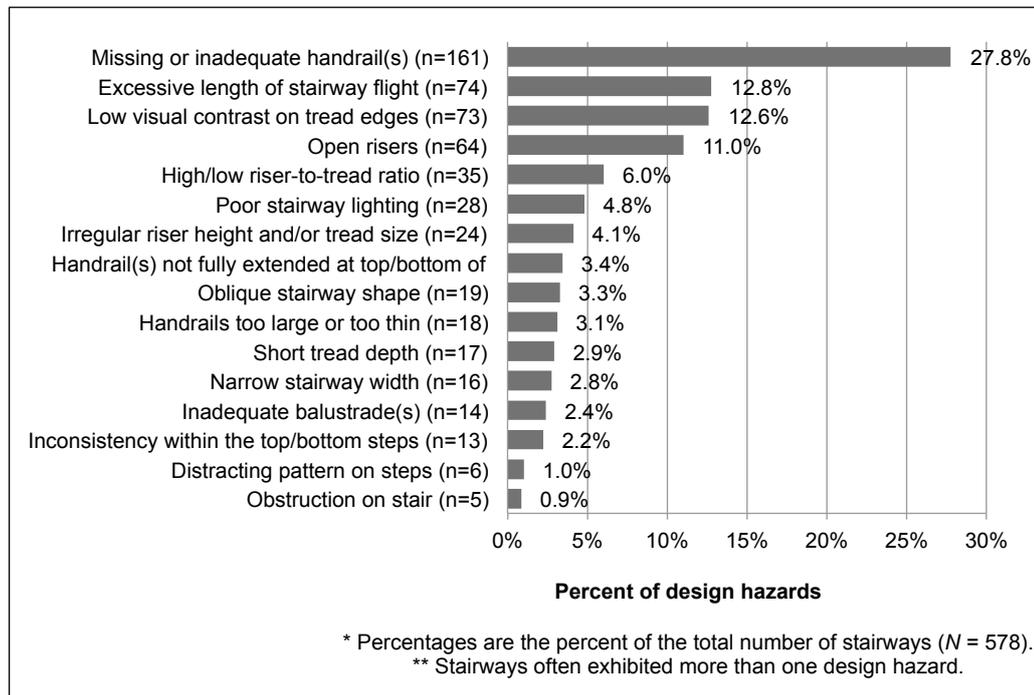


Figure 4. Frequency of stairway design hazards in *Architectural Record* feature articles and product advertisements between 2000 and 2012 (Source: Authors).

Although the handrail is probably the most important safety device for stair users, almost 30% of the stairways in this study (n = 161) had at least one or more of the following conditions: unprotected stairways at one or both sides (see Figure 5), three or fewer stairs that were potentially difficult to see or expect without handrails as visual cues, wide stairways without intermediate handrails distributed across the width, and non-continuous handrails that were interrupted by newel posts or other objects in environments where releasing grip of the handrail poses a risk.

Handrail(s) not fully extended

A basic principle of safe stairway design is that the handrail must be available for the user to grasp on the first step and maintain a grip all the way to the last step. Handrails are most heavily used at the top and bottom of flights; 70% of stairway accidents occur at these locations, demonstrating their importance (Templer, 1992). This research also suggests that handrails are needed most at landing areas. Handrail extensions or continuous handrails on intermediate landings can help people identify the start and end of the stairway, gain stability when mounting and dismounting flights, and make a safe transition in gait between landings (Danford & Tauke, 2001; Bakken et al., 2007). With proper installation, extended handrails can support people as they adapt their gait to various changes, e.g., in view, illumination, route direction, and floor surface (Templer, 1992) while entering and leaving stairways. U.S. building codes require handrails in a means of egress stairway to be continuous for the full length of each flight and extend at least 12 inches (305 mm) beyond the top and bottom riser, plus the width of one tread for the bottom extension. These extensions, however, are not required in dwelling units, assembly areas, the inside turn of stairways, and in existing stairways where they would be an obstruction (ICC, 2011).

In our study of new or substantially remodelled building projects, 20 (3.4%) stairways clearly had handrails of insufficient length, including those that truncated before even reaching the top or bottom riser (as seen in figure 5) and handrails that did not extend across the landing, primarily in public buildings.



Figure 5. Unprotected side, truncated handrail, low handrail visibility — duplex apartment in New York City, constructed 2008. (Photo courtesy of Jordi Miralles).

Handrails too large or too thin

After losing balance a stair user searches for support in an attempt to arrest a fall by reaching out and grasping a handrail (Templer, 1992). Handrail shapes that are too wide or too thin are not ergonomically designed to be grasped firmly and thus may not be effective during falls. A round handrail between 1.25 inches (30 mm) and 2 inches (50 mm) in diameter is generally accepted as the best shape and size for gripping because it provides a "power grip" in which the thumb can touch the fingers in the shape of the letter 'C' (Maki et al., 1998; Bakken et al., 2007; Dusenberry et al., 2009). Narrow or other shapes that require a "pinch grip" are generally not recommended (Maki, 2011).

Handrails were visibly too wide or too thin in 18 (3.1%) stairways. Rectangular shaped handrails made of metal or wood in 2x4 or 2x6 flat configuration were types of poor handrail shapes commonly observed. Railings with smaller cross-sections were used in minimalist designs, probably for their reduced obtrusiveness. As with irregularities of step geometry, the study methods did not allow measurement of handrails, and we could only see grievous conditions so this deficiency is probably underreported.

Inadequate balustrade(s)

Although balustrades are intended to protect sides of stairways, there is more leeway in regulations for creativity in baluster design than in railing design, and several types of hazards have been identified. Open spaces between balusters that are greater than 3.5 inches (90 mm) are areas where a child's head could slip through or body parts could become caught during a fall (Archea et al., 1979 cited in Templer, 1992). Large gaps under the bottom rail allow objects to slide or roll off stairways to areas below. Sharp edges of balusters pose risk of bodily injury. Horizontal rails and other balustrade attributes that can be climbed also pose risks for children and even adults (Templer, 1992).

The balustrade was missing or inadequate in 14 (2.4%) stairways. The majority of these (86%, n = 12) were located in private homes where the practice of omitting balusters was common. The findings provide evidence of a stylistic preference toward minimalist-aesthetic in stairway design. In the simplest of designs, only a railing was provided with no protective balustrade. Another variation on this theme was a railing with balusters spaced several stair treads apart and large enough for a person to easily fall through.

Low visual contrast on tread edges

The tread's leading edge is a key attribute in stairway design because it is crucial to help users perceive elevation changes between steps, place their foot accurately, and control their gait (Archea et al., 1979; Templer, 1992; Zietz & Hollands, 2009; Den Otter et al., 2011). Stair users visually scan a stairway using their foveal and peripheral visions. Depending on the user's attentiveness and the complexity of the environment, people may either look at the stair edges continuously, or they may glance at the stairs periodically. Most people scan the stairway at least once every seven steps taken (Templer, 1992), and rarely look directly at the stair edges. Miyasike-daSilva et al. (2012) suggest that this scanning behavior can be attributed to increased use of peripheral vision over foveal vision during the stair use task. Stair edges that are high in contrast levels can help make each step more visible in both central and peripheral zones of vision (Templer, 1992; Den Brinker et al., 2005).

U.S. building codes advise architects and builders to provide high visual contrast on stair tread edges mainly for people experiencing low vision (ICC, 2011), but this design practice can obviously benefit those with good vision as well.

In this study, low visibility of stair tread edges was observed in 73 (12.6%) stairways. This design practice was the third most commonly observed unsafe condition in stairway images. The results suggest that many stairways are clearly designed with a priority on aesthetics at the expense of safety. Stairways with a monochromatic color scheme for risers and treads are commonly used to achieve a cohesive visual form, uninterrupted by distracting elements (see Figure 6). Glass stairways and reflective tread materials contributed to the prevalence of this condition as well (see Figure 10).



Figure 6. Low visual contrast on tread edges, luminous lighting, obstacles on steps — Vera Wang Store in New York City, constructed 2010. (Photo courtesy of Paul Warchol Photography).

Open risers

There are two primary types of step and riser design: closed riser stairways (required within a means of egress in building regulations) and open riser stairways (not permitted within a means of egress by building regulations). Closed risers prevent feet and canes from accidentally slipping under treads, and they keep children, pets and objects on stairways from falling through (Templer, 1992). The solid barriers between treads also block distracting views in the background behind the stairway that may draw the user's attention away from the steps during ascent and cause tripping. Open riser stairways can cause a person to feel a sense of insecurity about the stair climbing task (Scott, 2005) and thus are not generally

recommended. Where permitted, open riser stairways must be installed so that a 4 inch (100 mm) sphere cannot pass through openings (ICC, 2011).

In this study, we observed 64 (11%) open riser stairways with overstimulating surrounding views that would cause visual distractions (see Figure 7).



Figure 7. Views through open risers — Isabella Stewart Gardner Museum in Boston, constructed 2012. (Photo courtesy of Bruce T. Martin Photography).

Poor stairway lighting

Lighting affects our ability to perceive steps, railings and hazards in stairways (Templer, 1992). Research has demonstrated stairways with lower illumination levels have a higher incidence of falls. Carson et al. (1978) found that incidents were twice more likely at 2 foot-candles (22 lux) of light than 8 foot-candles (86 lux) (Templer, 1992). Hamel et al. (2005) found that older adults did not lift their legs as high off the steps while descending the stairs as young adults did, resulting in inaccurate stepping patterns, which makes them more vulnerable to missteps in low light conditions. Kasahara et al. (2007) found that under low illumination, older adults restricted their eye movements and visual scanning patterns to foveal regions because they required more time to focus on the steps directly ahead, and thus causes them to disregard visual information in the periphery.

Current lighting recommendations for stairways in the U.S. range from 10 to 20 foot-candles (108 to 215 lux) (Templer, 1992; IES, n.d.). Good stairway lighting should also include even illumination on the handrails and walking surfaces so that shadows do not fall on the stairway as well as indirect illumination that does not shine into the user's field of view and cause glare (Templer, 1992).

In this study, 28 (4.8%) stairways were noticeably dim or unevenly lit. Although it was impossible to actually measure the illumination in the photographs, the conditions we identified were very obvious without such measurements. Moreover, professional photographers carefully illuminate their subjects. Thus the frequency of this hazard is probably underreported.

High or low riser-to-tread ratio

The slope of the stairway should allow comfortable walking gaits to reduce the risk of falls (Novak et al., 2016). Sometimes, however, the stair pitch is skewed toward steeper slopes in order to fit the stairway in a building or to increase the economic efficiency of the building plan, i.e., more rentable or saleable space. Research shows there are more falls on stairways as steps depart from a "best practice" standard of a 7

inch riser (180 mm) and 11 inch tread (280 mm) (Templer, 1992). In particular, Johnson and Pauls (2010) demonstrated that stairways with high risers cause more falls. Ascending users require a higher leg lift and more strength to raise their body up and forward, and descending users shift their weight forward and downward for longer distances while balancing on one tread in each footfall (Templer, 1992).

The U.S. building code allows exceptions to the “7-11” design standard for residential and spiral stairways. In residences, riser heights can be a maximum of 7.5 inches (190 mm), and tread depths can start at 10 inches (255 mm). Spiral stairways can have higher risers measuring up to 9.5 inches (240 mm), and treads can be more narrow at 7.5 inches (190 mm) depth measured 12 inches (305 mm) from the narrower edge (ICC, 2011).

We could not identify stairways that depart from optimal conditions due to slight variations as they are not enough to be noticeable in photographs. We were only able to identify obviously excessively steep and shallow stairways and found that 35 (6%) stairways met the screening criteria, ranking fifth in stairway design hazards. Since we could not measure risers and treads, this result is most likely underrepresenting the frequency of stairways with non-optimal riser-to-tread ratios.

Irregular riser height and/or tread size

The riser and tread must be uniform for every step in a stairway flight. People tend to expect well built (and safe) stairways with uniformity of tread and riser dimensions throughout their length, an expectation that leads to low attention to the steps while climbing stairways (Templer, 1992). A continuous run of rectangular treads that are equal in shape and size can help reduce the risk of falls by allowing stair users to have a more consistent and natural gait as opposed to treads with varying sizes and shapes that force alterations of gait while climbing the stairway. It is well known that dimensional irregularity of steps is a leading cause of stairway falls (Jackson & Cohen, 1995; Cohen et al., 2009; Johnson & Pauls, 2010). To help counter this problem, the building code requires uniform risers and treads where the largest riser/tread minus the smallest riser/tread in a flight of stairs cannot exceed 3/8 inches (9 mm) (ICC, 2011). But, this tolerance may be too great. Research shows that even a slight irregularity of as little as 1/4 inch (6 mm) can interfere with the user's gait (Johnson, 2011). In construction, dimensional variations of between 1/6 to 1/4 inch (4 mm to 6 mm) are commonly observed (Roys, 2011b).

Twenty-four (4.1%) stairways in our sample had obvious irregularities in step geometry, including combinations of rectangular and winder treads. In Figure 8, the stairway is also located in a residential setting, in which residents are likely to pay even less attention to the changes in tread size than if they encountered it in an unfamiliar setting. As with other criteria, the study was limited in that we could not actually measure risers and treads so it is probably underrepresenting the frequency of irregular step dimensions. But, Figure 8 demonstrates that irregularity of shape is easy to observe from photographs.

Narrow stairway width

The clear width between walls, railings or the sides of stairways should accommodate the expected traffic flow and reach ranges for handrails (Templer, 1992; Levine, 2003). Adequate space on stairways is needed to move safely and comfortably, including a pacing, sensory and buffer zone for the user (Templer, 1992). The minimum code requirement for straight flight stairway widths is 36 inches (915 mm) for areas with an occupant load of 50 or less and 44 inches (1120 mm) for 50 or more people (ICC, 2011). Templer (1992) argues 38 inches (965 mm) is needed for minimal comfort; 56 inches (1420 mm) allows people to walk side-by-side in heavy clothing; but, a 69 inch (1755 mm) stairway width includes clearance between heavy clothing and tolerance for tracking error and thus is most comfortable to the user. Codes allow spiral stairways to be narrower, 26 inches (660 mm) in width (ICC, 2011), but these stairways do not provide the standard 11 inch (280 mm) minimum tread depth at the inside walking line; the minimum stairway width would have to be 6 feet, 9 inches (2.06 m) wide to provide adequate winder tread depth at the walking line (Templer, 1992).

In this study, 16 (2.8%) stairways were very narrow. It was noted that many of these also lacked handrails or had winder treads. Narrow stairways without handrails can create problems in implementing handrail retrofits in the future since handrails take up at least 3 inches (75 mm) on each side of stairways (Templer, 1992), and this would reduce the effective width of the stairway even more. A narrow stairway width in winding configurations forces the user closer to the inside radius where the tread becomes too small for safe walking (see Figure 8).



Figure 8. Irregular tread size, narrow stairway width, short tread depth — duplex apartment in New York City, constructed 1999. (Photo courtesy of Michael Moran Photography).

Short tread depth

Slips due to overstepping treads in descent are the most frequent type of stairway falls (Bakken et al., 2007; Johnson & Pauls, 2010). The risk of overstepping increases where treads are too narrow to accommodate the length of the foot. This condition is often found along the inner radius of winder or "pie-shaped" treads on stairways that turn or spiral. U.S. building codes require an 11 inch (280 mm) tread as the minimum effective depth for accessible stairways in public buildings (ICC, 2011). Treads on residential stairways are currently allowed to be smaller, with a minimum of 10 inches (255 mm), and on spiral stairways, treads are allowed to be even smaller with a 7.5 inch (190 mm) minimum depth measured 12 inches (305 mm) from the narrower edge (ICC, 2011). Although the study methods did not allow us to measure the steps, we found 17 (2.9%) stairways had treads that were obviously too narrow for proper foot placement (see Figure 8).

Excessive length of stairway flight

A reasonably safe stairway should consist of at least three risers so that it is noticeable and people do not accidentally walk into it (Templer, 1992). But, it should also not have too many steps without a landing since the risk of falling on stairways increases with longer durations of exposure. Moreover, excessively long stairway flights require greater energy expenditure over a longer time of exertion, which can lead to a sudden loss of balance for older adults, people with arthritis and those with low stamina who need to stop and rest periodically. There are psychological factors to consider as well. Using stairways can be a daunting task for people with physical or cognitive limitations. A long continuous run of steps can contribute to the fear of falling, especially among elderly people (Tiedemann et al., 2007). To encourage more stairway use for fitness, stairways should not induce avoidance behavior by appearing too challenging and dangerous.

Although the IBC (2012 edition) does not specify the number of steps in a flight of stairs, it is recommended by the National Safety Council (NSC) that a landing be provided at every tenth or twelfth tread (Reese, 2009). Older people in a focus group study reported that they can negotiate twelve steps maximum in between landings (Ormerod, 2011). In our study, we applied a tolerance of three steps. Thus stairway flights with more than 15 steps were identified as hazardous, including the stairway with twenty-two risers shown in Figure 9. An excessive length of stairway flight was the second most common design hazard (12.8%, $n = 74$).

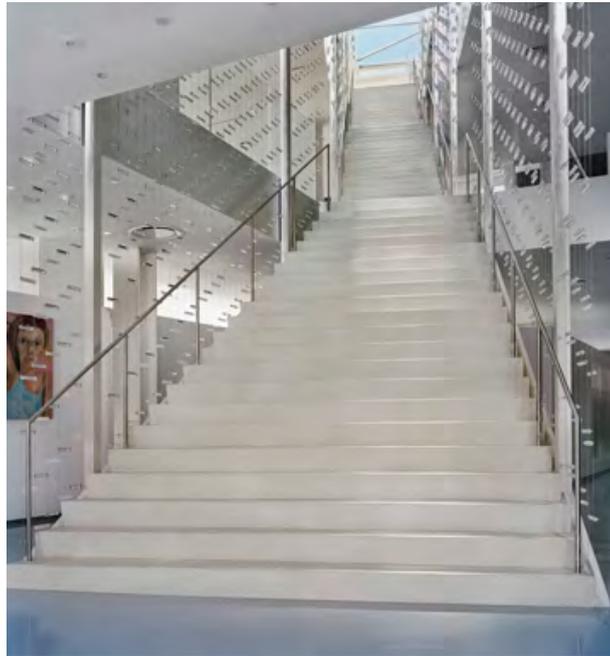


Figure 9. Excessive length of stairway flight, low visual contrast on tread edges, inadequate balustrades —DVF Studio in New York City, constructed 2007. (Photo courtesy of Elizabeth Felicella).

DISCUSSION

Our scan of current stairway design practices suggests that the knowledge available on stairway safety is not being applied consistently in buildings featured in a leading trade journal. Although standards and codes lag behind the science, that does not excuse the adoption of best practices, for example, contrasting tread edges and easy to grasp handrails, that have been well known for decades.

Architectural Record, like most professional design journals, features buildings that have unusual formal characteristics, including stairways, presumably to attract readership and maintain an innovative edge in the field of architectural journalism. The stairways featured are not the prosaic stair towers hidden away in the bowels of buildings, nor those in the buildings with which most citizens are familiar, e.g., most stairways in schools, formula driven office buildings, health facilities, and spec houses. One could argue that the vast majority of stairways in buildings meet code requirements and are relatively safe. Yet our study demonstrated that, in contrast, most stairways selected for publication are potentially dangerous based on well-known causes of stairway accidents. The results suggest that many architects are either unaware of the risks associated with stairway use, or they choose to ignore good practices to achieve other goals, such as getting their work published, attracting clients, or recognition by their peers (e.g., creating the lightest looking stairway ever). The higher value placed on form is not confined only to those architects whose work is featured in the architectural press. From our own personal experience, as a recent student and a design instructor who has attended hundreds of studio reviews, many design studio instructors encourage students to make stairways unusual and even scary! The focus on form over function can be perpetuated in design studio courses by failing to pose a design problem that requires a design solution (Maturana, 2014). Some clients clearly agree with this value orientation, or such stairways would not be approved for construction. They may even urge their architects to create a “wow” experience. But, it is the architect’s responsibility to ensure that buildings are safe and resist such pressure.

We selected *Architectural Record* for the source of examples because it is currently the most established, well respected, and well-read professional architecture journal in the U.S. and thus serves as an “opinion leader” in the professional print media. Interestingly, we found only two feature articles about stairway safety in our scan of thirteen years of issues (Talarico et al., 2000; Arsenault, 2012), suggesting communication about safe stairway design is limited in industry news and trade magazines in the print media. Considering stairways are important parts of architectural design and given the liability risks associated with their use, it would be reasonable for professional journals such as *Architectural Record* to

feature more articles about good stairway design practices or at least provide some criticism of the unsafe stairways featured in their journal. These articles could also focus on the health benefits that stairways provide building users. Such content could influence architects and builders to design and build more carefully.

We found that 61% of the stairways had at least one visible and well-known design hazard, including almost half (47%) of the stairways in product advertisements. Although the prevalence was lower in advertisements, the result raises questions about company standards for product safety, e.g., how well-informed are companies on their products' safety features?

The most common design hazards were defective or missing handrails, long stairway flights, reduced visibility of tread edges, open risers, and non-optimal riser-to-tread ratios. The results are aligned with the top priority-issues that have been identified in stair research and outlined by Pauls (2011c): handrail and guard shapes, step geometry, tread characteristics, landing size, stairway widths, and factors related to visual perception and cognition. We also found a much higher proportion of unsafe stairways in homes (87%) in comparison to those in public buildings (52%), which alludes to the "greater need" of improving stairway safety in homes – the site of 90% of falls (Pauls, 2013). Unsafe behaviour is more likely to occur in a residence due to the presence of children and the familiarity of the setting. Yet, residential stairways are typically less regulated, and so given the leeway, it seems architects experiment even more in these settings and are clearly given client support.

The results suggest a need for improved professional education on stairway safety for architectural journalists, in continuing education, and in the academy. While this study cannot be used to attribute negligence to the majority of practicing architects, it does suggest that opinion leaders in the profession place a higher priority on aesthetics than on safety and health or are lacking in knowledge about this important aspect of design. To counter the pervasive impact of media, more attention to building codes and design standards, including their limitations with respect to research knowledge, should be incorporated into school curricula to ensure that students learn best practices. Moreover, attention should be given to improve and expand stairway safety requirements in building regulations to protect the unsuspecting public, including housing. Public educational programs should also include emerging issues like the impact of obesity on stairway falls (Pauls, 2012), reduction of distracted walking accidents caused by use of electronic devices (Caya, 2014), and effects of new technologies and design concepts, like glass stair treads and minimalist handrails, on user safety. A review of the legal practices surrounding stairway accidents and risks of legal action against architects, building owners, and product manufacturers should be an important topic for continuing education and professional practice courses. In particular, due to gaps in the regulations, professionals and students need to learn best practices so that they are aware that standards and codes lag behind the research knowledge. Best practice examples would not only inform professionals, but also encourage interest in building safer stairways.

Our systematic research raised important issues for future investigation. First, open risers were of particular interest to us because the use of this feature is almost entirely based on aesthetic considerations. There is no practical reason for using open risers other than saving material, but the materials used on most open riser stairways, for example glass or stainless steel, clearly indicate that cost was not a major consideration in their design. In particular, understanding the impact of open riser stairways on both visual performance and gait is an area that needs research attention. Second, Templer suggested that long stairways are safer because they cause people to use more attention on the stairs (1992). In other words, in a short stairway flight, the user may glance at the steps only at the transition at top and bottom but not in between, but, on a long stairway, they will glance at the steps one or more times in addition. Is this hypothesis correct? Research on how users distribute their attention in relation to stairway length would be useful to determine optimum lengths of flights from an attention perspective. In addition, it would be useful to know the impact of long treads on users' perception of effort and benefits from stair walking. Do long stairways discourage use and therefore reduce opportunities for improving fitness? Third, winder treads are inherently more dangerous than straight stair treads, but they are used by architects to create sinuous stairways or to fit stairways in a small space. What is the impact of winder treads in places where environmental distractions cause people to turn their attention away from the stairs that are changing in size and shape as they descend or ascend? Finally, new technologies allow stairways to be constructed of unconventional materials. In this study, glass stairways were associated with low visibility of the tread edges (see Figure 10). Although nonslip treatments are available for glass used as a walking surface, where users are likely to track water in during bad weather, these treatments may not be adequate.

Research is needed to determine if glass tread edges can be easily perceived and whether non-slip surface treatments are adequate to prevent slipping, especially under wet conditions.



Figure 10. Open glass treads, irregular tread shape, missing handrails — duplex apartment in New York City, constructed 2001). (Photo courtesy of Roy Wright Photography).

There were several limitations to this study. The results represent stairway design practices in the U.S. Examples from buildings in other countries were not included because design standards differ across jurisdictions and countries. Thus findings cannot be generalized to buildings in other countries. Further, we only studied one professional journal. However, this journal covers noteworthy buildings and the work of leading architects. These same buildings are routinely featured in most other architecture trade journals. A comparative study could determine if other sources are doing a better or worse job in promoting safe stairway design. A comparison of Internet sources with print media would also be useful. Today the Internet may actually play a more important role in forming professional opinions. Like other traditional publications, *Architectural Record* itself maintains a major Internet presence, including a free site with limited content, additional in-depth material available to subscribers for a fee, and daily news sent by email. The content is similar to the print version although there are more buildings featured. Blogs about architecture like Dezeen and Architizer are proliferating and becoming more professional in their content over time. Searching websites and blogs is, of course, much easier than the print version and we intend on expanding our research to this material. We are anticipating that the trends we observed in this study will be similar or magnified even more on the Internet versions of publications and on blogs. For example, Dezeen has a prominent feature of “extreme staircases.” We could not find one example in their collection of photos that would be considered a “safe” stairway by our criteria. This feature is actually focused on promoting the most extreme of stair design ideas at the expense of safety!

Another limitation of the study is that the buildings featured in media are not representative of the vast body of stairway construction. *Architectural Record* and other architectural trade journals focus primarily on high-end buildings, especially in the residential sector of the building industry. A similar study of buildings not included in journals would be useful to find out if the findings here are widespread in professional practice. The buildings featured are primarily those that are designed by well-known or established architects who may have more leeway to depart from conventional practice than the average architect. Other architects may be more knowledgeable and careful about safe stairway design. Yet, the architects whose work are featured in the journals are role models for the profession and one may ask whether they

should take that responsibility seriously. They are like star athletes or performers whose fashions and lifestyles often set norms for their fans.

Although the study was carefully designed to maintain accuracy, the stairways were evaluated by a single researcher, thus the ability of other researchers to get the same results with the checklist is still not known. The method used also has some significant limitations on access to content. Stairway images could have been misleading or distorted during professional photography and editing; details could have also been hidden due to camera angles. But, given the simplicity of the method used and our conservative approach to evaluation, our findings are probably an underrepresentation of the problems found in current practices. With proper training in the use of the checklist and the evaluation task, it is also likely that good inter-rater reliability can be achieved using the checklist.

The checklist used in this study provides a tool for future research and practice. In future work, we also hope to extend the literature scan to learn more about the reader's perception of stairway designs. We also intend to assess the degree to which readers of professional journals can recognize unsafe stairway design features and whether, for the architects, it influences their own design practices, and for clients, their communications with design and construction professionals. And, through two other threads of research, in a laboratory setting and systematic observations of stairways in use, we are already taking up some of the gaps in our knowledge about safe stairway design that we observed in this literature scan.

In conclusion, this research raises questions about professional values that deserve more research. Is valuing form over function common among the opinion leaders in the architectural profession? Could stairway safety be only one example of this value orientation? Such a value orientation may be an occupational hazard – a by-product of developing strong design values and getting noticed. But, if it contributes to mistrust of the profession and the need for increased vigilance on the part of clients and building regulatory officials, it should be addressed in professional education and in the professional media. Most importantly, the unwary public is clearly put at risk without their knowledge when safety issues are neglected. How can such practices be changed? It is a public health question that the profession, including accrediting authorities, need to consider. We hope that with education and awareness, architects will take more interest in designing safer stairways that at the same time are attractive and innovative. These goals are not mutually exclusive.

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ARCHAEOLOGY, ARCHITECTURE AND CITY The Enhancement Project of the Archaeological Park of the Baths of Baiae

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Abstract

Following the theoretical and disciplinary framing of the elements that substantiate the relationship of archaeology with architecture and the city in light of the transformations of the modern city, the project aims at valorizing the archaeological asset, promoting a knowledge of the ruins from multiple theoretical perspectives. The enhancement project of the Archaeological Park of Baiae experiments with different modalities of knowing that include the knowledge of the relationship between the ruin and the landscape, the philological, typological-constructive knowledge, and the knowledge of the ruin's own spatial elements. Bringing together the contributions of different disciplines and experts under the coordination of an architect, the theoretical core of the project promotes the enhancement of the Archaeological Park, envisioning it as a means of valorisation of a wider urban environment.

Keywords: *Archaeology; Architecture; City; Interdisciplinarity*

INTRODUCTION: THEORETICAL FRAMEWORK

The contemporary city with its architecture, its multiple infrastructural systems, its yearning to change, its challenge to welcome climatic and environmental change, finds its meaning in the relationship with history and memory, with archaeology and the monuments. The idea that the monuments of the contemporary city, whether archaeological remains or permanent elements of the settlement structure, should, as sites of memory, function to inspire development and change is a shared and acknowledged notion. The codification and evolution of "urban archaeology" (Francovich, Manacorda, 2000) into a discipline and the large bibliography available on this topic mobilize scientific methodologies to govern the processes. The definition of urban archaeology - «The archaeological research in an existing city over its whole settling history from the foundation to the present without privileging a period over another» - refers to a necessarily systematized knowledge of the city's archaeological history that includes excavations and interdisciplinary research, to always engage with an eye to the transformations of the contemporary city. «The aim of teaching urban archaeology is to gain an in-depth knowledge of the relationship between the archaeological traces of the cities that existed before the present settlement and the need to identify processes of urban transformation compatible with the layered and complex palimpsest of the historical centers» (Manacorda, 2008). Biddle and Hudson's *The Future of the London's Past*, (Biddle, Hudson, 1973) and Andreina Ricci's essay *Attorno alla nuda pietra* - "Around the naked stone" - (Ricci, 2006) are a first reference to approach the issue from the archaeological and conservative point of view. From our position of architects it is important that the study of the stratifications of the city's originary settlement systems and the acts of preservation that accompany any thinking on archaeology and the monuments do not ignore the form of the city. The architect's research will focus on respecting the rule of conservation in harmony with the

form of the *urbis*, with the construction of the city and of the culture that it expresses. The city is a collective construction, based on its own history and representative of the people that built it; the city is always specific. Archaeology is the heart of thinking about the roots. Besides preserving the harmony with the form of the *urbis* and the specificities of the city, lies the issue of how to use archaeology's knowledge to plan the contemporary city without relinquishing the aesthetic aspiration.

Ever more often a consequence of an exasperated conservationist fundamentalism, or of inadequate cultural tools, has turned archaeological sites into archaeological enclosures, similar to the non-places, the islands of estrangement, described by Marc Augé (Augé, 2008). Architecture should, instead, address the ruin as a sedimented deposit of knowledge upon which to plan the new, regarding it for what it is in material and construction terms: the metamorphosis of an architecture, a part of all the historical architectures that comprise the architect's main tool of planning.

The enclosure and excavations connote the archaeological enclaves, constituting the main obstacle to grasping the connections that bind the ruins to the city, the soil's stratigraphies and the elevated constructions. Historical topography performs the necessary task of retracing possible sequences of representative spaces.

It carries on a patient research of the papers, the views, the representations that would help to grasp the connections and potential lines of continuities between the traces of the past and the city in becoming. The architect should prefigure a system of likely traces, connecting, integrating, entwining the archaeological ruins with the spaces of the contemporary city, where the red thread of history holds together multiple and multifarious elements, where the archaeological *insule* make up the foundation needed by architecture to pursue the value of the "eternal present" (Venezia, 2013). If this is the ultimate goal, we should create a methodology and establish a distinction between the archaeologist's "how" and the architect's "how", always keeping in mind that interdisciplinarity is one of the defining frameworks of such a project. Andreina Ricci argues that the first aim of the archaeologist is to help everybody to fully understand the meaning and value of the ruin and to virtually appropriate it by employing the two categories of "translation" and the "tale" that define "archaeological communication".

The architect's task is to implement the re-use of that asset in harmony with the "translation" and the "tale" envisioned by the archaeologist, never losing sight of the relationship between the form of the city and the architectural form of the ruin. Knowledge in its multiple meanings is the tool of the architect. As always happens with planning projects, critical orientation makes the work of knowledge essential and complex. Let us focus on three exemplary projects where the relationship of archaeology with the city and architecture is based on different modalities of articulating knowledge: Dimitri Pikionis' landscaping of the archaeological site around the Acropolis and the Filopappou Hill, Athens 1954-57, Giorgio Grassi and Manuel Portaceli Roig's restoration and rehabilitation of the Roman theatre of Sagunto, Sagunto 1985-93, and David Chipperfield's rebuilding of the Neues Museum, Berlin 1997-2009.

For Pikionis, the urban landscape enhances the knowledge of Athens' acropolis. The plan of the paths and platforms represents a realization of the dispositifs of vision of the acropolis. Pikionis practices a perceptive and material knowledge of the ruin in the landscape. «The Attic landscape, that has long lost its integrity, finds new life in the micro compositions that dot the path, in the narrow enclaves that give new meaning to the sense of the place, letting the original meanings ooze out of the rocks and intermingle with the other, century-old ones in the analogic play that regulates the succession of forms and ideas throughout history» (Furlenga, 2006).

Giorgio Grassi rather adopts a mode of knowledge of the typological-constructive variant. This is knowledge of the constructive features of the Roman theatre, actualized by means of an accurate redrawing deployed by means of maps, sections, and prospects, of different Roman

theatres, which he regarded as a necessary practice to reconfigure the absolute essence of the theatre's architecture. «The Roman theatre of Arles represents, from a material and especially symbolic point of view, the beginning of Grassi's Spanish projects between architecture and archaeology [...] The first concern that emerges from these notes is the notion that archaeology is integral to architecture and, as a direct consequence, the idea of 'ruin' as an architecture that lost part, or all of its original condition, without, for the same reason, relinquishing its typological and formal structure. It never ceased being an architectural form. Thus, the ruin is an architecture that has 'regressed' to a state preceding its completion, or, if we look at it from the opposite perspective, it is an 'unfinished' architecture that was interrupted halfway through its construction» (Malcovati, 2013).

Chipperfield practices a mode of knowledge based in the knowledge of the spatiality of "that ruin": this is a work on the architectural object in itself that reconfigures its perceptive unity. Chipperfield writes: «The process can be described as a multidisciplinary interaction between repairing, conserving, restoring and recreating all of its components. The original sequence of rooms was restored with newly built sections that create continuity with the existing structure. The almost archaeological restoration followed the guidelines of the Charter of Venice, respecting the historical structure in its different states of preservation» (Chipperfield's office web site, 2011).

In the enhancement project of the Archaeological Park of Baiae described in the following pages we mobilized the three modes of knowledge: the knowledge of the relationship that the ruin entertains with the landscape, the philological-typological-constructive knowledge, and the knowledge of the ruin's own spatial elements.

METHODOLOGICAL ISSUES

The method should be based on the principles of a theory that pertains to architecture, the project's sphere of activity, and aim at elaborating a process by establishing a common set of operating procedures for the projects within the different disciplines involved (architecture, archaeology, economics, as well as the institutions that deal with the protection and the local territorial governments). So an integral part of this process included the operations connected with dealing with the institutions that govern the territory to which the archaeological asset belongs; the governmental bodies in charge of its stewardship, the community of interested entrepreneurs, as well as with the state organizations which could offer funds to implement the development.

The process moves from a thorough understanding of the essence of what pre-exists. First of all an act of cognition is necessary. The same methodological consideration that invests the terms *archaeology* and *city*, but above all the interconnections established by these two terms, finds its inescapable beginning in the creative quest for knowledge. There can be no judgement without knowledge and there can be no project without judgement. The disciplinary tool which the architect mobilizes to know the city and architecture, or as one urban theory asserts, *the city itself as an architecture* (Rossi, 1966) is *Urban Analysis*, a tool which identifies specific epistemological modalities which depend on the urban project. In this disciplinary context, the project becomes an instrument of knowledge. If urban analysis provides us with a well-known procedure, in a certain sense codified by a reading of urban phenomena, for what, instead, pertains to the knowledge of the archaeological asset, we must necessarily refer to its material and formal consistency. It is clear that there exist several possible levels of knowing the archaeological asset. In light of this premise, the work involves a reading of the territorial scale, urban analysis, a formal reading of the archaeological asset, a research of historical documents, and a description based on a relief and re-drawing. After establishing the perimeter of the study-area, the urban analysis proceeds to include: an identification of the infrastructures system and accessibility; knowledge and description of the geomorphology of the ground and the configuration of the green areas and

open spaces located in the analyzed context; a reading of the urban context (primary elements and construction pattern, urban morphology and construction typology); the investigation and reconstruction of the urban scenes on which the various configurations assumed over time by the archaeological site have referred to (documentary investigations through elaborate graphic descriptions). In contrast, followings are the tools that allow an approach to the knowledge of the architectural form of the archaeological asset: historical documentary studies; studies on architectural consistency, particularly material form and composite based principles; drawings from architectural surveys and reconstructions of the configurations assumed over time by the asset. The process's first step is identifying the founding elements of the asset's architecture, of the underlying structure of its formal configuration, to re-propose the recognized characters in the concept of the pilot project. In this way a relationship of continuity and affiliation is established not with the linguistic and figurative apparatus of the asset, but with his *hidden structure* (De Fusco, 2000). An integral part of this process is represented by all the operations connected to the relationship with the institutions governing the territory to which the archaeological asset belongs; the governmental bodies with the community of interested entrepreneurs, with the state organizations which could offer funds to implement the development.

The complexity of this topic requires the cooperation of multiple actors to enhance the definition of the project, to transform the archaeological site in a propeller engine of the urban transformations of the local territory.

ABOUT THE RUIN

The enhancement project of the Archaeological Park of Baiae was developed under the scientific coordination of *Fondazione Internazionale per gli Studi Superiori di Architettura*, by the following team of architects: Uberto Siola, Renato Capozzi, Adelina Picone, Federica Visconti as senior scientists.

The monumental complex lays on the low part of the hill of *Baiae*. It consists of natural terraces, which, according to need, are moulded by powerful substructures acting as basis *villae*. It is a semi-annular shaped area of approximately 400 metres facing south-west to north-west. It is located between the Ferretti building and Piazza De Gasperi and features two nuclei, isolated from the original context by contemporary urban cuts (as shown in the so-called *Temple of Venus*), at the entrance of the harbour and the so-called Temple of Diana at the bottom of the modern square. The site is now under the authority of the Superintendence for the archaeological heritage of Naples and Pompeii. The first excavation in Baiae took place in 1800. In 1935 in obedience to Amedeo Maiuri's will, the Archaeological Park of the Baths of *Baiae* was created, following a process of land expropriation, excavations, restoration and safeguarding of a wide area expanding from the hill to the sea, which was however, enforced only in 1941. Other excavation and relief campaigns have been carried on in the area up to the present day, with the aim of restoring a more complete picture of the local topography. Experts have rarely agreed on dividing the site into sections, but today the complex is commonly to acknowledged as part of the imperial *Palatium* divided into the following sections: *Diana section*, *Mercury section*, *Villa Ambulatio*, *Sosandra section*, *Small Baths*, *Medium Level Baths*, *Hadrian Baths*. These designations are subordinated to description needs, as they refer, more or less, to autonomous architectural entities. The difficulty in detecting the use of these buildings is due to the network of structures and the presence of superimposed building phases that often prevent identification of the original architectural project of the buildings. The state of preservation of the area is not uniform and only a few original decorative coatings have been preserved (Guardascione, 2011).



Figure 1. The Archaeological Park of Baiae (Source: Authors).

THE AIM OF THE PROJECT

At the core of general theoretical consideration and of planning experiences carried on by the project, the archaeological site should be the object of proposals concerning not only its restoration and preservation, but also its use in the present days and, therefore, its inclusion in the behaviour of the contemporary city in light of a wider territorial reorganization. All this invites to look at the archaeological heritage from the alternative perspective of architecture.

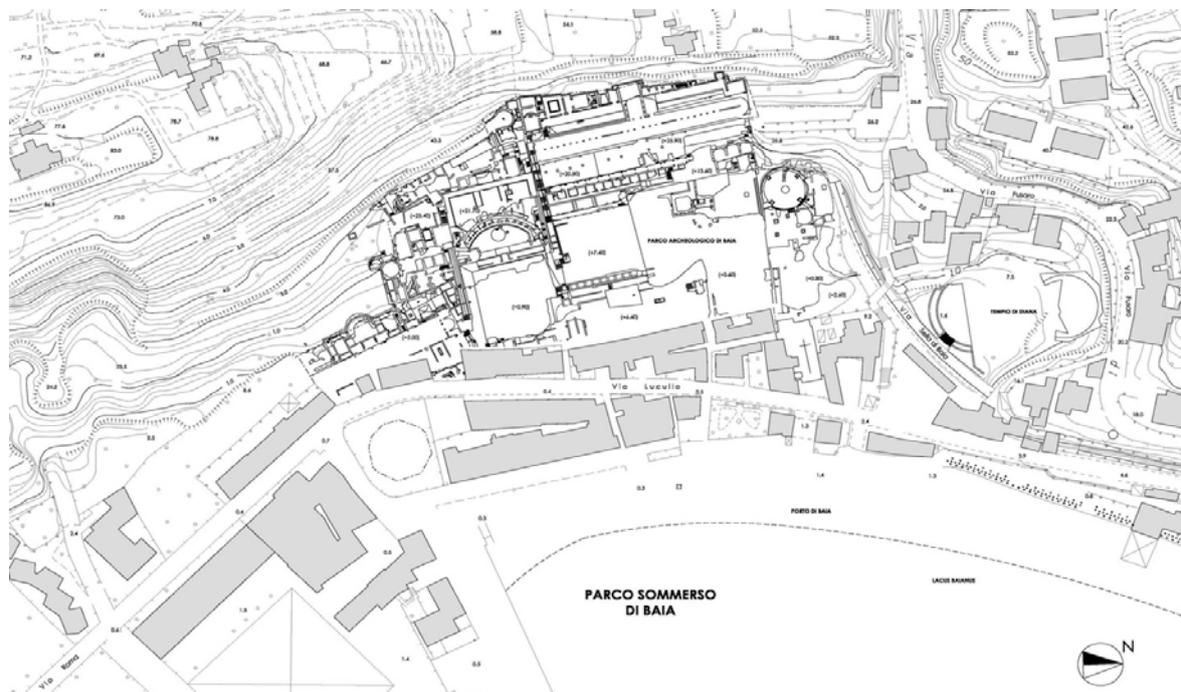


Figure 2. The Archaeological Park of Baiae: Consider The Monument, redraw general plan of the ruin (Source: Authors).

Carrying out the project has meant broadening our vision to larger areas, other than merely the archaeological ones, which as a result of the identification of their own dimension, changed from study-areas into project-areas. Beyond attaching a significant value to the pre-existing archaeological sites, we worked within these areas to restore the functional, formal and meaningful relationships between the different elements involved. From the functional point of view, this meant working on accessibility and on the supply of services, while formally we also introduced new architectures, as we continued to settle and stratify traces. Finally as concerns meaning, we suggested to introduce new “themes” and identified new uses for the archaeological areas. The Archaeological Park of Baiae acquired the look of an area where the narration of architectural and landscape values merges with the theatrical one, in different forms, such as opera, classical and experimental performances, in harmony with the several spaces surrounding the complex. Furthermore, the project aims at reestablishing the original functionality of the ancient thermal baths, located in the so-called Mercurio Sector, where the architectural spaces are still well configured.

THE ENHANCEMENT OF THE ARCHITECTURAL DESIGN

The distinctive trait and, in our opinion, also the real value of our work consists in developing an approach to the archaeological issue that avoids creating physical and functional areas and fences. Thanks to its great value, archeology should instead be perceived as an area to protect, found within a broader “space” where changing opportunities can be seized by trying to turn actual remains, which are sometimes indecipherable except for the experts, into elements whose task is «to spread our present into the future» (Ricci, 2006). The only possible way to enact this spreading in an enhancement project is to achieve a great and deep knowledge. The analytical actions needed to acquire the knowledge of the archaeological asset have to be undertaken firstly: the archaeological research and the redrawing with reliefs to verify the correct representation of all the asset’s portions.

The redrawing employed some reliefs obtained from the Superintendence as its basic plan, completed with measurements executed directly on site. The collaboration with the archaeologist was particularly relevant to obtain reliable sections and identify the right depth of the original levels. Redrawing can be considered a useful operation to attain a deep knowledge of the asset, introductory to conservation's actions. Further it acted as a sort of preparatory phase for the architectural design, particularly in the Mercurio Section, where great attention was paid to achieve the correct reconstruction of the original distribution and articulation of the spaces of the ancient thermal bath.

Starting from these premises, the design focused on two macro-themes, from which originated the following project topics:

- Improvement, to the urban scale, of the conditions of accessibility to the Archaeological Park, considered as a system within the cultural assets of the Phlegraean Fields in their totality, extending from Pozzuoli to Cuma.
- The new definition of the entrances to the Park of *Baiae*, identified according to the urban strategy Research of new functions with the goal of activating the enhancement's booster in the Archaeological *Park of Baiae*, considered as a part of the wide cultural system of the Phlegraean Fields.

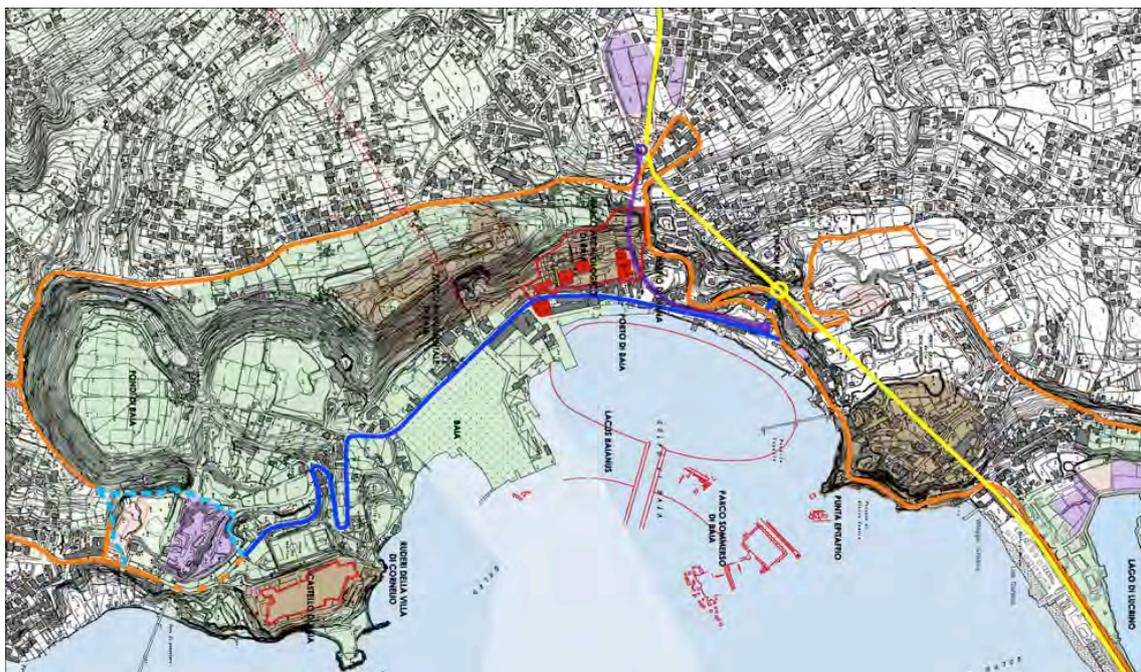


Figure 3. Accesibility and infrastructural system (Source: Authors).

Based on an architectural analysis, confirmed and strengthened by an economic-financial-management study conducted by UniMED, the possibility emerged that the Archaeological Park of *Baiae* could benefit from a new functional life. This stemmed, first, by considering its degree of accessibility, understood as an element of our cultural heritage, and secondly, taking a valuable action in full respect of the original configuration of the archaeological assets, implemented by restoring part of the thermal baths functionality in the Mercurio Section while using the open spaces as permanently-based venues of theatrical performances.

The project begins with an extensive study of the level of accessibility and infrastructural system of the archaeological monumental emergencies of *Baiae* (the archaeological monumental park, the submerged park, the *Castel of Baiae*) considering them as parts of a much wider complex of archaeological assets, which stretches up from Puteoli to Cumae and includes the Phlegraean Fields. The topics are:

- redefining the entrances;
- pedestrianizing the coast which supports the plan of accessing the Archaeological Park from the Temple of Venus, restoring the original relationship between the building and the *Palatium*;
- the new entrance from the Venus complex with a bookshop also accessible from an alternative route to the Archaeological Park;
- the entrance from the square directs visitors to the Mercury complex and implementing its restored thermal function;
- the established use of the open spaces as theatres, according to the various envisaged intervention levels: from the simple preparation of the seats and lighting fixtures in the so-called Temple of Venus for performances of experimental theatre, to the mounting of a “theatrical machine” in the *natatio* of the Sosandra section for performances of classical theatre and opera, as well as the layout of a natural *cavea* in one of the pensile garden for musical shows;
- the re-functioning of the baths in the so-called Temple of Mercury, foreseeing the restoration and a new functional life, closest to the original one, with the possibility to exploit the still-active thermal springs.

The development of these last two topics, related to the new functional life of the Archaeological Park, allowed to experiment with an interesting interdisciplinary approach.

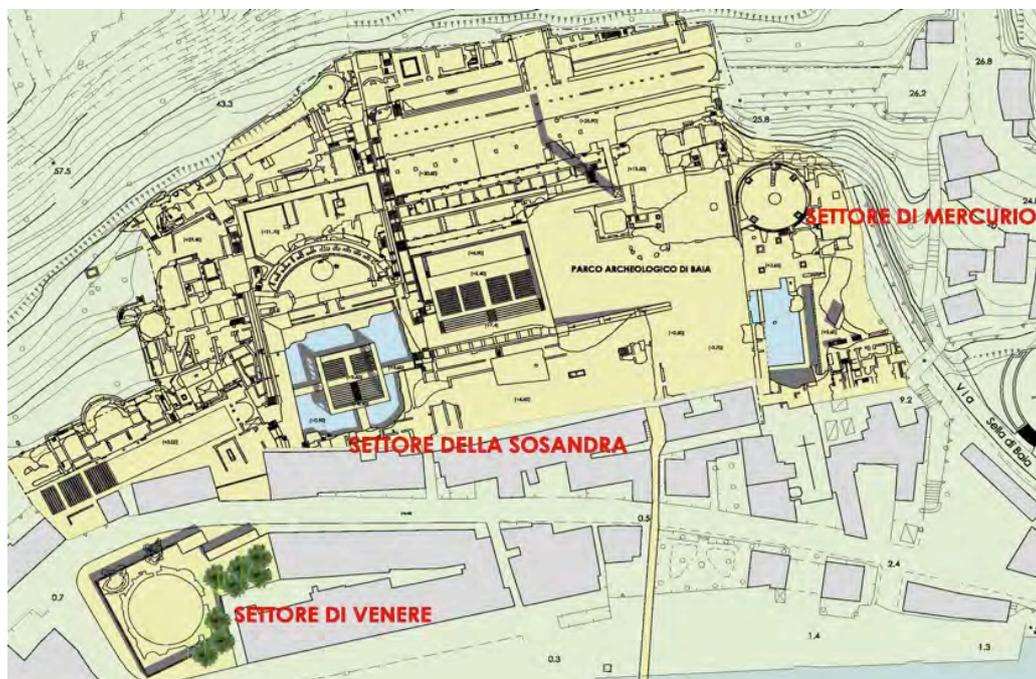


Figure 4. Archaeological Park of *Baiae*, the general enhancement project (Source: Authors).

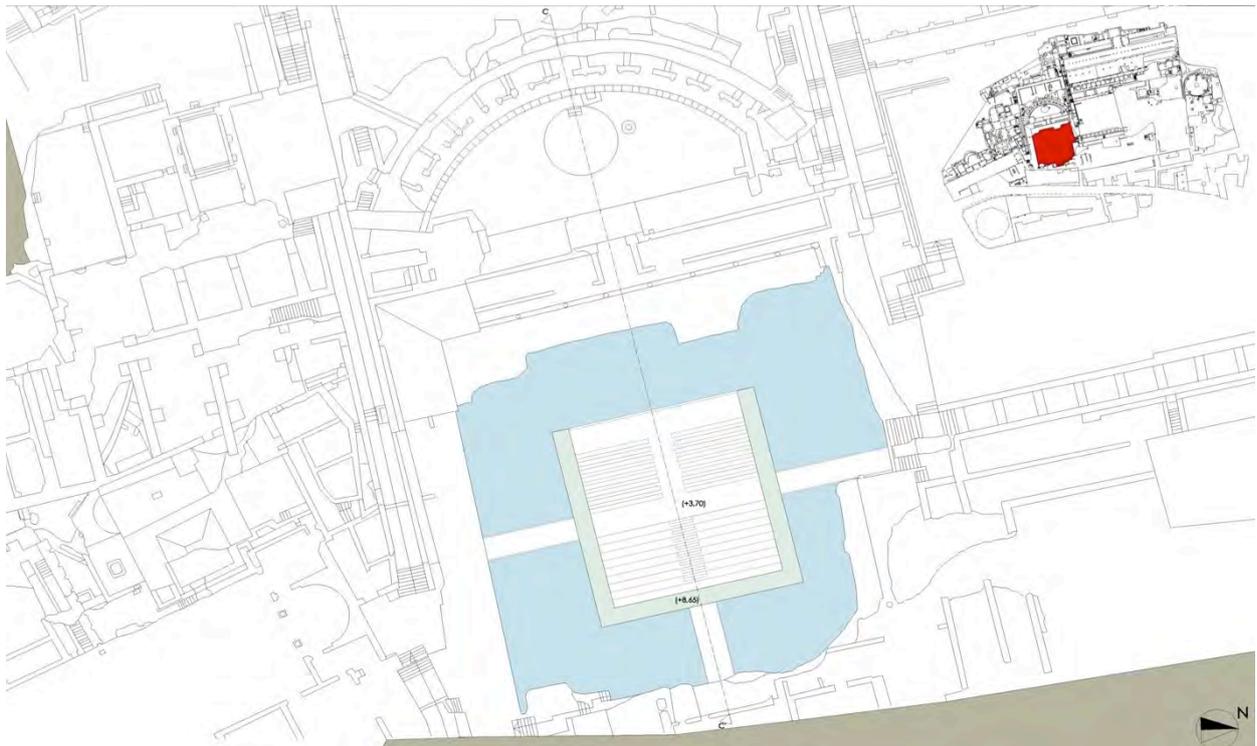


Figure 5. The project: the theatre in the Sosandra sector, plan and section (Source: Authors).



Figure 6. The project: the theatre in the Sosandra sector, plan and section (Source: Authors).

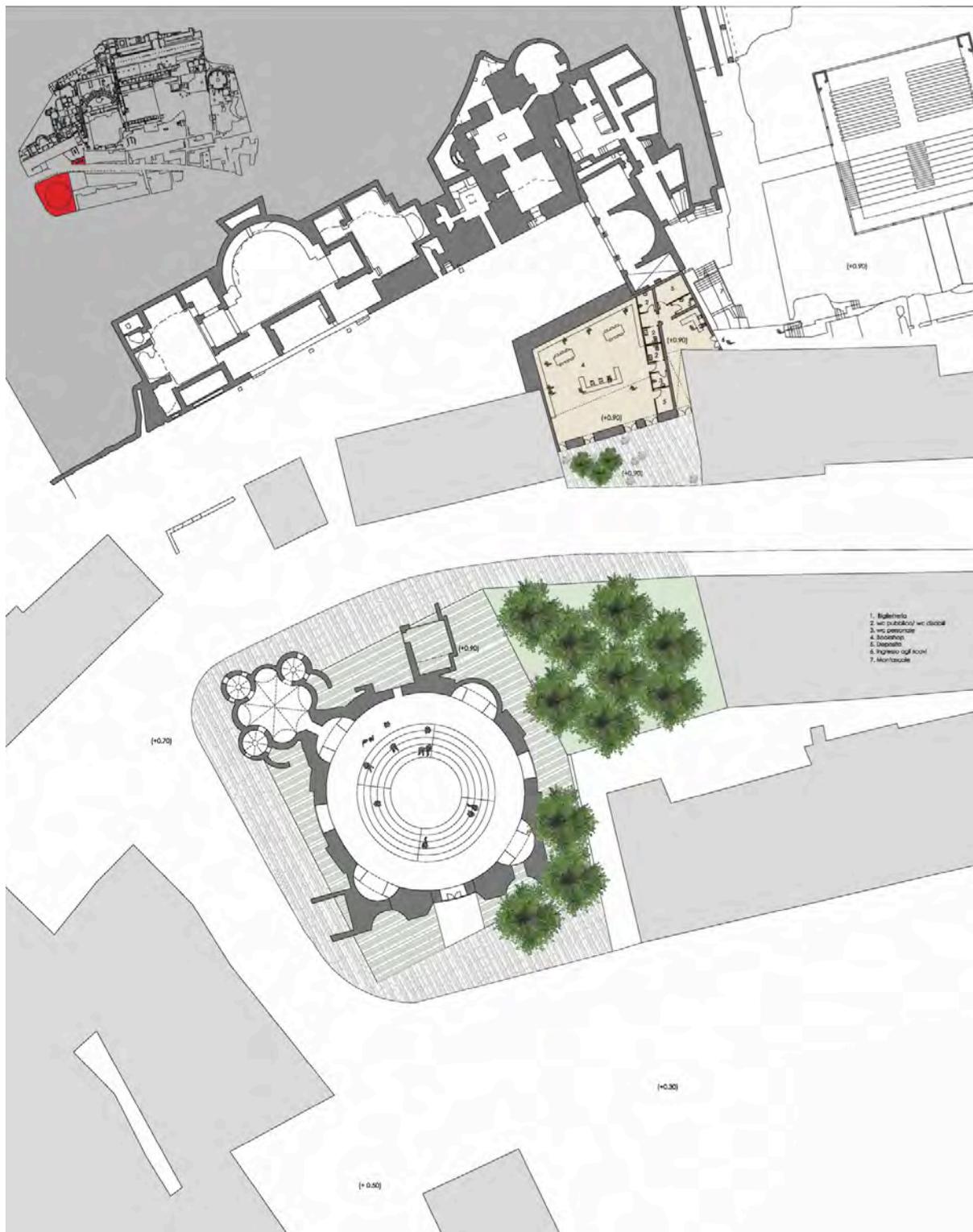


Figure 7. The project: the theatre in the Venus sector, plan (Source: Authors).

INTERDISCIPLINARY PROCESS

The different experts involved in the elaboration of the project played the relevant role of defining the work group, which required the coordination of an architect, an archaeologist - which worked not only as a consultant *ex ante*, but also as an interlocutor throughout the project -, and economists for context analysis and operational proposals in the framework of a strategy of revitalization and integration of resources.

It is really interesting to analyze this project in depth. In fact, all the elements of the explained methodology were epitomized in it. In the elaboration phase a number of collaborations were established with Flavia Milena Guardascione, an archaeologist involved also in the architectural project team; the team of economists composed by Luigi Manfra, Valerio Tuccini and Alessio Liquori, who worked under the scientific coordination of UniMED-Mediterranean Universities Union; a research group of the *Centro Interdipartimentale di studi per la Magna Grecia*, under the scientific coordination of Giovanna Greco; Campania Region's team, under the coordination of General Department Relations with National and International Bodies in matters of Regional interest-EU Projects Unit. Following the contributions of different actors:

- UniMED team produced not only the economic feasibility studies, but also the configuration of revitalization strategies of the entire urban environment, based on a deeper analysis of the context conditions, of the tourism market and of cultural asset's accessibility to the Phlegraean Fields. Furthermore, the economic research offered an important contribution to the new functions definition, as will be illustrated in the next sections.
- The research group of the *Centro Interdipartimentale di studi per la Magna Grecia*, in collaboration with the theatre company *Teatrocontinuo* directed by the dramaturge Nin Scolari, realized a theatrical experiment that was performed in the archaeological spaces. The performance, born from the scientific results of a research on the *Great Female Figures* from the ancient world, helped to test the potentialities of the archaeological park's open spaces.
- The Campania Region's team encouraged putting into practice the integration and cross-disciplinary contamination procedure, by envisaging comprehensive, cheaper and innovative architectural solutions and forms of management, with the aim of developing realistic and achievable action plans.

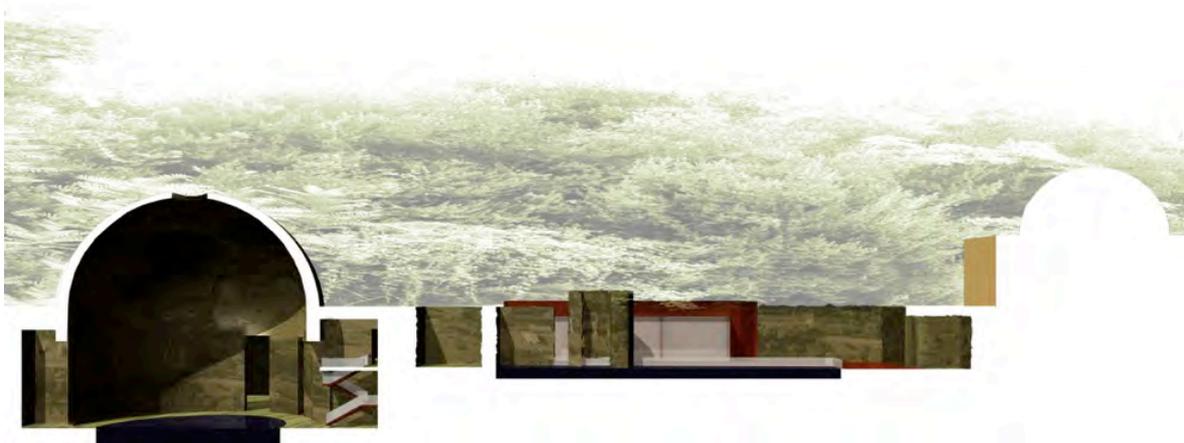


Figure 8. The project: the Mercurio sector Roman Thermal Baths, section (Source: Authors).

THE FIRST ENHANCEMENT RESULT.

The Archaeological Park as a multiform theatrical scene

The decision of holding a theatrical performance inside the Archaeological Park showed its potential function of events centre, considering the open spaces of the asset as background to all kinds of possible representations and performances: from experimental theatre to musical events, to grand opera theatre.

All the project's actors agreed with this vision, particularly the team of architects, which conceived the design with the aim to restore the ancient unity of the *Palatium*, highlighting the necessity of giving renewed centrality and urban visibility to the Archaeological Park. The new entrance, close to the Venus Temple, reconnects, also in a functional fashion, the monument with the Archaeological Park.



Figure 9. The project: the Mercurio sector Roman Thermal Baths, plan (Source: Authors).

The role of the Venus Temple is to reconnect and link once again the threads of the ancient tissue and the original landscape relations, providing a perfect chance to promote new urban centralities in present-day *Baiae*. This is the meaning at the basis of the project, which intends to set the temple free from its fences and to restore its surrounding backspaces, re-adapting them for urban fruition. The expected interventions include the simple rationalization of the pavement and the green parterre of the garden that surrounds the monument, which, in the new functional

life that ArcheoURB foresees for the Archaeological Park, will host experimental theatre performances and cultural events. The problems linked with the control, security and safeguarding of the archaeological ruins will be addressed by placing gates and glasses to the access rooms leading to the main hall, which will constantly be visible but accessible exclusively on planned occasions. Just in front of the Venus Temple, the project envisages a new access to the Archaeological Park using an area roughly based on via Lucullo, one of the few fissures of the curtain wall through which it is possible to actually see the archaeological complex. Here, we find the remains of the walls holding the above terrace of the Small Baths complex. These walls originally closed the halls, that according to archaeologists are of old age and were presumably used as warehouses. Here the designers plan to locate the bookshop and the ticket office, planning the front space in continuity and as an analogy with the parterre project of the Venus Temple.

This transformation was made possible thanks to the important contribution of the archaeological research, in order to give a certain knowledge of the original underground levels of the ruin. Furthermore the economical-financial study and the context analysis, conducted by UniMED team, were crucial in indicating the visibility-strategy.

The team of economists suggests to commit the crucial managerial aspect to a third subject, i.e. a foundation, who would be in charge of coordinating the different levels of expertise associated with the number of authorities involved: State, Region, Province, Phlegraean Park, Archaeological Government Department responsible for the environment and historical buildings.

In spite of the large funding that has been invested in the last ten years for the restoration works, for the rehabilitation and the environmental requalification actions, the expected cultural and touristic development in the Phlegraean Fields has never really started due to the lack of an integrated managerial action, and of the implementation of the system. The economic research makes a proposal for an operational solution for the enhancement of Baiae based on holding theatrical events within the Park: «the promotion of the Archaeological Park area by promoting cultural activities and events which may involve residents and day-trippers. The *Baiae* Roman baths is a charming area, open to different options due to the dimensional characteristics and the morphology of the site. The operational proposal devised in this project consists of setting-up several performance spaces in the baths area, with variable capacity, where a number of featured events (about 20) could be held in the summer season. Extraordinary funding channels could be employed (EU or national) for the facilities (the estimated cost for the performance areas is about € 4.2 m). Besides, regarding the events schedule (the estimated cost is about € 210,000 per year), grants for operating expenses, only partially covered by ticketing incomes, would be necessary and could be obtained from different channels (local administrations, sponsors, etc.). These activities could attract a relevant volume of visitors (a potential audience of about 8,200 people) and the contribution (the public and the private one) would be widely justified by the potential appeal of the activity, the cultural promotion of the archaeological area and the economic impacts on the retail trade» (Manfra, Tuccini, Liquori, 2011).

Following this idea all the *Palatium's* open spaces become potential theatrical spaces, as exemplified by the performance of the *Centro Interdipartimentale di studi per la Magna Grecia*, which chose an open space in the *Sosandra section* to host its performance, without requiring any sovra-structural installations.

«An extremely minimalist scenery has been requested and implemented, being almost inexistent in some particular areas where, indeed, it has been entrusted to the effects of lights, costumes and dancing, highlighting its emotional and fascinating side. On the whole, the scenery has never been invasive whereas the lights have emphasized the structures always present in the background. The monument, in all its parts, goes on playing the main character on stage and accompanies the audience towards the discovery of a beautiful niche, vault, or sinuous recess,

which is its actual enhancement. The theatre stage, the scenery with its lights and sounds has never hidden the monument and the open-air Museum has gained great emotional momentum.



Figure 10. The project: the Mercurio sector Roman Thermal Baths, view of the new entrance

The scenery has made the best use of lights by re-using the shades of ancient structures, thereby giving rise to evocative powers and feelings that have never upset or effaced the ancient character and the original nature of the monument. At the end of this research activity, a story

gathering texts, images, evidences, impressions discussed during numerous meetings and exchanges of views among the participants in the work group, philologists, archaeologists, historians of religions, comedians, has been staged. The story is set in the Mediterranean, sailed across at different times and along different routes. The performed travel is the travel of men, ideas, religions, cults and rites, which unfolds from the fall of Troy and the arrival of the Greeks on ancient Italy's coasts up to the present day. Great female figures that ancient tradition has passed on to us who answer the same strong and imperative appeal of motherhood. Guided by the strong royal power of Hera, protectress of sailing and happy landings, these Mediterranean goddesses-mothers narrate events and passions, changing routes, spaces and times, beyond rational, natural and temporal borders, thus becoming eternally universal icons and archetypes» (Greco, 2011).

Different and more complex is the case of a grand opera event that requires a large number of sovra-structural installations, as happened with the grand opera events (Cavalleria Rusticana, Aida) that the San Carlo Theatre of Naples staged in the Archaeological Park.

In order to stage effective theatrical activities in the archaeological park in terms of cultural promotion and economic impact, the offer of cultural activities should be diversified. Hence the need to host grand opera events without necessarily investing funds for the sovra-structural installations on every occasion, which would make the operation too expensive. The design meets these needs with its "theatrical machine". The new theatre - conceived as a demountable wooden structure - leads into the big court bringing it back to its original level and restoring its original function of *natatio*. The new building - as in the Roman tradition of "celebration machines" for *naumachias* or as for the maritime theatre of *Hadrian's Villa* - is an independent element inscribed as a fragment in the global additional composition for each single part, a new fragment which endeavours to making it easier for visitors to understand the rules and forms of the old times. In order to define its presence without imposing itself on the monument or competing with it, the theatre - from the architectural and syntactic point of view - thanks to an adequate and fit proportion, reaches the maximum height of the portico of the court; maintains in its overall layout the compositive axe passing by the centre of the exedra of the first terrace; and finally, due to its planimetric form, gains the shape of a square. In this way, the theatre, isolated in its formal and dimensional individuality, stands out and reflects itself in the stretch of water linked to the portico by two pedestrian paths running on a piled structure facing east-westward which marks the passage between the two *cavea*, while a third path facing north-south links the theatre to the perimetric *deambulatio*, to the changing rooms, the warehouses and the lavatories on the ground floor. From a constructive point of view, the theatre is organized by a very high procession of slender pillars (in lamellate wood) constantly steady step, which, through the *vomitoria*, hold the slabs of the steps. These are completely pierced to increase the transparency of the entire building and, as a consequence, to consent the perception of the terraces of the *palatium* also in the backside towards south. This semantic choice makes the new building uncovered and open, attaching to the sole framing element - which joins together the two scene towers closing the orchestra - the definition of the architectural decoration whose main objective is to revive the general completeness, alluding in this way to a virtual cubic volume. The proper double inclination of the *ima cavea* and of the *summa cavea* guarantees a perfect visibility either of the stage of the maritime theatre, or of the complex architectural/backdrop system formed by a terraced system with concave and convex exedras of the ancient monument. The new building above whose composition, as mentioned above, is programmatically and evidently based on the old monument above proposes, therefore, a possible contemporary interpretation of the theatre theme, in the archaeological sites, basically as an "architectural device". Such an intervention would justify a new presence and collocation in a so delicate and complex context, acting as a suitable "watching machine" for shows and for the archaeological ruins without winking but with

great respect and, at the same time, being able to glorify and acknowledge its beauty and value of testimony.

THE SECOND ENHANCEMENT RESULT.

Modern life for the ancient thermal baths in the Mercurio temple

As for the Mercurio section, the archaeological research ascertained the ancient function of the thermal baths, even if the original internal distribution of the spaces is not entirely clear due to the superficiality of the archaeological excavations. Most of the internal spaces of the Mercurio section are substantially still underground and their planking levels still unknown.

«As for the oldest complex we can only say that the big *rotunda* could be a *natatio*; here, drillings were done which reached a floor 8.50 metres under and intercepted a vein of water at 60° C. Chemical tests on water samples coming from the western area of the *rotunda* of Mercury were run, which have shown the presence of hyper thermal water with a temperature of 54,7° C, with organoleptic characteristics so to be classified as *strong sodium chloride* useful for balneo-therapy and mud therapy. The *Mercurio section*, which underwent magnifications, had to be very busy, but it never experienced functional alterations» (Guardascione, 2011).

The citation is from a Conference held in 1969 in the *Castello aragonese di Baia*, entitled: *Baiae Hydrothermal resources. Usages, Perspectives*, whose proceedings were published in 1997. The permanence of the water spring, the thermal proprieties of the water, the conservation of the thermal spaces, and mainly the striking *natatio* filled with water up to the vault, invite to imagine a new life for the *Palatium's* Baths, not only for functional and financial reasons, but to restore the ancient *genius loci*.

It is almost unnecessary to stress the importance and effectiveness of reusing parts of the Roman baths of *Baiae* to promote tourist-economic development, not only for *Baiae* and the Phlegraean Fields, but for the whole regional territory. The main point is identifying the modalities of conceiving this reutilization which should be not only appropriate as regards the safeguarding of the archaeological heritage, but also an effective tool of preservation for two essential reasons. The first one is of strictly economic nature and concerns the possibility of entrusting the management of the thermal activity to a private company which will take charge of the ordinary maintenance of the complex. The second one, of educational and popular nature, concerns the appropriate usage of the original archaeological heritage which allows a more direct empirical knowledge, restoring the original function and finally making the *Baiae* Complex alive. The main theme of the project of the Mercury section is the excavation, dictated either by distribution or spatial choices. The excavation itself - about three meters under the actual level of the floor of the entrance of the so-called Mercurio Temple - which will portray the open space of rectangular shape, - compositive nucleus of the intervention: one space conceived as a water basin, a modern *natatio*, which will compose the archaeological findings that the excavation will bring to light - the natural forms of the landscape, the architectures (historical and contemporary shapes) - and which will also work as an access to the baths. The autonomous function of the baths will be ensured by a separate entrance. The entrance from *Baiae* square, designed and realized at the time of the last restoration works, was never used and has now been vandalized. The project foresees the same archaeological visit to the park, but starting from the new entrance located in front of the *Venus Temple* and it will be carried on by visiting the three sections, with the possibility to face inside the *Mercurio natatio*.

As far as the functional articulation of the spaces is concerned, around the central one formed by the big hall of the Mercurio Temple, the project intends to give back the original usage of the Roman baths to the halls and functions and foresees as well, in spite of a lack of reliable data which could probably be gathered following thorough and exhaustive archaeological researches, a destination compatible with the greatness and proportions of each hall and their

proper use, in any case changeable, whenever new excavations bring reliable ascriptions to the punctual destinations, given the general sense of the operation.

The UniMED research highlighted the high touristic impact of this type of enhancement, with a really long range and huge potential. The main concern regards the managerial model, which would necessarily involve a qualified private actor, expert in the field. Following the formulated scenario: «It would represent an interesting opportunity even in terms of management because the maintenance of the area would be entrusted to qualified wellness and spa professionals, once spaces and structures have been restored and given their original function. In addition to maintenance and custody, this option may provide a potential income with positive relapses on the local economy (this initiative may take several legal forms that need further study and investigations). In the case under consideration, the particular features of the territory constitute a *unicum* which favours this union, by limiting to a minimum the harmful effects that are often attributed to the involvement of the private-profit sector in the cultural sector, and by providing an opportunity of “mutual support” thanks to which an important cultural heritage that is not available today may become accessible to the public. A time-regulated concession of the spaces can be hypothesized, through the payment of a fee in proportion with the income potential of the thermal activity. The resources deriving from this fee could be aimed at management of the part of the archaeological area that is open to the public (the possibility to start a project finance is not precluded). In order to understand the importance of the contribution that this solution could guarantee to the public mission of the supply of an available cultural heritage, some estimates and some basic, simplistic, yet crucial hypotheses in outlining the possible scenario, should be made. At this preliminary stage, according to some parameters gathered from field investigations, we hypothesize that the management of a spa facility in the Roman site may even produce a significant “compensation” flow aimed at the public management of the site, that may be approximately comprised between €100,000-€200,000. As stated, this hypothesis is very attractive and innovative but also actually applicable; it is particularly interesting because of the way in which it would make it possible to “open” a limited, yet important management space to private individuals, while still guaranteeing conservation of the heritage, sustainability of the cultural management and access to the public, in an area that today has a high risk of degradation and of being shut down» (Manfra, Tuccini, Liquori, 2011).

The interdisciplinary perspective from which we have elaborated this project requires the involvement of experts able to individuate the water springs still in action, to analyse the nature and properties of the water, and pushing away seawater seepages into the Mercury hall. Such a relevant research exceeds the competences of the project, which has anyway endeavored to bring to light, starting from a strictly urban view, the potential increased value in this field, giving a specific and clearly outlined scenario of an interdisciplinary methodology of research, waiting for funds that would allow to carry on with the plan.

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ALLURE OF THE "CRYSTAL: MYTHS AND METAPHORS IN ARCHITECTURAL MORPHOGENESIS

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Abstract

'Form' has always been one of the most important issues in architectural design. In the process of form-giving to the end-product, architects make use of different sources from typologies to intuitions or metaphorical ones. When the generic ideas of the prominent examples in architectural history have been traced, it can clearly be stated that one of the most effective metaphors used in architecture is the 'Crystal.' Appearing at the intersections between nature and human history and having a long history going back to myths, the 'Crystal' has been used extensively in architecture both as reflecting the meaning originating from its mythical background, and also, as a metaphor representing the perfection in nature. This article will try to trace the use of 'crystal' metaphor in history and analyzing the two examples, namely, the Royal Ontario Museum: 'Crystal' in Toronto (2007) by Daniel Libeskind and Musée des Confluences: 'Crystal Cloud of Culture' in Lyon (2014) by Coop Himmelb(l)au, will try to evaluate the change in the use of crystal metaphor in contemporary architectural morphogenesis.

Keywords: *Crystal; Myth; Metaphor; Nature; Morphogenesis*

INTRODUCTION

Crystal is one of the most sophisticated inorganic structures of nature which is repeatedly used in the past and still continues to be a significant source in the architectural form-giving process. An overview of the history reveals that crystal and crystalline formations have been used both literally and metaphorically in all arts and architecture from Antiquity up until today. The meanings attributed to crystals and the way they were incorporated into design process have varied in different periods of architectural history. They have come forward either as a reflection of a myth or as a symbolic metaphorical relationship representing transformations in social life and technology taking its cues from 'nature'. This timeless allure of the 'crystal' has been accepted as coming from its symbolism. It is the symbol of 'perfection', 'purity' and 'clarity' in the form derived from inorganic nature; the symbol of transformation from 'life to death', and also, the symbol of the 'organic' or 'living' with its potential to generate new forms of life. In contemporary architectural practice, crystal metaphor still continues to be an important symbol of natural processes in the morphogenesis of architectural end product. In other words, 'nature', once a source of inspiration for imitation by analogy, has become a source with its inherent principles discovered by scientific developments for the genesis of architectural form through computer based parametric design generations.

The Genealogy of Crystal Metaphor

Peter Behrens (1868-1940) explained the meaning of crystal as:"the symbolism of the crystal relies on a metaphorical relationship between transformations which take place at the micro- and macro- cosmic levels; for example, just as mere carbon under intense conditions assumes a particular crystal structure and becomes the prized diamond, so the power of art may transform everyday life into a resplendent life filled with meaning" (Anderson, 2002, p. 50). In this respect, he used crystal symbol for the opening ceremony of Exhibition for Darmstadt Artists' Colony in

1901. Although it was not an architectural example, the crystal symbol was used in the meaning of "metamorphosis of everyday life into a heightened artistic experience" (Bletter, 1981, p. 31). The most celebrated architectural example of 'crystal' in history is Crystal Palace (1851) which is accepted as "...a revolution in architecture from which a new style will date" (Giedion, 1967, p. 251), and in Lothar Bucher's words "all materiality blend into atmosphere" as cited in Giedion's famous book *Space, Time and Architecture* (Giedion, 1967, p. 255). Although named as crystal, the idea in the generation of form in Crystal Palace was not derived from the crystal form and idiosyncrasies of crystalline formations; instead, the technological advancements of the age used in garden structures of the period - iron skeleton and glass cladding were more effective in design. Paxton used the features of glass as 'transparency', 'lightness' and 'the ease of rationality in production' in his design. Crystal Palace was a real technological breakthrough in linear tectonics and the rationalized production techniques of the period, but, Ruskin criticized Paxton's design as "the New Crystal Palace as the poetical public insists upon calling it, though it is neither a palace nor of crystal..." (Ruskin, 2009, p. 96). In fact, these qualities, 'transparency and lightness' which were the prime motivation behind the use of glass in Crystal Palace were also the reason behind many glasshouses built at the end of the Seventeenth Century without any reference to mythical or metaphorical background. Glass became a favourite building material with its clarity and quantity of light in the age of enlightenment and rationalism instead of 'the aura of mysticism obtained by stained glass' in Gothic interiors (Hisham, 2006, p. 8). In the Nineteenth Century, glass developed to be an indispensable complementary building material in iron skeleton systems in glasshouses due to the developments in the glass industry such as *Jardin de Plantes* (1833), *Munich Glass Palace* (1834), *Palm House in Kew Garden* (1844).

The second recurrence of the crystal and crystalline forms as a metaphor appeared at the beginning of the Twentieth Century among German architects who sought to create an architecture free from traditional norms and constraints of the Nineteenth Century Schinkel tradition within utopian expectations in search for a new society against the political turmoil and social upheaval after the First World War. The idea of new architecture had expanded among architects belonging to a circle named as *Crystal Chain* (*Die Gläserne Kette*), generally referred as 'Utopian Correspondence' initiated by Bruno Taut, who signed his letters to friends with the pseudonym *Glas*. Taut designed *Glass Pavilion for Werkbund Exhibition* in Cologne just before the outbreak of First World War. Affected by his ideas about glass architecture, Taut dedicated this building to his friend, poet Paul Scheerbart, who is known for his book *Glasarchitektur* (1914) written with the inspiration under the effect of the glasshouse of the *Dahlem Botanical Gardens* in Berlin. The *Glass Pavilion* reflecting the ideals of the new architecture became the symbol of German Expressionism after the War. Taut, had linked the domed shape of his glass Pavilion with crystalline forms in his explanatory report as: "The large dome that resembles rhombohedron of crystal in its form, is composed of glass planes between ferroconcrete ribs and rests on iron-reinforced support, which comes out from a concrete scale" (Yamini-Hamedani, 2009, p.101). Rhombohedron crystal form was also used by *Violet-le-Duc*, in one of his drawings in which he juxtapose rhombohedrons of granite crystals with hexagonal crystals of volcanic basalt (Donahue, 1995, s. 50).

Taut's statement 'the Gothic Cathedral is the prelude to glass architecture' and one of the Scheerbart's couplets written on the plinth as "Light permeated the Universe/ It comes to life in crystal" (Scheerbart, 1972, p. 14) reflected Taut's interest both in mythical and spiritual meaning embodied in 'glass' architecture and also in debates of the Nineteenth-Century about the nature as a source of inspiration in architecture. What Scheerbart and Taut hoped for from 'Crystal Culture' was a new morality for the society (Pehnt, 1973, p. 74). Adolf Behne, who had hailed 'the alluring beauty of the ideal' - 'the ideal of glass architecture,' saw a delightful fragment of his ideal in the pavilion built for the glass industry (Pehnt, 1973, p. 75). He wrote in a 1915 review of Bruno Taut's architectural projects: "The longing for purity and clarity, for glowing lightness, crystalline

exactness, for immaterial lightness, and infinite liveliness found in glass a means of its fulfilment—in this most bodiless, most elementary, most flexible, material" (Bletter, 1981, p. 34). Crystal, representing the ultimate and the supreme, became the symbol for this new architecture, named as Expressionist Architecture by Behne in 1915. This architecture, contrary to the Paxton's Crystal Place, "...has no other purpose than to be beautiful" according to the pamphlet prepared by Taut for the visitors of the Glasshaus (Ersoy, 2007, p. 240).

In search of the background of German Expressionist Architecture appearing at the beginning of the Twentieth Century, Rosemary Bletter traces the mythical origin of glass back to King Solomon referring to Old Testament, Biblical descriptions, and Koran. King Solomon is said to have built a palace of glass (with glass floors). When Queen of Sheba, not knowing with the illusory effects of glass architecture, upon entering Solomon's palace: (Bletter, 1981, p. 23) "...when she saw it, she thought it was a body of water and uncovered her shins [to wade through]. He said, "Indeed, it is a palace [whose floor is] made smooth with glass." She said, "My Lord, indeed I have wronged myself, and I submit with Solomon to Allah, Lord of the worlds" (Koran 27:44).

According to Bletter, the meaning of glass architecture and its suggestion of shimmering water is quite direct and literal in Solomon's Legend (Bletter, 1981, p. 25). On the contrary, both glass and crystal, which has been used interchangeably, represented a spiritual meaning and superiority as a result of their symbolic metaphorical consideration in later examples.

The Crystal metaphor reappeared in German Expressionist architecture, coincided with a paradigm shift 'from the history-based approaches of the Nineteenth Century into the Twentieth Century visions of abstract' (Inceköse, 2006, p. 10). Especially, following the publishing of Wilhelm Worringer's book 'Abstraction and Empathy' (1907) and later 'Problems Of Form in Gothic Art' in 1911, architectural discourse centered around the idea of abstract in art and architecture and the 'crystal' form was accepted as true reflection of the natural order as Gothic architecture did. It is stated in his book Words and Buildings by Adrian Forty that "for most of the last five hundred years 'nature' has been the main, if not the principle category for organizing thought about what architecture is or might be" (Forty, 2012, p. 220).

Although addressed from different perspectives, or in some periods, the superiority of human being over nature has been accepted as a result of worldview, nature has been a creative repertoire in the formation of built environment from Antiquity up today. In the Eighteenth Century, architects interested in the processes and the rules of the nature for imitating as the origins of built form, like Leon Battista Alberti, in search for the organizing rules in the harmony of parts, as expressed in his book *De Re Aedificatoria* (mid 15th C), Vitruvius's myth of first building in *De architectura*, or Abbe Laugier's *Primitive Hut* (1753).

Nature was one of the prime concerns in art and philosophy also in the Nineteenth Century. Together with an increasing interest in Goethe's natural history studies, Goethe's interests in both crystal formation and plant 'morphology' influenced not only the German architectural theory but also philosophy. In his book, *The World As Will And Idea* (1851), Schopenhauer, referring many times to Goethe, asserted the role of crystal in the formation of life and also its unity: ".....the crystal has only one manifestation of life, namely its formation, which afterwards has its fully adequate and exhaustive expression in the coagulated form, in the corpse of that momentary life" (Schopenhauer, 1969, p. 155) and also: "in the inorganic kingdom of nature all individuality completely disappears. Only the crystal can still to some extent be regarded as individual; it is a unity of the tendency in definite directions, arrested by coagulation, which makes the trace of this tendency permanent. At the same time, it is an aggregate from its central form, bound into unity by an Idea" (Schopenhauer, 1969, p. 155).

In the Nineteenth Century, as a result of scientific studies of mineralogy and history of the natural world's own formation- Geohistory, an accumulation of a new knowledge on both forms of the earth's surface and also of the underlying unities of the diverse forms of nature like crystals and plants affected all arts and also the architectural discourse. The architectural discourse's

increasing interest in natural sciences with the tendency toward implanting theories, concepts and methods derived from natural sciences in architectural form-giving process reflected itself in the unconventional arguments in seminal works of three figures' at the beginning of Nineteenth Century: John Ruskin's (1819-1900) *The Seven Lamps of Beauty* (1849) and *Stones of Venice* (1851), Eugenie Viollet-le-Duc's (1814-1879) *Dictionnaire Raisonné de l'architecture française* (1856), and Gottfried Semper's (1803-1879) *Der Stil* (1860). Although they considered nature from different points of view, all three architects referred to crystal and crystalline forms. Semper, referring to geological formations using crystal metaphor for clarity and homogeneity stated that: "...just as the splendid marble that gives shape to the coasts and cliffs of Greece - notwithstanding its homogeneous formation- betrays its sedimentary origin through veins, scattered fossils, and other signs embedded in it, Hellenic art cannot deny its secondary origin. It too reveals to the observer all the deposits that form its material base but that, in a great metamorphosis of a whole people, rushed together from their sedimentary conditions into a crystal-clear homogeneity" (Bergdoll, 2007). In a similar way, fascinated with the Alps, both Ruskin and Viollet-le-Duc undertook extensive studies of the mineralogy and geology of the Alpine earth formations. Ruskin's exquisite watercolours of 'Fragment of the Alps' and by Viollet-le-Duc's studies of the glaciers of the High Alps outside Lausanne (Bergdoll, 2007) influenced art and architecture extensively that can be traced in Caspar David Friedrich's *Sea of Ice* (or *Arctic Shipwreck*) (1823-4) and in Walter Gropius's *Memorial to March victims in Weimar* (1921). (Figure1)



Figure 1.(Left) C.D.Friedrich's *Sea of Ice*, (1823-24) (<http://www.wga.hu/art/f/friedric/3/309fried.jpg>); (Right) Walter Gropius; *Memorial to March Victims in Weimar* (1921). (<https://www.pinterest.com/pin/452048881324350949/>)

Both Viollet-le-Duc and Ruskin sought analogies between natural formations and architecture especially with Gothic. Ruskin objecting the straight line's being at odds with nature, he discusses: "to find right lines in nature at all we may be compelled to do violence to her finished work, break through the sculptured and colored surfaces of crags, and examine the processes of their crystallization" (Donahue, 1995, s. 50).

In *Stones of Venice*, Ruskin stated that "(but) against crystalline form, which is the completely systematized natural structure of the earth... The four-sided pyramid, perhaps the most frequent of all natural crystals, is called in architecture a dogtooth; its use is quite limitless, and always beautiful ... and all mouldings of the middle Gothic are little more than representations of the canaliculated crystals of the beryl, and such other minerals" (Ruskin, 2009, p. 226).

Bruno Taut's famous book, named as *Alpine Architecture*, illustrating his ideals for a utopian future also explains the continuity of thoughts on nature behind German Expressionist Architecture. Although their utopian designs for glass buildings in 1920's couldn't find the

opportunity to be realized, the crystal has become the symbol of Bauhaus, most significant architectural movement in history, influenced by the ideas of Taut and Glass Chain. In the program pamphlet for opening speech in 1919, Walter Gropius explained the aim of the regeneration of German visual culture through the synthesis of arts and crafts as: "Let us create a new guild for craftsmen, without the class distinctions which raise an arrogant barrier between craftsman and artist. Together let us conceive and create the new building of the future, which will embrace architecture and sculpture and painting in one unity and which will rise one day toward heaven from the hands of a million workers like the crystal symbol of the new faith" (Curtis, 1996, p. 184). The cover of the program illustrated by Lyonel Feininger included a woodcut expressing a crystal cathedral, an allegory of the total work of art which represented the three arts of painting, sculpture and architecture as a symbol of social unity (Droste, 1993, s. 19). To summarize, a direct and literal use of glass in Solomonic myths has been transformed into a crystal metaphor for a new social order and salvation for architects. However, Bauhaus drew away from the complex and subtle ideas of Expressionist architecture fulfilling the demands of industrial productions and the functionalist approaches in design within the socio-political context of the age

The Crystalline forms faded from view during the political shifts of the early 1920's. Siegfried Gideon evaluated German Expressionism as: "The Expressionist influence could not perform any service for architecture" in his famous book *Space, Time and Architecture* (Giedion, 1967, p.485). On the contrary, parallel to the form priority approaches of 80's, as a reflection of the search for perfect form and geometry, crystal metaphor reappeared in the form-giving process. The *Crystal Cathedral* (1980) which has been designed as a religious monument with an appearance of a transparent four-pointed crystal by Philip Johnson and John Burgee, explained as hinted by the Bauhaus Manifesto illustrated by Feininger's woodcut: "the crystal symbol of a new faith."

When the latest examples of the architectural practice are analyzed, it is clearly seen that the Twenty-first Century has inherited the growing fascination for the crystal metaphor both in naming and in the visual appearance of the end-products. UFA Cinema Center in Dresden (1998) by Coop Himmelb(l)au; Denver Art Museum (2006), massive crystalline addition to existing Royal Ontario Museum (Michael Lee-Chin Crystal) in Toronto (2007) and Crystals at City Center, in Las Vegas (2009) by Daniel Libeskind; The Basque Health Department Headquarters by Coll-Barreu Arquitects in Bilbao (2008), and Musée des Confluences in Lyon by Coop Himmelblau (2014) ; and Soyak Crystal Tower in İstanbul are only some of the prominent examples that make use of the 'crystal metaphor'. All these examples bring to mind the following question: are the expressionist design approaches accepted as 'crystal utopias' at the beginning of the Twentieth Century coming to real with the help of technological advancements as in farsighted words of Otto Kohtz as early as 1909: "It is highly possible that later generations will achieve such mastery of materials and technique that they will construct a building or a landscape for no other purpose than that of contemplation, simply out of a desire to create in a particular mood, rather in the way that many pieces of music are written today" (Pehnt, 1973, p. 9).

Contemporary Use of Crystal Metaphor in Architectural Morphogenesis

Following the exhibition of *Expressionist Utopias: Paradise, Metropolis, Architectural Fantasy* in Los Angeles in 1993, the Crystal metaphor has emerged back from the memory, and the stunning design of the exhibition by Wolf D. Prix provoked architects' attention into Expressionist ideals of the 1920's.

In 1998, Coop Himmelb(l)au architectural office of Wolf D. Prix designed The UFA Cinema Center in Dresden. The UFA has displayed similarities with the visionary design ideas of the German Expressionism. The building, characterized by two intricately interconnected units: The Cinema Block– with eight cinemas and the Crystal- a glass shell which serves simultaneously as the foyer and public square, has been expected to be "a crystalline lamp displaying a series of

complex and fragmented images to the city" (Heathcote, 2001). The contrast of lightness and sparkling brilliance of huge walls of glass and the heavy concrete structures containing the auditoria which anchor the building to the earth reinforce this notion of the revival of Expressionist imagery, of the building as a crystal cathedral rising mystically from the solid rock of the earth (Heathcote, 2001, p. 91) (Figure 2).



Figure 2. (Left) The UFA Cinema Center, Dresden The Crystal from outside; (Right) The Crystal from inside (Devrim Işıkkaya, 2012).

Coinciding with the Deconstructivism in architectural discourse, the attractive and unusual geometries proliferated at the beginning of the Twentieth Century. Libeskind designed a massive expansion to the Royal Ontario Museum: ROM, in Toronto. Named as 'The Crystal', the museum is simply an assemblage of five giant cubes in between two historic stone buildings. Thinking about the museums' role in rebuilding and revitalizing cities, Libeskind designed ROM with an unusual geometry to create public attraction and activity point. The 3-Dimensional intersection of predefined regular forms creates an enclosure for 'a multilevel space created at the intersection between the crystals' (Stanwick, 2007) in which the reclaimed natural light through the refracted spears piercing the cubes create a spacious effect. In ROM, The Crystal, on the contrary to the precedents of crystal metaphor, don't carry the characteristics of illuminating its environment with its gleaming crystal's "purity and clarity" and "infinite liveliness found in glass" as Behne stated in defining German Expressionism (Figure 3).



Figure 3. The Royal Ontario Museum:ROM, in Toronto (2007) by Daniel Libeskind

(Azan Kozbe, 2015).

On the other hand, both The UFA and The Crystal- ROM are the prominent examples of a changing form paradigm that started to challenge the everlasting use of Cartesian space understanding in the form-giving process.

Today, a new paradigm of form as well as the idea of space developed in architecture as a result of the advances in digital technologies and modelling techniques. Paralleled with the changing environmentalist attitudes to the relations between human beings and nature, stimulated the alternative approaches, 'employing techniques and processes outside the mainstream of industrial production' (Forty, 2012, p. 238), 'nature' has become a new source of architectural quality. As a result of incorporating the volumetric matrices, growth, adaptation, pattern derivations as in nature, a shift in form paradigm transformed the architectural design from a form-giving act into a designing of a form-finding process. The new architecture, freed from Cartesian space understanding with the help of digital design processes, therefore, has also changed the idea of form. The current technological advances allow architects to use computers and digital tools for generating forms, in other words, morphogenesis. The concept of morphogenesis, originating from biology in the Nineteenth Century and transferred to the Twentieth Century by geology, is understood as a group of methods that employ digital media not as representational tools for visualization but as generative tools for the derivation of form and its transformation. Digital morphogenesis in architecture bears a largely analogous or metaphoric relationship to the processes of morphogenesis in nature, sharing with it the reliance on gradual development but not necessarily adopting or referring to the actual mechanisms of growth or adaptation (Roudavski, 2009, p. 348). In morphogenetic processes of design, instead of fitting into a predetermined form as in form-priority design paradigm, designers develop a generative model which proposes many alternatives for the designer to choose. Therefore, design process becomes a form-finding process among the numberless variability: "The plan no longer 'generates' the design; sections attain a purely analytical role. Grids, repetitions, and symmetries lose their past *raison d'être*, as infinite variability becomes as feasible as modularity, and as mass-customization presents alternatives to mass-production" (Kolarevic, 2005, p. 13). The computational derivations out of nature have made possible even large scale complex structural productions like the Bird's Nest (2008), Water Cube (2007), and CCTV Headquarters Building (2008) in Beijing. All these projects taking inspiration from nature have created a new understanding of form. They also became the examples of mass-customized production operating through the logic of optimization with the use of digital morphogenesis.

Digital morphogenesis, or in other words, the new form paradigm as form-finding has also been applied to the designs with Crystal metaphor. In this new approach, crystalline aesthetic has developed to be meaning fractures, reflections, imperfections as in natural processes instead of accepting the beauty of a predefined perfect crystal form, parallel to the change in the evaluation of nature as a process. Nature and natural processes and crystals are still the main sources of inspiration in design. Deleuze and Guattari affected the architectural discourse as: "We took as our point of departure cases of this kind on the geological stratum, the crystalline stratum, and physicochemical strata, wherever the molar can be said to express microscopic molecular interactions ("the crystal is the macroscopic expression of a microscopic structure"; the "crystalline form expresses certain atomic or molecular characteristics of the constituent chemical categories") (Deleuze, 1987, p. 57).

Always in search for dynamic space, fluid context, vibrant representation of life, and vitality, Austrian Firm Coop Himmelb(l)au designed Musée des Confluences (2014) in Lyon. The Museum is one of the contemporary examples of the Crystal metaphor in architecture that also makes use of the morphogenetic process in design. The Museum, taking its name from its site known as the "Pointe du Confluent," has been built on an old industrial area at the intersection of the Rhone and Saone rivers with the purpose of revitalizing the devastated industrial area. Taking its cue

from its special site, the Confluence, Museum becomes a point for encounters between natural and man-made nature, science and art, education and recreation to fulfill its founding 'mission of increasing and disseminating knowledge among mankind.' (Couturier, 2014, p. 25) The building embodies three heterogeneous components as the Crystal, the Cloud, and the Plinth, bringing the earth and sky together within "progressive differentiation" in Manuel DeLanda's terms without homogenizing the parts (DeLanda, 2002, p. 14). Displaying the organic unity in the form of assemblages, Museum is expected to be a "Crystal Cloud of Culture" for the City of Lyon. (Figure 4)

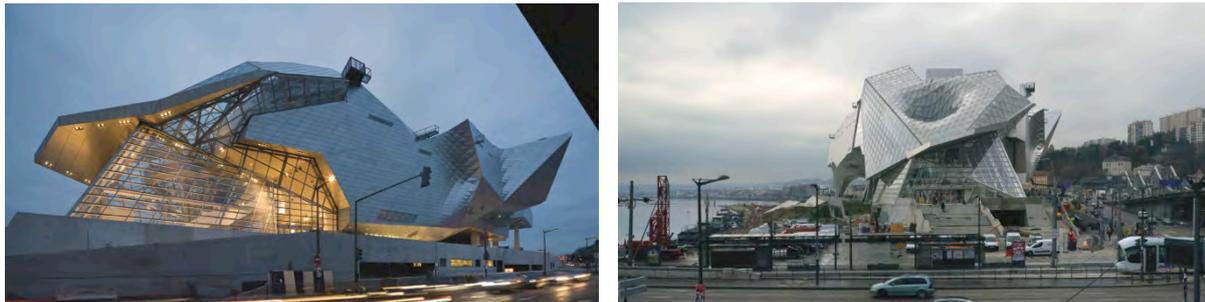


Figure 4.(left) "The Crystal Cloud of Culture": Lyon; (Right) Entrance Hall, (© Duccio Malagamba, 2014) Musée des Confluences (2014) by Coop Himmelb(l)au.

The Crystal, housing the entrance hall, brings together the museum and the city and its immediate environs as an urban forum and connect entrance hall to exhibition spaces through the vertical circulation space. Entrance hall's crystalline form is completely structured by glass and steel. Wolf D. Prix explains the essence of the design as the 'concept of fluidity' that is derived from turbulence created by the flow of the two rivers confluence at the tip of the land. The flow starts from the river, continues into the entrance hall hosting the multi-faceted crystal structure that is constructed out of rectangular steel tubular frames carrying the transparent glass panels. Crystal's multifaceted planar surfaces supported by steel and glass structure transforms at one point into a curvilinear vortex touching the ground, as a supporting element called 'gravity well' (Figure 5).

By virtue of digital computational techniques, transformation of the 2-dimensional planar surface's rational grid structure into a 3-dimensional grid to create a support displays the morphogenetic character of the design process. The Cloud, hovering above the ground contains the exhibition spaces as Black Boxes. A grid system also continues within the Cloud creating multifaceted geometries, covered with metal sheets in contrast to the transparency of the Crystal's glass-panelled surfaces. As a result, the emergence of a form generating multiple reflections and visions both from the inside and outside, day and night, adds to the vitality of the city, similar to the Expressionist ideals. In fact, Wolf D. Prix has criticized the Expressionist architecture as "representing an insufficient level of formal achievement", although he has accepted influence on their design approach (Benson, Dimendberg, Frisby, Heller, & Kæs, 2001, p. 180). Departing from the regular forms with the help of digital technologies creating asymmetric, dynamic, multifaceted three-dimensional forms, crystal metaphor in contemporary architecture has become the symbol of three-dimensional dynamization of space. Adding 'movement' with the inclusion of human being into space, the crystal has been transformed from inorganic to organic living organism (Figure 6).



Figure 5. The Gravity Well: Entrance Hall, Musée des Confluences (2014) by Coop Himmelb(l)au, Lyon (© Duccio Malagamba, 2014).

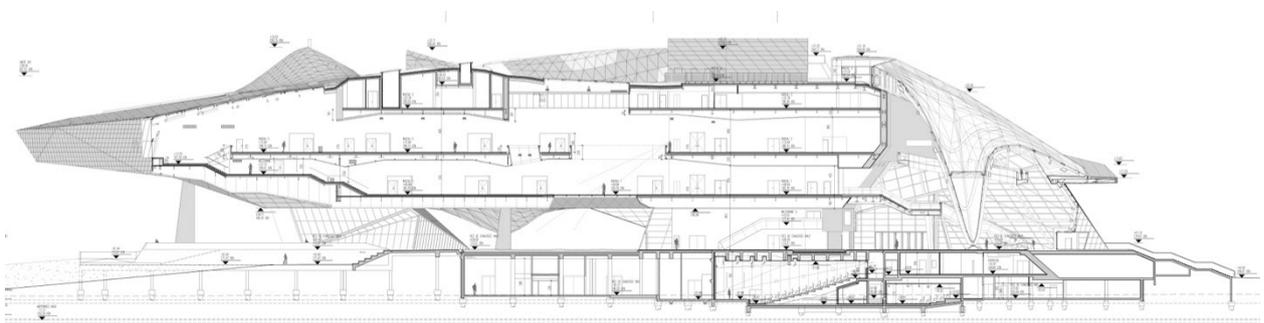


Figure 6. Musée des Confluences, Section (2014), (© Coop Himmelb(l)au).

Conclusion

This paper aimed at evaluating the transformation of the crystal metaphor from glass- a transparent and lightweight building material used as a cladding, to an architectural form representing the esoteric roots and the idea of perfectness, and finally the state-of-the-art approaches as crystalline formations in form-finding processes. Crystal metaphor has always been an important generic idea in design, either as a representation of a myth or as a metaphor reflecting the idea of perfectness, purity, and transformation derived from the 'nature' that is a source of inspiration either for imitation or driving the laws of order. The use of crystal metaphor traces a discontinuous emergence at the intersections between humanity- natural history and architectural thought, where the 'nature' has been accepted to develop human experience in creating arts. Since "mere imitation of natural forms and objects would achieve..... inferior and derivative beauty" as Ruskin stated, rejecting imitation advocated the "acceptance of sources of delight from nature" in the power of mental expression in architecture.

The confluence of humanity, nature and architecture also coincide with the intersections of art and natural sciences in history like geohistory, mineralogy where the ordering laws of nature discovered. In the contemporary world, harnessing the digital technologies in the generative process, a whole new world of formally and spatially different, fluid, dynamic digital designs, other than Cartesian space, has developed.(Figure 7)

Unfortunately, many architects incorporated natural forms from biology or zoology just for the sake of visual similarities to nature. On the other hand, the experimentation with natural forms and processes are the topic of many articles in recent years. Roudavski gives a detailed information on the studies related to natural morphogenesis in architecture. He discusses about the difference of the biomimetics and the bioinspiration which emphasizes "indirect and multiplicitous characteristic of knowledge transfer between biology to architecture" (Roudavski, 2009, pp. 365-368). Most of the digital morphogenesis studies have concentrated on material performance over appearance, and on processes over representation (Leach, 2009, p. 34).

The reuse of patterns and tessellations inspired from the patterns of nature applied to many architectural designs like pinwheel aperiodic tiling of Federation Square (2002), Serpentine Pavilion by Toyo Ito or Voronoi tessellations are not only mere skins but also spatial designs.

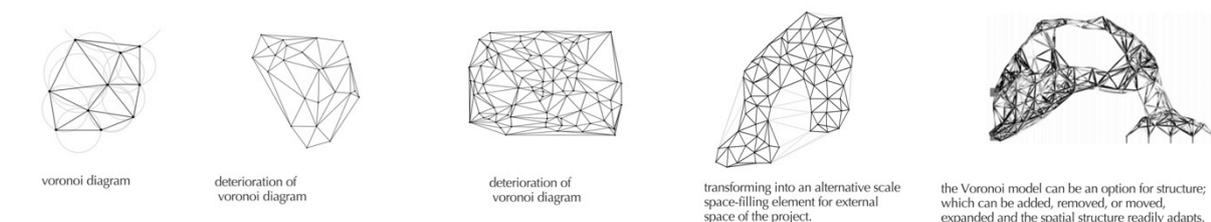


Figure 7. Voronoi Tessellations and alternatives for masses for an Aviation Museum Project by Öykü Arda, Graduation Project at Bahcesehir University (Source: Author).

Furthermore, modelling three dimensional forms using polygonal meshes, usually made up of triangles and quadrilaterals or deformed meshes with straight lines has ended in multifaceted continuous surfaces and spatial continuities as well. The new modeling technique making use of

curves –NURBS, instead of straight lines together with the developments in evolutionary biology used in digital design and fabrication paved the way for more natural, adaptive and transformative architectural morphogenesis.

The Crystal's structural system in Musée des Confluences shows how the rectangular mesh transforms into a curvilinear surface creating a flow of outer space into interior creating a structural element. Therefore, differentiating from other architectural examples still accepting the formal analogy of crystal, Musée des Confluences shows the development one step further approaching to natural morphogenesis in the 'becoming' process.

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IS THERE ANY GEOMETRICAL GOLDEN RATIO IN TRADITIONAL IRANIAN COURTYARD HOUSES?

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Abstract

The traditional architecture of Iran always places heavy emphasis upon beauty and harmony. This architecture is renowned for detectable principles such as modular design, geometry and specific systems of proportion. This paper involves analyzing these principles, especially geometrical golden ratio embedded within traditional houses, to confirm whether or not they are a perfect match with for the proportion system and modular design used. Eighty traditional courtyard houses in Iran were selected as a case study. The research employs the qualitative method involving archival documents, direct observation, on-site documentation and design analysis. This paper presents a detailed analysis of both proportioning and geometrical principles utilized in the facades of traditional houses and courtyards and their respective roles in creating harmony and beauty. This article concludes that despite the fact that public traditional buildings were made based on geometry and a proportioning system, this is not the case for courtyard houses. The vital factors in this case are the repetitive scale and module of openings in most traditional houses being crucial to the creation of harmony and beauty.

Keywords: *Geometry; Modular; Proportion; Traditional Courtyard Houses; Openings*

INTRODUCTION

Scholars have recognized the fact that geometry is imperative to the traditional architecture of Iran (Ardalan & Bakhtiar, 1979; El-Said et al., 1993). The comprehensive understanding of geometry and its relevant terms enabled Iranian architecture to present more durable and stable forms based on the circle and square, or rectangular geometrical characteristics. The utilization of these geometrical aspects, proportions and measurements assisted the architects in the development of the concept for modular design (Vakili-Ardebili & Boussabaine, 2006). The geometrical basis in Iranian design is present in many facets of the architecture: in the proportion of spatial design, in the creation of three-dimensional geometric objects and in two-dimensional surface decoration. Any system of proportion functions via creating a united design, making the product aesthetically pleasing. Writers have pointed out that there is no particular set of proportions that is innately preferred by the human psyche. Experiments designed and conducted to prove otherwise, such as those undertaken to elucidate the properties of the "golden section", have at best been inconclusive. The popularity of the "golden section" is owed to its flexibility. The Islamic system of proportion, which utilizes irrational numbers, is based on the geometrical proportion of the square, the double square, the equilateral triangle and the pentagon (El-Said et al., 1993).

There has been mounting evidence that classical Greek architecture used a system of geometric proportion, which was most probably retrieved from the intermediary of Euclid's treatise on geometry (Hartshorne, 2000). The Arabs then adopted this approach, and it was

further enhanced during the Islamic Era. Early Arabic treatises on mathematics paid special attention to the needs of the architect, and in these works, the aesthetics of architecture were discussed. Despite the fact that nothing rivals Vitruvius's treatise on architecture, there are some works dealing with geometry for the architect, geometric designs for craftsmen, and comments throughout general texts on mathematics that can be related to architectural practice (Golombek et al., 1988).

Beauty always possesses holistic qualities, as it is constituted by a figurative balance of order in diversity. It is holistic in a way where all figurative principles and levels are attuned to one another. Beauty is present in the ensemble effects, and the proportions are vital in their constituents, because it guides the intermediation between order and diversity, along with other unifying principles. This statement is valid and adapted to establish teachable systematic design principles that must see future advancements. Proportion is one of the determinant architectural criteria in the context of harmony. Grütter (1987) said that harmony is the discipline and regularity which exists between components of phenomena. Vitruvius & Morgan (1960) pointed out that when it is assumed that a building is beautiful, it implies that the proportion among the components is rigidly defined. Le Corbusier (1931) said that geometry is intertwined with rhythms and the language of men, and forms the basis of all activities (Elam, 2001).

The beauty of proportions is derived from the geometry of regular polygons. People will inevitably be able to see the clarity or crystalline-like order in proportioned architecture derived from regular geometry. The majority of the thousands of treatises on art and architecture that appearing in Antiquity and between 1450 and 1850, place emphasis on the importance of proportion for beauty, similar to the philosophy of Antiquity, Middle Ages and Modern times.

The emphasis of Iranian architecture was on beauty and harmony. Proportion and module in components are visible on many parts of the buildings, mostly intended to decrease the sizes of the components and simplifying construction. But most of the Iranian architectural principles highlighted by scholars are applicable in traditional public buildings. In Courtyards and facades of mosques, palaces, schools and gardens, there are proportioning and geometrical principles such as human scale and modularization. There is not specific evidence for traditional houses in Iran. They supposed to repeat all of these geometrical principles. This paper involves analyzing these principles, especially geometrical golden ratio embedded within traditional houses, to confirm whether or not they are a perfect match with for the proportion system and modular design used.

This present paper contains the following parts: 1) a brief outline of the systems of proportions and some Iranian systems based on literature review. 2) a brief geometrical analysis and the use of the science of geometry in design of traditional Iranian buildings, such as mosques, palaces, and gardens. 3) an analysis of the eighty traditional houses via their courtyards, circulation, openings and facades.

GEOMETRY AND PROPORTION

Architecture depends on geometry (Frith, 2010). According to the 10th century philosopher, Abu Nasr al- Farabi, the fundamental of architecture were derived from mathematical science. Furthermore, the basic science of architecture was the knowledge of *hiyal*. This term is difficult to translate without reference to Farabi's discussion of the sciences, from which *hiyal* emerged from. Literally *hiyal* mean "skill, art, cunning", concerning the ingenious and artistic manipulation of geometric forms (Golombek, Wilber, & Allen, 1988). Thus, geometry was the foundation of an architect's training.

Proportion is strongly linked to geometry (although non-geometric procedures for proportion are possible). Practical geometry in the building crafts are regarded as self-guiding methods of regular and statically proven design. Proportion and geometry primarily regulate the extensional order of buildings. Symmetry controls invariants of figurative relations in regard to mirror axes, rotation, stretching, or shrinking; mirror symmetry is by far the most important symmetrical pattern

in architecture. Proportion and symmetry are regarded as complementary (even if buildings are not symmetrical).

Proportion in geometry, architecture and art can be said to be a harmonious relationship between the parts, with and within the whole. Proportion refers to the relationship between one part of a design and another part or to the whole design. It is a comparison of sizes, shapes, and quantities. Vitruvius (1960) wrote in his Ten Books on Architecture, which is the oldest surviving work in this context, that symmetry is a proper agreement between the members of the work itself, and the relationship between the different parts and the whole general scheme, based on the standard selected parts. Furthermore, due to the fact that nature has proportioned the human body, this needs to be replicated in buildings as well. From systematic proportions, each and every part is correlated, resulting in an aesthetically pleasing and workable design (Frings, 2002).

The selection and use of systems of proportions are vital to artists and architects. There were not only specific ratios used, particular systems of proportions were preferred over others. Some systems of proportions were based on the musical intervals, the human body, and the Golden Ratio.

Golden ratio

The Golden Ratio (also called as the Golden Proportion, Golden Section, Golden Mean, Divine Ratio, and Divine Proportion) (Markowsky, 1992) is a suprarational or transcendent ratio found in fundamental forms: plants, flowers, viruses, DNA, shells, planets and galaxies. Although the Golden Ratio is primarily regarded as a proportion, not a number; as a numerical quantity it is defined to be 1.618 (Hejazi, 2005) (see Figure 1).

$$\varphi = \frac{1 + \sqrt{5}}{2} = 1.6180339887\dots$$

Figure 1: Numerical Quantity of Golden Ratio

The Golden Ratio is the unique ratio of two terms when the ratio of the larger term to the smaller term equals the smaller plus larger to the larger. It symbolizes the regeneration and progression and extension from the Unity, due to the fact that every generation is connected to its ancestors. It is also regarded as the perfect division of the Unity. The Golden Ratio has some unique properties:

- The Fibonacci sequence is a set of numbers: 1, 1, 2, 3, 5, 8, 13, 21, ...
- The relationship between two successive numbers of this series tends to approach 1.618. This series can be found in many places in nature where self-generating patterns are in effect.
- The human body illustrates the Golden Ratio.

Iranian golden ratio

For the best solution to form the buildings, Iranian architects relied on geometrical shapes with commensurate ratio to design most spaces in traditional houses. This system is more advantageous in terms of geometrical perception, along with the provision of its building structure and quicker completion time (Bozorgmehri, 1981; Memarian, 2008; Pirnia, 2005). They selected a regular hexagon formed by regular triangles (see Figure 2). The levels of scales are realized via the accurate utilization of the ratio known as the Golden Ratio. This is evident in the architecture of countless cultures.

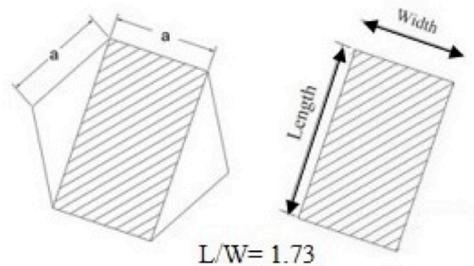


Figure 2. Iranian Golden Rectangular/ Ratio (Source: Authors).

Units of Traditional Measurement in Iran

Utilization of specific units in traditional measurements is a well-established practice in the design of traditional structures. The utilization of specific module allows architects and designers to harmonize the elements. These units were derived from human scale, such as the dimension from fingers to elbow in a medium-size person, or an open hand (Bozorgmehri, 1981; Pirnia, 2005).

Specific units were used for the majority of the parts in a traditional building. An example of this is the usage of the specific brick size. This is done for the purpose of harmonizing various buildings put together. The measurement unit in Iran is called Gaz (see Table 1). All elements, especially openings used to be built based on this unit and its proportion.

Table1. Units of Traditional Measurement.

1	One <i>Gereh</i> = 1/16 <i>Gaz</i> = 6.66 cm
2	One <i>Gaz</i> = 16 <i>Gereh</i> = 106.66 cm

IRANIAN TRADITIONAL ARCHITECTURE

Iranian architecture adhered to certain principles, observable in traditional buildings (Pirnia, 2007), which are currently absent (Curatola & Scarcia, 2007). Iranian architecture principles are presented based on the attention of various levels in design. The natural element in environment is one of the vital factors that Iranian architecture focuses on (Vakili-Ardebili & Boussabaine, 2006).

These principles have influential roles in traditional buildings, with some of them being specified for houses. For example: to be in accordance with human scale, modular unit, structural rigidity.

Traditional Houses

In Iran, traditional courtyard houses represent the most prominent types of houses (Pirnia, 2005; Daniel, 2006; Moradi & Akhtarkavan, 2008).

A courtyard provides security, privacy, and comfort (see Figure 3). Rectangular courtyard houses typically are organized around an inner courtyard (Nabavi et al., 2012). The courtyard allows for outdoor activities with protection from the wind and sun (Ghobadian, 2006). Designing different spaces with various functions and a big courtyard in the heart of a house helped them live in suitable situations (Ardalan & Bakhtiar, 1979).



Figure 3. Traditional courtyard Houses (Source: Authors).

GEOMETRICAL ANALYSIS OF TRADITIONAL IRANIAN BUILDINGS

The Geometrical analysis of many Iranian traditional buildings proved that a complete knowledge of proportions, in particular the Golden Ratio, was applied extensively in Iranian architecture and forms the basis of Iranian aesthetics.

In many traditional Iranian buildings, both the plan and elevation were defined within a framework of squares and equilateral triangles, with the intersecting points being important, such as the width and height of doors, the width, length and height of galleries, the position of inscriptions, etc. this means that the size of each part within the structure is correlated with a defined proportion. A building was not defined as a jumble of wired components, but is regarded as a harmonious configuration of proportionally related elements, which are aesthetically pleasing and provide elegant spaces (Bozorgnia, 2005; Pirnia, 2005).

For example, the Golden Ratio has been masterly used in the design of the Taj-al-Mulk dome dated 1088 AD, in Jami mosque in Isfahan (see Figure 4).

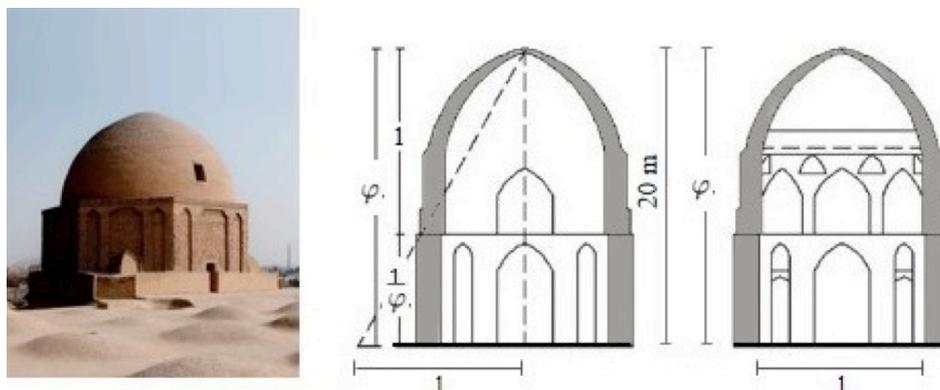


Figure 4. Taj-al-Mulk dome, Isfahan, Iran (Hejazi 1997).

The elevation of Ghasr-e-Khorshid as shown in Figure 4, has a complete relationship with the Golden Ratio and Golden Rectangle (see Figure 5).

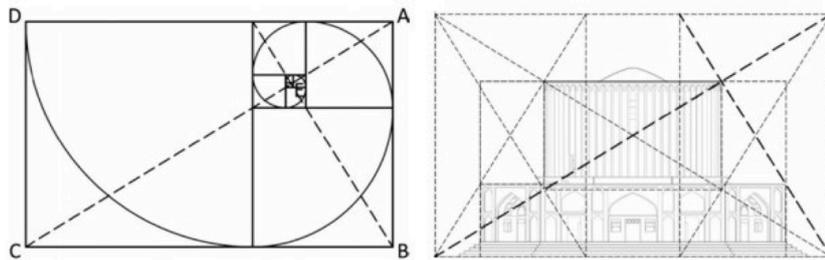


Figure 5. Ghasr-e-Khorshid (Reza zadeh Ardebili and Sabet Fard 2013).

METHODOLOGY

For the purpose of this paper, the study employs a case study approach because it is a strategy of inquiry in which the researcher explains in depth a particular process (documents, direct observation and audiovisual material). The case study subjects are eighty traditional houses in Iran which are registered as valuable buildings in the Cultural Heritage Organization of Iran.

In July and August 2011, the researcher made a trip to Iran and collected documentations related to eighty traditional houses from the Cultural Heritage Organization. Some of the houses lack formal planning, but according to the conditions being discussed, eighty of the traditional houses in Iran were selected. It was followed by direct observation of most of these houses (see Figure 6).

Archival research from the Cultural Heritage Organization in Iran has helped to identify eighty traditional courtyard houses in Iran. All these traditional houses selected were registered in the Cultural Heritage Organization in Iran as heritage buildings, and represents the best examples of the finest Iranian traditional houses. They were located in three ancient provinces of Iran –Yazd, Isfahan, and Shiraz.

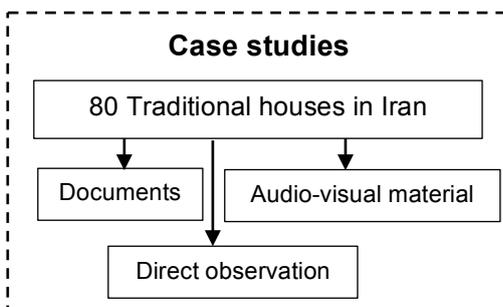


Figure 6. Sources of evidence (Author)

The study tries to have a geometrical analysis of traditional houses (Haider & Moussa, 2015). A detailed analysis of both proportioning and geometrical principles utilized in the facades of these eighty traditional houses and courtyards and their respective roles in creating harmony and beauty.

For each identified house, there are some write-ups on the history of the house, basic information such as house address, owner, year built and the site location. Technical information such as scaled floor plans, sections and elevations are also available.

Geometrical analysis started with the courtyard and after that, the openings of the main rooms which surrounded the rectangular courtyard (see Figure 7). Based on the literature review,

in designing the traditional buildings, architects have used different proportion systems and the Golden Ratio.

All the courtyards were checked for the golden proportion and the Iranian Golden Rectangle. In the next step, most of the geometrical common rules and systems of proportions used in traditional Iranian architecture were analyzed in all eighty houses. The most important part of this paper's analysis was about openings which made the harmonious facades around the courtyards.

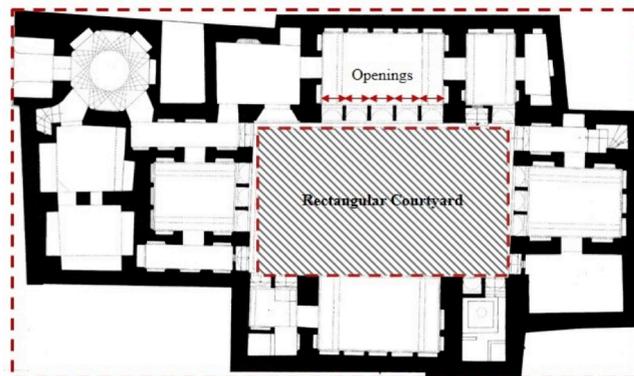


Figure 7. Geometrical analysis of traditional houses (courtyard, openings) (Source: Authors).

RESULT AND DISCUSSION

After analyzing eighty traditional houses in Iran, it can be concluded that some Iranian architectural principles are applicable in these houses. However, unlike the public traditional buildings (such as palaces, mosques and schools), the principles employed in traditional houses are different in that:

- All of these houses have an inner rectangular courtyard with the main spaces surrounding the courtyard. A courtyard is commonly made up of a central pool, small gardens around the pool, and the water pathways, which differs in shapes and sizes due to differing weather and environments. All of the shapes are rectangular (see Figure 8).



Figure 8. Rectangular Courtyard with Pool and Plants (Source: Authors, 2012).

- This geometry imposes a corresponding hierarchy on its different spaces. The most important point here is the hierarchy starting from the main door, which can find in all eighty traditional houses. It is repeated in all the cases being analyzed (see Figure 9).



Figure 9. Hierarchy in Traditional Houses (Cultural Heritage Organization, Iran).

- Although there is a geometrical harmony in the plan layout of all these eighty traditional houses, there is no specific ratio about courtyards (Golden Ratio: 1.61 or Iranian Golden Ratio: 1.73). From the eighty samples, there are five courtyards based on the Golden Ratio (see Figure 10) and ten courtyards with the Iranian Golden Rectangle (see Figure 11). The proportions of these rectangular courtyards were analyzed and they range between 1.2 to 1.8 (see Table 2).

Table 2. Analysis the proportion of Courtyards (Length/Width) (Source: Authors).

	Courtyard ratio (length/width)						
	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Number of the houses	11/80	12/80	26/80	13/80	5/80	10/80	3/80
Total (%)	13.8%	15%	32.5%	16.2%	6.3%	12.5%	3.7%

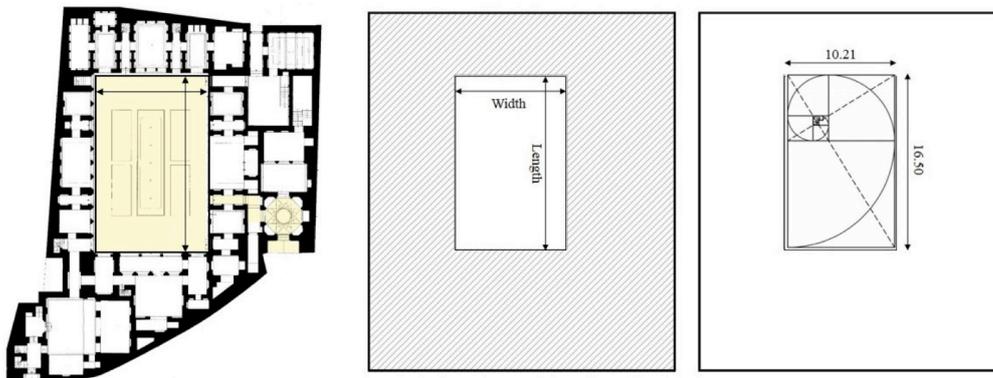


Figure 10. Traditional house with Golden ratio (1.61) – code 01 (Source: Authors).

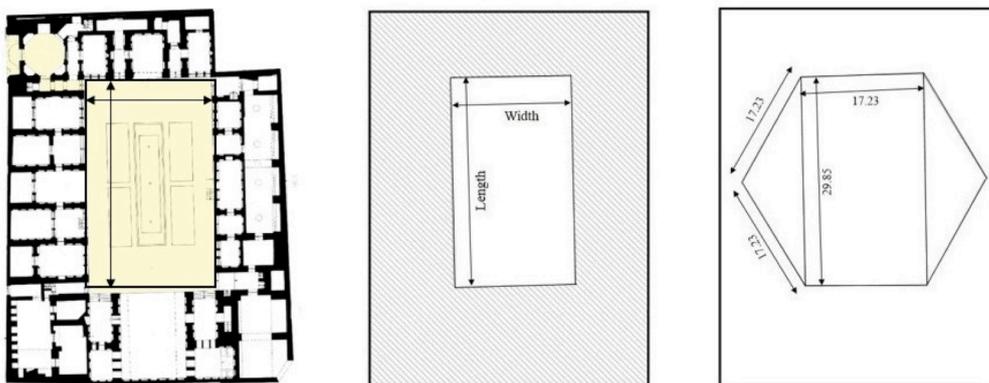


Figure 11. Traditional house with Iranian Golden ratio (1.73) - code 10 (Source: Authors).

- There is a meaningful proportion between the two main rooms in the traditional houses – the bedroom (with three openings) and living room (with five openings). The dimensions of these rooms are related to their respective function, *sedari*; which is a room with three doors was smaller than a living room, and is suitable for people of average height (see Figure 12).

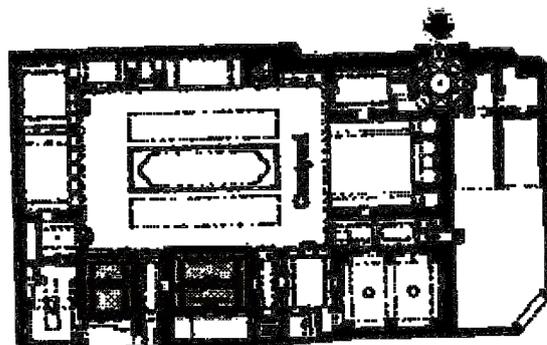


Figure 12. *Sedari* and *Panjdari* in Traditional House (Source: Authors).

According to literature review, rooms are classified according to their corresponding morphology (Mirmoghtadaee 2009), and the number of doors or windows: *panjdari* (see Figure 13), is a room with five doors, and functions as a living room. Bedrooms were designed in accordance with human height, and enough space for a man to lie in the room. All these spaces are rectangular in a traditional layout, and according to their function, *panjdari* is bigger than *sedari*, with a ratio between their respective widths and lengths (Pirnia 2005).

If a room was built larger than another, its height, as well as its architectural elements such as the arches, the shelves, and the doors, would need to be built bigger following the same ratio. Thus all of the elements of any architectural space would be proportionate to the size of the place (Mirmoghtadaee, 2009; Soltanzadeh, 2005).



Figure 13. Typical living room (*Panjdari*) - Outside and inside (Source: Authors).

- The openings of rooms are examined, and the traditional measurements were checked as well (see Figure 14). All opening widths were equal to 14 *Gereh* (93.2 cm), which is suitable for the passage of a normal-size person (see Figure 15). These types of opening are present in almost all parts of a traditional house. For example, for *panjdari* (living room) five of them are placed right next to each other, and three of them for *sedari* (bedroom). They play an important role in providing harmony in the main façades of traditional houses that surround a courtyard. As per the literature review; the openings in the traditional houses match the size of an average person (Memarian, 2008; Pirnia, 2005).

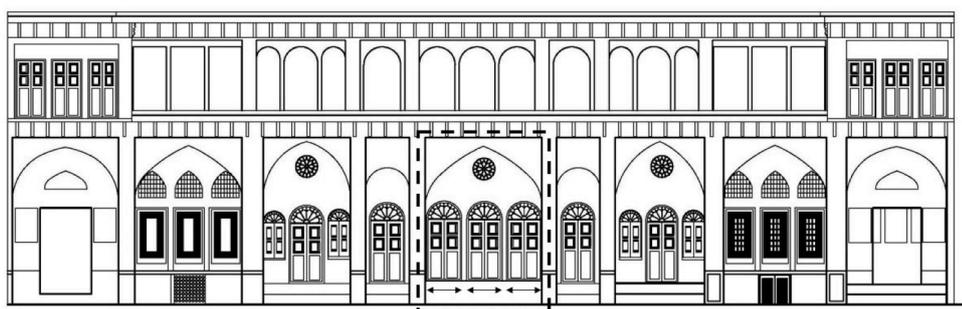


Figure 14. Main facade in traditional house (Source: Authors).

They were suitable and quite large enough for a person to pass through, and also allow ample daylight in. An opening in an Iranian courtyard house is composed of multiple details that are salient towards the optimizing of daylight. Furthermore, the defined proportion of openings increases the speed of construction, due to the exact dimensions of the different rooms.

All of these openings were infilled using a lattice frame, and a beautiful wooden frame with unique motifs to control day light, especially intense sun rays in the hot summer. These frames are covered with colorful glasses.

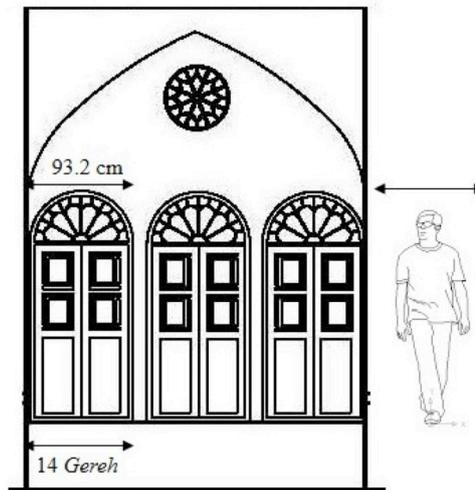


Figure 15. Proportion of the opening (Source: Authors).

CONCLUSION

From the eighty samples studied in Iran, it can be concluded that there are many different ways for utilizing the module in a traditional houses. By and large, there are logical proportions and scales in important spaces of the traditional houses in Iran. These include building forms, courtyards and important rooms for family members and guests. It is suggested that these techniques have improved the speed of construction, while also harmonizing and beautifying these houses.

The present research involved geometrical analysis of the traditional courtyard houses in Iran, and checking the different systems of proportions in various spaces of these houses. Was there any geometrical golden ratio used in proportioning the courtyards? What are the proportional rules in creating harmony in the elevations and facades of these traditional houses?

After analyzing all eighty traditional houses, it was found that there are just five courtyard houses based on the Golden Ratio (1.618) and ten courtyards with Iranian Golden Rectangle (a rectangle in a regular hexagon formed by regular triangles).

This means that although there is geometrical harmony in the plan layout of all these eighty traditional houses, there is no specific ratio for the courtyards. Generally, there is a rectangular courtyard which is made up of a rectangular central pool and small gardens around the pool.

It is also concluded that there are harmonious facades around the courtyard of these houses. Most of the openings followed a certain proportional unit based on the human scale which has a vital role in creating modular elevations.

After analyzing the eighty courtyard houses, it can be identified that architects and designers of traditional architecture of Iran had followed certain geometrical rules and instruments to improve the quality of their creations through proportion and harmony. Regular shapes, proportional sizes and hierarchy played important roles to achieve this purpose.

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CONSTRUCTION TECHNIQUES ON THE BOSPORUS REGION

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Abstract

The Bosphorus is a unique place with its traditional architecture. The construction of new buildings along the Bosphorus coast line are forbidden and only reconstructions of demolished original historic buildings are possible. Since 1984 legal authorities act different legislations about these reconstructions. Until 2005 the legislation gives permission for the usage of any structural material unless the overall appearance is the same as the original building. But after 2005 the legislation changed and the usage of original structural material became mandatory. The underlying reason of this is to protect the originality and authenticity of the Bosphorus buildings both with their appearances and construction techniques. But the practical output became promoting the constructors for making the reconstructions without following the approved reconstruction projects or changing the reconstructions afterwards. In this paper structural system, external wall, window, and roof alternatives for reconstructions are compared and contrasted by evaluating the performance requirements. Examples of inappropriate reconstructions are documented and a tentative proposal is made for the reconstructions of the Bosphorus region.

Keywords: *Construction Techniques; Structure; Building Elements; Residential Housing; Bosphorus*

INTRODUCTION

Istanbul is divided into two parts between Asia and Europe by the waterway Bosphorus. Bosphorus connects Black Sea with the Sea of Marmara and is about 30km long. Its coastal region consists of several villages where authentic residential Istanbul buildings exist. There are three main types of buildings in the villages of the Bosphorus; monumental palaces, “yalı” buildings, and mansions. Monumental palaces were the residential buildings of the Ottoman dynastic family and, yalı and mansions were other residential buildings for nobles and common people. The main difference between a yalı and a mansion lies within their locations. Yalı buildings were constructed on the coast of Bosphorus by the sea, whereas the mansions on inner parts (Sakoglu, 2012). Residential building typology of Bosphorus has gained it a unique building texture.

In order to protect the unique building texture of Bosphorus a special law, dated to 1984, has been acted through which new building constructions are forbidden (Grand National Assembly, 1984). It is only possible to make restorations for old buildings, and to reconstruct a building only if it can be proved that there used to be an original historical building in that place (Kanadoglu, 2009). Two bodies were authorized over Bosphorus by the law; the first one is the “Cultural and Natural Heritage Preservation Board”. Its functions are; to assess the buildings of Bosphorus, to categorize them into groups, and to evaluate the demands for reconstructions in means of architectural restoration or reconstruction projects. The second body is the “Directorate of Bosphorus Housing” and its function is to control the restorations, and the reconstructions (Istanbul Metropolitan Municipality, 2014).

On Bosphorus region, apart from the monumental palaces, almost all of the residential buildings initially constructed of wood (Hisar, 2012). Since 1980s several of them were

reconstructed with different construction techniques. These reconstructions are a debate for a long time and there are mainly two different aspects: In the first aspect, it is claimed that these houses are authentic as a whole with their construction techniques. Whereas, in the second aspect it is claimed that; the overall characters of the facades and of the districts are authentic and so the construction techniques of the houses may be changed. Until 2005 the second aspect had been practically used, after then, the first aspect was started to be used and; the usage of the original construction techniques, especially the original structural system, has been started to be compulsorily demanded by the related legal authorities (Kanadoglu, 2009). As a result, different construction techniques in terms of structures were used for the reconstructions on the Bosphorus. The reconstructions realized according to the first aspect use wood as the structural component, and reinforced concrete is used with the second aspect. The significant thing about these reconstructions is that the difference of the structures cannot be distinguished from outside appearance. Nevertheless, these different types of structures have different positive and negative properties and discussing the subject only from conservation perspective is not sufficient. For example, wooden structures are restricted in the "İstanbul Building Construction Code", because of the absence of a specific code related to wooden structures (Istanbul Metropolitan Municipality, 2007). Most of the reconstructed buildings of the Bosphorus do not meet these restrictions and this conflict should be discussed and corrected. On the other hand several original details of the reconstructed buildings with the first aspect, have been changed for improving the performance of them. Double glazed windows, and thermally insulated external walls are examples for these kinds of changes about the details of the buildings. Although the reconstructions on the Bosphorus are specially treated by the law, because of their authentic worth, it is also expected from them to comply with several legislations, like the legislation of energy efficiency in buildings (Ministry, 2008). In order to comply with this legislation the original façade details of the buildings should be changed and these changes affect the authenticity of the buildings no matter the original structural material was used or not. Sustainability is another critical issue about these buildings. Although wooden structures seem to be more environment friendly, the usage of excessive insulation materials lower the structures sustainability (Berge, 2009). Furthermore, the operational energy costs of the system, which is the energy consumed during the in-use phase of a building's life, in terms of CO₂e is higher than the reinforced concrete structured buildings (Yazicioglu, 2012), (Cole and Kernan, 1996). Hence sustainability related issues should also be studied in detail while discussing the reconstructions of the Bosphorus. These examples demonstrate that, the reconstructions on the Bosphorus should not only be studied about their authentic properties, but also the detail design properties of them should be analysed, and the decisions about the buildings should be given with an integrated evaluation.

In the paper, examples of original and reconstructed residential buildings of Bosphorus region will be analysed, giving an emphasis on the construction techniques. The legislations, related with the conservation of the buildings and performance requirements will be compared and contrasted. At the end a tentative proposal about the reconstructions on the Bosphorus region will be given.

METHOD

The method adopted for this research consists of two main parts. The first part is comparing and contrasting the selected systems of the reconstructions. Four systems; the structural system, external wall, window, and roof were selected to be compared and contrasted. The reasons for selecting these systems are as follows: Having a structural system is the primary criteria for the existence of a building as it gives the building its shape and it resists to all loads coming to the building (Engel, 1981). Thus, the structural system is the first building element selected to be examined. Having an envelope is also a primary criteria for having a good performing building as it determines the building's structural stability, climate control, and degree of energy performance

(Lovell, 2010). Thus the 3 elements of the building envelope; the external wall, the window, and the roof are the other 3 systems selected to be examined.

The comparing and contrasting was realised by evaluating the performance of the alternatives. Considering the most important user requirements expected from the systems, a total of 7 performances were chosen to be compared and contrasted (Rich, 1999). 5 of these are evaluated with respect to the detailed case and literature reviews. These are structural strength and stability, acoustics, water & moisture, fire, and durability related performances. In order to compare and contrast these 5 performances of the systems key detail drawings have been generated considering the analysed cases and literature.

The other 2 performances, which are thermal and sustainability related, are mathematically calculated, compared and contrasted. For thermal performance; EN 832 standard has been followed for walls, and ISO 10077-2 standard has been followed for windows, and U-Values have been calculated (Standards British, 2000, Standards International, 2012). U-Value is the overall heat transfer co-efficient, in other words it shows the mathematical value of the heat loss in a building element such as a wall, floor or roof (Bougdah, 2009). Thus the calculation of it made it possible to understand thermal performance of the systems. The U-Value also shows the success of a detail about the operational heating energy losses of the systems. Operational energy usage shows the success of the building about sustainability concerns because it shows the CO2 footprint of it. CO2 footprint is the total amount of harmful emission that has been given to the atmosphere during the life of a building (Cook, 2011). Furthermore for evaluating the sustainability related performance of the systems embodied CO2 have also been considered. The embodied CO2 is the total amount of harmful emission in the production step of a material (Cleveland& Morris, 2009).

The second part is the evaluation of the cases about the selected systems. The cases are selected by making site visits and the most significant cases are used as examples in the paper. The common feature of the selected cases are to have modern construction techniques and materials together with the original and authentic details. These cases are critically analysed and the reasons why modern construction techniques and materials are used in the reconstructions are tried to be understood. Finally a tentative proposal is made for the reconstructions on the Bosphorus.

COMPARATIVE ANALYSIS OF ORIGINAL DETAILS WITH RECONSTRUCTION ALTERNATIVES

In order to analyse the original buildings of Bosphorus four different building sub-systems are going to be discussed. The first one is the structural system. The structural system is a critical element of the reconstructions on the Bosphorus as the usage of original structural system material or a contemporary one is one of the major debates (Cultural and Natural Heritage Preservation Board, 2005). Also it gives the building its shape and protects this shape under the effect of loads which make the structural system one of the most important elements of all buildings (Turkcu, 2003). Thus the structural system is chosen to be the first sub-system that is going to be analysed. The external wall is the vertical opaque component of the external envelope. Most of the performance requirements expected from the buildings are satisfied by the external walls as they form the largest area of the external building envelope (Brock, 2005). Thus the external wall system is chosen to be the second sub-system that is going to be analysed. Together with the external walls the window systems are also the vertical components of the external envelope. In order to satisfy the transparency needs of the external envelope the windows are the most critical points. Meanwhile, windows are systems where several leakages occur, like thermal leakage (Carmody, et al. 2000). Thus the windows are the third sub-system that is chosen to be analysed. The roofs are the horizontal/semi horizontal parts of the external envelope. It is directly and critically under the effect of atmospheric conditions. It is also a

challenging part of the building for the architects to transform it into a residential space (Harrison, 2000). Thus the roofs are the final sub-system chosen to be analysed. In this part of the paper these systems are going to be analysed, considering mainly the methods/approaches used in the restorations/reconstructions of Bosphorus district.

Structural system

On the Bosphorus district originally stone is used in the basements and foundations (substructure), and wood in the upper floors and the roofs (superstructure). The superstructures are typically consist of two or three storeys and an attic. This character of the original buildings limited the spans to be four meters at most. The plan schemas and the facade characters of the original buildings were shaped by this very basic structural limitation. The substructure is the critical end point of the structural system from where the loads are transferred to the ground. Originally because of the sloped topography most of the residential buildings on the Bosphorus district used to have a partial basement floor. The typical structural system details of the original buildings can be seen in figure 1.

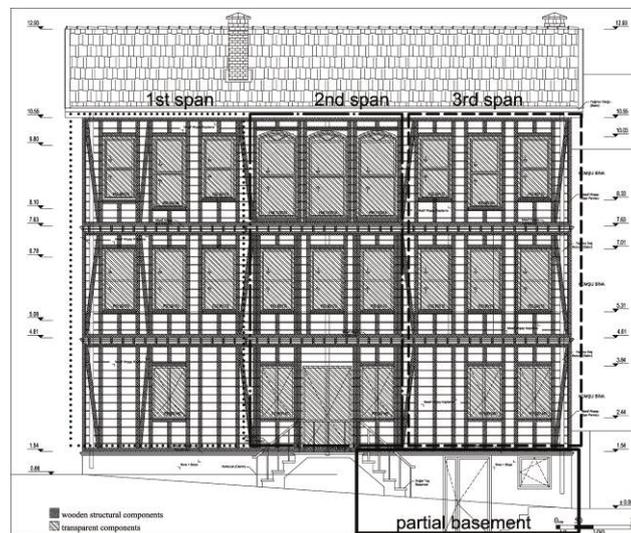


Figure 1. Typical facade drawing, showing three different spans and the place of the partial basement (Source: Author).

In the reconstructions, the substructure of the buildings are made of reinforced concrete. Both the legislation related with the substructure and the principles determined by the “Cultural and Natural Heritage Preservation Board” obligates this (Cultural and Natural Heritage Preservation Board, 2005). And the original partial basement is transformed to be a full scale basement because of the same reasons. But about the superstructure a fuzzy situation exists. Until 2005 any structural material was accepted to be used in the reconstructions. Hence mainly reinforced concrete (R.C.) and steel structures were used until then. The reasons of that is; firstly because of the needs of the contemporary living style, larger spans are expected by the users. And R.C. and steel give the possibility to pass larger spans. Secondly, R.C. and steel structures perform better about the sound, fire, and durability related performances.

In table 1 performances related with wooden, R.C., and steel structural materials are evaluated. If masonry and R.C. substructures are compared it is found out that R.C. substructures are slightly better than the masonry structures. The performance related with impacts are satisfied better with R.C. substructures because they are more homogenous and instead of adhering single large pieces, small pieces are adhered to each other. Thus it is harder

to harm R.C. substructures by impacts. The same thing is also valid about the pressured underground water. As larger spaces exist between stones used in masonry structure, it acts worse about pressured underground water.

If wooden, R.C., and steel superstructures are compared it is found out that R.C. superstructures are slightly better than the other two. As R.C. is denser than the other two, performance related with airborne sound is the first performance which R.C. overcomes. R.C. also performs better about all 5 performances related with fire. Both wooden and steel superstructures will perform badly if they are not treated specially against fire, whereas R.C. is naturally performing well under fire. R.C. and steel performs similar about durability related performances and they are performing slightly better than wooden structures, especially about the resistance to biologicals.

Table 1. Evaluation of the structural system materials which may be used in the reconstructions.

		masonry substr.	R.C. substr.	wooden superstr.	R.C. superstr.	steel superstr.
Performance related with structural strength and stability	own weight	+	+	+	+	+
	earthquake	+	+	+	+	+
	impacts	-	+	-	+	-
	wind	+	+	+	+	+
	water pressure	-	+	/	/	/
	soil pressure	+	+	/	/	/
Performance related with acoustics	impact sound	-	-	-	-	-
	air born sound	+	+	-	+	-
Performance related with fire	inflammable	+	+	-	+	-
	continuity of str. safety	+	+	-	+	-
	harmful gases emission	+	+	-	+	-
	keep the fire in its place	+	+	-	+	-
	keep the smoke in its place	+	+	-	+	-
Performance related with durability	resistance to chemicals	+	+	+	+	+
	resistance to biologicals	+	+	-	+	+
	res.to mechanical move.	-	+	+	+	+
		12/16	15/16	5/14	13/14	6/14

External Wall

The external walls of the original buildings were wooden stud walls which were also acting as the vertical load bearing component. In table 2 performances related with original wooden, reconstruction alternative wooden, and blockwork structured walls are evaluated. The typical details of the original external walls can be seen in figure 2 left. Mainly these external walls were typically 16 cm thick, which consist of 2 cm of wooden siding outside 12 cm of air cavity in between the studs and 2 cm of wooden siding (+plaster) inside. The U-value of this detail has been calculated and is approximately 0.73 W/m²K.

There are basically 2 different types of details for reconstructions on the Bosphorus district. The first detail is used for reconstructions with wooden stud walls. The typical external wall details of this type can be seen in figure 2 middle. Mainly these external walls are similar with the original one, the only difference is the thermal insulation material used in the air cavity. The resulting U-value of this type of external wall has been calculated, and is approximately 0.51 W/m²K. The

second detail is for reconstructions with blockwork walls. The typical external wall details of this type can be seen in figure 2 right. These external walls are typically about 30 cm thick, which consist of 2 cm wooden siding, 4 cm of thermal insulation, 2 cm of external plaster, 20 cm of solid core, and 2 cm of internal plaster. The resulting U value of the external wall has been calculated, and is approximately 0.46 W/m²K. When thermal performance of wooden and blockwork walls are compared it is found out that blockwork walls are slightly better than the other two wooden structures.

If a building's life cycle of 30 years, which is heated by a natural gas burning boiler, is calculated for each external wall detail it is found out in a previous study that the CO₂ footprint of the first detail is larger than the other two, and the last detail (R.C. structure) is the smallest of the alternatives (Yazicioglu, 2012). The blockwork wall alternative is also overcoming the other two about the performance related with fire and durability.

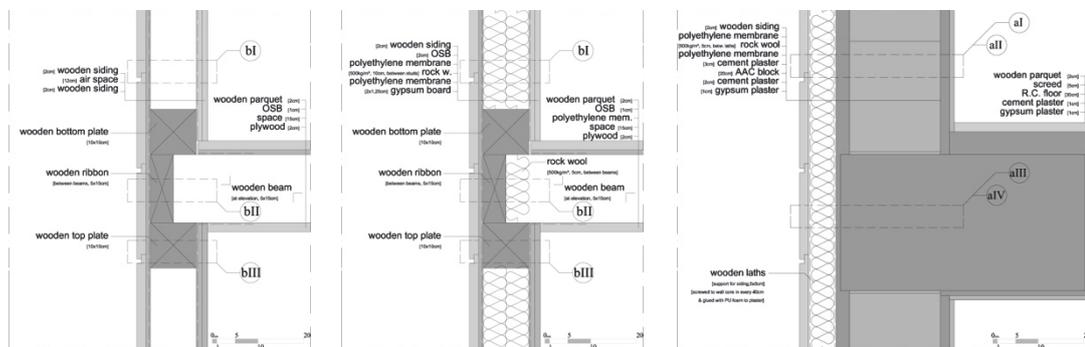


Figure 2. (Left) section of the original buildings external wall details; (middle) section of the external wall of the reconstructions with wooden stud walls; (right) section of the external wall of the reconstructions with blockwork walls (Source: Author).

Table 2. Evaluation of the original external wall with reconstruction alternatives.

		original detail	wooden wall	blockwork
Performance related with structural strength and stability	own weight	+	+	+
	earthquake	+	+	+
	impacts	+	+	+
	wind	-	+	+
performance related with thermal issues	low heat transfer	-	+	+
	heat storage	-	-	+
	sense of high surface heat	+	+	-
Performance related with acoustics	impact sound	-	+	+
	air born sound	-	+	+
performance related with water and moisture resistance	water resistance	-	+	+
	moisture resistance	-	+	+
Performance related with fire	inflammable	-	-	+
	continuity of structural safety -	+	+	+
	harmful gases emission	-	-	+
	keep the fire in its place	-	-	+
	keep the smoke in its place	-	-	+
Performance related with durability	resistance to chemicals	+	+	+
	resistance to biologicals	-	-	+

	res. to mechanical movements	+	+	+
performance related with sustainability	CO2 footprint from the production	+	+	-
	CO2 footprint from the usage	-	-	+
	recycling	+	+	-
		9/22	15/22	19/22

Windows

The original details of the windows of historical Bosphorus buildings are wooden with single glazing. The lower sash is vertical sliding and the upper sash is fixed. In some of the examples a special counter balance mechanism which is buried inside the frame exists to operate the vertical sliding lower sash. The U-value of this detail has been calculated and is approximately 5.1 W/m²K.

In table 3 performances related with original timber, and reconstruction alternative timber windows are evaluated. Most of the reconstructions use the same detail for windows on Bosphorus district which is vertical sliding, wooden with double glazing. In some of the constructions both the upper and lower sashes are operable but usage of the original counter balance operating system is rather rare. Instead modern spring type operating systems are adopted in some of the details. The usage of a solar control system is also used in most of the reconstruction details. These vary largely; wooden horizontal pivoting solar shutters, figure 3 left, and the aluminium roller shutters, figure 3 right, are two largely used but significant examples of the windows of Bosphorus district. The U values of these windows have been calculated, the first one without any shutters is approximately 3.3 W/m²K, the second one with wooden shutters closed is approximately 0.71 W/m²K, and the final one with aluminium shutters closed is approximately 0.31 W/m²K.

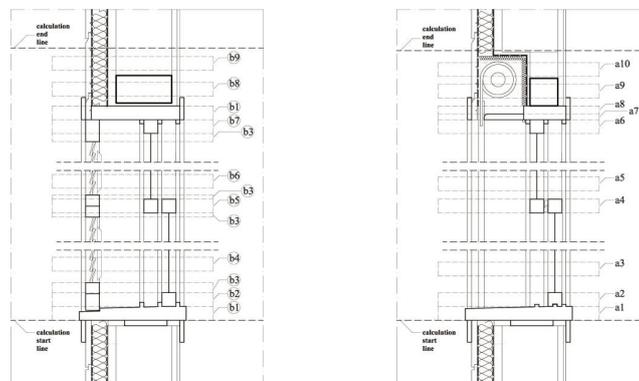


Figure 3. (left) section of the window of the reconstructions with wooden shutters; (right) section of the window of the reconstructions with aluminium roller shutters (Source: Author).

Table 3. Evaluation of the original window with reconstruction alternatives.

		original window	with wooden shutter	with aluminium roller shutter
Performance related with thermal issues	low heat transfer	-	+	+
	sense of high surface heat	-	-	-
Performance related with acoustics	impact sound	-	-	-
	air born sound	-	+	+
Perf. rel. w. water &	water resistance	+	+	+

moisture resistance	moisture resistance	-	+	+
Performance related with durability	resistance to chemicals	+	+	+
	resistance to biologicals	-	-	-
	res. to mechanical movements	-	+	+
Performance related with sustainability	CO2 footprint of production	+	-	-
	CO2 footprint of usage	-	+	+
	recycling	-	-	-
		3/12	7/12	7/12

When reconstruction alternatives, without any shutters, are compared with the original detail the benefit of the double-glazing is distinctive. On the other hand the effect of shutters is significant, when closed they are performing even better than the external walls. But the air space between the window and the shutter is accepted to be fully sealed as written in the related ISO 10077-2 standard (Standards International, 2012). Thus a critical test should be made to determine the exact levels.

Finally, as the sashes and frames of the original and alternative windows are kept the same any other significant performance differentiation was not determined.

Roof

The roofs of the original buildings were wooden structured. The residential usage of the attics were limited because of the crowd of studs supporting the roof. Mainly these roofs were typically consisted of tiles that stood on wooden board of 2 cm, the wooden board was being supported by rafters of 5x10cm which were standing on top of purlins of 10x10cm, purlins were supported by studs of 10x10cm, and finally the rafters, purlins, and studs are connected to each other by collar ties of 5x10cm. This detail didn't have any thermal insulation material. The air inside the attic was acting as a buffer zone for thermal issues and improved the thermal performance of the normal storeys but the attic itself was unsuitable for residential purposes. In table 4 performances related with wooden, and steel structured roofs are evaluated.

There are mainly 2 different types of details for roofs. The first detail is used if the building is wooden structured. This detail is very similar with the original detail but plenty of thermal insulation is used between the wooden rafters and the rafters are covered from below with a board, in figure 4 left, a section of these kinds of roofs may be seen. The resulting U-value of the roof has been calculated and is approximately 0.40 W/m²K. The disadvantage of this detail is about the free, usable space of the attic. There should be too many studs to support the purlins of the roof structure which minimise the total usable area of the attic.

The second roof detail is used in buildings which are R.C. or steel structured. Instead of wooden rafters, steel rafters are used which are supported by steel purlins, in figure 4 right a section of these kinds of roofs may be seen. As the steel purlins' structural capability is greater than the wooden purlins they are supported by less studs, which maximise the total usable are of the attics. Again there is plenty of thermal insulation over the rafters. The resulting U-value has been calculated and is also approximately 0.40 W/m²K.

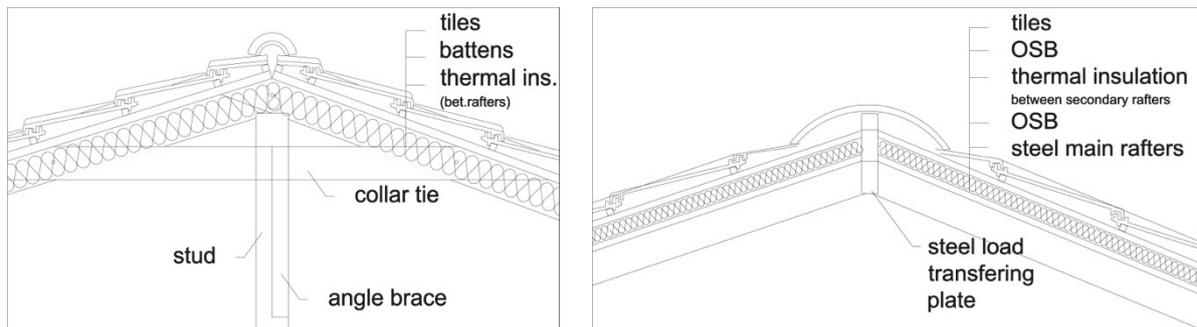


Figure 4. (left) section of the wooden roof; (right) section of the steel roof (Source: Author).

Table 4. Evaluation of the original roof with reconstruction alternatives.

		original roof	wooden roof	steel roof
Performance related with structural strength and stability	own weight	+	+	+
	earthquake	+	+	+
	impacts	+	+	+
	wind	-	+	+
Perf. related with thermal issues	low heat transfer	-	+	+
	heat storage	-	-	-
Perf. rel. w. acoustics	impact sound	-	+	+
	air born sound	-	+	+
Perf. rel. w. water & moisture resistance	water resistance	-	+	+
	moisture resistance	-	+	+
	inflammable	-	-	+
Performance related with fire	continuity of structural safety	+	+	-
	harmful gases emission	-	-	+
	keep the fire in its place	-	-	-
	keep the smoke in its place	-	-	+
Performance related with durability	resistance to chemicals	+	+	+
	resistance to biologicals	-	-	+
	res. to mechanical movements	+	+	+
performance related with sustainability	carbon footprint of production	+	+	-
	carbon footprint of usage	-	+	+
	recycling	+	+	+
		8/21	15/21	17/21

DISCUSSION

The growing demand for housing in Istanbul and the attractiveness of the Bosphorus increase the demand for the restorations and reconstructions of the historical buildings. This demand brings out a contradiction with the related legislation about the Bosphorus which's main aim is to stop any kind of construction in the region unless it's a historical building. The main challenge related with this legislation is the need to transform the historical buildings original details into new details for contemporary needs. These needs are both related with; the conceptual designs of the internal spaces of the buildings, and the performance requirements of the systems. For example, larger spaces are needed in the residential contemporary houses which means that there is a need for larger spans inside the buildings. Or, another example may be related with the thermal performance of the external walls, today external walls cannot be thought without insulation. It is

usually too hard and inappropriate to make these kinds of changes in the existing historical buildings, but for historical buildings which do not exist anymore, these kinds of changes may be appropriate while reconstructing them. The challenges about the reconstructions may be discussed under four main topics; the structural system, the external walls, the windows, and the roofs.

Structural System

The structural system of the reconstructions of the historic buildings are demanded by the legal authorities to be the same as the original building. The idea behind this demand is to use the authentic construction techniques and to reconstruct the building as original as possible. But the original structural material may sometimes be insufficient for contemporary needs of the users. On the other hand the same legal authorities demand the building to be appropriately designed according to the legislations like structural, fire, thermal, etc. This demand contradicts with the first demand of the legal authorities and makes the contractors construct some parts of the buildings with “illegal” methods. In figure 5 left, a reconstruction example from Bosphorus, dated to 2013, can be seen. The building was originally a wooden structured building. It is reconstructed with wooden structure but in order to pass larger spans the wooden structure is supported by steel beams. In figure 5 middle, a wooden truss beam of a reconstruction dated to 2012 may be seen. In figure 5 right, a fire wall of a reconstruction of another historic building may be seen, in order to realize the reconstruction the existing masonry fire wall has been demolished and a new R.C. wall has been constructed. Steel angle profiles has also been attached to support the wooden beams of the structure. In all of the examples although the original structural system material is used, the resulting buildings’ structural systems do not have any authenticity which is believed to be the intention of the legal authorities.



Figure 5. (left) steel beam and column supporting the wooden structure; (middle) wooden truss used as the main beam of a wooden structure; (right) R.C. firewall and anchored steel angles for supporting the wooden beams (Source: Authors).

External Walls

The external walls of the reconstructions of the historic buildings are demanded by the legal authorities to be the same as the original building. The idea behind this demand is to use the authentic construction techniques and to reconstruct the building as original as possible. But no matter what type of original external wall materials used, the performances expected from the external walls are the same and same performance improvement materials are used in reconstructions. In figure 6 left, a reconstruction of a historic building with blockwork external walls and in figure 6 middle left, a historic building with wooden stud external walls may be seen. Although the systems used are entirely different than each other the water proofing material used

is the same and even in the construction process the difference cannot be distinguished. And once the reconstructions finish it is almost impossible to understand the type of the external walls.

Windows

The legal authorities let some minor changes about some parts of the windows. The main idea lies beneath this is to make the windows look like the original windows. The changes which may be realised in the windows are; the usage of double glazing, the usage of contemporary spring type opening mechanisms, operable design of the upper sashes, new locking systems, etc. The changes which are not accepted by the legal authorities are; the changes about the overall appearance of the windows, the changes about the opening type of the sashes, the usage of a solar control systems (if there wasn't one in the original building), etc. Figure 6 middle right and figure 6 right, are photographs of a window of a reconstructed building taken at different times. Figure 6 middle right is taken at the end of the construction process and figure 6 right is taken about a year later when the user added a new solar control system.



Figure 6. (left) high-density polyethylene fibre water proofing material used in a R.C. reconstruction; (middle-left) high-density polyethylene fibre water proofing material used in a wooden reconstruction (middle-right) wooden window immediately after the reconstruction, without any solar control system; (right) the same wooden window sometime after the reconstruction, with a solar control system (Source: Author).

Roofs

The roof systems of the reconstructions of the historic buildings are demanded by the legal authorities to be the same as the original building. Also the usage of the attic is accepted by the legal authorities only if it is used in the original building. On the other hand the usage of insulations in the structure of the roof system is accepted by the legal authorities which disrupts the authenticity of the roof. In figure 7 two exemplary buildings' roofs may be seen, the roof windows demonstrates that the attic is transformed to a usable space. The tiles used in figure 7 left has a special form which is manufactured by a recent manufacturer, and the tiles used in figure 7 right are concrete tiles. Both type of tiles do not represent any authenticity because originally the tiles used in these kinds of buildings were "Turkish pantile" type tiles.



Figure 7. (left) roof with roof windows and contemporary type of roof tiles; (right) air vents for ventilating roof layers and roof windows changing the overall appearance (Source: Author).

CONCLUSION AND A TENTATIVE PROPOSAL FOR RECONSTRUCTIONS OF HISTORIC BUILDINGS

The Bosphorus is a unique place which has a traditional architecture. In order to protect traditional style, a special law dated to 1984 has been acted by Turkish government (Grand National Assembly, 1984). The law bans the construction of any new building along the Bosphorus coast line. A construction is possible only if it is a reconstruction of an original historic building which was demolished for any kind of reasons. Since 1984 legal authorities act different legislations about these reconstructions. For example until 2005 the legislation gives permission to some of these reconstructions to be built in any structural material unless the overall appearance is the same as the original building. But after 2005 the legislation changed and the original structural material is demanded to be used in the reconstructions. The underlying reason beneath the new legislation is to protect the originality and authenticity of the Bosphorus buildings both with their appearances and their construction techniques. But the practical output of this approach of the legislation makers promotes the constructors to make the reconstruction without following the approved reconstruction projects and also change the reconstructions afterwards. Addition of steel beams into wooden structured reconstructions, addition of roof windows, addition of solar control systems to the windows are some examples for these inappropriateness. This fact is a problem which is inappropriate, and which decreases the overall quality of the buildings. In the paper different common features of the reconstructions are compared and contrasted with a performance evaluation of different materials, components, elements, and/or construction techniques. This performance approach is tentatively proposed for the legal authorities to be realised for each reconstruction and decide on all kinds of materials, components, elements, and/or construction techniques considering the performance evaluation.

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ITALO-AUSTRALIAN TRANSNATIONAL HOUSES: BUILT FORMS ENHANCING SOCIAL CAPITAL

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Abstract

The literature reveals that culture, as a way of life, is a factor determining the house's spatial form, which, in turn, can contribute to the construction and/or enhancement of social capital. Scholars also stress that in the past the study of the relationship between houses' spatial form and social capital has focused on physical spatial environments at macro scale, neglecting the investigation of micro-scale housing. Namely, regardless of the interest to this relationship, direct assessment of the extent to which the spatial form of transnational houses contributes to the formation and enhancement of social capital in a host built environment is still rare in the field. The specific objective of this paper is to explore how the spatial form of Italian transnational houses in Australia contributed to the formation of social capital. It is argued that the spatial form of houses built by Italian migrants in post WWII Brisbane was conceptualized as means of re-establishing and enhancing social activities and/or interactions, and therefore contributed to the formation and enhancement of social capital. In order to provide an answer to the main question, the system of social activities performed within the domestic setting was investigated. Data obtained from visual material and interviews with participants was analyzed in order to reveal how the spatial form of Italian transnational houses enhanced social capital.

Keywords: Architectural Sociology; Migrants; Culture; Social Activities; Transnational Houses, Social Capital.

INTRODUCTION: THE DISCIPLINARY CONTEXT

An investigation of the literature reveals that the house, the place where on a daily basis family members share their life, is seen as the physical expression of interacting cultural needs. Due to the need to create contemporary spatial environments responding to users' cultural needs or simply to humanize the built form, social researchers and practitioners pointed out the necessity of re-evaluating a theoretical cultural framework in the architectural design of the built form (Rapoport, 1969, 1982a, 1982b, 1997, 2000). This approach, aiming to humanize spatial environments, is defined as humanistic in opposition to a 'formalistic approach', which focuses mostly on the appearance of buildings (Rogers & Gumuchdijan, 1996, p. 107; 2003, p. 7) (Zevi, 1948, p. 68).

In response to the recognition that much contemporary architecture, in its pursuit of economic and technological efficiency, has paid little attention to its human context, the last two decades of architectural studies have been marked by a renewed interest in the way designed built environments are related to users' specific needs, which are expressions of culture as way of life (Rapoport, 2000). This triggered the birth of the 'social design movement', whose purpose was to create physical designed environments responding to occupants' specific needs (Sommer, 1983, pp. 92-108) and to encourage practitioners to become more sensitive to the human context

of the designed built form. In the 1980s, researchers from various social sciences conducted extensive research and gained insights into the relationship between human context and designed physical spatial environments. Notably, architectural sociology, a specialized field defined as the study of how human behavior and/or activities are projected onto the spatial form of buildings, emerged during this time (R. Smith & Bugni, 2003, p. 8).

Smith and Bugni (2006), who created a resource that addresses many aspects of the relatively new discipline of architectural sociology, argue that the designed physical space, ranging from macro-scale level built environment (big-scale cities) to micro-scale built form (small-scale buildings), influences and, at the same time, is influenced by the behavior and/or activities of its occupants. Additionally, they state that it is virtually impossible for any human behavior to reside outside of cultural influence, because behavior and culture interact continually throughout development. Therefore, they emphasize that while the focus of investigation is the relationship between spatial environment and human behavior, the role of culture must also be explored. More specifically, architectural sociologists argue that an analysis of human behavior and/or activities, which are a response to specific cultural needs in turn dictated by culture as a way of life, can provide an understanding of how the users shaped the form of their settings. Therefore, architectural sociologists aim to apply their theories and research methods to the architectural design process, with the purpose of creating designed physical environments responding to users' specific cultural needs, or simply humanizing them (R. Smith & Bugni, 2006).

My own view is that architecture is a reflection of behavior or the use of space which, in turn, is a reflection of culture; the use of space is the result of highly culture-specific and at times temporal-specific designs (Kent, 1997, p. 3).

Architectural sociology is the most relevant discipline to the context of this research study because its objective is to explore and understand how the fulfilment of Italian migrants' behavior and/or activities had priority in the architectural design process of their transnational houses in Brisbane, and consequently contributed to a humanization of the spatial environment.

In order to fill this gap, this paper constructs a theoretical framework to understand the extent to which the internal spatial distribution of a specific typology of dwelling, the archetypal 'house on a quarter-acre block' built in post-WWII Brisbane, was conceived in response to human behavior and/or activities and, furthermore, contributed to the formation and enhancement of social capital.

BACKGROUND

The aim of this section is to outline the parameters of the research study, to establish a conceptual framework for an exploration of the topic under investigation and to address the research question. In this section critical attention to basic narratives and to the theoretical resources found in the relevant literature are outlined. Namely, scholars' views, exploring the extent to which settlement patterns and housing spatial form contribute to the enhancement of social interactions, were reviewed. Researchers' insights allowed the construction and implementation of a conceptual framework, firstly for the exploration of the way the spatial form of migrants' houses contributed towards the formation and enhancement of social interactions and secondly for the analysis of the empirical data for this study.

The focus of the research study

The literature reveals that in spite of a focus by architectural sociology on the relationship between human behavior (and/or activities) and physical environments at any scale, ranging from built environment to built forms, in the past the discipline has not given much attention to the investigation of micro-scale housing (R. Smith & Bugni, 2002b, 2002c, 2006). Scholars stress that the architectural sociology field now contains a large body of findings relevant to job satisfaction,

expression of emotion at work, space-design influence of organizational well-being, the impact of buildings on human behavior in business, organizational-development and effectiveness. Social researchers have described how physical designed environments reflect managerial philosophies, while analysing how they subsequently impact on the participants, processes and outcomes of the organization (R. Smith & Bugni, 2002c). Bugni and Smith (2003) have also highlighted how architectural sociologists in the past have mostly focused either on matters related to people and organizations that often involve workspace design, choice of furnishings, layout of work stations and location of conference and break rooms. As scholars highlight, the link between built environment and human activities has also been of great interest to the field of urban planning, particularly to the subfield of urban design, zoning planning and transportation planning, which is the object of study of a discipline named urban sociology (Handy, Boarnet, Ewing, & Killingsworth, 2002).

This gap in the literature is also asserted by Amos Rapoport (1969, p. 5), who undertook extensive research, dating from as early as 1969, on the relationship between built form and culture, namely in a cross-cultural context (King, 1984, p. 4). In his pioneer work, Rapoport claimed that the interest in the way human behavior and/or activities influence the form of domestic dwellings, the most typically vernacular building type, is frequently neglected by architects, sociologists and multi-disciplinary researchers, who are more interested in studying cultural preferences embedded in built forms at a macro scale rather than a micro scale level (King, 1984, p. 6). Furthermore, as Rapoport states, the interrelationship of the built form and human behavior and/or activities has not been extensively investigated in a cross-cultural vernacular housing context. In this setting, as Rapoport notes (1982a), vernacular houses built by their users in an alien built environment are referred to as 'transnational houses'. Consequently, broadly this study endeavours to bridge the gap in the knowledge concerning the comprehension of the relationship between human behavior (and/or activities) and the spatial form of buildings, and specifically in the detailed micro-scale context of vernacular and transnational houses (Poulsen & Lange, 1998; Rapoport, 1982a).

House's spatial form as manifestation of culture

In this section a brief explanation of the relationship between buildings and human activities is presented. As highlighted below by King, all buildings are produced as per societies' socio-cultural factors, which are changed and modified as per societies' cultural needs. This means that as needs in societies change, so building forms change: buildings serving the same function may have different forms in different societies at a different period of time.

Buildings result from social and cultural needs and accommodate a variety of functions-economic, social, political, religious and cultural. Their size, appearance, location and form are governed not simply by physical factors (climate, material or topography) but by society's ideas, its forms of economic and social organisation, its distribution of resources and authority, its activities, and the beliefs and values which prevail at any one period of time (King, 1984, p. 1).

...

In this way, it might be possible to see how the ideas, values, beliefs, activities, relationships and forms of social organization of particular institutions were related to the form and plan of particular buildings, and also to see how changes in institutions were reflected in changed building form (King, 1984, p. 10).

In their historical study of residential units located in Anatolia, scholars highlight how cultural and social characteristics influence the form of the settlement. They stress that the spatial configuration of the settlement and the house must be analyzed within its social and cultural context. Its spatial form is the result of a socio-cultural multi-layered interaction, and not an outcome of just physical effects. Therefore, socio-cultural factors must be analyzed in order to

understand how way of life, as well as materials and technology of a specific period, have influenced the built form. In their words:

“Traditional house architecture and its traditional fabric constitute a live museum, which reflects history, culture, lifestyle and world views of a society. The house is a cultural phenomenon. Its form and organization are influenced by the cultural environment it belongs to. Social infrastructure of communities is in a state of constant transformation. Together with this process, people’s expectations from their environments and inhabited spaces were subjected to change.” (Erdogan & Erkis, 2014, p. 117)

...
“Houses are designed in accordance with the user needs and they are indicators of customs and traditions narrating culture of life” (Erdogan & Erkis, 2014, p. 119)

Furthermore, in their behavioural study of the form of traditional Souqs, scholars investigated the extent to which urban spaces are influenced by users socio-cultural factors, which in turn affect human behavior. Spatial form is influenced by activities in turn dictated by human needs. They argue that spatial form and socio-cultural factors are interrelated: there is a mutual relationship between space and human beings, where factors of use and functionality of the space is the manifestation of people socio-cultural needs (Al-Maimani, Salama, & Fadli, 2014).

In his book called ‘House, Form and Culture’, Rapoport (1969) argues that the form of the house is related *‘to culture as a way of life, world view and form of social organizations’* (King, 1984, p. 4), where by culture it is meant *‘a group of people who have a set of values and beliefs, which embody ideals and which are transmitted to members of the group through enculturation’* (Rapoport, 1984, p. 286). Rapoport stresses that through an investigation and analysis of the activities performed within the domestic space by the family members, it is possible to understand how the users distributed and utilized the space of their houses and the extent of which human beings’ culture, namely specific needs and way of life, has influenced the spatial form of the house. This approach is also emphasized by Oliver who stresses that the built environment is a reflection of behavior, which has to be considered in the context of activities (Oliver, 1997, p. 16). Furthermore, Rapoport highlights the importance and the need to dismantle the concept of activities into its variables, as he did with the concept of socio-cultural variables. He identifies six components, which, in his theories, represent the system of activities. He highlights the variability of the activity which involves (1) the nature of the activity itself (what), (2) the persons involved or excluded (who), (3) the place where it is performed (where), (4) the order or sequence it occurs (when), (5) the association to other activities (how - including or excluding whom), and finally (6) the meaning of the activity (why) (Rapoport, 1969, 1982a, 1982b, 1997, 2000). He stresses the importance of studying the systems of activities, because in his words *‘variability with lifestyle and ultimately culture goes up as one moves from the activity itself, through ways of carrying it out, the system of which it is part, and its meanings’* (Kent, 1990, p. 11).

Vernacular houses and cultural needs

This section focuses on the type of building, which constitutes the topic of investigation. While architecture encompasses many different types of buildings, the focus of this study will be limited to vernacular architecture, and particularly to domestic dwellings, which are considered to be the most typically vernacular building type (Rapoport, 1969, p. 5). The term ‘vernacular architecture’ represents all buildings designed and built by their users within a bounded cultural and traditional context, in opposition to building exemplars created by formally trained architects (Oliver, 2006, p. 143; Tilley, Keane, Kuchler, Rowlands, & Spyder, 2006, p. 230).

Specifically, Rapoport states that the form of the vernacular house is (1) the product of human beings’ culture, which acts as a dominant or primary determinant, and is (2) in turn modified and/influenced by architectural responses both to climatic conditions and to limitations of materials/construction technologies, which act as secondary determinants. As Rapoport argues:

Primary determinants affect the way we behave and how we wish to behave, the clothes we wear, the books we read, the furniture we use and how we use it, the food we eat and how we prepare and eat it, and consequently the houses and settlements in which we live and how we use them. It is these influences that make it easy to identify a house or city as belonging to a given culture or subculture (1969, p. 85).

Oliver, who highlights that vernacular architecture is the reflection of both components material and cultural of its builders and occupiers, share Rapoport's view. He highlights that all cultures have distinctive and unique vernacular architectural forms, which are shaped by specific needs dictated by culture as a way of life.

Vernacular architecture generally embodies community values, and less evidently, may symbolize concepts of the cosmos, or acts as an analogue for the abstractions of belief. Thus, even a simple dwelling may reflect both the material and spiritual worlds of builders and occupiers (Oliver, 1997, p. xxii).

...

Over time, cultures have determined the buildings that will accommodate their needs, subsequent generations drawing upon their traditions and tempering them as changing circumstances warrant (Oliver, 2006, p. xviii).

Finally, vernacular architecture has been chosen because it is considered to be more autochthonous, spontaneous and authentic compared to that designed in a professional environment. Therefore, its form can be examined as evidence of the way the users influenced it in response to both specific cultural needs. Specifically, the purpose of this research study is to investigate and analyse the system of the activities performed within the domestic space by Italian migrants in order to understand (1) how the users distributed and utilized the space of their houses and (2) the extent to which the spatial form of their houses contributed to enhance social capital.

Transnational houses as places of memory and refuge

As Foley stresses, a house comprises much more than a physical shelter for people to occupy: it encompasses the broader residential setting, including privacy, location, safety and investment (Foley, 1980, p. 457).

Scholars (Al-Thahab, Mushatat, & Abdelmomem, 2014) argue that the concept of public/privacy realm represents a factor determining the spatial form of the house and of the organization of its social spaces. Namely, the need for privacy, which is also dictated by culture, affects the form of the house: social spaces, determined by traditional inherited behavioural values, contribute to communal social integration. The house and the spatial organization of its activities have the role of holding family gathering within the living area. On the other hand, for example it is shown that the space of the entrance is shaped in order to prevent any kind of visual intrusion from outside towards the family/living room and the courtyard, which represents the main social core of the house. Therefore, the house becomes the manifestation of social and human organization and encompasses several systems of activities.

"The separation of public/private spaces summarizes the impact of the cultural and behavioural value systems on the sequence and hierarchy of spaces that largely defines the organic pattern of the traditional fabric at large" (Al-Thahab et al., 2014, p. 238).

Smith, who states that the form of the house is influenced by cultural traditions and social dynamics, also emphasizes this concept. Traditions and dynamics contribute to better understanding the development of the urban fabric and of its built forms such as houses (M. E. Smith, 2014, p. 207).

More importantly, a house provides the setting within which people live their lives in a community; the house impacts on human beings' senses, emotions, participation in physical activity and community life, sense of community, and general well-being (Israel, 2003).

Commonly, once tenants have achieved the security that a house provides, it is then possible to transform that house into a home. A home becomes a place which can accommodate people's needs; a place reflecting and affecting people's behavior according to their cultural preferences; a place where people spend part of their time undertaking the sort of human activities determined by their own culture (Inglis, 2005, p. 10; Kent, 1997; Rapoport, 2000); a place where tenants create memories (Sarup, 1994). At this level the home becomes a physical setting providing a social space allowing occupants to meet and finally enhance their social interactions (Steele, 1973, 1983).

In addition, Rapport and Dawson (Rapport & Dawson, 1998) stress that the transnational house is a mobile habitat which is subject to change and it cannot be perceived as a fixed physical structure. Also, Kent argues that the users tend to distribute the domestic space to perform activities, which are developed during the childhood.

The use of space is an integral part of every human being's daily life. Every day, we make subliminal and conscious decisions concerning the occasions at which a diverse range of activities will be performed. Such decisions are based on the spatial patterning that is developed in childhood through socialisation (Kent, 1984, p. 1).

These insights suggest that this perception of the house as a habitat opened to changes may strengthen migrants' desire to build and distribute their own new houses in the host country according to their past housing experience, to enhance the feeling of familiarity. Therefore, the construction process is seen as a way to create a tangible linkage between migrants' present dwelling and their desired past house. Inevitably the new transnational house built in the host built environment can become a place of memory. In addition to this interpretation, Depres (1991), in her studies of trans-national houses, emphasises that cultural groups interpreted the house as a place of refuge - reminding migrants of their origins - and a place allowing migrants to go back to the traditional activities they used to perform before emigrating.

Following these insights, the extent to which Italian migrants' housing past experience have influenced the shape of their new houses in their host environment was investigated. Specifically, it was explored how the need of creating a place of refuge reminding migrants of their origins and allowing migrants to go back to the social activities traditionally performed in previous spatial environments affected the form of their houses.

Urban settlements: a setting to enhance social capital

According to a renowned sociologist, Pierre Bourdieu (1992), who introduced concepts such as cultural, social and symbolic forms of capital, social capital derives from the cooperation, network and connections between individuals and groups. Social capital promotes cooperation among members and families of a community, therefore facilitating social integration within the community.

Scholars reveal that the formation of spaces within both the built environment (macro-scale level) and the built form (micro-level) can facilitate social activities and/or social capital (Coleman, 1988; Siegrist, 2000; Woolcock, 1998). Rapoport also points out the relationship between social capital and built environment. He highlights that it is the need of human beings to meet, to share food and finally to have a private place which affects the form of the house or its spatial configuration. He stresses the importance to investigate and understand how patterns of behavior and/or activities, which are influenced by culture as a way of life, impact on the house's spatial form.

...humans who need places to meet, to share food, to have private territories, should have differentiated among spaces and places from earliest times.

...

It is therefore imperative to consider man-environment interaction both through time and cross-culturally in order to trace regularities and patterns and also in order that any generalizations which are made might be valid (Rapoport, 1984, p. 284) .

In Addition, Putnam highlights that the way we design and build the macro-scale urban setting where communities reside can have an impact on the degree to which people are involved in those communities (neighbourhoods). He stresses that it is not just the micro-scale level single house's spatial configuration, but also the surrounding built environment, enhancing a sense of community, which can enrich social interaction among the population (Putnam, 2000).

Those tangible substances [that] count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit ... The individual is helpless socially if left to himself ... If he comes into contact with the neighbour, and they with other neighbours, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community (Putnam, 2000).

This view is shared by Smith and Bugni, who stress that the planning of a city has an impact on the way people live in the city, in a similar way as the internal layout of a house, distribution, location and size of each room within the house has an impact on the way tenants live their lives (R. Smith & Bugni, 2003). Emphatically, the way the city and its sectors are planned has a deep impact on the way people use the city, live their daily lives and carry on their social activities. Also, according to Wilson (1997), when the built environment is shaped in a way, which does not promote social interactions and/or capital, it is the community and the individuals who get involved and gradually attempt to shape the built form to facilitate and enhance the development of social activities. This might occur through the creation of public open spaces such as porches, sidewalks and multi-use parks, which facilitates social interactions among people.

The role of public sites - as spaces of leisure, meetings and encounters - in creating possibilities to develop social activities, which stimulate new encounters and contribute to create resources of social capital among the population, is also highlighted by Huntoon (2001) and Warner (2001). The insights from these scholars suggest that the lack of public sites or public open spaces within the host built environment may strengthen migrants' desire and need to shape the spatial form of the house in order to allow them to carry out social activities. Scholars argue that the way in which people use the settlement also affects the spatial form of the house: for example in some urban contexts the meeting space can be the house while in other urban contexts the meeting space can be a street or a plaza which is part of the urban settlement. For example, Rapoport stresses how, in Latin America, the domestic space is mainly used to sleep and store things, while most social activities take place outside the house within the public open spaces of the city. In particular, Rapoport points out a relevant distinction between Latin, Mediterranean towns - where people use the settlement or the public town square area within the settlement for social activities purposes - and Anglo-American cities - where inhabitants use their house and backyard to entertain social interactions (Rapoport, 1969, 1982a, 1982b, 1997, 2000).

This suggests that for a better understanding of the way the configuration of the Italian Transnational house enhances social capital, the house cannot be studied in isolation from the Australian host settlement. It has to be explored as part of the whole macro-scale spatial system which relates the single house, the settlement and the way of life, because the spatial form of the house is not just affected by the way the users live in it and the range of social activities taking place in it, but also by the way such activities are performed in the whole built environment.

QUALITATIVE RESEARCH METHODOLOGY

The following section explores and discusses reviewed housing research approaches, perspective, strategy, case study and methods. The literature reveals that social researchers apply three different theoretical approaches for the study of housing (Clark, Deurloo, & Dieleman,

1984; Littlewood & Munro, 1997; Saunders, 1989; R. Smith & Bugni, 2002a): (1) quantitative economic or demographic studies on housing and moving patterns; (2) a qualitative approach to understanding the cultural meanings of the home to its occupants; and (3) a quantitative approach to understanding cultural differences in housing consumption and preferences.

Namely, architectural sociologists stress that the data collection methods used by social researchers, ranging from statistical to qualitative, are most applicable to architectural practice because they can assist scholars and practitioners in understanding the nature of people's specific cultural needs and their influence on the spatial form of the house. As they also highlight, the choice of method, either quantitative or qualitative, is dependent on the research objective (Sommer, 1983).

Clapman (2005), who shows that quantitative housing research uses rationalistic criteria focusing on the size and installations in the house in order to understand housing choices and consumption, argues that this is not the most appropriate criteria with which to understand the cultural influences on the form of the house by its occupants. According to Clapman (2005), the cultural influences on dwellings need to be investigated through research based on qualitative methods, in order to capture and understand the culture, as a way of life, of the occupants. Architectural sociologists (R. Smith & Bugni, 2006) also argue that the form of the house is difficult to understand outside the context of its cultural settings.

Therefore, in attempting to gain insights into the relationship between the spatial form of Italian transnational houses in Brisbane and the users' social activities, the study employs a predominantly qualitative methodology. This is because insights into the cultural meaning that a material form has for individuals within a given social context can best be gleaned from the individuals themselves, and by exploring the rich symbolic universe within which individuals exist (Blumer, 1969).

The Symbolic Interactionist Perspective

Symbolic interactionism is the selected perspective for this study (Blumer, 1969) because of its usefulness in exploring the meanings which are produced through social interactions between human beings. Applied symbolic interactionism was developed in the early twentieth century by John Dewey, Charles Horton Cooley and George Herbert Mead, three scholars at the University of Chicago, and by Jane Addams, a practitioner with an interest in research. Although each of these thinkers sympathized with the philosophy of 'pragmatism', Dewey and Mead were interested in intellectual pragmatism, while Addams had an interest in the applied sciences. All three believed that thinking/doing, theory/practice, social science/social work, should not be separated (Forte, 2003). Dewey, Cooley, Mead and Addams asserted that objects do not have inherent meaning, but that their meaning is attributed to them (Blumer, 1969). Additionally, as these researchers emphasise, human beings shape and reshape their reality through an on going interaction with and among social objects, self and others (Blumer, 1969). Plato also established this concept of the social construction of reality:

Socrates . . . what is really true is this: the things of which we naturally say that they 'are', are in process of coming to be, as the result of movement and change and blending with one other. We are wrong when we say they 'are' since nothing ever is, but everything is coming to be (Plato & Campbell, p. 152).

This perspective suggests that the views, perceptions and meaning Italian migrants attribute to their houses are produced and shaped by the complexity of interactions between human beings and the cultural context of the setting.

Qualitative Research Strategy

The qualitative research methodology is considered the most appropriate one to apply in the current study. Additionally, it is necessary to choose between a numbers of qualitative research

strategies. Denzin and Lincoln (2005, p. 14) stress the importance of choosing 'a flexible set out of guidelines that connects theoretical paradigms to strategies of enquiry and methods for collecting empirical material'. They identify four sub-categories of research inquiry (Denzin & Lincoln, 2005; Silverman, 2000): (1) phenomenology may be chosen when the subject of the research examines a deep, underlying reason for a person to believe a particular thing, or to act in a particular manner; (2) ethnography may be employed if the study is based on cultural values; (3) case study may be used when the study is of a particular person or clearly defined group; (4) grounded theory is appropriate when the researcher has no clear theory on the subject of investigation. A qualitative research study can be developed by adopting any, or a combination, of these strategies (Creswell, 2003).

The Case Study

The data collection's process started with the selection of Italian migrants, followed by the selection of their not-altered self-built artifacts (See figures 1-4-7-10). The selection of interviewees was based on clearly defined criteria. Interviewees were limited to migrants born in Italy during the 1930s and 1940s. All selected Italian migrants had migrated to Australia in the 1950s and 1960s. As all interviewees were approximately 20–30 years old at the time of their arrival in Australia, it was assumed that people who lived in their homeland for several years and migrated as young adults were preferable because they had spent enough time in Italy to assimilate a culture, as way of life belonging to a cultural group.

Additionally, social class is a 'limit' that was also taken into account. Bourdier, AlSayyad, Passeron and Thompson (J. P. Bourdieu & AlSayyad, 1989; P. Bourdieu, 1977, 1979, 1983, 1986, 1990a, 1990b, 1992, 1993, 1998; P. Bourdieu & Passeron, 1990; P. Bourdieu & Thompson, 1991) highlighted the fact that the concept of culture is closely related to a cultural group and to social class. In their view, each social class possessed its own habits, defined as a set of acquired patterns of thought and behavior, and generally of a way of life. Therefore, he stressed that the built form is the reflection of culture, as a way of life, of a cultural group and its social class. A house and its appearance can be linked to social identity and therefore can distinguish one social status group, and also one social class, from another. Through functional and decorative attributes, a house can be used as a marker of status and class. As mentioned earlier, this factor was considered in the selection of Italian migrants for this research study. The selected participants belonged to the working social class, since participants belonging to this specific class represented the majority of Italians who migrated to Australia (Cresciani, 1985, p. 95). Accounting for the limits listed above, the case study included 20 Italian migrant couples and four self-built not-altered houses.

Methods for data collection

The research study inevitably draws upon multiple qualitative research methods (Creswell, 2003, p. 181). Being the objective of exploring a case from different perspectives to ensure the validity of the case-study research, varied methods were employed and combined, or triangulated (Denzin, 1978). Johansson defines this process as triangulation, or 'the combination of different levels of techniques, methods, strategies, or theories, is the essence of case-study strategy' (Johansson, 2003, p. 8). Therefore, within the current study, triangulation from different sources is adopted in order to validate the findings, (Yin, 2003, p. 159).

In order to explore and understand how Italian migrants shaped their transnational house in Brisbane and contributed to the formation and enhancement of social capital, a detailed case study was required for collecting first-hand data. The chosen methods allowed collecting oral and visual data.

Oral data was collected from oral stories from Italian migrants living in Brisbane through focus groups, in depth interviews and photo elicitation. Visual data was gathered through site

visits, field observation, visual material and photographs. An integration of methods collecting both oral and visual data was considered essential for the purpose of this research study (Creswell, 2003).

FINDINGS

Participants revealed that two main factors played a determinant role in Italian migrants' decisions to build two story houses in Australia (see figures 1-4-7-10). (1) The wish to have a house designed for their needs that is having more space to perform activities dictated by cultural needs; (2) the wish to continue the old tradition of the grand family house where interviewees had lived in Italy before migrating. Consequently the construction of two-story houses, influenced by the memory of the family house, allowed having more space to be used by the family members' to perform social activities.

All participants revealed that after working in the sugar cane fields in North Queensland, many Italians moved to Brisbane driven by the wish to live in a less isolated built environment where they would have more opportunities to socially interact among themselves and with locals. As a result, the house was distributed in order to allow social activities to be performed within the domestic context (see figures 2-3-5-6-8-9-11-12; the yellow area indicates public space and the grey one indicates private space). More specifically, participants highlighted the nature of social activities performed within the house and distinguished them into (a) informal and (b) formal social activities.

While informal activities, such as the daily family dinner, the randomly family and women meeting, were performed in the living-dining area located at the ground floor (see figures 2-5-8-11) and readily accessible through the front door of the house, formal activities, such as the Sundays and Christmas and Easter and general public holiday days lunch were carried out in the open area comprising living, dining and kitchen, located in the front area of the upper level (see figures 3-6-9-12).



Figure 1: Front façade (Case 1)
 (Source: Authors)



Figure 2: Ground Floor Plan (case 1)
 (Source: Authors)



Figure 3: First Floor Plan (case 1)
 (Source: Authors)



Figure 4: Front façade (case 2)
 (Source: Authors)

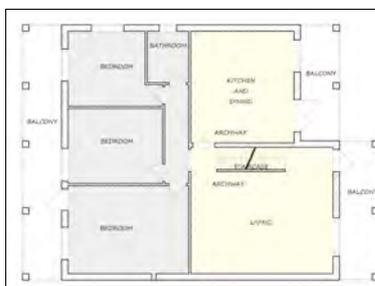


Figure 5: Ground Floor Plan (case 2)
 (Source: Authors)

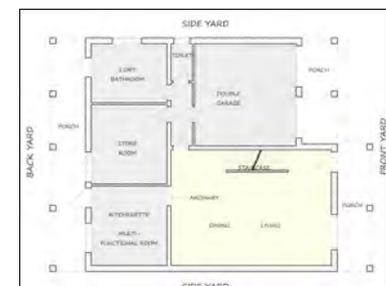


Figure 6: First Floor Plan (case 2)
 (Source: Authors)



Figure 7: Front façade (case 3)
(Source: Authors)

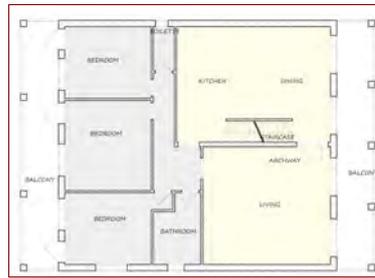


Figure 8: Ground Floor Plan (case 3)
(Source: Authors)



Figure 9: First Floor Plan (case 3)
(Source: Authors)



Figure 10: Front façade (case 4)
(Source: Authors)

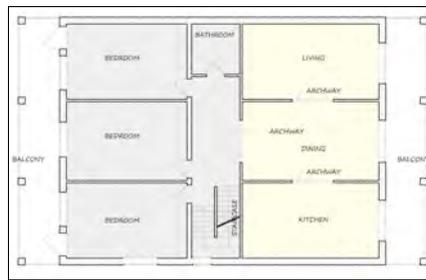


Figure 11: Ground Floor Plan (case 4)
(Source: Authors)

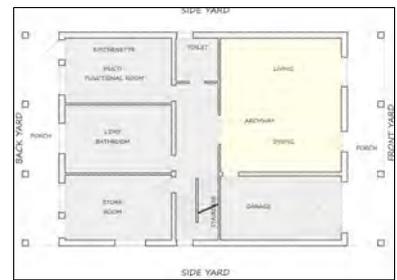


Figure 12: First Floor Plan (case 4)
(Source: Authors)

The two diagrams below (figures A and B) clearly summarize and explain the nature of the activities performed, the relationship between activities and spatial form of the house and the reasons behind the activities selected.

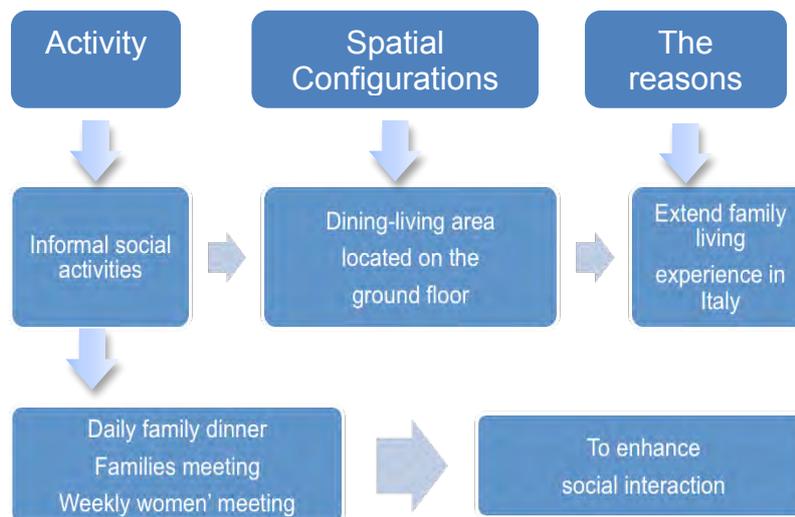


Figure A: Informal social activities (Source: Authors).

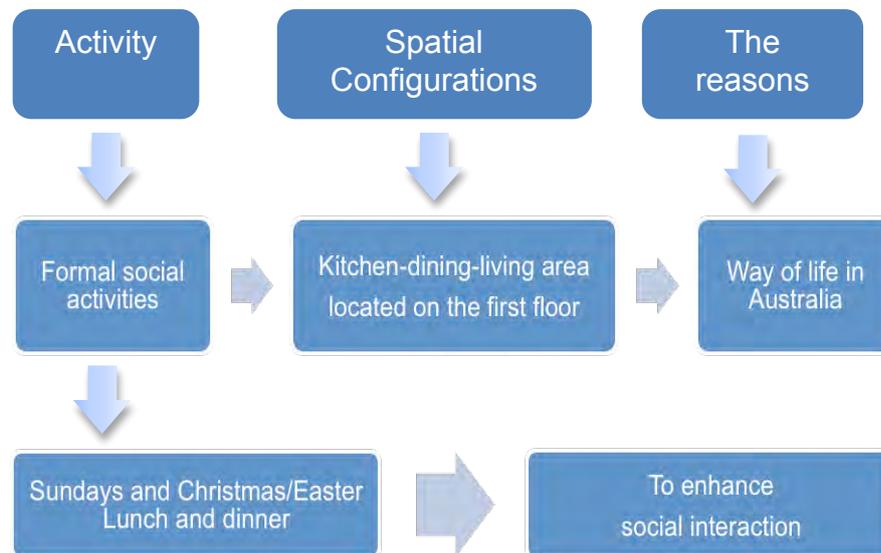


Figure B: Formal social activities (Source: Authors).

Participants highlighted that the internal layout in Italian migrants' houses was purposively conceived to enhance their social interactions among family members, relatives, friends and neighbours. As revealed, Italian migrants' houses comprised two 'daily areas' utilized for social interactions: an area comprising living and dining rooms at the ground floor utilized for informal meetings (See figures 2-5-8-11), and an area comprising kitchen, living and dining rooms at the first floor utilized for formal meetings (see figures 3-6-9-12).

The space to prepare food, cook and perform social activities is emphasized in Italian houses built in Brisbane. This occurred because (1) traditionally Italian way of life has revolved around the preparation of food, a good glass of wine and the company of friends and family; (2) in Australia many migrants had no families with them and for those, new friends met in Australia became as intimate as family, taking the roles of aunts, uncles and grandparents. Coming together over a table in their Australian transnational houses was like creating a new family network and a sense of being Italian.

The findings revealed another factor, which contributed to allocate space for social activities: the host built environment. Interviewees stressed that (3) in the 1970s residential areas in Brisbane lacked of open public spaces, commonly used as meeting spaces, as town squares which were a urban element incorporated into the fabric of Italian cities. As a result, Italian migrants, perceiving that this lacking urban element contributed to deprive them of the possibility of socially interacting in the way they used to do back in Italy, allocated more space for social purposes within their transnational houses.

CONCLUSIONS

The findings revealed that (1) the spatial form of Italo-Australian transnational houses was shaped in response to the specific need to perform social activities dictated by cultural needs, in the attempt to adjust to, to 'tame', and to make sense of, a radically different environment, and (2) the house was interpreted as a place of memory shaped through nostalgic practice whose purpose was to enhance a sense of familiarity in the host built environment.

More specifically, the findings highlighted that urbanization patterns in an alien built environment, namely the lack of public urban spaces like a town square traditionally utilized by

Italian migrants in their native built environment for performing social activities, had an impact on the nature of social activities performed at a macro-scale level in Brisbane. The lack of public space in the host urban settlement combined with the need to establish a social network in a situation where integrative ties have been weakened by movement to a new location influenced the way Italian migrants conceived the internal spatial distribution of their houses in Brisbane.

The house was configured with two large living areas, utilized for performing formal and informal social activities and therefore in order to enhance social interactions and/or social capital. This insight means that migration to another land represents a fundamental dislocation of social activities and, in this regard, the spatial form of the house could be conceptualized as means of re-establishing social interactions and/or enhancing social capital.

This study revealed that Italian migrants adopted a humanistic approach when they built their houses, because they constructed their artefacts in response to specific needs, based on their culture. Therefore, this study can help in translating these research findings into practice. In order to support a humanistic approach, and fill the gap between the disciplines of Architecture and Sociology, the architectural design of houses should be based upon two aims: to investigate (a) the extent to which house design can be guided by the users' cultural needs, expressed as human behaviour and/or activities; and (b) possible avenues of alternative creative designs for housing based on users' cultural need. Therefore, the involvement of residents and an evaluation of responses to forms of habitation from users within a given society can improve future planning, and can progress housing process design. Such participation would enable the users to express their needs and would facilitate a spontaneous, dynamic change. Culture as a way of life of inhabitants cannot be expressed if the environment is built through an imposed formula dictated by standardisation, speculation and for profit purposes. People can have a deciding role in the creation of their built form. They can put a visible imprint on it. Houses built by Italian migrants are an example of this concept. Their houses facilitated the mode of living of the users according to their culture.

Additionally, this study contributed to better understanding of how Italian migrants influenced the built form of the host Australian built environment and how socio-cultural factors are embedded and preserved in the built form, which represents the national cultural heritage of Australia. This exploration of a historically significant process of Australian domestic architectural development contributed to knowledge of contemporary Australian society.

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LEGIBILITY OF NEIGHBORHOOD PARKS AND ITS IMPACT ON SOCIAL INTERACTION IN A PLANNED RESIDENTIAL AREA

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Abstract

Neighbourhood parks are designed to provide opportunities for leisure and communal activities for the residents. However, studies have indicated that social interactions in these spaces are not at a satisfactory level. In the urban design context, a good public space should be legible to the observers. Legibility refers to the apparent clarity of the cityscape that directs people's movement, pattern of activities and form of interaction in public spaces. This paper discusses park's legibility and its impact on social interaction within a neighbourhood. The results presented are based on a questionnaire survey and a mental mapping exercise conducted with residents in the city of Putrajaya, Malaysia. The results demonstrate a strong relationship between the park's legibility and the social interactions among the park users. A clear structure of the setting and fewer sight obstacles found within the parks influence residents' pattern and the Intensity of outdoor activities. The findings contribute to the development of legible environments in neighbourhood park design, its positive impact on social interaction, and social bonding among the residents.

Keywords: Legibility; Social Interaction; Neighbourhood Park; Putrajaya

INTRODUCTION

Public open spaces are designed to fulfil human needs (Al-Bishawi & Ghadban, 2011), and social interaction is one of the most important needs (Hatfield et al., 1994). Hence, neighbourhood parks as crucial public open spaces for social activities, afford opportunities for contact which include proximity and convenient access to public facilities, particularly in urban residential areas (Azmi & Karim, 2012). Green open spaces within the parks allow residents to sit, relax and meet one another. These spaces support physical activities, social interactions, enjoyment of nature and provide an escape from hectic city life (Brown et al., 2013) towards a better quality of life. However, increasing urban growth had contributed to the weakening of the social cohesion and social attachment in urban areas despite all the efforts to promote public parks in cities during the end of the last century (Greenbaum, 1985; Ujang, 2014). Various studies in many parts of the world have identified the lack of social interaction in a form of shared experiences among residents in urban residential areas (Hari & Kujala, 2009). In this context, the physical living environment has been identified as one of the main factors that influence residents' outdoor activities and the use of public spaces for social interactions (Gehl, 2010). Social interaction is influenced by the configuration of spaces that leads to numerous opportunities for social contact in public places (Lelévrier, 2013). Findings from previous studies raise a legitimate question: despite the presence of all the physical elements of social interactions and wellbeing in public parks - why the social interaction among park users is still low? How coherent is the visual and physical environment to influence the social use of public spaces? This paper examines the neighbourhood parks of a planned city in Putrajaya, Malaysia to understand the relationship between legibility in park design and its influence on social interaction.

MAKING BETTER PLACES

The core of urban design concern is making better places for people (Carmona et al., 2010). The concept of place deals with the relationships between human and land. A place is constructed by the physical form, activity, and meaning (Tuan, 1977). It is important to examine primarily the concept of “sense of place” to comprehend what stimulates people to interact with their environments. Sense of place is the principal concept relating to a place that describes the liaison between human beings and their spatial settings (Jorgensen & Stedman, 2001). One of the important constructs that define sense of place is place identity which is defined as the bond between the personal identity and the physical environment (Proshansky et al., 1983). This relationship is shaped as a result of a mental construction process of the information received from the landscape, which is transformed into a cognitive image (Yeung, 1996). The clarity of this image is attributable to certain order and coherence in the structure of the physical environment. Therefore, to develop the sense of place and identity, it is fundamental to examine the clarity and legibility of the physical setting, in this case, the neighbourhood parks in relation to their social use and functions.

LEGIBILITY

Legibility is a vital attribute for good and successful places (Ujang & Shuhana, 2012). It refers to the characteristic of being clear enough to be understood (Lynch, 1960). Legible landscape means having easily recognized elements within a setting. It is determined by the quality of the built environment, its clarity, simplicity, continuity, rhythm and the dominance of unity with all the elements of the setting (Gehl, 1971). It is one of the main physical attributes that influences the popularity of a park and its utilization (Karuppanan & Sivam, 2012). Legible spaces strengthen users’ attention, clarifies their perception and their mental cognition towards the spaces. These benefits promote positive relationships between people and the environment and support social connectedness and interaction among residents (Bounds, 2008). Several empirical studies have identified the positive relationships between the legibility of streets, markets and the social interaction (Ujang, 2012; Yeung, 1996). Realizing the importance of social sustainability of neighbourhoods in the globalised urban environment, this study examines the legibility of neighbourhood parks within a planned residential area and its impact on social interaction.

NEIGHBOURHOOD PARKS

A neighbourhood park is the most important element that supports the sustainability and the economy of living because it offers a space for resident’s connectedness with each other (Neal, 2003). It has an arrangement that promotes the family-like lifestyle for the community (Ratcliff, 1975). They are large public gardens used as a recreational ground within walking distances of residents home i.e. between 400 to 800 meters (Hultsman et al., 1987). Designed as a physical and social space for a pragmatic and effective utilization, a neighbourhood park functions as a unit that provides residents with all the convenient access to public facilities (Azmi & Karim, 2012). It is designed to reflect community and place identity by developing a positive relationship between space, environment, and society (Carmona et al., 2010). Hence the park design influences the social interaction among the users.

SOCIAL INTERACTION

Social interaction is a process of mutual stimulation and interactivity between at least two people. It includes all forms of communication such as cooperation, competition, imitation, helping, playing, informing, negotiating and bargaining (Hari & Kujala, 2009). Social interaction occurs spontaneously as a result of people moving and gathering in the same space, hence signifying the importance of public places such as neighbourhood parks. Human social interaction can occur through four main behaviours: verbally, attitude or expression, gestures, actions and

postures (Hari & Kujala, 2009). The basic elements of human interaction occurring through the main social behaviour: bodily contact, proximity, orientation, gestures, facial expression, eye movements, verbal and non-verbal aspects of speech (Argyle, 1979). This paper focuses on the level of social interaction among residents in neighbourhood parks in light of the legibility attributes of the elements in the parks.

METHODOLOGY

This study was conducted to determine the impact of park's legibility on social interaction in the context of urban residential areas. The context of the study is the planned city of Putrajaya, the new federal government administrative centre for Malaysia. The city is located 25 kilometres south of Kuala Lumpur with a population of 86 000 persons (Department of Statistics, Malaysia, 2013). The city was planned as a model for other future sustainable cities in the country focusing on the creation of a healthy urban environment. The city is divided into administrative, commercial and residential areas called precincts. Neighbourhood parks in Precinct 8 and Precinct 9 were selected as the sample areas based on the city's local plan provided by the authority (Perbadanan Putrajaya, 2002). Precincts 7,8,9 and 10 are the major residential areas with complete public facilities and comfortable environment for living. Precinct 8 has a lower density of 12,814 residents, consisting of attached single-unit type of housing. Precinct 9 has a higher density with 41,796 residents. Houses in this latter precinct consist of several high-rise condominiums (Inspection Report of Putrajaya, 2009, p.35). This study further examines the correlation between population density and the frequency of use of neighbourhood parks. The functional factors such as the volume of people have an impact on place legibility (Yeung, 1996); thus, it is assumed that a higher density of residents will provide greater park utilization.

This study employed a close-ended and self-administered questionnaire to measure the impact of independent variables (*Clear Structure* and *View Obstacles*) on social interaction within the parks. Besides, a cognitive map exercise was conducted to confirm the survey results. Both methods had been adopted in various studies on parks' legibility, their value for residents, and social bonds (Shukur et al., 2012; Rasidi et al., 2012; Talen, 2010).

The survey questionnaire addressed the users' feedback on the physical characteristics and elements of parks, and their level of social interaction by using a 5-point Likert- Scale (1=strongly disagree to 5=strongly agree). The survey involved 378 respondents sampled based on the Morgan table instructions (Krejcie and Morgan, 1970). The sample was selected randomly from the two neighbourhoods. Precinct 9 consisted 68% of the studied population while Precinct 8 provided 32% of the population samples. Thus, the 378 survey questionnaires and sketch mapping exercises were distributed as follow: 257 at Precinct 9 (257) and Precinct 8 (121). The studied population in Precinct 9 lives in 18 blocks of residential buildings with each one containing 12 floors and 16 apartments per floor, for a total of 3,456 apartments. For data analysis, SPSS version 22.0 was used to generate a random selection of 257 cases from the total number of apartments in Precinct 9. The same method of random selection was used for Precinct 8. The age of respondents was 18 years old and above, and they include both male and female samples.

The participants were asked to answer questions about the legibility of the parks (Clarity of Structure and Visual Obstacles), the intensity of social interaction and types of contact while using the parks. This procedure allowed the researcher to examine whether or not parks promote contact between users. A sketch mapping instruction was attached at the end of the questionnaire to support the results of the questionnaire survey. Respondents were requested to sketch and locate on a blank piece of paper the identifiable physical elements of their respective neighbourhood parks, indicating as many details elements as possible.

Data from both mapping output and questionnaire survey were then categorized the legible elements and the level of social interaction identified by the respondents. Based on the Likert

scale description by Bernard (2011), the questionnaire survey results could be classified into four groups with an equal range ($m=1.0$), and the frequencies of the sketched mapping could into four groups with an equal range of ($f=5$ for Precinct 8 & $f=7$ for Precinct 9). The sketch mapping results were based on the 50 sketch maps collected from respondents (20 from Precinct 8 and 30 from Precinct 9). The classification is shown in Table 1 and Table 2. The classification is based on Bernard (2011); however the range established follows the Likert scale (1 to 5) for the questionnaire and the number of respondents in both Precincts for the sketch mapping exercise.

Then, Cronbach's Alpha was used to measure the reliability of a set of items or a single uni-dimensional latent construct. The Cronbach α reliability coefficient was 0.763, which indicates a good questionnaire reliability.

Table 1: Classification of legible elements for mental mapping (Source: Authors).

Frequency (f) 50		Legibility
(f) Precinct 8 (20)	(f) Precinct 9 (30)	
16 - 20	24 - 30	Legible: Highly identifiable
11 - 15	16 - 23	Legible: Moderately recognizable
6 - 10	8 - 15	Illegible: Poorly recognizable
0 - 5	0 - 7	Illegible: Unrecognizable

Table 2: Classification of legible elements for questionnaire survey (Source: Authors).

Means (m)	Likert scale (description)	Legibility	Social Interaction
4.1 - 5.0	Strongly Agree	Highly identifiable	Strong SI
3.1 - 4.0	Agree	Moderately recognizable	Moderate SI
2.1 - 3.0	Disagree	Poorly recognizable	Weak SI
1.0 - 2.0	Strongly Disagree	Unrecognizable	None SI

RESULTS AND ANALYSIS

Demographic information

There were slightly more female (52.2%) than male (47.8%) among the 339 respondents participated in the survey. The majority of the respondents were between 26 and 45 years old (41%) The lowest age group were the elderly above 66 years old (4.4%). As for the income of respondents, the majority (70.5%) gain less than RM4000 per month. Regarding education, diploma and bachelor holders took the larger percentage respectively at 32.7% and 42.2%, with only 6.2% master holders. As for ethnicity, there were Malay (86.1%), Chinese (10.3%), and Indian (3.2%).

In addition to the density differences, the most striking feature between the two precincts is mainly the social class variation. Precinct 9 contains the greater number of workers and middle-class residents earning less than RM2000/month that constitute 89.6% and 93.4% of SPM certificate school leavers. However, in Precinct 8, 59% of respondents earn between RM 4000 and 6000. The latter also has more postgraduate degree holders (60% of the Master holders and 100% of PhD holders live in the Precinct 8).

Legibility of the neighborhood parks

a) Results from questionnaire survey

Crosstab statistics was used to identify and compare the legibility based on means scores between the Precincts 8 and Precinct 9. Table 3 shows the respondents' feedback on the parks' legibility through the main variables which are Clarity of Structure (Edges, Nodes, Landmarks, Paths and Districts) and Visual Obstacles. There were significant differences in visual obstacles

variable between Precinct 8 (m=2.27), and Precinct 9 (m=3.58). This trend can be associated with several reasons. One of them is the layout of the parks. The Park in Precinct 9 is designed as a concave curve while the Park in Precinct 8 has a convex curve shape. The form of Precinct 9 park is circular thus it has higher visibility when viewed from within the park. The legibility of this park is intensified by the influence of two physical characteristics: 1. the park was laid out on concave curve which allows better views with less sight obstacles; 2. the regular form of the park (circular shape) allows users to see the whole park from a single point (as shown in Figure 2). On the other hand, the convex curve shape of the park in Precinct 8 makes it difficult for observers to view the whole park from a single point. Another factor that might influence the visual obstacles is the lack of face to face seating orientation in the parks in addition to the very few number of seating provided, which is valid for both parks.

Regarding the Clarity of Structure, results indicated a major difference between the two parks. Moderately recognizable elements were recorded in Precinct 9 park (m=3.70), and poorly recognizable ones in Precinct 8 park (m=2.73). The results indicated that the Park in Precinct 8 has significantly lower structures and more view obstacles when compared to Precinct 9 Park. These results suggest that the Park in Precinct 9 is more legible than the Park in Precinct 8.

Table 3: Results on the legibility of the parks in Precinct 8 and Precinct 9 (Source: Authors).

Construct	Variables	Items versus precincts	Precinct 8 N=107			Precinct 9 N=232								
			Legibility			Legibility								
Legibility	Clear structure	Activities in the park can be seen from outside	Poorly recognizable	M	Sd	Se	Moderately recognizable	M	Sd	Se				
		The park is a very noticeable area												
		The location of the park is very convenient												
		There are many gathering places												
		There are many landscape elements												
		The walkways are very comfortable to use												
	Visual obstacles	Activities in the park are so close from each other	Poorly recognizable	M	Sd	Se	Moderately recognizable	M	Sd	Se				
		I can see the whole park from a single point												
		The face to face arrangement of the seating allow me to talk with others												
		The park has direct views with good ability to see												
		The design of the seating make it easy for me to interact with others												
		The beauty of the park makes it more enjoyable to experience												
Carefully designed details of the elements are very attractive														
			2.73	.996	.369	3.70	.761	.234	2.47	.873	.302	3.58	.761	.321

(Where: M = mean. Sd = standard deviation. Se = standard error. N = number of respondents).

b) Results from the sketched mapping exercise

Table 4 ranks the five main components of Legibility namely Paths, Edges, Districts, Nodes and Landmarks, based on the mental maps sketched by the respondents. Results indicated that the Park in the Precinct 8 is less legible than the Park in Precinct 9, with the main differences in Edges (P8: f=06; P9: f= 19) and Nodes (P8: f=10; P9: f= 21). Edges in the sketch mapping outputs were identified by the parks' boundaries and the resting places. For the Nodes, the

researcher identified strategic points like junctions between entrances and the park’s path, as points of orientations for users. From the Figure 1 below, it is obvious that Edges and Nodes in the Park in Precinct 8 are poorly recognized as compared to Precinct 9. These outcomes support the results of the questionnaire survey.

Table 4: Legibility results of the two parks from sketch mapping (Source: Authors).

Items versus precincts	Frequency		Legibility
Edges	Precinct 8	06	Poorly Identifiable
	Precinct 9	19	Moderately Identifiable
Nodes	Precinct 8	10	Poorly Identifiable
	Precinct 9	21	Moderately Identifiable
Landmarks	Precinct 8	16	Highly identifiable
	Precinct 9	23	Moderately Identifiable
Paths	Precinct 8	14	Moderately Identifiable
	Precinct 9	22	Moderately Identifiable
Districts	Precinct 8	11	Moderately Identifiable
	Precinct 9	20	Moderately Identifiable

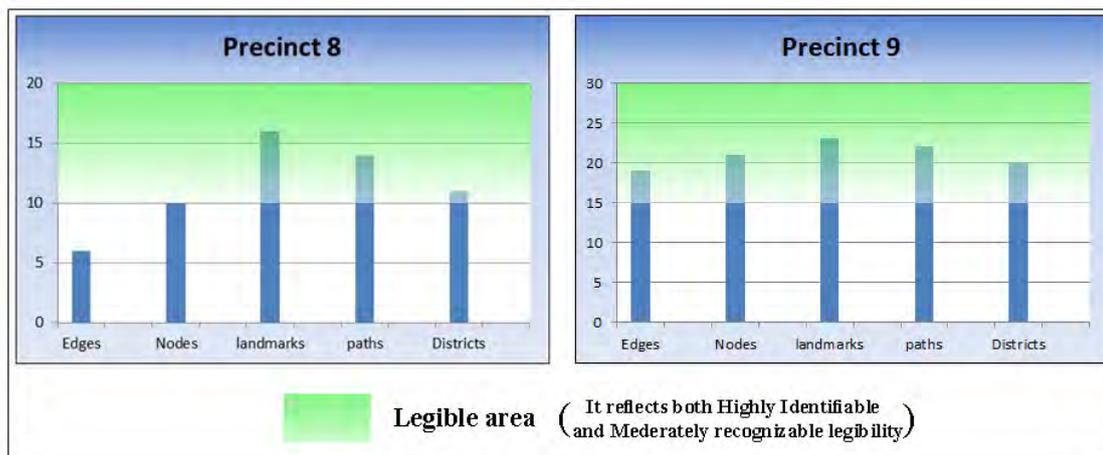


Figure 1. Legibility results of the two parks from sketch mapping (Source: Authors).

Social interactions within the neighborhood parks

Table 5 shows the level of social interaction recorded in Precinct 8 and Precinct 9 parks. The level of social interaction is measured based on the level of engagement and the ability of the parks to encourage contacts. Firstly, the users’ level of engagement was determined by the duration of visit in the parks. Secondly, the study determined whether the parks promote isolation or contact through the length of meeting among the park users. Results indicate that the mean values of social interaction for both parks ranged from 2.89 to 3.76. The intensity of meeting had the highest mean values ($m= 3.76$) that was recorded in Precinct 9. This result reflects a moderate social interaction. At the same time, the Precinct 8 park recorded a weak intensity of meeting ($m=2.89$). These scores are contributed by the level of visual obstacles and the distance between activities within the two parks. The duration of outdoor activities was relatively high for Precinct 9 ($m=3.75$) which reflects a moderate outdoor duration. On the other hand, the Precinct 8 recorded a weak outdoor duration with ($m=2.91$). These outcomes reflect a lower level of social interaction in Precinct 8 compares to the Precinct 9.

Table 5: Level of Social interaction in the Precinct 8 and Precinct 9 neighbourhood parks (Source: Authors).

Construct	Variables	Items versus precincts	Precinct 8 N= 107			Precinct 9 N= 232		
			Level of SI			Level of SI		
Social Interaction	Engagement with park	I participate in many activities within the park	Weak social interaction			Moderate social interaction		
		The park is quiet and reflect a peaceful ambience						
		The park offers good resting opportunities						
		The park allows more conversing opportunities between residents						
		There are variety of recreational interest						
			M	Sd	Se	M	Sd	Se
			2.91	.932	.491	3.75	.862	.373
	Types of contact	Many occasions for greeting	Weak social interaction			Moderate social interaction		
An occasional discussion								
A friendly discussion								
A warm discussion								
		M	Sd	Se	M	Sd	Se	
		2.89	.991	.379	3.76	.732	.553	

(Where: M = mean. Sd = standard deviation. Se = standard error. SI = Social interaction).

Correlations between density and social interaction

A partial correlation test was performed to describe the strength and direction of the linear relationship between the level of density in the two precincts and social interaction within the parks. This statistical procedure allows the researcher to control and remove the influence of other variables on park legibility, measured in this study.

Table 6 indicates that park legibility and density are positively correlated with social interaction. The bi-variate correlation between density and engagement with park $r(339) = .60$, $p < .001$, types of contact $r(339) = .61$, $p < .001$ are statistically significant. A partial correlation was then computed between density and social interaction, holding constant for park legibility variables (Clarity of Structure and Visual obstacle). If park's legibility variables are the principal determinant of social interaction, the partial correlation between density and social interaction should not be significant. The results suggest that there is a substantial, significant positive correlation between density and social interaction, even after controlling park's legibility' variables, namely engagement with park $r(339) = .50$, $p < .001$, and types of contact $r(339) = .51$, $p < .001$.

Table 6 Correlation between social interaction and park legibility and partial correlation for density

	Clarity of Structure	View Obstacles	Density	Partial correlation for Density
1. Engagement with park	.703***	.682***	.599***	.503***
2. Types of contact	-.662***	-.689***	.612***	.509***

* $p < .05$. ** $p < .01$. *** $p < .001$ conventional definition ($> .500$ = strong correlation)

DISCUSSIONS

The objective of this study was to determine elements that support the legibility of neighbourhood parks and its impact on social interaction. It is also to determine whether or not the density of a neighbourhood has a positive impact on the intensity of social interaction. A statistical procedure

was used to examine the correlations between independent and dependent variables. Descriptive statistics was applied to determine the impact of park's legibility on social interaction, and inferential statistics was then used to determine whether or not density has a positive impact on the intensity of social interaction.

This study found that park legibility is influenced by various physical attributes. For instance, the visual obstacle influences park legibility. Results revealed a major difference in the level of visual obstacles between the two parks (see Table 3). This might be due to several reasons. Visual obstacles decreased within integrated activities in the park. The more segregated are the activities; the higher is the visual obstacle. Thus, the distance between activities should not be too far and should be visually linked to involve the parks users in active or passive interactions. Visual obstacles could also occur due to the lack of direct view and visibility from a single point. Figure 2 illustrates the overall shapes of the two parks. The overall shape of the park in Precinct 8 (irregular form) and Precinct 9 (regular form) revealed that regular shapes of parks especially circular, oval, square and rectangle are more suitable for allowing a direct view to park users than complex shapes (the combination of two or more regular forms). It is obvious that in Precinct 8 park, the area next to point B cannot be seen by observers staying in the areas next to the points C and D. While in Precinct 9 anyone at points A, B, C or D, can view nearly the entire park.

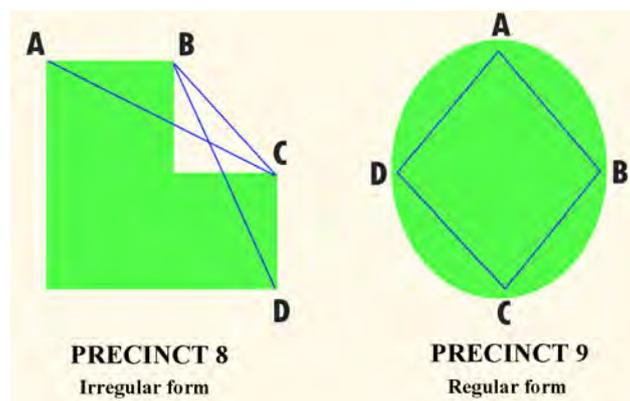


Figure 2: Overall shapes of the parks with possible view obstacles (Source: Authors).

The factors that influence the legibility of the physical elements found in this study were in accordance with Gehl (2010) who stated that a public space should be designed based on the integrated activities rather than segregated activities to avoid the problem of sight obstacles. The mental map results also indicate clearly that the most striking differences between the two parks are the edges (see Figure 1), which might explain the apparent differences in the level of legibility. That is what Gehl (2010) called as the “edge effect”. Carmona et al. (2010) also underlined the city spaces’ edges as an important component of the functional dimension of urban design. In Precinct 8 park, edges are treated as a “line” with “no thickness” while in Precinct 9 park, edges are treated as “place”, a zone with “volume” terms used by Alexander (Alexander et al., 1977). Along these edges, there are many attractive zones for standing, stopping, and creating new experiences. Hence, this study found that smooth edges that are rich in intricate details of landscape elements are important contributors for the parks legibility.

In the context of professionalism, planners usually focus on the location and the form of the boundary of parks, while landscape architects emphasize on the appropriate landscape facilities, creating scenic views, and well-designed elements. However, less attention is given to the design of the edges of the park as an element that defines boundaries and place distinction. This finding

is in accordance with Alexander et al. (1977), where he summarizes the importance of edges in making distinctive places.

The study also demonstrates that the clarity of the park's structure influences its legibility. The findings revealed a considerable difference in the Clarity of Structure between the two parks. Landscape elements were moderately recognizable in Precinct 9 park. However; they are poorly recognizable in Precinct 8. These results suggest that the clarity of the park's structure is highly influenced by the landscape cues (paths, edges, districts, nodes, landmarks) as well as the coherence of its structure. This study reaffirms the important role of the apparent clarity of structure which is the core criteria of legibility as proposed by Lynch (1960).

The study further examined the correlation between legibility, social interaction and density. The findings indicate that a strong correlation was recorded between social interaction and park legibility. This outcome is supported by Gehl (1971) who claimed that legibility of a city is determined by the quality of the built environment, which influences residents' outdoors activities. Karuppanan & Sivam (2012) also stated that legibility is one of the main physical attributes that affects the frequency of park's utilization, and encourage users to interact with each other. On the other hand, a partial correlation between density and social interaction revealed that legibility variables are not the principal determinant of social interaction. Results indicated that there is a significant positive correlation between density and social interaction. This finding is supported by other studies which stated that density of population and perceived density within parks have a high relationship with social interaction level (Argent, 2008; Neutens et al., 2012). This finding is in accordance with the core criteria of the functional dimension of urban design indicating that a sufficient density of activity and people has often been regarded as prerequisite for animation and vitality, and for creating and sustaining viable mixed use (Carmona et al., 2010) and essential for urban life (Jacob, 1961). Argent (2008) further suggested many benefits arising from higher development density. Among them are the social benefits through encouraging diversity and positive interaction.

However, this study has a limitation. Due to the broad concept of physical elements, legibility is also determined by several other physical attributes that affect the utilisation of open space including parks. These include image of places, place attachment, permeability, comfort, maintenance, activities and facilities, safety, etc. (Karuppanan & Sivam., 2012). Thus, it is suggested that a more comprehensive study of the physical environment is needed to support a more sustainable level of social interaction in residential areas.

CONCLUSION

This study highlights the legibility as an important factor in promoting social interactions in public spaces, particularly within residential neighbourhoods. When landscape elements are easily identifiable with a relative order and structure coherence, it allows residents to have a functional sense of place, strengthen their place identity and familiarity with the urban elements.

The findings of the study will contribute to resolving the issue of underutilized neighbourhood parks within a planned residential area. Legible parks in addition to a certain critical level of density may increase the residents' feeling of connectedness within the neighbourhood, strengthen the community cohesion and may help to a certain extent reducing the cultural gap between ethnic groups by providing places to interact. The finding is a step further in the field of urban design, to improve the planning and design of neighbourhood parks towards the development of environmental and social sustainability.

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COPING WITH CROWDING IN HIGH-DENSITY KAMPUNG HOUSING OF JAKARTA

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Abstract

This study aims to draw attention to the architecture of kampung housing, as an attempt to identify those circumstances under which people live in the context of limited space. A kampung housing is a dense non-formally planned cluster of residential dwellings in urban area, which are packed together in a contiguous area created by a large number of migrants. We tried to determine the way in which the spaces are arranged into a place to live, which implies a certain dynamic of survivability among the kampung's inhabitants. The research methodology is conducted with questionnaire surveys, interviews, and detailed observations of daily life cycles, dwelling elements, and the pattern of domestic space arrangements. The study revealed that the characteristics of particular high-density settings have been adapted so that kampung inhabitants devised a particular set of rules and behavioral strategies to cope and support themselves in crowded situations.

Keywords: *Crowding; Dwelling; Space Arrangement; High Density Kampung; Behavioral Strategies*

INTRODUCTION

This article is an outcome of the Research Project Megacity and Global Environment funded by Research Institute for Humanity and Nature (RIHN), Kyoto in collaboration with Universitas Indonesia. It aimed to identify the city of Jakarta as being "a latecomer megacity", i.e. fast growing, but without long-established urban patterns and efficient infrastructure. Jakarta's population reached 9.99 million in 2015 and it is estimated the population will reach around 11.50 million in 2035 (BPS, 2015). The ever-growing mass migration of people descending upon Jakarta has intensified the problem of formal housing provision. The urban lower class inhabitants have to live in the fast-growing, self-emerging, and densely populated settlement called *kampung*s. This hardship of *kampung*'s living has been intensified by crowding; either inside the house itself or the houses is crowded onto almost all available space. How do people cope with crowding and survive living in such densely populated place?

Crowding generally refers to people's psychological response to density; that is, to their feeling of being crowded, having a lack of privacy or an increase in unwanted interactions or psychological distress (Greenfield et al., 1973; Gove et al., 1979; Crothers et al., 1993; Jazwinski, 1998). Research on the consequences of crowding in urban housings has been done on a massive scale by urban sociologists and psychologists. They argue that crowded housings condition leads to poor mental and physical health, poor social relations at home, and have negative effects to child care (Baldassare, 1988; Freedman, 1970; Lawrence, 1974; Rodgers, 1981; Stokols, 1972). Yet, according to Altman (1978), crowding is a psychological state, a subjective experience that refers to a feeling of having very little space. Hall (1966) emphasized the theory that crowding is a subjective experience which appears to significantly vary across different cultures. Yet most of the scientific, cross cultural studies on crowding have been conducted within North America (Evans et al., 2000).

As crowding exists in three different modes of situational, emotional and behavioral perspective, it is a researcher's task to identify the personal, social and physical factors that lead individuals to label and experience crowding (Gifford, 2002). This paper does not intend to focus on the consequences of crowding nor measure prevalence factors associated with crowding. It attempts to reveal what the residents are doing and determine not only at what point they are in a crowded situation but also the ways for relieving crowding. The research question is: How do the *kampung* dwellers develop strategy to cope with crowding? As *kampung* inhabitants have clearly adapted to density, how does crowding affect their method of spatial arrangements to create decent domestic living space?

THE AIMS OF THE STUDY

Many studies have revealed that informal unplanned areas are densely crowded and uncomfortable, yet most studies are not accompanied by detailed study and a complete recording of the houses. Much study is focused on the effect of housing on health (Ambrose et al. 1996b; Baker et al., 2000; Muller et al., 2007; Evans et al., 2003) and the neighborhood (Brown et al, 2009; Curry et al, 2008; Sampson, 2003; Schulz et al, 2000). However, the relationship between crowding and health is extremely complex and is influenced by a number of covalent variables included the condition of housing and socioeconomic factors, such as income, employment status, and education (Fuller, 1993).

In terms of housing, although *kampungs* are not always equated with slums (Mc Carthy, 2003), many researches have concentrated on *kampungs* as being the urban underclass habitation with a poor state of infrastructure and degraded environmental condition (Silas, 2010; Jellinek, 1995; Suparlan, 1984; Nas, 2000; Somantri, 2007; Silver, 2011). Some researchers have focused on *kampungs* within the context of the history of Jakarta (Colombijn, 2010; Abeyasekere, 1987), economic and social life (Tunas, 2011), culture (Funo et al, 2005) and the transformation process of *kampung* (Funo et al, 2002; Funo et al, 2004). There is only one study on *kampungs* and crowding that focused on the issue of cultural differences in perceptions of crowding through identification of a wide range of expression related to crowding (Clauson-Kaas et.al, 1997). This paper addressed the lack of research on *kampungs* that is predominantly concerned with spatial constraint caused by crowding and the motivation to eliminate or reduce their salience. The study also enriches debates on the wide spectrum exploration and investigation on housing issues, especially in South East Asia (Salama, 2015).

As people living in *kampungs* are disregarded as subaltern or as "others", there appears to be little research that focuses on their living environment and everyday life. De Certeau in his famous conceptualization of strategies and tactics enhances the significance and necessity of analyzing "ordinary people's daily lives" (De Certeau, 1984). To do this, he emphasizes on people's practices as the multiple domains that demonstrate societal data. He states that everyday practices are not random actions of people; on the contrary, they have logic to be understood. Through analyses of power mechanism on daily life practice of "the others", he declared that ordinary people, in fact do not surrender to power and its regulations, but form invisible resistance.

As a preliminary attempt to recognize real-life circumstances under which people live in high density living environments, this research tried to determine the way in which overcrowded houses in the *kampung* are used and adapted as places to live. Bourdieu mentioned that most significant micro practices conceive the main element of whole society should be the "house". Dwellings are places that create different forms of discourse, lifestyles and practices by reproductions (Bourdieu, 1996). De Carteau stated that: "[t]his fragment of society and analyses is first of all the dwelling, which is as we know the reference of every metaphor. Through the practices that articulate its interior space, it inverts the strategies of public space and silently organizes the language (a vocabulary, proverbs, etc.)" (Certeau, 1984). Depending upon the

theoretical framework on an individual tactic in daily life, this research tried to bring everyday life and mundane practices to the forefront. The main focus of this study was *kampung* dwellers who were active agents of their own daily life practices. Within this existence, as “different ones”, they can produce new forms of resistance against generally accepted ways of living in formal housing.

METHODOLOGY

This study focused on *Kampung* Cikini at the district level or the Kelurahan Pegangsaan Central Jakarta. The case study is a representative of typical high density informal settlement in Jakarta. According to data from the Kelurahan, in 2014 *Kampung* Cikini covers 1.5 hectares and has a population of 3.784 inhabitants (2,522 person/ha). Data gathering consisted of two phases. The first phase was a questionnaire and survey conducted by the author in collaboration with Life Style Team of Megacity and Global Environment Research Project (Kato, 2012). The team distributed structured and semi-structured questions to 146 respondents in *Kampung* Cikini in September, 2012. All respondents were selected by a principle of volunteer participation. The investigation focused on how inhabitant' lifestyle impacted their behavior through questions on daily activities such as work, leisure, house repair activities, and social cultural activities.

The second phase aimed to find out through case studies how dwellings at *Kampung* Cikini had been arranged to cope with crowding. Interviewers went door-to-door of randomly selected blocks of *kampung* dwellings to observe the physical condition of the houses and seek households who were willing to be selected as survey participants. As Flick (1998) mentioned, in qualitative research, it is the relevance to the research topic rather than the representativeness which determines the way in which respondents/objects are selected. Eventually, only 20 respondents were willing to be selected as subjects for case studies. However, the number was sufficient to provide the relevant information for the research. The selected houses sizes ranged from 6 to 42 m². These houses typically represented the range from the smallest and the biggest houses. Each case categorically represented the house's type based on layout and modification.

To describe the way in which *kampung* dwellers arrange their domestic space, students visited selected houses for semi-structured interviews and detailed mappings of their dwelling situations based on precise measurements, photographs, and video documentation. Groups of 3 (three) students intensively worked on each house. The first student conducted the interview with house owners in their mother tongue; the second made interior sketches; and the third assessed other aspects of the house using photographs and videos. The students drew the use of space as well as the fixed and unfixed furniture used in the house. For each category, the students had to spend time to develop a rapport with the respondents to allow detailed investigation of their private domestic spaces and prevent inaccurate information. To reveal the spatial representation, students encouraged the inhabitants to talk not only on how they utilized the space, but also how they appropriated spaces as their home and what that spaces meant for them.

In doing the analyses, the spatial representation of recorded data was shifted into deeper architectural spatial knowledge within the richness of spatial usage. This knowledge can only come from residents, although they might not be able to articulate space as an everyday knowledge. Interpretations were developed from what the space represented and the sense of what respondents did not say about the space. As Miller (1987) pointed out, the conscious reading of space is often revealed in nonverbal clues. For that reason the residents' own voice and narratives were not always employed as quotations. From twenty cases studies investigated during research, based on categories on how they negotiate with crowding, finally seven cases were selected to be presented in this paper.

HISTORY AND ACTUAL CONDITION OF KAMPUNG CIKINI

Originally meaning “villages”, the irregularly formed *kampungs* had already existed for a long time and constituted one of the typical features of towns and cities in Indonesia (Rutz, 1987). During

the Dutch colonial era, the formal urban development plan bypassed the existing low density *kampungs* to integrate them into urban areas, but without ample provision for urban utilities and facilities. As a result, these settlements tend to be evenly scattered throughout the formally planned built-up areas. The *kampungs* provided dwelling places for the laborers at the wharves, warehouses; industries and public works as well supplied domestic helpers for middle class neighborhoods (Castels, 1967). By the middle of the 20th century, a massive numbers of migrants migrated to cities and found *kampungs* as attractive, easily accessible and cheap locations to live. New ad-hoc buildings soon infiltrated the vacant lands and transformed low density *kampungs* into high density, heterogeneous and sub-standard settlements. In 1969, almost 75% of the total population in Jakarta lived in *kampungs* (Rachman, 1995). They were the urban poor who had to face severe social and economic problems that forced the local government to declare Jakarta as closed to migration in 1970. In 1974, the government enacted *Kampung Improvement Program* (KIP) to improve the existing housing stock and allow for the provision of service. Nowadays, while it is very difficult to obtain the exact size of the population living in the *kampungs* due to the complexity of data, the Urban Poor Consortium (UPC) Jakarta reported that 20-25% of the total population in Jakarta lived in *kampungs* with an additional 4-5% living illegally along riverbanks, an empty lots and in flood plains (Urban Poor Consortium www.upc.org, 2010).

The history of *Kampung Cikini* is traced back in early 20th century, when the Dutch developed the district for the Dutch elite class in Menteng Estate. Native inhabitants lived along the bank of the Ciliwung River soon took the opportunity to provide service for upcoming well-to-do Dutch inhabitants. At the same time, the Dutch also developed the railway infrastructure through *Kampung Cikini*. In the 1960's, when the government closed down railway in the former location of *Kampung Cikini*, the railway track was overlaid with asphalt to transform it into a vehicular access. The railway yards and embankments were left vacant. People took advantage to squat and then built shelters in the empty spaces that they became denser every year.

While those who squatted the ex-railway yard claimed to have permission from National Railway Company (PT Kereta Api Indonesia), other inhabitants have declared semi-legal land ownership rights granted from the colonial authority called *hak girik* (tribal land right). This is a kind of land certification that is acknowledged by government, but it does not entitle them the rightful ownership of property (*hak milik*). Throughout the years, *kampung* householders have acquired a sense of complacency as they have received benefits such as electricity and paying *Pajak Bumi Bangunan* (PBB) or taxes for building and land, thus implying their land use rights. *Kampung Cikini* is located in one of the most expensive and sought after sites in Jakarta with close proximity to Cikini Train Station, the flower market (Pasar Kembang) a six-storey shopping center. The surrounding developments, such as hospital, hotels, offices, restaurant, and so forth offered an economic opportunity for low-income dwellers of *Kampung Cikini*.

Kampung Cikini is designated as an RW (*Rukun Warga* or Community Unit Group) and is divided into 13 RT (*Rukun Tetangga* or Neighborhood Unit Group), of which each RT includes 50-60 households. The demographic profiles of the inhabitants are rather diverse; they are coming from many different ethnic groups from around the Indonesian archipelago. The unclear status of land does not necessarily discourage the practice of an informal land market where many houses in the *kampung* were passed down to different hands across the years. Owing to the great location and accessibility of employment, recently the demographic texture of *Kampung Cikini* tends to be diversified by formal sector workers and educated people. The strategic location of *Kampung Cikini* and the rises in land value attract newly middle income occupants who seeking the immediacy of home in the city center.

As in most *kampungs*, social relations among inhabitants are relatively strong. Most of residents socialize and interact with each other at daily basis. As formal regulations were absent, the numbers of social groups and networks helped to establish order in *kampung*. Furthermore, the mandatory in Islamic social-religious customs, which are embraced by 97% of respondents

controlled the norms of daily life and bounded the community together. There were 5 (five) mosques in *Kampung* Cikini that indicates the significance of religious institutions to community living.



Figure 1. *Kampung* Cikini (Source: Ellisa, 2012)

DWELLING QUALITIES, LIFE STYLE AND NEIGHBORHOOD CHARACTERISTIC

Surveys and questionnaires about houses in *kampung* Cikini revealed that the building construction approach was typical self-help without any particular design method and refreshingly free from spatial constraints. Buildings are incrementally and gradually developed around the original starter unit or the basic shelter. The results were mostly a blend of old and new structures. Some buildings are remnants of older periods, while others have been recently renovated or completely rebuilt. Residents often add building extensions that occur not only because of the direct pressure from family growth, but also when the family acquired some source of additional funding. The building materials and finish quality are comparable to formal low-cost housing: 87.9% of the respondents used a reinforced concrete post and beam skeletal system with red brick infill. The roof is structurally formed of wood beams with fiber cement corrugated roofing. The ceiling height is typically low, and it does not allow for good air circulation. Flooring is largely ceramic tile over concrete floor.



Figure 2. Some Examples of Houses in *Kampung* Cikini (Source: Ellisa, 2012)

The houses have been expanded in such a way that residents found difficulties to make ample windows and openings to ensure cross-ventilation. As it was essential to withstand the hot humid tropical climate of Jakarta, all respondents had at least one electric fan to control the thermal comfort inside their houses. The assumption that low income, high density housing constrains the possession of home electrical equipment is completely misleading. The questionnaire survey revealed that various electrical appliances were fully used for resident's daily-life activities. Mobile telephones were not necessarily seen as a luxury or even as a status symbol, but these devices

provide a sense of withdrawal from the main residential space for people who had no private space of their own. High density living does not constrain those who have hobbies and interests that occupy comparatively large spaces, such as keeping birds and breeding fish.

For the inhabitants, the *kampung* represents more than just a space to live; it offers security and stability. Kent (1990) pointed out that the house cannot be seen in isolation from the settlement, but it must be viewed as part of a total social and spatial system that relates to the way of life of a particular settlement. Unlike vertical urban tenements, the morphological arrangement of the *kampung* offers some advantages. As there are no formal rules and or rigid distinctions between private and non-private space, it is very normal for residents to make use of the space immediately outside their homes to do their laundry, keep belongings, cook, prepare food, and eat meals. Living together as a community the inhabitants secure about leaving their doors and windows open. High visibility inside and out gives neighbors plenty of opportunities to interact and chat. Since everybody knew everyone else's business, there is no need to interfere and the residents could live together in a spirit of mutual reliance.



Figure 3. Outdoor Alleys of Gangs in the *kampung* (Source: Ellisa, 2012)

QUANTIFIABLE MEASURE OF THE HOUSE

Before understanding how residents deal with crowding, we need to measure the quantifiable manner of dwelling units in *kampung* Cikini. A questionnaire survey of 146 respondents revealed that 24.3% of the respondents were living in households with 4 (four) individuals, 23.4% were living with 3 (three) individuals, 16.8% were living with 5 (five) individuals, 12.1% were living with 2 (two) individuals, 8.4% were living with 1 (one) individual, and 7.5% were living with more than 6 (six) individuals. The average number of individuals in the household was 3.93. In comparison with the situation during the urbanization boom in previous years, nowadays those who live in the *kampung* are not predominantly members of an extended family.

Regarding the number of rooms they lived in, it revealed that 39.3% of the respondents lived in a household with 1 (one) room, followed by 32.7% who were living in 2 (two) rooms, 19.6% were living in a household with 3 (three) rooms, 5.6% were living in a household with 4 (four) rooms, and 1.8% living in a household with over 4 (four) rooms. The median of room number of rooms was 1.5rooms/household. When compared with the average number of individuals in the household and median number of rooms, each person in a household had 0.38 rooms/person. This indicated that the dwelling unit at *Kampung* Cikini was far below the range 0.6 rooms/person to 0.8 rooms/person of the European standard (Edwards et.al., 1994).

To understand the size of habitable floor space, we categorized the houses ranging within an interval of 10m². The survey revealed that 22.4% of the houses had room sizes in the range of 11–20 m², 23.4% had room sizes in the range of 21–30m², 7.5% had room sizes in the range of 31–40m², 14.0% had room sizes in the range of 41–50m², and the rest were found to be distributed randomly between 50 and 100m². The median floor area was 23.5m². A comparison between the median of floor area and the average number of individuals, with the average actual room consumption per person showed a value of 5.98m²/person, indicating that *kampung*

dwellers have inadequate living space, when compare to Indonesian National Standard of 9m²/person. It cleared that the quantifiable manner of houses in combination with the qualities of houses in the *kampung* indicated that *kampung* residents not only face the problem of sub-standard quality of housing but also overcrowding.

DWELLING SPACE ARRANGEMENT

As all buildings in the *kampung* were typical self-help and incrementally developed at the various extended time, there were no two houses the same. Yet, from twenty case studies investigated during the research period, they eventually were classified into 7 (seven) different types based on a combination of the sizes, the characteristics and the spatial arrangements. The selected cases consisted of two extended families, four single families, and two doubled households. Five selected houses were two-storey, one house was a three-storey, and one house was a one-storey. Basically, they were arranged to allocate furniture and user's activities which included access and movement inside the house, or what Bollnow identifies as the space of action (Bollnow, 2011). Based on how the inhabitants negotiate with crowding, all cases were clustered into four categories as follows: 1) a basic shelter; 2) a common house; 3) a house as an income generator; and 4) an ideal house.

Basic shelter type

Basic shelter was a very small house that it was almost impossible to include a wet area inside the house. As a consequence of crowding, the wet area in the *kampung* is defined as the space for a kitchen and a bathroom with or without a toilet. Many older houses that were built when the *kampung* was less crowded might have private toilets. However, as the *kampung* grew getting more and more densely packed, it becomes almost impossible to locate septic tanks. There was a rule that the newly build houses strictly not allowed to have an individual indoor toilet. For that reason, residents had to use the public toilet or *Mandi Cuci Kakus* (MCK) for bathing, washing, and toilet. Since they were sufficiently provided nearby, residents did not find it was inconvenient not to have private toilets.

Sundari House

Sundari's house was a one room shelter, 1.8m in width and 3.4m in length (6.12m²). As Sundari lived with her husband and three children, she needed to take the full advantage of the available space. Here was the place for all daily activities, ranging from sleeping, eating, raising children, studying, watching TV, and cooking. There was hardly any furniture inside the house except storage unit stacked next to the wall to keep all family belongings.

This family could not resist the problem of overlapping activities in their daily domestic life. All domestic activities were carried on with minimum equipment in whenever spaces were left free of belongings. Privacy was totally ignored because there was no compartmentalized space inside the house. Sundari said that intimate relations could only be done when all the children fell asleep. Anticipating crowding, her husband and children spent almost all of their daily activities outside, except sleeping at night. This allowed Sundari and her 2-year-old child to enjoy a more spacious feeling while being at home during the day. Our observation of her house revealed that there was no space to avoid feeling "cramped". Yet Sundari felt, as her family gradually grew and adapted to the space they eventually knew very well how to dwell in it. She said that although the house was barely furnished, it was not bare and empty like a prison cell. Excessive smallness did not mean an unsettling situation as each family member was able to stretch out at one's ease. She said that the important task of the house was to provide a refuge from the outside world. For Sundari's family, no matter how small the house, it fulfilled the basic concept that the dwelling space must give an impression of seclusion.

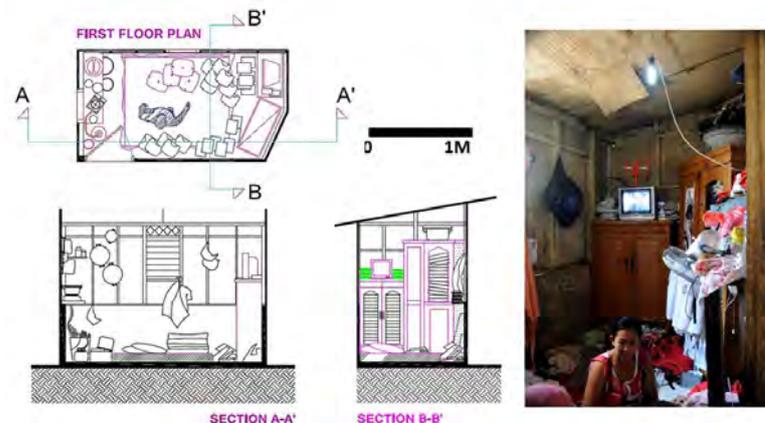


Figure 4. Sundari House (Source: Listiyanti, 2012)

Suheni and Mimin House

The case of non-related, doubled up household was very common in the *kampung*. The second case was this type of house occupied by two extended families that were living under one roof, one on the first floor and the other on the second floor. Both families lived with the elderly. The house was two-storey, each floor size was 2.43m×6.0m (14.58m²). The family living on the first floor was Suheni's family, which consisted of a couple, a paralyzed grandmother, and one child. The second floor was Mimin's family consisted of a couple, grandmother, and two children.

Suheni arranged her living place based on a relative degree of privacy, from back to front. She put the bedroom for herself and her husband in the back of the house, a divided room for her daughter and grandmother in the middle, and a multi-function room at the front. There were stairs in the middle of the room as the only access to Mimin's family to their living place upstairs. Two stoves-tops were located close to the stairs, one owned by Saheni and the other owned by Mimin. However, both housewives rarely cooked and preferred to buy edible food outside. In the multi-functional room, Suheni put all of her family belongings. As there was a large amount of furniture and belongings, the space for movement inside the house was very poor.

Like Sundari, when asking about her feelings in such an overcrowded house, Suheni demonstrated an impression of privacy in her house. Suheni and her family spend most of the time at home whenever possible. Crowding was a factor that depreciated the spatial quality of her home, but it did not appear to be an overriding deterrent to happiness. The smallness of her house did not restrict her family in spending most of their time at home. As Suheni did not enjoy socializing with her neighbors, during leisure time she preferred to watch TV while accompanying her daughter when she was doing her homework. She said disorder and clutter neither have a disquieting effect, nor disturbing her daily activities at home.

The second floor was occupied by Mimin's family. The family comprised a 70-year-old grandmother and a couple with a 7-year-old son and a baby. Here, the conditions were worse. There were two rooms, one was for the grandmother's bedroom and the other was the parent's room with their children.

Except for sleeping, the dwelling space was inadequate to provide sufficient internal space for basic daily living activities. During our several visits, we found that Mimin's family coped with this severe crowding by spending their daily activities outside as much as possible. Crowding forced this family to deal with two constraints. First, their shelter did not have any connection with the earth's surface. To reach their own house on the second floor, this family had to interfere to other family territories at the first floor. Second, there was scarcely any space to escape inside the house, as the whole space was packed with belongings.

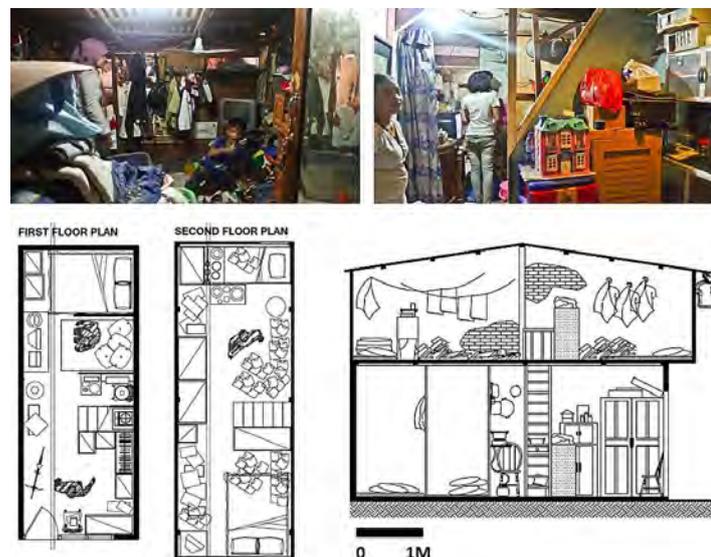


Figure 5. Suheni and Mimin House (Source: Listiyanti, 2012)

It was not surprising that Mimin did not express any feeling of intimacy with her home. She realized that her only choice was to stay outside most of the time. Normally, one might consider a house as the refuge from outside. However, for Mimin' family the house was barely more than a storage space. To escape from overcrowding, the exterior of the houses or "the outside world" was the best place. As the organic pattern of dwellings with *kampung* created no defined boundaries between private and public spaces, Mimin's family extend their territories beyond their actual dwelling and considered the public space simply as part of their own territory.

Common House type

The two houses below were examples of common houses in the *kampung* in terms of the total amount of space, the way in which space had been divided, the availability of space for supporting daily living activities, as well as the availability of a wet area.

Nanan House

The first common house type case was a three-storey house (4.3m×2.75m at the lower levels and 4.3m×3.5m at the upper level), owned by Nanan, who lived with his wife and adult son. As the head of the neighborhood community (*Rukun Tetangga*), Nanan often had visitors and discussed community matters with his neighbors. Therefore, he needed to set up the first floor almost entirely as public space. He located the wet area on the first floor, consisting of a mini-kitchen, washing machine and a bathroom without a toilet. Like most of the other residents, Nanan family would use the communal toilet at the MCK for solid waste, but they preferred to urinate on the cement floor in the bathroom. With no proper plumbing inside the house, the waste water simply flowed down into the gutter outside the house.

On the second floor, Nanan divided the area into two parts, one was a space for watching TV and family gathering, and the other was the space for the "master" bedroom. On the third floor, the space was divided into two parts, one was an area for drying clothes, ironing, and storage, and the other was for his married daughter. Yet the room was often empty, as his daughter eventually preferred to live in another place with her husband.



Figure 6. Nanan House (Source: Listiyanti, 2012)

The Nanan's house provided the basic internal functionality that included space for furniture needed by the residents (including occasional visitors), space to access the furniture, space to move around the house, space to undertake living activities (washing, dressing, cooking, eating), and space for the storage of daily items. The separation between the rooms allowed for the required level of privacy, but the size of the house was too small to provide adequate space to avoid the feeling of being "cramped". Nanan expressed the difficulty in deciding whether to fill up or to utilize the space inside his house. In order to function well, inhabitants needed to lessen the sense of individuality and maintain tolerance each other.

Een House

The second common house type case was a two-storied house with a size of 2.45m×8m (19.4m²) at the lower level and 2.45m×3.8m at upper level (9.31m²). Een shared the house with her married daughter who lived with her husband and twin daughters. The first floor was divided into two parts – one was at the front with a multipurpose room that accommodated several simultaneous activities. During the day it functioned as a common space and in the night it was transformed into a sleeping space for Een and her grandchildren. In the back of the house, the family utilized an extended narrow longitudinal space for a bathroom with a toilet and a kitchen. The second floor had become a multipurpose space, irregularly arranged as the area for watching TV, storage, and drying clothes. Een arranged a bedroom for her married daughter by putting a simple divider for privacy.

The Een's house represented a common house type in the *kampung* as we often noticed similar ones during our field observation. These houses were arranged with no separation between the spaces for storage and living activities. Nevertheless, the house showed a strong flexibility and adaptability for multi-family accommodation. On one hand, there was no effort to arrange the house into a more comfortable place to live, but on the other hand, it implied the effort of multi-family members to adjust their lifestyles to live in crowded conditions under the same roof. For family members, this was not a problem as they were living with family members.

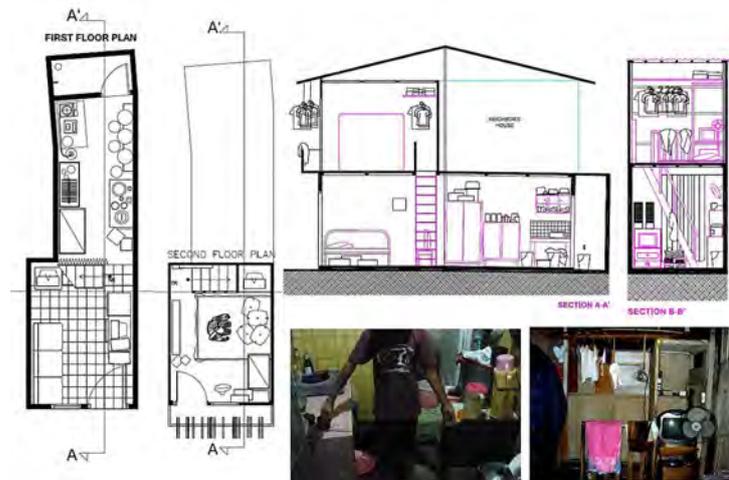


Figure 7. Een House (Source: Listiyanti, 2012)

During the interview, Een family members expressed little interest in improving the use of space. It was not that they were dissatisfied or felt they already had sufficient space, but rather because they were not sufficiently motivated. Ironically, this reluctance to improve the spatial arrangement of the house seemed to be dominantly represented in the character of domestic space in the *kampung* housing. The two generations also exhibited a marked contrast in consumption attitudes that triggered overcrowding, as all belongings of this family were not always essential items. Een's daughter mentioned the generation gap between her mother and herself when she referred to her mother who continued to use of things her daughter considered either old or useless.

The house as an income generator

Lack of access to the formal job market has encouraged the inhabitants to use their crowded domestic space for generating income. Many houses accommodate these activities such as a *warung* or a stall, services, private rented rooms, and small enterprises production. Each had different characteristics with respect to space organization and the nature of work. The double functioning of the dwelling as both home and workplace had transformed the domestic space into an essential shelter for subsistence activities. The alteration of domestic space into a home base for income generation also indicated the security of tenure of living in the *kampung*. As the dwelling space itself faced the problem of congestion in dealing with domestic activities, the inhabitants have to find their own working space within these limitations. There are two case studies for the house as income generation, the Atin house and the Rosadah house.

Atin House

The first case of the house as an income generator was Atin's house. Atin was a single mother living with her adult son and her married daughter with one child. Owing to its strategic location, Atin had fully utilized the house to generate the family's income through culinary production. As cooking activities needed more space, when compared to Jaya's house, Atin's house was bigger (4.2m×4.7m or 19.74m² at the lower level and 4.2m×5.9m or 24.78m² at the upper level).

Atin used the space sparingly between food production and daily living based on time differentiation. During the day, the entire area of the first floor became the kitchen and food stall. She simply aggregated the space required for cooking activities which were butted up against one another without any leftover space. She collected water for cooking from the faucet in the bathroom in the corner of the house. At night, Atin cleared all the cooking appliances, put them

near the wall, and transformed the space into her sleeping area, a place for relaxation, and for enjoying TV. She dedicated almost the whole day for cooking while at night what she needed was merely a place for a little relaxation and sleep.

The second floor was entirely used as the living space for her children, consisting of one bedroom for her son, one bedroom for her daughter's family, and one empty bedroom. There was nothing special about the second floor because it represented a common living space and arrangement in the *kampung*.



Figure 10. Atin House (Source: Listiyanti, 2012)

Rosadah House

The second case was Rosadah's house. It was an irregular shape (7.3m×2.3m or 16.79m² at the lower level and 8.1m×3.1m or 25.11m² at the upper level). Rosadah was 70 years old and lived alone. She occupied the first floor and arranged it in the same way as typical houses in the *kampung*. The house spoke of crowding that was not imposed by the spatial limitations, but produced by owner's own desire. Furniture took up a large amount of space and left almost no space for moving around. There was a small kitchen, but she almost never used it. Rosadah was fully aware, as she was living alone, she would have more space if she cleared out unused stuffs. Yet, she needed to keep so many things related to her past experience or when things were not easy to get.

Three rooms on the second floor used to be occupied by her children. She left one room for her grandchild who often visited her and rented the other two rooms for families. One was a couple without a child and the other was a family with two children. The renters accessed their rooms from the stairs outside and shared the toilet with the homeowner on the first floor.

Rosadah resorted to renting out the empty rooms to tenants for income. Without any spatial adjustment and rearrangement, her house was easily adapted to accommodate the change of family composition. She transformed the house from a single family into a multi-family dwelling. The presence of tenants on the second floor only required minimal interface, although they have to share a toilet. Neither the owner nor the renter considered this situation as a constraint.

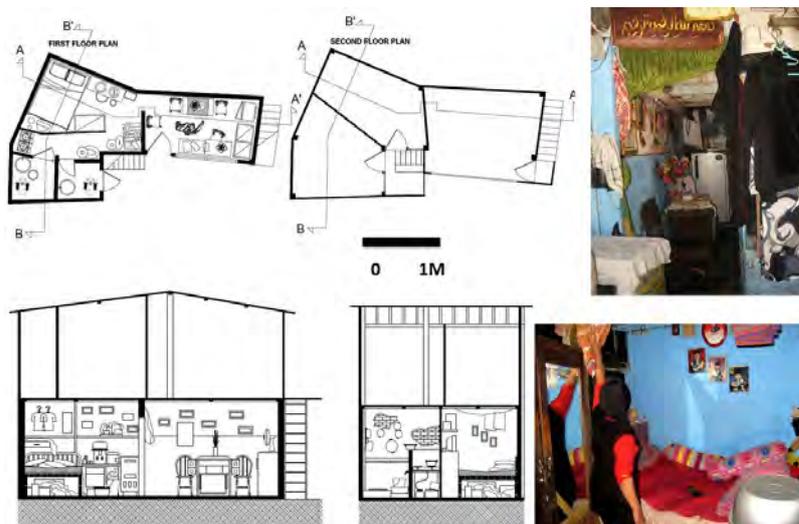


Figure 11. Rosadah House (Source: Listiyanti, 2012)

Ideal House – Siti House

We choose a small house (1.75m×4.38m or 7.66m² at the lower level and 1.75m×5.18 m or 9.06m² at the upper level) owned by Siti as the Ideal House. Here the owner skillfully arranged the small shelter into a neatly compact, multi-functional living space. Siti lived with her husband and two children. Taking full advantage of the available space on the first floor, she planned the circulation inside the house in accordance with the door placement. As a result, the room was not cut in two by the traffic flow as in other typical houses.

She clustered items into separated units to eliminate clutter and increased the floor space for circulation. She located a private bath, toilet, and washing area under the stairs, with the stove in the corner. In the kitchen, she utilized the space in-between the table and the ceiling height to store cooking utensils. She carefully arranged all furniture parallel to the walls and categorized them based on the character and closeness of activities. She arranged the space at the corner for watching TV. When the door was closed, the space in front part was transformed into a more spacious place. Siti decided not to hoard things and made a special effort to keep their possessions in minimum.



Figure 12. Ideal House (Source: Listiyanti, 2012)

As in other cases, she also utilized the second floor for sleeping and storage. She put a double bed at one side of the wall and spread a curtain to divide the bed from the storage area. She eliminated less essential furniture to provide more usable space. There were no laundry clutters because she hung the clothes on the balcony. Finally, she kept less-used belongings in the attic. Siti was a rare example of *kampung* residents. She consciously decided not to accumulate things and made a special effort to minimize possessions. With careful decisions to select specific belongings she developed a sense of spatial logic by making the best use of the space available in her house.

DISCUSSION

All cases discussed in this paper show that although individual differences aroused different ways of compromising lifestyle choices within a high-density situation, the characteristic of particular high-density settings motivated the inhabitants to develop a specific set of rules and strategies to help them cope with crowding. (See Table 1).

The lessons learned from these four categories are as follows:

- a) There was no minimum size requirement in the basic habitable parts of dwelling in the *kampung*, because inhabitants always found ways to use and negotiate with the existing living space, notwithstanding the number of persons who live within homes and how they relate to each other. The smallest dwelling basically was arranged into a space for sleeping at night and the storage of “dry” belongings. As inhabitants showed mixed responses, either highly tolerant or by withdrawal to minimize the inconvenience of living in such crowding, further insight is needed to answer how this marginal shelter meets the fundamental standard of health, privacy, safety and morality.
- b) In all cases, the addition of the wet area (toilet, kitchen, washing) into the dwelling area increased crowding and poor hygienic practices. It caused space reduction, either in the habitable rooms or for the storage space. In terms of cooking activity, there was continuing uncertainty on whether the kitchen space inside the house had to be maintained or at least reduced, because in many cases, the inhabitants preferred to buy edible food outside. A further insight needs to be considered whether an indoor kitchen manifests a practical function or is simply symbolic attribute within the housewife’s realm in the *kampung*.
- c) The majority of common houses in the *kampung* sufficiently provided the basic internal functionality of the house with a number of mechanisms to cope with crowding. Better than a basic house, these common houses provide at least a minimum degree of privacy through the separation of rooms. However, the size of the house was too small to provide adequate space to avoid a feeling of being “cramped”.
- d) The effort of the inhabitants in all cases to compartmentalize the space for sleeping, whenever possible indicated that the lack of privacy from an open-plan arrangement was a major issue. The main concern was about sleeping space for adolescent and adult members of the opposite sex, except the husband and wife.
- e) The attitude of the residents to keep things does not appear to be restricted by density. In the absence of spacious rooms for storage, there was no way that the items which the family might wish to be put away could be hidden due to a lack of storage units. The spatial appropriation for the placement of belongings was not always a conscious action, but was often based on what was convenient and close at hand.
- f) Crowding is very much associated with household size and composition, which reflects not only the affordability issue but also cultural norms. Yet, crowding lessened as children grow up and leave home. Therefore, crowding was temporary, dynamic and will change over time as the age and composition of households change.

- g) The primary motivation of the spatial arrangements for most of the residents who live at houses hosting economic activities focused on the need to accommodate the space for the “business,” rather than the need to create a comfortable living space.
- h) The case of the Ideal House revealed that, notwithstanding the size, the inhabitant’s ability to arrange a small space through zoning daily activities, clustering items, and eliminating less essential furniture was the key in finding the best way to cope with “crowding”.

Table 1. Characteristics of Houses of Seven Case Studies (Ellisa, 2012)

	BASIC SHELTER		COMMON HOUSE		INCOME GENERATOR		IDEAL
OWNER	Sundari	Suheni & Mimin	Nanan	Een	Rosadah	Atin	Siti
SIZE (SQUARE METERS)	6.1	20.1	42	28.9	27.2	41.9	16.7
FLOOR NUMBER	1	2	3	2	2	2	2
NUMBER OF THE ROOM	1	5	6	4	4	9	7
NUMBER OF PERSON	7	9	3	5	8	4	5
FAMILY TYPE	Nuclear Family	Doubled up household	Nuclear Family	Extended Family	Owner and Renters	Extended Family	Nuclear Family
WET AREA							
Washing Tap	No	No	Yes	Yes	No	Yes	Yes
Toilet	No	No	No	No	No	Yes	Yes
Bath	No	No	Yes	Yes	Yes	Yes	Yes
SEPARATE SLEEPING SPACE	No	No	Yes	Yes	Yes	Yes	Yes
COOKING SPACE	Not available	Available but rarely used	Available but rarely used	Available	Available but rarely used	Available	Available
STORAGE	Mix & untidy	Mix & untidy	Separated & upkeep	Separated & upkeep	Mix & untidy	Mix & untidy	Separated & upkeep
FURNITURE	Basic	Excessive	Adequate	Excessive	Excessive	Adequate	Adequate
CIRCULATION/ MOVEMENT	Very congested	Very congested	Congested	Congested	Congested	Sufficient	Sufficient
DAILY ACTIVITIES	Overlapping	Overlapping	Overlapping	Separating	Overlapping	Partially Overlapping	Separating
DEGREE OF PRIVACY	No privacy at all	No privacy at all	Minimum	Minimum	Minimum	Adequate	Adequate
STRATEGY TO COPE WITH CROWDING	Spend almost all the daily activities outside, except sleeping at night	Suheni: Arrange a relative degree of privacy. Mimin: Extend dwelling territory outside the house.	Arrange the space to provide basic space for furniture, access and daily activities	Arrange the space adaptable to accommodate activities for all members of multi-family	For economic purpose ignore the opportunity to free from crowding	Use the space sparingly for economic purpose and daily living	Finding the best way to avoid crowding by making the best use of the available dwelling space

CONCLUSION

The idea that crowding has serious consequences for the man appears to have fairly wide acceptance (Altman, 1975; Altman, 1978; Gifford, 2011; Wells, et al, 2007). However, in the case of crowding in the *kampung*, this research suggested that to resist the effect of crowding, *kampung* residents retained immeasurable, intangible variables that should be taken into account. Although crowding involved potential inconveniences, it was not necessarily salient to the perceptions of *kampung* inhabitants. The size of the dwelling space was inevitably inadequate for *kampung* occupants, yet as they had experience living under conditions with limited space, they modified their spatial standards to alleviate the sensation of crowding. Rather than considering crowding as a problem, *kampung* dwellers expressed the benefit of living in dense setting, as it offers each other social support and economic opportunity. This research confirmed Stokols' theory on crowding, that the particular form of one's response to crowding will be a function of the relative intensity of social and personal factors, and the degree to which they can be modified (Stokols, 1972). The findings confirmed that *kampung* inhabitants were comparable with the Chinese and Hispanics who have a greater level of tolerance for overcrowding than Anglo-Americans as a generalization. Many scholars believe that for "close contact" Asian societies, living in confined quarters were judged as being voluntary or at least tolerable (Gove and Hughes, 1983; Hall, 1966; Stokols, 1972).

Crowding in the *kampung* was not merely caused by the scarcity of space, but also inter-generational co-residence under the same roof. To adjust to the limited economic ability of families to set up new households, crowding is synonymous with multi-generational living in the *kampung*. Affordability issues were not the only reason for tolerance levels related to crowding. For the elderly and for those who needs assistance and a quick response from family members (such as in the case of injuries and other accidents), smaller spaces mean more eyes and ears are available. An obligation towards family members, personal preferences, the need for mutual support, or a combination of these factors appeared to be a strong factor in why crowding does not always negatively impact the well being of *kampung* dwellers.

The finding strengthens the need of innovative and alternative method to avoid isolation, simplification and superficial approach in developing the knowledge on housing affordability (Salama, 2007). While in fact the activity of designing contemporary domestic space mostly relies on western spatial assumptions, residents' method of appropriating and thinking about space could not be overlooked. Additionally, the affirmative reaction to the high density of an inhabitant's adaptation level raised the need for further research on residents' preferences in relation to *interiority*. Another path of inquiry is on the wealth of ideas beyond crowding, which here not yet been explored in this research. It is also important to link the findings to other variables of the outdoor space and spatial arrangement of the whole *kampung*, such as the close-knit social network in the *kampung* community and the physical layout that enhancing social cohesion among residents.

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MEANING OF PUBLIC SPACE AND SENSE OF COMMUNITY: The Case of New Neighbourhoods in the Kathmandu Valley

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Abstract

This paper examines the meaning of public space and sense of community among neighbourhood residents in the changing urban context of the Kathmandu Valley in Nepal. Two new neighbourhoods were selected for the purpose of this study with data collected from interviews with the residents. The study has found that most residents of the new neighbourhoods have an understanding of the significance of public space in community life. However, such understandings are based less on the actual use of public space. The existing public spaces in these neighbourhoods are less successful in offering a meaning to the residents, due to their poor development and the lack of active use. Despite these changes, some residents believe they have developed a sense of community, which is an outcome of other individual factors than the use of public space. It is argued that the role of contemporary neighbourhood public space in fostering a sense of community appears to be less significant in the valley's present context.

Keywords: *Urban Change; New Neighbourhoods; Meaning of Public Space; Sense of Community; Kathmandu Valley*

INTRODUCTION

Cities have been in a continual state of transition since their evolution. Over the past century, urban environments around the globe have witnessed a significant level of transformation. Kathmandu Valley, the cultural, economic and political centre of Nepal, has not been immune to the global forces of urban change. Following the political change of 1951, the valley was opened to migration from other parts of the country and exposure to globalisation (Basyal & Khanal, 2001; Shah & Pant, 2005). This created an opportunity for rapid urban growth and subsequent transformation of urban landscape (ICIMOD, UNEP, & Government of Nepal, 2007; Thapa, Murayama, & Ale, 2008). Within a short span of time, the valley has now developed into the largest metropolitan region in the country with a population of over three million people (KMC/World Bank, 2001; Muzzini & Aparicio, 2013).

The contemporary urban growth has had a considerable impact on residential environments of new neighbourhoods in the Kathmandu Valley. The new neighbourhoods exhibit a low density urban sprawl in their physical form, which is in a sharp contrast with the compact and dense settlements of the traditional towns. In addition to the morphological changes, a host of socio - demographic changes can also be observed in the valley's new neighbourhoods. These neighbourhoods are comprised of migrating populations who have moved in from within and outside the valley. The residents are thus newcomers, and the community is essentially multiethnic (Ninglekhu & Rankin, 2009; Subedi, 2010), with an entirely different social milieu as compared to the traditional neighbourhoods (Poudel, 2012).

Another important feature of the current transformation of urban environment in the Kathmandu Valley is the changing provision and use of neighbourhood public space, which has its root in the morphological and social changes of the new neighbourhoods. Scholars argue that

the rapid and uncontrolled urban growth over the past decades has led to the loss of neighbourhood public space, resulting in a low provision of communal meeting areas (see Adhikari, 1998; Chitrakar, Baker, & Guaralda, 2014; KMC/World Bank, 2001; Pradhan, 2003; Shah & Pant, 2005; Shrestha, 2013; Shrestha, 2001). Recent studies confirm such a loss of public space, particularly in the unplanned new neighbourhoods that form a large portion of the valley's current urban growth (Chitrakar, Baker, & Guaralda, 2016). Observations indicate that the residents of most new neighbourhoods find it difficult to find places where they can meet and interact with neighbours; children do not find places to play. The loss of public space thus has had significant consequences on life and activity within urban neighbourhoods (Chitrakar et al., 2014). Some studies also point out at the lost sense of community due to the loss of neighbourhood social life (Shrestha, 2013; Shrestha, 2001).

The meaning of public space is rooted in its provision and use. Abu – Ghazze (1996) explains that public space in urban neighbourhoods have meaning for people as it invites them for use and participation through creating a common platform in its provision. According to Cattell *et al.* (2008), public space is not just a physical setting but it also has a host of subjective meanings for its users that accumulate over time. While the provision and use of public space is changing in new neighbourhoods of the Kathmandu Valley, it remains unclear how such changes have affected residents' perception of contemporary public space and sense of community. This paper attempts to fill this gap in knowledge and examines the meaning of public space and sense of community in the valley's new neighbourhoods in the present changing context. Public space is a broader term that includes a range of venues for social interaction such as open spaces, streets and buildings. However, the focus of this study does not cover streets and other similar venues within urban neighbourhoods.

Current provision and use of public space in new neighbourhoods of the Kathmandu Valley

Overall, there is a severe shortage of public facilities, including open spaces and green areas in new neighbourhoods of the Kathmandu Valley (Adhikari, 1998). According to Pradhan (2003), Kathmandu Metropolitan City (KMC), the largest metropolitan area of the Kathmandu Valley, comprises only 6% of open space (compared to 10 to 20% in other metropolitan regions of the world) with per capita organised open space of 0.97 m². Shrestha (2001, pp. 17-18) observes “a total lack of shared open spaces for social interaction or playground for children”, and finds that the trend of unplanned development of most urban neighbourhoods without open spaces and shared amenities has not only negatively affected the quality of life but also the cultural values of the society. Tiwari (n.d., p. 2) argues that the new neighbourhoods “aggrandises the private spaces and demeans the public ones, and shuns community living”.

While the unplanned new neighbourhoods of the Kathmandu Valley have practically no open spaces (Adhikari, 1998), there are noticeable problems with public spaces in the planned new neighbourhoods, including the gated communities. Shrestha (2005) observes that the planning and design of open spaces in these neighbourhoods are not satisfactory, as their shape and location are inappropriate, and there is an absence of basic amenities to render them user unfriendly. He argues that the amount of open spaces that ranges from 2.5 to 5% of the total developed land area is far less than what is needed to fulfil the needs of the residents, including different age groups. In contrast, the community spaces average about 12% of the built-up area in the traditional urban neighbourhoods (Adhikari, 1998). This indicates that the development of public space has remained poor in both the planned and unplanned new neighbourhoods in terms of the quality and quantity (Chitrakar et al., 2014), with a direct consequence on its use and social life. If public spaces are designed and developed well, so that the physical setting is conducive to life and activity, it can dramatically increase the level of socialisation by combining

necessary, optional and social activities in a common platform (Gehl, 1987). However, this platform is missing in new neighbourhoods of the valley in the present context.

LITERATURE REVIEW

Public space and its meaning in urban neighbourhoods

Public space is “the stage upon which the drama of communal life unfolds” (Carr, Francis, Rivlin, & Stone, 1992, p. 3). Scholars argue that public space at neighbourhood level plays a significant role in people’s everyday life; it is an everyday space of community (Gallacher, 2005). According to Madanipour (2010, p. 107), “public space is intertwined with everyday life in neighbourhoods” in such a way that it is directly related to the quality of day-to-day social life.

Public space concerns not only the physical but also the social and psychological dimensions with a significant overlap among them. The physical dimension refers to the physical environment or “provision” of public space which provides a setting for social interaction, whereas the social dimension refers to the “use” or activities occurring in the space (Carmona, Tiesdell, Heath, & Oc, 2010). The psychological dimension relates to the perception of public space, which may be expressed in terms of how people interpret the space and give “meaning” to it, and how such meaning helps develop a sense of community. The meaning of public space thus has a strong relationship with its physical and social dimensions. Studies have shown that the physical setting of public space can influence its meaning for social interaction and fosters a sense of community (see David, Enric, & David, 2002; Dempsey, 2009; Garcia-Ramon, Ortiz, & Prats, 2004; Peters, 2011).

Sense of community in urban neighbourhoods

According to Schwirian (1983, p. 84), urban neighbourhoods are “distinguished from a residential area by the degree of social organisation among the residents”. The neighbourhoods have been developed as a means of creating areas of greater social interaction and enhancing neighbourliness and thus, are linked with the notion of community (Gregory, Johnston, Pratt, Watts, & Whatmore, 2011). Rogers *et al.* (2009, p. 326) define sense of community as “the extent to which any member [of a neighbourhood] feels connected to and committed to others in the community, which bears on a sense of security and belonging”. McMillan & Chavis (1986, p. 9) propose four key elements of sense of community: a) membership - a feeling of sense of belonging and emotional safety; b) influence - reflecting ability to change each other in community; c) reinforcement and need fulfilment - suggesting that needs are met through mutual cooperation; and d) shared emotional connection - the sharing of belief and commitments by individuals.

Sense of community is a key psychological construct that the residents of urban neighbourhoods build over a period of time (Nasar & Julian, 1995). It is about a feeling of belonging to the neighbourhood that an individual develops during the period of residence. The length of residence thus becomes important in fostering a sense of community, in addition to neighbourhood association and mutual cooperation. Sense of community is thus also an individual factor (Francis, Giles-Corti, Wood, & Knuiaman, 2012), and the physical design of neighbourhood alone cannot necessarily foster it (Garde, 2011).

Relationship between meaning of public space and sense of community

Carmona *et al.* (2010) argue that neighbourhood’s socio-cultural character is enhanced in a due course of time through a time-thickened experience, in which there is an important role of social process that includes social interaction and cultural assimilation (Rogers & Sukolratnametee, 2009). Public space facilitates this process in providing an appropriate physical setting. According to Rappoport (2002), neighbourhood does not necessarily involve neighbouring, suggesting that social contact and interaction do not happen in the absence of a common ground. Public space

offers this common ground and facilitates the processes of social exchange and interaction among neighbours.

Public space is thus a meaningful social territory (Abu-Ghazze, 1996), and people give meaning to it for its role in social integration (Peters, 2011). It remains a key design feature of an urban neighbourhood with a potential to offer place attachment. This suggests that the design of physical environment should consider a better provision of public space to encourage social interaction through its use and thus, to build a meaning of place (Abu-Ghazze, 1996, 1999).

The design of the built environment has a direct impact on the development of social relationships. In the context of urban neighbourhoods, studies reveal a strong association between the quality of public space and sense of community (Francis et al., 2012; Kashef, 2009; Lund, 2002; Rogers & Sukolratanametee, 2009; Talen, 2000). This paper maintains that social interaction in public space is one of the significant environmental factors associated with the creation of the sense of community. Such a social process helps neighbourhood residents in acquiring a meaning of public space, which is an outcome of participation and interaction in the physical space over a period of time.

METHODOLOGY

Selection of the study areas

The Kathmandu Valley is currently comprised of a diverse urban form. At present, three types of new neighbourhoods can be identified. First, the lack of urban development control has resulted in the spontaneous growth of most urban neighbourhoods, which are largely prevalent throughout the valley. Second, a small number of planned urban neighbourhoods have emerged over the past decades through the efforts of government agencies, utilising Site and Services and Land Pooling or Readjustment schemes. Recently, as an alternative to the unplanned development of new neighbourhoods, private housing companies have developed a number of gated communities in different parts of the valley. The selection of the study areas, therefore, has considered the emerging urban typology, including both planned and unplanned new neighbourhoods, and their contextual features.

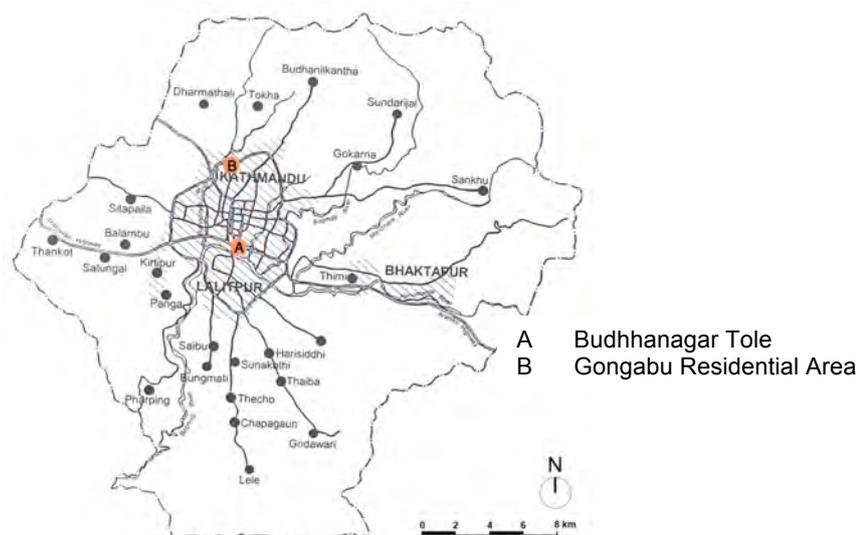


Figure 1. Map of the Kathmandu Valley showing the location of neighbourhoods selected for the study (Source: Modified from KMC/World Bank, 2001)

Two study areas were selected in this study to represent the development of new neighbourhoods that include Budhhanagar Tole¹ (BT) and Gongabu Residential Area (GRA). Figure 1 provides the location of each study area in the Kathmandu Valley. The BT represents an unplanned urban neighbourhood of the valley, whereas the GRA is a planned residential neighbourhood developed by the government using the Land Pooling scheme, with the objective of controlling haphazard urban growth.

Interviews

Data in this research were collected from face-to-face and in-depth interviews with 23 neighbourhood residents, including key informants, across the two study areas. The key informants were those residents who have been assuming or have assumed an active role in the local community-based organisations. Some of the key informants were the ones who posed in-depth information on the development history of a neighbourhood. These informants were personally approached and asked for the interviews. Snowball sampling was employed to identify other participants. The selection of the interview participants was made to represent different gender, age groups, ethnic backgrounds, occupations and the length of residence so that the sample represents a larger section of the residents. Most interviews were conducted at participants' residences. The interviews remained open-ended and the questions were structured around: a) residents' opinion on the development of public space; b) their understanding of public space and its significance; c) social interaction in public space; and d) the role of public space in developing a sense of community. Interviews were conducted in Nepalese, which were later translated and transcribed into English.

RESEARCH RESULTS

Budhhanagar Tole

Located in Ward No.10 of Kathmandu Metropolitan City (KMC), the BT is one of the earliest contemporary urban neighbourhoods in the Kathmandu Valley. The residential development in the BT was initiated in the late 1970s. However, following the pressure of migration to the valley, the past two decades have seen a considerable increase in the pace of neighbourhood growth. At present, the BT has developed into a larger neighbourhood, consisting of approximately 1200 households (see Figure 2).

The BT is comprised of a migrant population with the residents moving in from both within the Kathmandu Valley and other parts of the country. The residents belong to different caste – based ethnic groups, which mainly include *Brahmin*, *Newar* and *Chhetri*. Despite the existing ethnic diversity, the residents have been trying to “organise” themselves within a community. This is evident from the formation of a number of local community-based organisations within the neighbourhood with an aim of managing or improving the residential community. The local residents reveal that the local organisations have taken major initiatives in the development of neighbourhood's physical infrastructure such as roads, water supply and sewerage and street lighting. However, most of these organisations have been inactive for the past few years. As one of the residents explained, this is mainly so because the basic physical development needs of the community have currently been fulfilled, and there is no urgent need to “collaborate” at the moment.

¹ Tole is a local terminology used to refer to an urban neighbourhood.



Figure 2. Map of the Budhanagr Tole
 (Source: Modified from the Kathmandu Valley Town Development Committee)

Opinion on the development of public space

The growth of the BT has been spontaneous due to the lack of planned intervention by government agencies. In such a context, the private land brokers have had a major role in the physical development of the neighbourhood that has led to the poor quality development of public space. Virtually, no public space exists in the BT, except for the streets. A small number of existing public spaces include a few smaller open space pockets located in different parts of the neighbourhood. Some such spaces adjacent to the streets locate smaller temples, whereas others have been left unattended (see Figure 3). The provision of public space is thus unsatisfactory for most residents as evident in the interviews. Most residents expressed their concern over the lack of public space and pointed at a need to have more open space in a close proximity. The residents explained that they find no space for social events or for the children to play. A 57-year-old male resident said:

We don't have [public] space. For morning walk we use the [nearby located] UN Park. There is no other place. We might meet in tea shops with a couple of friends. There is no other way.

The residents of the BT believe that, due to the loss of public space, there is a lack of social contact and “unity” or social harmony among the neighbours, and blame the government for this. The interviews also revealed that while most residents are trying to adjust with the current situation of the loss of public space, a couple of families are trying to move out of the neighbourhood. A 34-year-old male resident explained:

I am moving out [of the BT] as I feel that this area is becoming more congested [with the growing population] as compared to the past. There is no place to meet and chat with people in this area except for some local tea shops and the temples and the UN Park ... There is nothing done by the government regarding [the provision of] public space ... This is so because the BT has been developed in an unplanned manner.



Figure 3. Views of the Budhhanagar Tole (Source: Author, 2014)

Perceptions of public space

The residents value public space although there is a loss of such space in the BT, with a direct impact on neighbourhood social life. Findings from the interviews suggest that the local people usually have an understanding of the significance of public space in community life. A 60-year-old male resident, who has lived in the BT for the last 16 years explained:

Since ancient times, public spaces have been in use for the betterment of all. This shows the importance of public space in the past and throughout many generations. The need for having public space might have been lost in the recent past when I first came to the Kathmandu Valley some 40 years ago. However, over the last two decades, its importance has grown. The value of public space is increasing day by day.

Another interviewee, a 25-year-old female resident stated:

Public space does relate to my life. Because it is the space common to all, I consider it accordingly. I feel public space as my own as I can use it as other people do. I am aware of the benefits of using public space.

The residents of the BT are thus aware of the benefits of using public space and consider it as an important part of their social life. The same resident explained:

I think the use of public space definitely benefits us. I enjoy visiting the parks. I get to worship at the temples. Public space is common to all and we can say that it is ours.

Social interaction in public space and sense of community

Most residents of the BT consider that the use of public space helps in developing social interaction among neighbours despite the fact that they currently have very less opportunity for this. They are also aware that it is important to have public space in the neighbourhood to foster a sense of community. They believe that public space has a potential to be a point of contact among the neighbours, with the benefit of creating a platform for social exchange. A teenager recalled in the interview how his friendship with other local children initiated from playing together

in an open space. Likewise, a 60-year-old male resident explained the social benefits of public space:

The more people come in contact with others, the more they have an opportunity to widen their thoughts with a possibility of a greater social exchange [and interaction]. They would have the chance to share their views with neighbours.

However, the existing situation of public space in the BT does not seem to have a constructive role in the process of socialisation among the neighbours. Most residents indicated that the current level of social interaction is not satisfactory due to the loss of public space and they feel deprived of its potential benefits. A 57-year-old male resident explained:

It would have been much better if we had some public space. The lack of public space has reduced the possibility of meeting among neighbours. People would have spent their leisure time if there was public space. It would have provided a platform for informal chats and discussions, and people could be more interactive with each others.

Another interviewee, a 60-year-old male resident, said:

People do not tend to be social in the absence of public space and their activities are limited to the internal spaces ... They tend to be individualistic in nature.

Some residents revealed the case of a feeling of isolation among the children due to the lack of physical space for socialisation. An interviewee, a 45-year-old male resident, reported that his son, who is a teenager, has no friends. He further explained:

I wish there was a better provision of public space. Our child is [feeling] isolated due to the lack of public space. He misses going out [of home].

This situation exemplifies a serious psychological consequence of the loss of public space in the BT. Arguably, it is not only the children but most adults may also tend to be introverted in such a situation with an adverse impact on the sense of community. This is more evident in the observation made by the same resident:

Public space is an essential part of life. The lack of this lessens the feeling of attachment to the neighbourhood. The tole is like a family. But it is not so here, due to the lack of common grounds.

Gongabu Residential Area

Spread over an area of 14.2 ha, the GRA is the first planned contemporary urban neighbourhood in the Kathmandu Valley. It is located in the northern peripheral area of the KMC in Ward No. 29 and consists of a total of 406 residential plots. The Land Pooling project for the development of the residential area was introduced by the Kathmandu Valley Town Development Committee (KVTDC) (now, Kathmandu Valley Development Authority) in 1988 and completed in 1996.



Figure 4. Site plan of the Gongabu Residential Area (Source: Modified from KVTDC)

The GRA is a new residential community where the local people have migrated from both within and outside the Kathmandu Valley. The different caste-based ethnic groups in the GRA mainly include *Newar*, *Brahmin*, *Chhetri*, *Gurung*, *Thakali* and *Magar*. Similar to the BT, a number of local community-based organisations are also active within the GRA, with a direct role in the management of the neighbourhood. The local organisations are involved in a range of socio-cultural activities taking place within the community, and thus contribute towards developing social interactions and maintaining social cohesion.

Opinion on the development of public space

Since the GRA is the planned new neighbourhood, a number of plots of varying sizes have been developed as public open spaces (see plots for non-residential purpose in Figure 4). This turns

out to be 4.9% of the total developed area, which is almost twice the actual requirement². Also, there are two community buildings within the neighbourhood with a total floor space of approximately 375 m². The residents have mixed opinions on the development of public space. The development is satisfactory for a few residents as they have found the provision better, when compared to other unplanned new neighbourhoods with no public space. These residents consider that the public spaces are adequate for organising neighbourhood social events. A 46-year-old male resident explained:

Personally, I feel public spaces in the GRA are good and this is why I have chosen this place to live. I think this place is becoming better compared to the time when I first arrived here.

Another resident, a 48-year-old male said:

Some public spaces in the GRA have been leased out to the nursery and a swimming pool. Some are under review in the court [due to encroachment]. However, the provision is better compared to the other places although it is not as good as those found in the planned residential areas of developed countries.

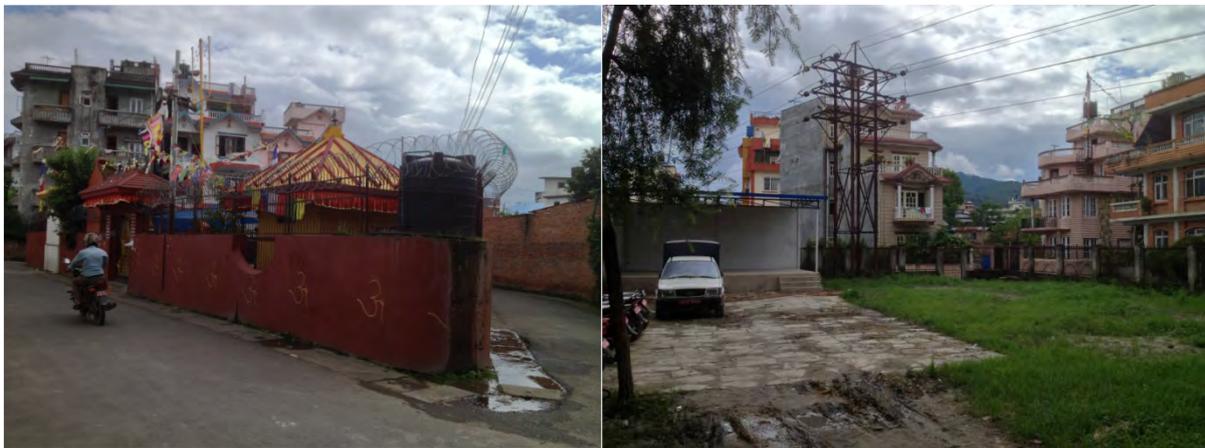


Figure 5. Views of some public spaces in the Gongabu Residential Area (Source: Author, 2014)

Other interviewees, however, expressed their dissatisfaction over the current provision of public space. They feel that most open spaces and the community buildings have been inconveniently located within the neighbourhood and exist in a fragmented way. They find no elements of interest or landscape features within most of these spaces that are necessary to support social life and activity. The residents complained that the open spaces have not been managed properly, but remain largely inaccessible to the public. Because of these factors, they feel that the public spaces are not properly utilised in the GRA and therefore, benefit is not able to be made of them. While a number of open spaces have been put into a private use through long-term leasing arrangements, some residents even had an opinion that it is reasonable to lease out the open spaces if the committee cannot manage them properly. Moreover, some interviewees also feel that there is a lack of maintenance for public spaces because most people do not care for them, including the local organisations (see Figure 5). A 68-year-old male resident said:

Public spaces are more adorable than my own house. It is because my house belongs only to me but public spaces are common to all and all residents have contributed to creating them. But the case is rather opposite at present. No one cares for the public

² According to the Building By-laws, 2007, the requirement for open space development (excluding roads) for the project area of more than 5.09 ha is 2.5% of the total land area.

space as they do for their houses. This is happening because we are ignorant. We lack proper education.

Perceptions of public space

Overall, the residents of the GRA have an understanding of the significance of public space in community life. Findings from the interviews suggest that they are aware of the benefits of using public space. As a social being, they consider public space as an important part of their life. A 48-year-old male resident explained:

Public spaces are common to all for the people in the community. These are to be used for social and recreational purposes by the neighbourhood residents ... It makes a difference in one's life if such spaces are not there as there would be no areas for social events. Such spaces should be present in every neighbourhood of the Kathmandu Valley.

Likewise, a 31-year-old female resident explained:

Public space is the place where people could gather for any purpose. Such gathering may not be possible at homes and public space can be used. It is used by all including children and elderly people ... It is required to organise any social event including the public meetings ... We do not have to use the private venues located outside the GRA for such events as we can use the public spaces located inside.

In the same assessment of public space, a teenage girl explained the significance of public space to her neighbourhood life:

It is important as it is the place where social events are organised and allows all people of the society to participate. People come to express their views even if they are your relatives. This is how the community develops.

Giving an example of the major public open space in the GRA, a 34-year-old male resident highlighted the significance of public space:

Let us talk about the public space where we used to organise several social events. I think we have utilised this public space to the fullest and it was the platform to get to know each other. With these public spaces, we are able to organise such programs. It would have been difficult to organise such events on private land ... Public space has helped us a lot.

Social interaction in public space and sense of community

Most residents of the GRA have an opinion that the use of public space helps in developing social interaction among the neighbours. A 46-year-old male resident stated:

It is better to have public space in a neighbourhood ... It can be used for social gathering by all the residents, and this, in turn, allows all of us of to interact with each other and learn new things. I see a huge role of public spaces [in developing social interaction] ... It would have been a disaster if there were no such spaces.

Another interviewee, a 34-year-old male resident explained:

I get to know other people in the community through frequent participation in the social events. In such events, we see a lot of faces and get to introduce each other. You become more familiar when you meet for the second time.

This indicates that the residents in the GRA have been able to know each other by using public space. While the residents use public space for social exchange and interaction, they acquire its meaning over a period of time. A teenage boy explained about his experience:

You can't stay at home all day and you may go to play in a neighbourhood outdoor space with friends. As you visit a place several times, you tend to remember it in future. I

think there is a role of public and playing spaces in the development of a psychological sense [of community].

Developing a meaning of public space is thus a psychological process with most respondents indicating that it is important to have public space and social interaction in building a sense of community. However, at an individual level, the level of social interaction and the resulting sense of community do not appear to be identical in all residents. In addition to the use of public space, the difference in such a psychological process appears to be dependent on the level of involvement in community activities and social events. A 34-year-old male resident, who is actively engaged in the community as an employee of the local organisation explained:

You start to love the place if you have worked for it. People involved in social works would care more for the community and feel more responsible towards it ... I know 97% of the people in the neighbourhood and this is also due to my job within the community.

Some members of the executive committee of the local organisations also expressed similar feelings of belonging to the community, citing the reasons such as the length of residence and the ability to develop social interactions with neighbours.

DISCUSSION

Understanding of public space and its significance

This study began with an assumption that the current provision and use of public space, which does not appear to be satisfactory for most residents, might have had negative consequences on its understanding among the residents of new neighbourhoods of the Kathmandu Valley. However, research findings suggest that this is not necessarily the case. Although there is an obvious impact of the loss of public space on the opportunity for socialisation, most residents of both the planned and unplanned new neighbourhoods have an understanding of the significance of public space in the community life. The residents define public space as a common platform for meeting and greeting with neighbours that facilitates the process of social interaction and cultural assimilations (Rogers & Sukolratnametee, 2009). They consider public space as an integral part of their daily life, despite the current unsatisfactory development. Moreover, the residents also identify both the physical and psychological benefits of using public space as they are aware of its roles in promoting physical wellbeing and creating a better social environment. For them, a potential to foster a sense of community is another benefit of using public space with which the physical space could become a meaningful social territory (Abu-Ghazze, 1996).

Findings indicate that the understanding of public space that the residents of new neighbourhoods have acquired are based less on the actual “utilisation” of the existing spaces. In most cases, these appear to be “intuitive and embedded perceptions” that have emerged largely out of past experiences and engagements³, and already been acquired before moving into the new neighbourhoods. In other words, such understanding does not reflect a place – based experience of the residents’ present habitation.

Meaning of public space and sense of community in the changing urban context

Public space is a key physical feature of an urban neighbourhood with a potential to offer a host of subjective meanings (Cattell et al., 2008). However, while the current provision of neighbourhood public space in the Kathmandu Valley has significant impacts on its use, due to the existing drawbacks, the consequences can be noticed in their inability to offer an appropriate meaning for their users. In other words, the existing public spaces are less successful in offering

³ Several interviewees reported that their previous (parental) places were better in terms of the provision of public space with a comparatively higher level of social interaction. Some explained that the use and observation of public spaces in traditional towns has helped them understand their significance.

a 'new meaning' for the residents in the changing context. None of the interviewees explicitly expressed their attachment towards public spaces in new neighbourhoods.

The lack of development of meaning of public space has had psychological consequences. Findings indicate a relatively poor development of sense of community among neighbourhood residents through the use of public space. In the unplanned new neighbourhoods, the sense of community is almost non-existing, due to the loss of public space and social life, whereas in the planned new neighbourhoods, it is weak and inadequate. This highlights the inherent association between public space and the sense of community (David et al., 2002; Dempsey, 2009; Garcia-Ramon et al., 2004; Peters, 2011), although in the negative sense.

The findings also point out at the development of sense of community among the neighbourhood residents based on the factors other than the actual use of public space. The GRA case highlights this, where the local community-based organisations are relatively more active compared to the unplanned new neighbourhoods. This aligns with previous research findings suggesting that the physical design of neighbourhoods, including public spaces, alone may not foster a sense of community (Garde, 2011). The sense of community among a portion of neighbourhood residents appears to be an outcome of individual factors (Francis et al., 2012) such as the level of involvement in neighbourhood activities, the length of residence and the ability to make friends or neighbours. Those residents who are actively engaged within the community, particularly in the local organisations, have claimed in the interviews that they have developed a better sense of community and a feeling of attachment, regardless of the extent of the use of public space.

CONCLUSION

Over the past decades, the growth of contemporary urban neighbourhoods in the Kathmandu Valley has seen a considerable level of both morphological and social changes as compared to the traditional neighbourhoods, with a direct impact on the current provision and use of public space. Past studies suggest that the development of public space in new neighbourhoods is not adequate, which is an outcome of rapid and uncontrolled urban growth. As a result, the platform for social interaction is largely missing. Findings of this research confirm such observations as the existing public spaces are not satisfactory for most residents in both the planned and unplanned new neighbourhoods. The findings also indicate that this has had negative consequences on the quality of neighbourhood social life. The residents of new neighbourhoods are largely deprived of the benefits of using public space, and their physical and social wellbeing have been compromised in many cases. Consequently, the meaning of neighbourhood public spaces hardly exist among the neighbourhood residents. Without adequate opportunity to use public space, the level of social interaction among the residents is decreasing, with an adverse impact on the sense of community. All these consequences indicate that sustainability of urban social life may emerge as a major challenge of the current transformation of public space. The satisfactory development of public space in new neighbourhoods and its sustainable use is thus a key concern that demands urgent consideration from all stakeholders. Future urban development policies and plans for the Kathmandu Valley should consider this need and endeavour to develop neighbourhood public space as a critical urban amenity.

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SUSTAINING THE CULTURAL VITALITY OF URBAN PUBLIC MARKETS: A Case Study of Pasar Payang, Malaysia

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Abstract

The development of a public market in the city planning is pivotal in supporting the growth of the local economy. The market is also a place where the culture of the locals evolves daily. However, the unique qualities of the market are vulnerable to the redevelopment process. This study examines the cultural aspects of Pasar Payang in Terengganu, Malaysia, as one of the well-known markets among the locals and the tourists, which will soon be redeveloped. The aim of this paper is to identify the tangible and intangible qualities of the market, so that it can sustain its cultural qualities in the future. The methods adopted for this study comprise of conducting a survey among 497 visitors, and semi-structured interviews among 19 market vendors. The findings reveal that the cultural vitality of the market can be sustained by strengthening its local identity through its products and culture, providing spaces that can facilitate tourist activities and cultural participation, and enhancing the development of the local businesses.

Keywords: *Culture; Heritage; Markets; Urban Tourism*

INTRODUCTION

Markets are a prominent trading space found in most cities and towns. Their commonplace role as a venue for traders and buyers to exchange goods with currencies can be traced back to the history of public markets as a place of commerce. A traditional market that possesses a strong historical background gives huge contributions to the economy of a country (Shakur et al., 2012). Likewise, the market serves as a historical site and business centre. While the fundamental function of markets as a trading space has not changed for centuries, they are also regarded as a cultural space where a glimpse of the local lifestyle can be seen (Ashworth, 2000; Weiss, 2001; Crespi & Perez, 2015). As markets grow to be known for its local culture, and eventually become a tourist attraction, they are usually upgraded or redeveloped so that they can serve the customers and vendors better. However, in the process of redevelopment, the intrinsic cultural qualities of the markets have the tendency to fade as the markets become more modernized than their previous state (Kim, Lee, & Ahn, 2004; Vural Arslan, 2015). Therefore, the aim of this paper is to examine the qualities of an urban public market that can sustain its cultural vitality alongside the physical redevelopment. Studies of traditional markets and public markets have been researched by various scholars globally. However, this area of research in the context of Malaysia is still scarce. This study investigated Pasar Payang, a public market located in the city of Kuala Terengganu in Malaysia, which will undergo a redevelopment process in the near future. Pasar Payang is one of the local markets that is promoted as a cultural tourism attraction. The first objective of this paper is to identify the significant qualities of the market based on the perspectives of the local visitors and tourists. The second objective is to identify the nature of the market's businesses and the experience of the vendors. Finally, this paper concludes by recommending the way forward to sustain the cultural vitality of the market.

Positioning markets in the historical and current context

Throughout history, markets and bazaars have served as an integral distribution point of goods and a meeting point for people and traders. Polanyi (1957) defined, 'the market is the locus of exchange'. In the Islamic city planning, the *souq* (market) is placed near the central mosque for the purpose of the economy and social integration (Mortada, 2003; Omer, 2005). In the ancient Greek city, markets operated in the *agoras* (public open space). The market not only served as a place for trade, but where merchants meet with customers, and where customers meet with their acquaintances (Glantz, 1996). The markets are second homes to vendors that may have inherited the businesses from their families from generations to generations. The gathering of vendors who sell an assortment of specialized and generic products contribute to the quaint qualities of the markets and their culture. Although supermarkets and shopping malls functionally serve the similar trading purpose, however, what set the public markets or bazaars apart from the modern commercial complex are its cultural roots. Meanwhile, Al-Maimani, Salama and Fadli (2014) posit that both spatial and socio-cultural aspects are essential to maintain a livable traditional marketplace (*souq*). The two interrelated aspects need to be considered when planning for future improvements of the marketplace.

In the Malaysian context, studies on the development and issues of markets are beginning to receive attention by local researchers. Among the prominent public markets in Malaysia are Pasar Payang in Kuala Terengganu, Pasar Siti Khadijah in Kelantan, Pekan Rabu in Alor Setar, Chow Rasta in Penang, and Central Market in Kuala Lumpur. The historical tracks of these markets date them back to as early as the 1800s (Badan Warisan Heritage Services, 2012). Since their early days, the markets have gone through different phases of relocation and redevelopment as part of their growth. Redevelopment is a common process for many markets across the globe. Change is an inevitable part of urbanization, which affects the rise and fall of markets (Fava, Guàrdia, & Oyón, 2010; Hanachi & Yadollahi, 2011; Kim, Lee, & Ahn, 2004; Tangires, 2008). As this is an anticipated process, markets need to be resilient to thrive alongside the modern development without compromising their innate qualities and ways of operating. Fundamentally, the market is the people's place. It is where vendors make a living, and where customers shop for their daily goods.

In the recent years, urban and cultural researchers have also shown a growing concern over the threats of gentrification and globalization towards markets. In Asia, market vendors contribute from 10 to 35 percent of the growth of the informal sector (United Nations Task Team, 2015). In a study of the historic city of Bursa, Turkey, Vural Arslan (2015) examined the threats and challenges faced by traditional markets. The study found that the loss of market vitality accrued from the shift of development and lifestyle due to industrialization and urbanization process in the 20th and 21st centuries. The similar impacts of rapid modernization were discussed by Kim et al. (2004) in the case of the traditional markets in Seoul, Korea. In the last 30 to 40 years, the city went through redevelopment processes where traditional buildings were transformed into modern commercial buildings. After the 1970s, many of the traditional markets lost their competitiveness against newer retail markets and shopping centres. This global urbanization phenomenon is not uncommon as cities grow to develop their physical, social and economic stability.

Cultural Vitality

The cultural vitality of a place can be defined as the distinctive identities and sense of place that create opportunities for cultural participation, social interactions and business development among the local community (Jackson, Herranz & Kabwasa-Green, 2006; Duxbury, Gillette & Pepper, 2007). Jackson et. al (2006) outlined three domains of cultural vitality, which are the presence of cultural activities, cultural participation and the support systems. Places that offer opportunities for cultural participation are cultural venues, such as museums and theatres, and community places such as the library, community parks, markets and festivals. According to

Duxbury et. al (2007), culture contributes to lively cities, and cultural places act as physical assets for cultural engagement. Culture also forms the heritage values of a city. Heritage means the combined creation and products of nature and of man that make up the living environment in time and space (UNESCO, 2005). Meanwhile, the term cultural heritage is often associated with materials that were traced from past cultural activities, which ranged from natural to man-made elements (Canizaro, 2007; Raj Isar, 2004). Cultural heritage falls into two groups, namely tangible and intangible heritage (Moreno, Santagata & Tabassum, 2005). Intangible cultural heritage, as initially defined by UNESCO, is the collective works originating from a given community based on tradition. This includes all forms of traditional craftsmanship and popular folk culture. In comparison with the natural heritage and tangible heritage, intangible heritage needs a continuous community involvement in order to sustain its existence. The urban heritage in Malaysia embodies physical development and spiritual value inherited by a community (Khuo, 2000). It is a ground where people have taken root and flourished socially and economically. Urban heritage supports economic and socio-cultural diversity, and identity of each community in the country. Each heritage has lasting historic values, variety and contrast in the modern world. It is a visible evidence of the continuity between past, present and future that can be appreciated in their own ways (Shamsuddin & Sulaiman, 2002).

METHODOLOGY

This study uses a case study approach to enable an in-depth investigation towards a specific phenomenon, setting, process and relationships (Creswell, 2009). This method applies to the built environment research because it enables the combination of multiple factors that include social, physical, environmental and economic aspects. This study adopts a single case approach to analyse the specific qualities of the market and its roles to the city and its people.

The case study

Pasar Payang is a public market located in the city of Kuala Terengganu, in Malaysia. This market is an urban public market that is promoted as a tourist attraction for its local products, such as batik, local food and local crafts (Fig. 1 and Fig. 2). The market started to operate in 1967, two years after the Public Works Department built it (Mohd, Zakariya & Kamarudin, 2014). Throughout its nearly 50 years of operation as a public market that serves the city, Pasar Payang has gone through several phases of upgrading and renovation to improve its infrastructures. According to the Federal Development Office of Terengganu State (PPP Terengganu, 2015), Pasar Payang will undergo a major redevelopment process soon.



Figure 1. The market building
(Source: Authors).



Figure 2. Batik – one of the local products
(Source: Authors).

Data collection

The data collection comprised of conducting survey questionnaire among visitors and semi-structured interviews among the market vendors. The survey involved 497 respondents that visited Pasar Payang. Using the probability sampling strategy, the targeted respondents were local and foreign visitors. The researchers conducted the data collection during weekdays and the weekends to ensure that it also included the day-to-day local visitors. The objectives of the survey questionnaire were to identify the visitors' profile, the motivation of their visit, and their cultural experience of the market (Appendix A). The cultural experience of the market is segmented into three parts, which are the visitors' perception of the market's image, their visiting experience, and their shopping experiences. On the other hand, the interviews allowed a closer engagement with the market vendors to document their business experience. The researchers conducted the interviews on 19 market vendors that come from different business categories, such as food, merchandise, clothing and traditional wear, fruits and vegetables, and souvenirs (Appendix B). The objective of the interview was to study the length of involvement of the vendors in the market and their nature of businesses. The data collected from the visitors and vendors were analyzed to establish a relationship between the visitors, the vendors and the market in order to synthesize how the market can sustain its cultural vitality.

RESULTS AND ANALYSIS

The visitors' profile

Based on the survey, 89% of the visitors are Malaysians. 11% came from other countries, such as those from other parts of Asia, Australia, the UK and Europe, and the Middle East. Within the majority of the Malaysian visitors, 69% constituted of domestic tourists from various states in Malaysia, and only 20% were local visitors from Terengganu. The majority of the survey respondents aged between 26-35 (33.4%) and 15-25 (30.4%). In terms of income, 52.9% of the visitors are composed of those in the low-income group, with a monthly income of RM2000 and below. 32.2% of the visitors have a monthly income between RM2001-RM4000. There is also a relatively balanced distribution between female (54.5%) and male (45.5%) visitors to the market. A large percentage of them came with their families (44.1%) and friends (34.8%). Half of the visitors (53.4%) stayed in Kuala Terengganu for two to three days. Their main choices of accommodation were hotels (32.8%) and homestay (31.8%).

Motivation of the visit

53.1% of the respondents were returning visitors while 46.9% were the first time visitors. Their motivation to visit Pasar Payang was mainly driven by the "local products" (62.6%) (Table 1). They also regarded the market to be an "interesting and a well-known place" (49.3%), which portrays the "local culture" (47.3%). There are three types of local products that received high priority in the visitors' shopping activities. The products are the "local food", "clothing items" like batik and *songket* (traditional woven cloth), and "seafood products" (including dried products like fish crackers, salted fish, etc.) (Table 2). These findings correspond to earlier studies conducted by Alias (2010) and Salli (2011), where the majority of visitors found Pasar Payang as an interesting place to visit, and that the traditional market activities increase its attraction values. Similarly, in a study by Sims (2009), it was found that there is a strong relationship between local food and local products in symbolizing the local culture.

Table 1: Motivation of visit according to market's qualities.

Factors	Percentage
Local products	62.6%
Interesting and well-known	49.3%
Local culture	47.3%
Affordable products	19.7%
Quality products	7.8%
Interactions with the locals	7.8%
Specific services	4.6%

Table 2: Priority in purchasing market products.

Products	Mean
Local food	5.87
Clothing (batik, <i>songket</i> , etc.)	5.61
Seafood (dried, fresh, processed, etc.)	5.08
Household items	4.99
Brassware	4.87
Others	2.05

* Mean range 1.0 (lowest) to 7.0 (highest)

Cultural experience of the market

The visitors' cultural experience of the market was examined based on three aspects: (i) the market's image, (ii) visiting experience, and (iii) shopping experience (Table 3). These aspects comprise of both tangible and intangible forms of culture that are present at the market. Based on the results, the market's image is shaped by its identity as a "place where visitors can get local products" (Fig. 3). Consequently, the market becomes a "tourist attraction". To the visitors, the market "represents a unique local lifestyle", where they can "experience the culture of Terengganu" through its local products and "interaction with the market vendors". According to the results, the culture in this sense is primarily reflected through the market's local products, followed by the presence of the market vendors.



Figure 3. (a) Local food; (b) Local crafts; (c) Special rice for traditional cooking.

Table 3: Visitors’ cultural experience of the market.

Index of qualities	Mean	Index of qualities	Mean	Index of qualities	Mean
MARKET’S IMAGE		VISITING EXPERIENCE		SHOPPING EXPERIENCE	
A place to get local products	5.72	Experience the culture of Terengganu	5.56	The market has authentic local products	5.59
A tourist attraction	5.71	Interaction with market vendors	5.35	The products reflect the local culture	5.48
Represent unique local lifestyle	5.64	Friendly market vendors	5.34	Products have good quality	5.31
Source of economy for the city	5.48	Feels secure	4.88	Prices are easily negotiable	5.15
The building’s aesthetic value	5.41	Feels nostalgic	4.20	Prices of goods are affordable	4.98
Overall Mean Value	5.59	Overall Mean Value	5.07	Overall Mean Value	5.30

* Mean range 1.0 (lowest) to 7.0 (highest)

The results of the survey reflect that the cultural qualities of the market, as ascribed by the visitors, are interrelated. The highest overall mean value of the qualities is the “market’s image” (mean=5.59). The result implies that visitors go to Pasar Payang because of what the market offers, namely the products and the local people. The visitors’ “shopping experience” (mean=5.30) links directly to the consumptions of local products and products that reflect the local culture, as opposed to generic products. This shows that the availability of local products is an important quality that contributes to the cultural vitality of the market. The visiting experience (mean=5.07) indicates that despite shopping activities, the local culture can still be experienced by the visitors through opportunities to interact and encounter with the local people.

The vendors' nature of business

Since the market’s operation of nearly 50 years ago, 10 out of 19 of the interviewed vendors have conducted their businesses there for more than 20 years (Table 4). Most of them sell merchandise that is common to a public market, such as fruits, vegetables, herbs, spices and local food.

Table 4: Vendors' profile and businesses.

Years of business	No. of vendors	Products
40-48 years	4 vendors	Fruits and vegetables; souvenirs; herbs and spices
20-30 years	6 vendors	Dried fish crackers (<i>keropok</i>); grocery products; mixed goods; gold
10-19 years	6 vendors	Traditional food (<i>kuih-muih</i>); plastic ware; mixed goods; dried fish crackers; snacks and candies; <i>Keris</i>

Eight of the vendors informed that they inherited their businesses from their family. For instance, a fish cracker vendor who has conducted business in the market for 30 years took over the stall from his brother. Another vendor inherited the business of selling fruits, vegetables, and other food from his mother, who started to sell the products in 1967 when the market began to operate. There is also a vendor who inherited his father's herbs and spice business of 53 years, where the business originally started elsewhere before the market was built. These findings are integral to studies on developing public markets and traditional markets, as they reveal the rich intangible heritage of the business traditions in the market. According to Beattie (2008) in his study of the Indian bazaar, the market is about the relationships between the people: vendors and their suppliers, vendors and other vendors, and vendors and customers. These relationships over time establish a sense of trust between the vendors and their customers. However, Beattie noted that this 'long-standing' relationship of a family-based business might limit the 'hybridity' of a bazaar, where it might be difficult for new families to venture into business.

Based on the interviews, the other eleven vendors started their businesses on their own, which means the businesses are not inherited. For example, the batik seller in the interview has only operated in the market for two years after he moved back to Kuala Terengganu from Kuala Lumpur. His length of involvement in the market is considered new, compared to other batik sellers who have had a longer engagement. The existence of new vendors in Pasar Payang suggests that people see an opportunity for their businesses to develop, which reflects the economic potentials of the market.

Products and customers

11 out of 19 vendors reported that their products are locally sourced from around Terengganu. Such products are the dried fish crackers, batik, fruits and vegetables, traditional food, herbs and spices, and souvenirs. The dried fish crackers were made by the locals from around the state, as fish is one of the main local marine products. Batik, a traditional hand-painted fabric, is also sourced from local batik producers. Traditional local food, such as a range of sweet delicacies (*kuih-muih*), are sent to the market by locals who prepare them from home or their shops elsewhere. Herbs and spices, such as the mixture used to make a traditional glutinous rice meal called *nasi dagang*, are also obtained locally. The vendors sought after local products primarily due to availability, convenience, and affordability. These products are also sold because they are in demand from the local people. In a study by Roininen, Arvola and Lahteenmaki (2006), it was found that people perceived local products to support the local economy and contribute to the local people's businesses. This suggests another factor that contributes to the products' prolonged existence in the market over time. Additionally, products that reflect the local arts and crafts, such as clothing, batik and *songket*, are also considered as cultural heritage.

The majority of the vendors also expressed that they have regular customers who would repeatedly come back to buy from their shops. The vendors' report corresponds to the visitor survey data that indicates more than half of the visitors were returning visitors. The types of products sold by the vendors match the visitors' expectations and needs, whereby visitors see the market as a place to get authentic local products, such as *nasi dagang* and *kuih-muih*, which are specialities of Terengganu. One of the grocery vendors voiced that the market's traditions should be continued, such as the tradition of selling from the baskets, the layout, and the setting. The plastic ware and the gold vendors expressed that the market's image and its layout should be maintained as close to its current "market" look. They are concerned that if the market becomes too modernized and looks like a shopping mall or a supermarket, it would diminish the heritage values of the place. The plastic ware vendor further added that at the market, customers are their friends and vendors talk to each other. For him, this kind of interaction cannot be found at the supermarket. This finding relates to the data from the visitors' survey, where they regarded interactions with the market vendors to be a significant part of their experiences. The products, social interactions and ambiance found in the market are the qualities that shape people's perception of the market's image and their experience. This finding is congruent with a study on a night market in Taiwan, where Lee et al. (2008) found that the market's image is constructed by the visitors based on food, products and atmosphere. As such, both the tangible and intangible qualities of the market play a vital role in shaping the market's image to its visitors, particularly for markets that are recognized for their cultural values and tourism potentials.

DISCUSSION

It is evident that for Pasar Payang, the local products are the vital component that contributes to the cultural qualities and attraction values of the market. Products are the core business of any market. For markets that grow to be known for its local culture, then the local products are its heritage. According to Wang (1999), visitors seek for this 'authentic' experience during their role as a tourist. Their 'liminal experience' allow them to take part in a 'non-ordinary' activity that is different from their daily lives. The tendency for a visitor to notice some specific items or products during their travels has been widely discussed in tourism literature. The notion of experience is often associated with a sense of uniqueness and difference that the place offers (MacCannell, 1976; Selby, 2004).

The challenge, however, is in sustaining the production of the local products that require specific local knowledge. The sustainability of the market's operation requires a wide range of infrastructure that goes beyond the market site (Zakariya, 2015). For example, vendors who sell traditional food not only rely on their skills and recipes to sustain the local culinary culture, but also on the continuous appreciation of the younger vendors and visitors towards the local food. With the incoming of globalized trends and changes in lifestyles among youth, traditional family businesses may not be able to thrive as they have been in the last fifty years. In a study on sustaining the Malay traditional food among youth, Hamzah et al. (2015) identified six factors that can influence the continuance of cultural heritage: influence of family, cultural values and personal values, the knowledge inherited from earlier generations, motivation to get involved, incorporating parts of the traditions as a way of life, and benefit to one's income and living. These factors are also relevant to other types of local products such as the batik and *songket*, the production of dried seafood, crafts, and others. This is where cultural incubators and smart partnerships with the vendor associations, the government, young entrepreneurs, NGOs and others can come into place to provide training and support to help grow and sustain the local businesses (Grodach, 2011).

The cultural qualities of the market were also found to be present in its physical setting. In the analysis, the building's aesthetic value was not as strongly regarded to shape the market's

image compared to its local products. Nonetheless, it is important to understand that the built environment influences the market's operation and atmosphere. Market studies have found that physical settings influence people's utilization of spaces and their experience (Kim et al., 2004; Mohd et al., 2014). The intricate and complex fabric of the market's physical qualities contributes to the atmosphere of the market. Therefore, to position the market as a cultural attraction, there needs to be a multi-scale approach in planning and designing the market spaces. It is imperative to appreciate how the market operates from the outside to the inside, from the scale of the city to the street and into the market spaces. When these core qualities are in place, then enhancement of the market's architecture and landscape can be implemented to reinforce the market's local image from the outside and the inside. The cultural vitality of the market can further be sustained through incorporating creative approaches that are in line with contemporary trends. Some examples are such as organizing food festivals, proposing an in-house gallery to spark interest and educate visitors about the local products, and creating customized market tours. Some of these approaches have already been implemented in renowned markets in other parts of the world, and there is undoubtedly a potential too for Pasar Payang.

CONCLUSION AND RECOMMENDATION

This study has examined and discussed the tangible and intangible aspects of the market that contribute to its identity as a cultural place. The sustainability of a market depends strongly on the people and the products, just like any other commercial space. Still, it is evident throughout history that what sets the market apart from shopping complexes is its strong link with the local culture. While development changes are inevitable, there are still ways to sustain the tangible and intangible cultural qualities of the markets throughout its redevelopment process and in the future. Based on the research findings, this study recommends three approaches in sustaining the cultural vitality of urban public market. First, the community identity of the market and its sense of place need to be identified to determine its uniqueness and significance. In the case of Pasar Payang, the local products and the local culture were found to be the market's strongest assets. Therefore, efforts should be made by the vendor association and the local authority to continuously provide a support system to facilitate the growth of the local businesses. Second, market venues need to have spaces and activities that can create opportunities for cultural participation. For instance, the vending spaces should be designed in a way that encourages social interactions among the vendors and the visitors. Even though Pasar Payang might have a new look in the future, nonetheless, some of the market spaces can be adapted from time to time for food preparation, crafts demonstration or events, as a way of attracting visitors to participate in the cultural activities. Third, the cultural vitality of the market can be sustained through the development and support of the local businesses, especially those that sell local products. The continuity of local businesses is vital to the operations of the public market because, fundamentally, the market is a place for trading. Finally, this paper concludes by underlining that a multi-dimensional and an interdisciplinary approach are essential in offering a broader solution to tackle the challenges of the urban public market in sustaining its cultural vitality.

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APPENDIX A.

Visitor's Profile	
Gender	Age
Nationality	Malaysian (State)
	Non-Malaysian (Country)
Monthly Income	
Visiting Company	<input type="checkbox"/> Families <input type="checkbox"/> Friends <input type="checkbox"/> Spouse/Partner <input type="checkbox"/> Alone
Length of Stay in Kuala Terengganu	
Accommodation	<input type="checkbox"/> Hotel <input type="checkbox"/> Homestay <input type="checkbox"/> Friends/Relatives
Visiting Patterns	
Have you previously visited Pasar Payang?	<input type="checkbox"/> Yes (state when: ___) <input type="checkbox"/> No
Reason for visiting	<input type="checkbox"/> To buy local products <input type="checkbox"/> It is an interesting and well-known place <input type="checkbox"/> To experience the local culture <input type="checkbox"/> The products are affordable <input type="checkbox"/> The products have good quality <input type="checkbox"/> To interact with the locals <input type="checkbox"/> To get specific services (please state: ___)
Shopping Patterns	
Preference in purchasing products from Pasar Payang	<input type="checkbox"/> Local food <input type="checkbox"/> Clothing (batik, songket, kaftan, etc.) <input type="checkbox"/> Seafood (dried, fresh, processes, etc.) <input type="checkbox"/> Household items <input type="checkbox"/> Brassware <input type="checkbox"/> Other (please state: ___)
Visitor Experience	
	Strongly Disagree: 1 ← 2--3--4--5--6 → 7: Strongly Agree
Perception on Image	<input type="checkbox"/> Pasar Payang is a place to get local products <input type="checkbox"/> Pasar Payang is a tourist attraction <input type="checkbox"/> Pasar Payang represents a unique local lifestyle <input type="checkbox"/> Pasar Payang is the source of economy for the city <input type="checkbox"/> Pasar Payang market building has aesthetic values
Visiting Experience	<input type="checkbox"/> I can experience the culture of Terengganu at Pasar Payang <input type="checkbox"/> I get to interact with the market vendors <input type="checkbox"/> I feel the market vendors are friendly <input type="checkbox"/> I feel secure in the market <input type="checkbox"/> I feel nostalgic when visiting the market
Shopping Experience	<input type="checkbox"/> I can buy authentic local products at the market <input type="checkbox"/> The products reflect the local culture <input type="checkbox"/> The products have good quality <input type="checkbox"/> The prices are easily negotiable <input type="checkbox"/> The prices of products are affordable

APPENDIX B.

Vendor Interview	
Gender	Age
Nationality	Malaysian (State)
	Non-Malaysian (Country)
Years of Business at Pasar Payang	
Products Sold	
<ol style="list-style-type: none"> How did you start your business in this market? Did you inherit it or did you start on your own? Did you sell this product since you opened up your business? If not, what had you previously sold? Where do you get your products/supplies? Why do you get them from those places? Do you have regular customers? How do you maintain them as your regular customers? How do you promote your products to the customers? In your opinion, what is unique about Pasar Payang? What sort of things/practices should be sustained? What is your opinion and suggestions on the redevelopment of the market in the future? 	

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CONTRASTING GLOBAL IMAGERY TO LOCAL REALITIES IN THE POSTCOLONIAL WATERFRONTS OF MALAYSIA'S CAPITAL CITIES

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Abstract

Urban waterfront redevelopments are often about image-making for economic and political gain. This article analyses three major recent waterfront projects within the Kuala Lumpur metropolitan area: Kuala Lumpur City Centre, the River of Life, and Lake Putrajaya. All have been important in projecting an image of a modern, developed, postcolonial Malaysia. The article examines these waterfront landscapes in relation to three key themes: their contribution to the overall city image, to economic development, and to ecological performance. The article draws upon policy documents, project plans, interviews with local policymakers, designers and academics, field observation of the current physical development, land use and social use of the three waterfront precincts, and a mental mapping survey of users' cognitive images of how these precincts fit within the overall city image. Analysis shows that the appearance, use and development process of these three waterfront projects draw heavily on international models. The article suggests several waterfront sites and uses within the three projects that indicate a more authentic local paradigm for urban waterfront development.

Keywords: *Waterfront; Redevelopment; Representation; City Image; Environment; Malaysia*

INTRODUCTION

The redevelopment of urban waterfront areas for non-industrial uses has been driven by a wide range of economic, social, and environmental objectives (Breen and Rigby 1996). It also has aesthetic and representational aims. Existing research into flagship waterfront development projects in Western cities highlights three key representational aims. Firstly, it often emphasizes the key role these areas can play in transforming the wider image of cities, both literally and metaphorically (Marshall 2001, Dovey 2005). Secondly, the redevelopment of waterfronts for new residential, commercial, and leisure uses typically aims to both display and facilitate a transition to a post-industrial economy. Waterfront plans tend to be driven by economic imperatives that prioritize real estate investment and leisure and tourism uses, both internationally focused (Sandercock and Dovey 2002, Desfor et al. 2010). Thirdly, this is often coupled with ambitions to demonstrate environmental remediation and enhanced ecological sustainability in formerly-industrial waterfront areas, although there are criticisms of the limited environmental benefits of such transformations and which socio-economic groups they serve (Stevens 2010, Hagerman 2007, Bunce 2009).

For newly-developing countries in the global East and South, flagship waterfront redevelopments also often seek to showcase nations' transitions away from their colonial pasts; urban ports were typically a key locus of exploitative colonial-era trade. Studies of waterfront transformation projects in Hong Kong (Law 2002), Singapore (Chang et al. 2004) and the Caribbean (Dodman 2007, Gidel 2010) suggest that waterfront projects that try to assert a new, local identity and a new economic trajectory for a city and a nation paradoxically often draw upon international

consultants, international planning approaches and architecture, and international financing. Locally-driven waterfront transformations appear to privilege the interests, activities and self-image of newly-dominant local elites and ignore the needs of existing waterfront residents and workers (Dodman 2007). Projects that ostensibly seek to reintegrate the city and its waterways and to create new, socially-inclusive urban spaces often paradoxically increase social and spatial fragmentation. There is broad agreement that the imagery of waterfront redevelopments in Southeast Asia and elsewhere is largely generic, inauthentic, and detached from their cities' wider economic vitality (Savage et al. 2004, Chang et al. 2004, Dovey 2005, Chang and Huang 2010).

There is growing international interest in the environmental remediation aspects of contemporary urban waterfront development (Desfor and Laidley 2011). But many waterfront projects involve the creation of entirely new, artificial landscapes, often by filling into waterways. These landscapes are carefully tailored to particular consumer interests, and have little connection to either local history or ecology. In tropical regions, the redevelopment of waterfront areas for new urban leisure uses is often argued to be a desirable makeover of "unhealthy, repulsive swamps and mangroves" (Gidel 2010:35). However, Savage et al. (2004:218) emphasize that while Singapore's, redeveloped river "has become a more ecologically viable and sustainable environment, the motivation was not primarily environmental, but more to sustain a new economic lifeline for... tourism... Keeping the River... aesthetically pleasing". There is little literature examining the environmental benefits or impacts of urban waterfronts (Savage et al. 2004). Gidel (2010) highlights that goals of improving environmental cleanliness often become entwined with goals of social cleansing. Existing research emphasizes tensions between traditional local waterfront spaces and activities that are 'authentic' but unsustainable and insufficiently profitable, and global waterfront transformations that bring investment but obliterate local character.

Within the Southeast Asian context, Malaysia's waterfronts differ from those in the more widely studied island city-states, Hong Kong and Singapore. In those cases, significant population and economic pressures drive the production of new waterfront land, which has been going on for many decades. Singaporean respondents in a survey by Chang and Huang (2010) cited the Malaysian waterfronts of Malacca and Kuching as having retained local image and lifestyle better than Singapore's efforts to present a 'world class' waterfront. The inland waterfronts of Malaysia's largest urban area, Kuala Lumpur, have developed later and more quickly than Hong Kong's and Singapore's.

BACKGROUND

Kuala Lumpur was founded in 1857 at the confluence of the Klang and Gombak Rivers. Historically, the Malay settlement concentrated northeast of the junction. The city's oldest mosque, Masjid Jamek (1909), was built at the rivers' confluence, on the site of the city's first Malay burial ground. The Chinese neighborhood was to the south, around Petaling Street. The British administration occupied the Klang River's west bank. As the rivers' role as transport corridors declined after 1911, squatter developments spread along the derelict riverbanks. Major floods in 1925 and 1971 killed thousands. Planners relocated the squatters. Concrete channelling for flood mitigation blocked visual and physical access to the rivers. Later, new elevated highways, light rail tracks and their stations spanned large sections of the rivers. In the early 1990s the riverfront pedestrian walkways around Masjid Jamek were improved (fig. 1) and urban design guidelines encouraged new buildings to face the river (Shamsuddin et al. 2013, Abu Latip et al. 2009).

In the 1990s, Malaysia's economy grew rapidly. The federal government began developing Putrajaya, a new administrative capital city 25km south of Kuala Lumpur. This sat within the new Multimedia Super Corridor that stretches a further 40km south to the new international airport (fig.

2). Malaysia's parliament remains in Kuala Lumpur. The MSC was intended to relieve existing metropolitan growth pressures to the west along the Klang River valley. Putrajaya was intended to be a showplace of post-colonial Malaysian identity (King 2008). The city has 72,000 residents, predicted to increase to 350,000 by 2025. Most federal ministries have relocated there (Putrajaya Holdings 2014).



Figure 1. Masjid Jamek (Mosque) at confluence of Gombak (left) and Klang (right) Rivers, Kuala Lumpur, April 2014. (Source: Authors).

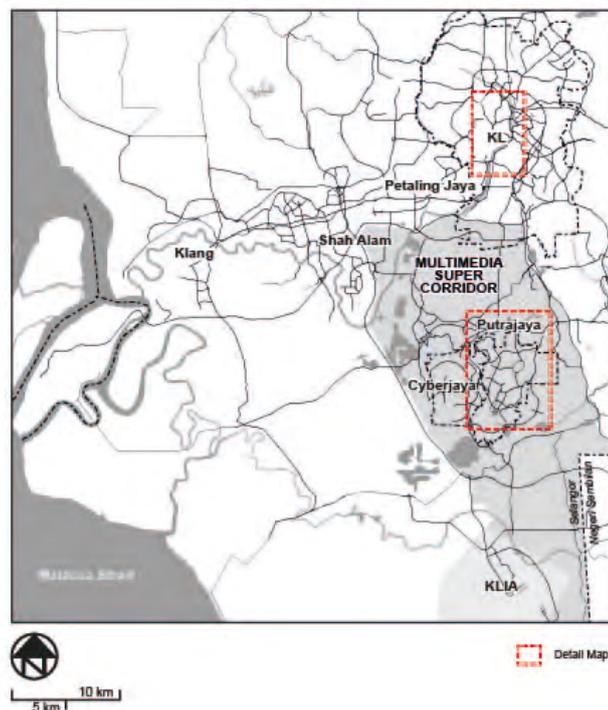


Figure 2. Map of Greater Kuala Lumpur Metropolitan area, Selangor, Malaysia. (Felix Fehr)

METHODOLOGY

This article examines the three largest mixed-use waterfront projects developed in the greater Kuala Lumpur metropolitan area over the past twenty years. The mixed use projects include Kuala Lumpur City Centre (KLCC) and River of Life in Kuala Lumpur, and Lake Putrajaya in Putrajaya. All the three projects are located in the Kuala Lumpur Metropolitan Area (see fig. 2).

Kuala Lumpur City Centre (KLCC) (figs 3 and 4) is a new high-rise downtown area, incorporating the landmark Petronas Towers, a mosque, convention centre, high-end 6-storey shopping mall, Suria KLCC, prestige apartment and hotel towers, and a 20 ha public park with a children's playground and a botanical garden built over underground carparking (Bunnell 1999). The park was the last major project by renowned Brazilian landscape architect Roberto Burle Marx. The design retained mature trees and contains many indigenous plants (Bunnell 1999). A 'Symphony Lake' features fountains programmed to music, and a children's wading pool. Kuala Lumpur's planned River of Life (ROL) project (fig. 4), integrated within the Kuala Lumpur City Plan 2020 (DBKL 2012), seeks to revitalize the Gombak and Klang riverfronts in the city centre as a means to stimulate national economic development. EUR 900 million invested in improving aesthetic quality and amenity aims to leverage economic transformation when government waterfront land is ultimately tendered to private developers (MFT 2014). ROL embraces key cultural destinations Kampung Bharu, Masjid India, Masjid Jamek, Pasar Seni (the oldest city market), Petaling Street, and Malaysia's national space, Merdeka Square. AECOM's Master Plan (AECOM 2013) foregrounds ecological, social and economic principles, creating a pedestrian-friendly environment, retaining existing natural landscapes and increasing native tropical vegetation (AECOM 2013b).



Figure 3. KLCC Park, Kuala Lumpur. Wading pool, Suria KLCC mall and Petronas Towers

(Source: Authors.)

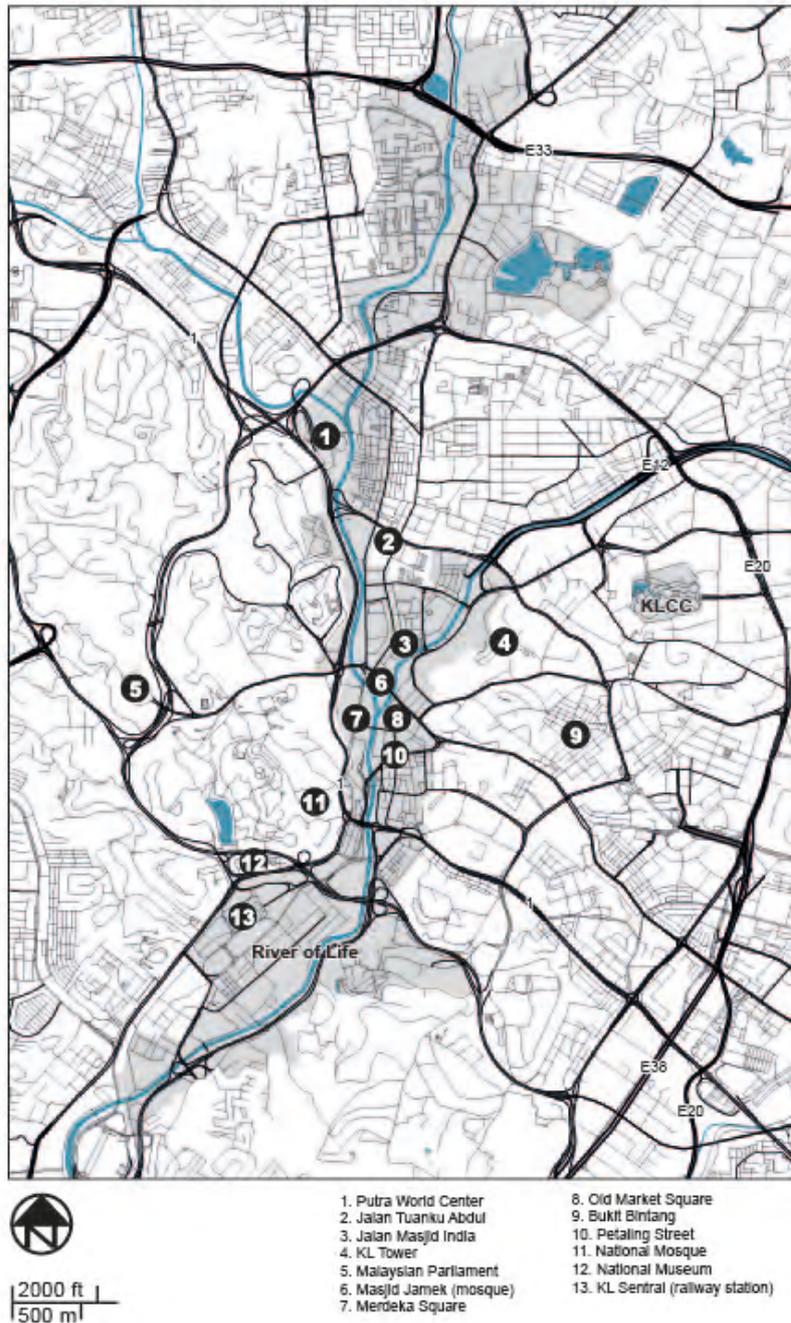


Figure 4: Map of central Kuala Lumpur, showing River of Life area and KLCC. (Felix Fehr)

- | | | |
|------------------------------------|--------------------------|--------------------------------|
| 1. Putra World Trade Centre (PWTC) | 6. Masjid Jamek (Mosque) | 11. National Mosque |
| 2. Jalan Tuanku Abdul Rahman | 7. Merdeka Square | 12. National Museum |
| 3. Jalan Masjid India | 8. Pasar Seni | 13. KL Sentral Railway Station |
| 4. Malay Menara | 9. Bukit Bintang | |
| 5. Parliament House | 10. Petaling Street | |

Lake Putrajaya was developed as the heart of Malaysia's new capital city (figs 5, 6) on a former oil palm plantation. Its master plan by a consortium of Malay consultants and government planners includes 200 ha of terraced wetlands (Moser 2010). Development is regulated by the local authority, Putrajaya Corporation (PP 1997). The technocratic plan segregated land uses. A purely administrative central precinct, essentially a large master-planned office park for government, lines the 4km formal central boulevard, Persiaran Perdana, terminated by the Prime Minister's office and an International Convention Centre on two large hills. Putrajaya's masterplan provides significant public recreational space along the lake foreshores, including the Botanical Gardens and Taman Wawasan, 'Vision Park', Putrajaya's central park, its name linked to former Prime Minister Mahathir's vision for Malaysia to attain developed country status by 2020. There is a water-sports complex at the lake's south end.

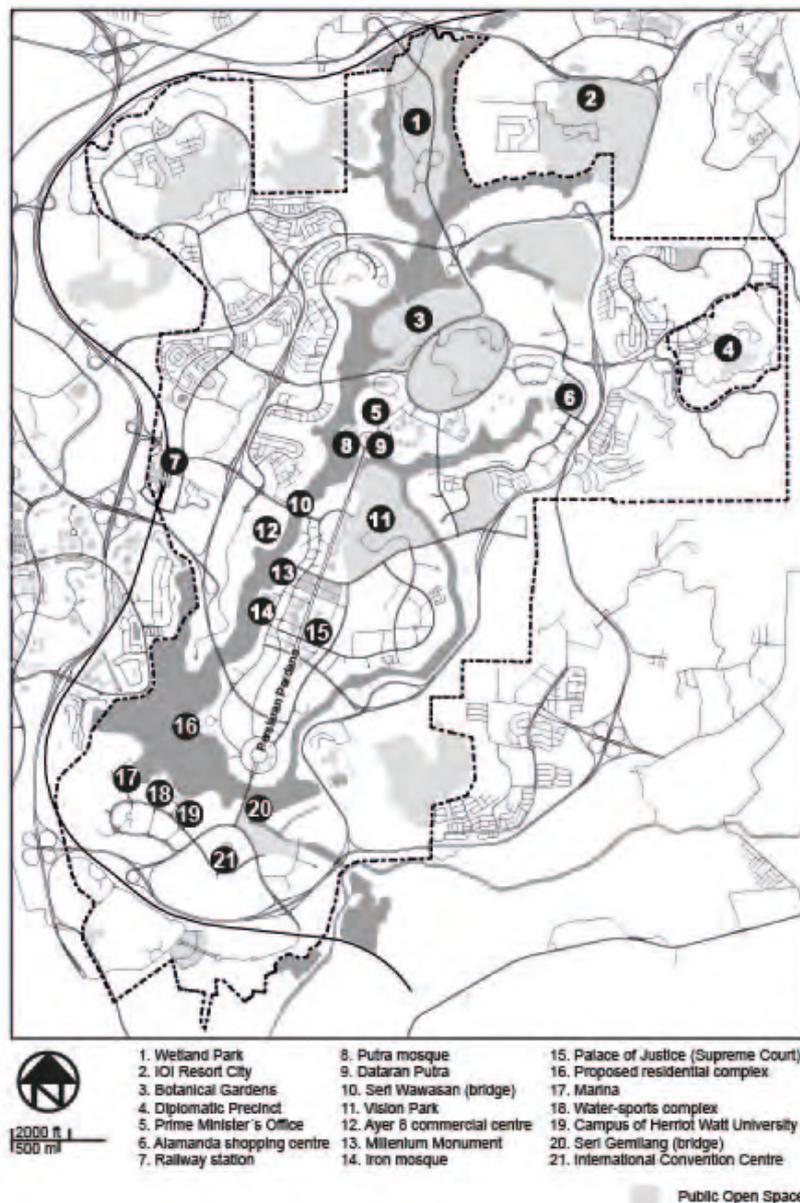


Figure 5. Map of Putrajaya. (Felix Fehr)



Figure 6. Putra Mosque and the Prime Minister's Office as seen from Lake Putrajaya.
(Source: © Stefan Fussen, fussen.de, CC BY-SA 3.0, Wikimedia Commons).

Our analysis examines the distinctive aims, forms and impacts of these three waterfront schemes. It identifies what international waterfront images and formal models have been chosen as exemplars, from where, and why, and what messages about Malaysian identity and national development these schemes present. The article examines these new Malaysian waterfronts in relation to three leading critiques of the imagery of waterfront redevelopment worldwide, which were identified in our Introduction's review of the recent literature: waterfronts' contribution to reshaping the overall city image; the use of waterfront redevelopment visions to attract private-sector investment in real estate and in service industries; and presenting the appearance of improved environmental performance. These facets of contemporary waterfront development in Malaysia indicate that visions of urban form, development and environmental management are perceived as important both for expressing the country's shifting identity as a postcolonial nation and for impelling its further development.

The article draws together the limited existing data and first-hand analysis to assess the effectiveness of these waterfront landscapes in both representational and performative terms. The evaluation contrasts the representational aspirations of these three waterfront projects against empirical realities of their performance in shaping the urban image, attracting further urban development and employment, and enhancing ecological sustainability. The aesthetic, representational, economic, and environmental objectives underpinning the projects and the formal models that inspired them were gleaned from policy documents, project plans, and interviews with local planners, policymakers, designers and academics who are closely engaged with the projects.

As Savage et al. (2004) note, quantitative and qualitative data and assessments of urban waterfronts are generally limited. In recently-developed nations such as Malaysia, there is a paucity of published historical and current information to track rapid urban and economic changes. Our analysis of the actual impacts of these three Malaysian waterfronts draws together the limited existing empirical studies of the three precincts (Siong et al. 2013, Hassan and Hanif 2012, Shamsuddin et al. 2012, Moser 2010, King 2008, Bunnell 1999). The analysis was extended through first-hand field surveys of the current physical development, land use, social use, and open space management regimes of the sites. These surveys identified the number of existing hotel rooms adjacent to KLCC, the number of eating establishments facing Lake Putrajaya, and the orientation of entry points to major buildings on Putrajaya's main street. A mental mapping survey of users' perceptions of central Kuala Lumpur and Putrajaya was also undertaken to determine the significance of the waterfront areas within the overall city image. This involved thirty random pedestrians in each location, including local residents, workers and visitors. At each site respondents were asked to sketch a simple map of the respective city centre area identifying the most recognisable geographical and built form elements. They were also invited to note the elements they recognized within each area.

Analysis of this data identifies tensions between the images and objectives that Malaysia's governments and property developers pursue through flagship waterfront schemes, and the local nuances of the case studies' urban fabric, landscape, climate, vegetation, management practices, and the consequent local uses of waterways and open spaces. The conclusion of the paper draws these findings together to reflect on the successes and shortcomings of these three waterfront projects in promoting an authentic post-colonial Malaysian cityscape.

FINDINGS

Our analysis explores three aspects of the urban waterfront image, and how that image responds to international influences and local conditions and customs, considering in turn the contributions these waterfront projects make to the overall city image, to an image of economic development, and to an image of ecological sensitivity. The three paradigms cover issues related to aesthetic qualities, placemaking, people's perception, economic performance, political decision making and environmental and sustainability aspects.

City Image

These three waterfronts in the Malaysian capitals have important roles in placemaking and place marketing, and in this respect they are consciously similar in purpose and form to waterfront projects in developed countries, which transform inner-urban, previously-industrial areas to present a new image of a city focused on new 'world class' residents, businesses and cultural and leisure amenities (Desfor et al 2011, Marshall 2001). Each of these Malaysian waterfronts is proposed as the centerpiece of a wider urban area, fundamental to its image.

Our mental mapping survey for Kuala Lumpur (Table 1) revealed a majority of respondents identified the Petronas Towers as the city's main landmark. Only two respondents included the KLCC Park's lake in their mental sketches. Most identified the shopping area Bukit Bintang and major traditional streets such as Jalan Tuanku Abdul Rahman and Jalan Masjid India (see fig. 4, #2 and 3). Despite strong local publicity for the River of Life project, only 23% of respondents identified the two rivers as elements. They were usually drawn in isolation from the street network, and only the historic mosque Masjid Jamek (see fig. 1) and Light Rail Transit (LRT) stations were shown connected to them. This corroborates the findings of earlier surveys of the city image that modern high-rise buildings dominate lower historic buildings, and that the rivers are perceived as boundaries isolated from the neighborhoods that they demarcate, not as integrating pathways within them (Kum and Ujang 2012). For Putrajaya, 93% of respondents

identified the Putra Mosque, the Prime Minister’s Office (see fig. 6), the International Convention Centre and the main boulevard Persiaran Perdana (see fig. 4). Most identified the major node Dataran Putra fronting the Putra Mosque. Almost 60% sketched Lake Putrajaya as a key feature, although most showed it detached from any streets or buildings. It appears that KLCC’s Petronas Towers and Putrajaya’s axial boulevard of large Islamic-styled buildings generate strong images, and the waterfronts are peripheral elements.

Table 1: Summary of elements drawn in cognitive maps of Kuala Lumpur and Putrajaya

KUALA LUMPUR (n=30)			PUTRAJAYA (n=30)		
	Frequency of depiction	Percent of users depicting		Frequency of depiction	Percent of users depicting
RIVER	7	23	-	-	-
KLCC LAKE	2	7	LAKE	17	57
DRAINAGE	1	3	-	-	-
LANDMARK • BUILDING • BRIDGE	28	93	LANDMARK • BUILDING • BRIDGE	29	97
PATH/ STREET	23	77	PATH/ STREET	25	83
EDGE – RAILWAY	8	27	EDGE – RAILWAY	0	
NODES • JUNCTION • SQUARE	24	80	NODES • JUNCTION • SQUARE	18	60
OTHERS • BUS STATION • LANDSCAPE • PARKING	2 2 1	7 7 3	OTHERS • BUS STATION • LANDSCAPE • PARKING • TREES	1 4 2 2	3 13 7 7

Major landmarks identified for Kuala Lumpur:

KLCC Petronas Tower
 KL Tower
 National Mosque
 Jamek Mosque
 Central Station
 KL Sentral Station

Major nodes identified for Kuala Lumpur:

Merdeka Square
 Bukit Bintang

Major landmarks identified for Putrajaya:

Putra Mosque
 Iron Mosque
 Premier’s Department
 Putrajaya International Convention Centre
 Lake Putrajaya

Major Paths identified for Putrajaya:

Persarian Perdana (main boulevard)

Major Nodes identified for Putrajaya:

Putra Square

The Symphony Lake and wading pool at KLCC Park have an important role in the image making of the Petronas Towers and shopping mall by providing a visually, aurally, and bodily pleasing, animated foreground that attracts tourists and families and provides a comfortable setting free from traffic, an ‘oasis’ within the ‘concrete jungle’ (Bunnell 1999:13), where they can linger, look at, photograph, and then visit the Towers and the Mall (fig. 5).

Lake Putrajaya was intended as the city’s central feature. The Prime Minister wanted to ‘put the water in front of the people’ (PP 2014). But Putrajaya’s main axis of government office complexes is set approximately 400m back from the lake, separated by car parks (fig. 7). A survey of the 11 buildings lining this axis’s western side shows all of their public entries face the boulevard; the rear facades only have minor staff entrances. Pedestrian access from the boulevard to the lake along transverse streets is hampered by the use of these frontages as access points for cars and service vehicles. Putrajaya’s streets and buildings are not oriented to enjoy lakeside views and breezes. Visual connectivity to the lake from the city is limited. Most other residential and office areas also turn their backs on the lake. Putrajaya’s two large mosques

stand off-axis near the lake. Their picturesque minarets and domes dominate the city image from the lake, foregrounding the government's desired image of Malaysia as a modern Muslim state (fig. 6).



Figure 7. Government office buildings in Putrajaya set well back from lake edge and facing away from it onto Persiaran Perdana. Vacant lots currently used as temporary car parks (Source: Authors).

A comparison of Putrajaya's layout (fig. 5) with that of other master-planned post-colonial capitals - Washington, New Delhi, Canberra, Brasilia, and Sri Jayawardhanapura Kotte in Sri Lanka - confirms its designers were keen to redeploy and appropriate the strong colonial image of an urban axis of power (Vale 2008). But there are significant contrasts between Putrajaya and the other capitals planned around lakes. The lake does not contribute any obvious symbolism to the meaning of the government or the nation, unlike Sri Lanka's 'floating' island parliament near Colombo, which draws upon ancient cultural precedents, or Brasilia, with its lake conceived as the headwaters of the country's three great river systems spreading north, south and east (Vale 2008). Unlike axially-planned Canberra and Brasilia, Putrajaya does not symbolically link its irregularly-shaped lake into the spatial framework that represents national identity and its connection to the wider landscape. Putrajaya's planning is more comparable to Washington D.C. in being a postcolonial capital designed to proclaim an independent identity by employing the urbanism and architecture of other, older, imperial cultures. Putrajaya's architecture does not draw upon specifically Malaysian precedents, but primarily seeks to evoke the history, modernity and wealth of the contemporary Middle East (King 2008, Moser 2012). Much of the Putrajaya lakefront remains vacant and underutilized (author survey). There are few attractions or facilities near the lake that might promote activities and attract pedestrians, and little residential development within walking proximity of the shoreline.

Economic Development

The KLCC Park is an amenity to encourage companies to make economic and symbolic investments in the KLCC's 'new downtown'. The precinct is now home to many other leading multinational and Malaysian companies including Exxon, Maxis and Mitsubishi, and several leading international hotels (Hassan and Hanif 2012). Our own survey identified 2250 hotel rooms and serviced apartments nearby. Public investment in the site has had a significant role in attracting such businesses. Twenty-seven of the site's 39 ha were public land on leasehold, but

the entire site was sold in untransparent circumstances to a former director of Petronas with close links to the then Prime Minister (Bunnell 1999). The new 20 ha park is in principle owned by the city government, but the council granted the property developers a 21-year lease to manage the park, so they could ensure high maintenance standards to optimize the value of the surrounding commercial investments (Hassan and Hanif 2012). This management regime admits the prospect of controls that go beyond mere maintenance, to optimize amenity value for commercial consumption. This includes posted rules prohibiting eating and drinking near the wading pool and adults wearing swimsuits, the right to close the pool to public use without prior notice, and construction of a leasable waterfront pavilion to re-capture the value of the lake view. The pavilion's daily rental fee is 16,000 EUR, restricting it to high-end business users. The KLCC Park serves primarily as an amenity that has helped attract wealthy tourists, shoppers and residents to the Suria KLCC mall and Petronas Towers, and is attracting significant further property development (JUMB and Langdon Seah 2014).

The larger-scale River of Life project is first and foremost conceived as an investment in national economic development, as part of Malaysia's aim to attain developed-country status by 2020. The two rivers (Gombak and Klang) which played such an important role in the history and development of Kuala Lumpur have been transformed into two industrial drains, buried under the city's transport and road infrastructure (King 2008). The current landscape along the rivers in central Kuala Lumpur is constituted by blank flood walls and empty pedestrian walkways. The only points of interest are the flood walls' informal murals (fig. 8). DBKL's deputy director of planning put it frankly: when the national government looked at what quality of life assets cities in advanced economies had, they all had revitalized urban waterfronts (DBKL 2014). Waterfront revitalization was thus made an element of the wider development goal within Malaysia's Economic Transformation Plan to enhance urban development in the Klang Valley. For ROL, economic impact is difficult to measure and very long-term, compared to industry investments in other sectors (DBKL 2014). The other ETP projects all involve exploiting existing natural or human resources. The Klang and Gombak rivers are seen as assets degraded through relatively low-value uses, underexploited and requiring public-sector recapitalization to leverage private investment in more up-market housing and offices. The Economic Report supporting the ROL Master Plan indicates that the project aims to trigger as much as 5,000,000m² of new development on private and government owned land, including 20,000 new apartments to house 66,000 residents (23% of Kuala Lumpur's total predicted growth), and 100,000 new jobs (AECOM 2013c, DBKL 2012). What the River of Life primarily seeks to emulate from the world's most liveable cities and their waterfront redevelopments is not improvements in ecology or quality of life, but demonstrating and advertising the municipal government's entrepreneurial competence in neoliberal management of an existing resource, recovering its potential as an asset to stimulate private-sector real estate investment (Desfor et al. 2010). The project clearly has an indirect, promotional role in the Klang Valley's economic development. To date, however, it is difficult to determine the viability of the ROL's economic predictions, as it has just begun construction.

Compared to ROL, Putrajaya's waterfront lacks potential to directly stimulate economic development. There was no pent-up demand for the land of the existing oil palm plantation. Like the River of Life, Putrajaya's lake and surrounding green spaces are an amenity intended to attract white-collar residents to the city, promote a leisure lifestyle that makes use of public settings, and thus stimulate domestic consumption. But Putrajaya's development is strongly shaped by state regulation and state investment; it is not a real estate venture. Tight constraints on a private-sector land market have limited the prospects for significant outside economic investment. This approach is slowly changing (Kozłowski 2014). But few sites near the waterfront are open to private-sector land development or to commercial activities. The government's emphasis on preserving water quality restricts the range and intensity of waterfront and water-based uses. A dearth of permits for restaurants and food vending means few attractors to draw

people regularly to the lake edge and keep them there for an extended time. Poor wayfinding and poor pedestrian connection to most of the lake edge also limits its attractiveness for commercial uses.



Figure 8. Informal murals painted on the concrete flood walls of the Klang River in central Kuala Lumpur. Note also transport infrastructure cutting river off from surrounding city (Source: Authors).

Putrajaya's waterfront recreation complex is at present disconnected from the government spine. Most food venues near Lake Putrajaya have views onto it but no direct physical connection, limiting prospects for complementary pools of mixed uses that would attract other consumption venues and keep the waterfront lively (Stevens 2006). Although the lakeside bicycle path is illuminated at night, public bicycle rental facilities close at 5pm, limiting evening cycling, the optimal time for active outdoor recreation in this perennially tropical climate. Our field survey of cafés and restaurants in the eight Precincts surrounding Lake Putrajaya revealed only 12 of 43 outlets are located along the 38km of lakeshore.

Putrajaya's two central mosques potentially provide focal points for catalyzing a mix of urban activities near the lake. But they are set very high above the lake edge, and are entered from the land side, along sub-axes connecting to the city spine. There is a missed opportunity to harness the potent symbolic connection between the clean lake and the ritual of washing before entering a mosque to pray. As a point of comparison, the historic mosque Masjid Jamek in the centre of Kuala Lumpur, at the junction of the city's two main rivers, was originally entered from a grand staircase leading up from the water's edge. Putrajaya's largest completed shopping centre, Alamanda, sits adjacent to the lake. Although it is too far from the city's main axis to walk, it is potentially within walking distance of several dense residential clusters. Like the Suria KLCC, the Alamanda mall has a large pond with dancing fountains outside its inland, roadway front entrance, and a smaller one at the lake end of its main spine. But like most malls, it is very internalized. The outdoor dining area is elevated 3.5m above the foreshore, and has poor connection to its lake frontage. A 3m high blank wall on the lake frontage of the adjacent Everly Hotel also discourages evening pedestrian activity along the lake.

Only in recent years has the Putrajaya Corporation begun encouraging residential and commercial development facing the lake. A new lakeside commercial complex, Ayer 8 has recently opened across from the Iron Mosque. It incorporates some retail and dining premises fronting the water. But the public waterfront right-of-way has not been upgraded to support these uses (figs 9, 10); there is a lack of coordination between private and public investments. New waterfront developments recently opened include the Putrajaya Marina recreational complex and a 2.6 ha local campus of Scotland's Heriot Watt University catering for 5000 students, deliberately sited within walking distance of the marina and resort. The campus should enhance pedestrian vitality, economic vibrancy and commercial development along the Lake (Heriot-Watt University 2014). There are still 1746 ha of vacant land suitable for development in Putrajaya. Sixty percent of this is located along the Lake or ancillary waterways (Putrajaya Holdings 2014). This illustrates the significant scope for further waterfront investment in Malaysia's administrative capital.



Figure 9. Open-sided waterfront restaurant in Taman Seri Empangan, a park adjacent to the dam at the south end of Lake Putrajaya (Source: Authors).



Figure 10. Ayer 8 commercial development, Putrajaya. Weak pedestrian connection to the lake edge (Source: Authors).

Ecological Performance

The managers of KLCC Park advertise its preservation of mature trees and its planting of a range of indigenous species, and its potential as a haven for native birds and small wildlife. But its purported role as a 'green lung' (Bunnell 1999) has to be seen chiefly in visual, psychological and promotional terms. Kuala Lumpur's hilly terrain retains adequate amounts of undeveloped, densely-forested land. The KLCC Park is an idealized, thematic construction of a tropical Malaysian landscape for leisure consumption, placed in a sublime oppositional pairing with high-tech, high-rise urban forms. It is not the riparian reconstitution of an endogenous water body; it has little capacity to improve air quality or protect biodiversity.

The creation of Lake Putrajaya and its wetlands has served practical purpose in controlling runoff and purifying the water. Putrajaya's lakefront botanical gardens and Vision Park help support biodiversity. There are numerous green fingers and reservations providing a wider green network throughout Putrajaya's built-up area. The area has a far richer diversity of plant and animal species than the palm plantation it replaced. The lake's extensive, sophisticated system of retention and filtration ponds advertise Malaysia's ecological ambitions, showcase contemporary best practice in sustainable drainage systems, and educate the public about the importance of water quality; at least for those who venture upstream of the lake to inspect them. These are certainly all significant steps forward.

But the overall visual rhetoric of Putrajaya as a 'green lung' (Siong et al. 2013) and these specific investments in ecological protection and their touted benefits should not be seen in isolation (PP 2012). As a whole, Putrajaya is a relatively carbon-intensive urban development. The city's carbon emissions have increased six-fold over the period 2007-2011, and the local authority is now pursuing policies aiming to reverse this growth (Ho et al. 2013). Putrajaya's buildings are mostly air-conditioned; only the mosques and pavilions utilize the lake breezes. The most popular outdoor waterfront places for social interaction in Putrajaya are the two major bridges that span the lake (fig. 11). Out of 48 buildings in Putrajaya's core surrounding Persiaran Perdana (Precincts 1, 2, 3 and 4), only two buildings, the Premier's Department and the Energy Commission Building are certified as having efficient use of energy, water and materials (Green Building Index 2014). The distances between workplaces, residences and leisure areas in Putrajaya are too large for walking in the hot humid climate, and so are the distances between individual buildings; most people use cars, taxis or busses.

King (2008) critiqued Kuala Lumpur's as lacking any of the kind of ecological management and education provided by Putrajaya's wetlands and botanical garden. The River of Life responds to this lack, developing an image of ecological sensitivity. Like Putrajaya, the ROL reinforces its implicit message of ecological awareness through educational facilities such as publicly-accessible demonstration detention and filtration facilities along the embankments. But these investments are not concentrated in significant, useful enhancements in ecological performance. The ROL is, rather, a carefully managed image composed from natural elements, overlaid on a thoroughly urbanized, manufactured landscape, functioning as an advertisement for the government.

Despite the high internal environmental standards of these three waterfront projects, and their appealing images as ecologically rich, vibrant, clean environments, none has the capacity to provide significant improvements in overall environmental quality for their wider urban areas, except to the extent that Lake Putrajaya provides a source of clean, drinkable water. Nor has this necessarily been intended. These are urban waterfronts, carefully designed to fit within a context of intense development and use of land and high-volume transportation infrastructure. All three of these waterfront landscapes are highly cultivated, even to the extent of reforming drainage channels and basins. The wider urban development surrounding these signature set-pieces seldom makes any attempt to yield to natural landforms and vegetation or traditional practices of managing them (King 2008).



Figure 11. People socializing in the evening on Seri Gemilang (Bridge), Lake Putrajaya (Source: Authors).



Figure 12. Reinstatement works on stairs leading down to the river confluence, Masjid Jamek (Mosque), Kuala Lumpur, October 2014. (Source: Authors).

CONCLUSION

The waterfront precincts examined here contribute significantly to the portrayal of Putrajaya and Kuala Lumpur as post-industrial cities that have moved beyond a colonial heritage of resource extraction and dependence, and that can compete for residents, global visitors and high-end real estate investment on the basis of high-quality landscapes tailored to consumption and displays of environmental responsibility. The KLCC and Putrajaya waterfronts also follow similar projects overseas in being largely segregated from existing mixed-use pedestrian precincts that could potentially make these waterfronts lively, inclusive social settings. Rather than reconnecting urban areas with the water, KLCC and Lake Putrajaya establish new enclaves. The ROL project's effort to re-integrate the city centre and the rivers by emphasising connectivity to, across and along the river corridor is a step in the right direction.

Despite critiques of its origins and ethnic exclusion, the Islamic-inspired architecture of Putrajaya and the Petronas Towers has been quite successful in presenting a distinctive new Malaysian identity (Moser 2010, Bunnell 1999). The same cannot be said for the waterfront landscapes that these buildings sit within, which reproduce generic international ideas about the appearance and uses of waterfront open space. These settings are strongly influenced by both Western and Eastern exemplars with colonial heritage: green oases within shopping malls, aquatic play zones, riverside promenades, restored colonial buildings, artificial beaches, educational demonstrations of ecological restoration, spectacular road bridges. None of the three projects reflect the local context of hilly, tropical jungle (except by selecting choice tree specimens from it), and there is little attention to traditional local ways of managing and using waterfront landscapes.

While urban waterfront redevelopment in most countries involves remediating the toxic heritage of former sea and river ports, none of these three Malaysian sites were industrial precincts. While Lake Putrajaya and the River of Life, like other urban waterfront renaturalization schemes, clearly provide aesthetic benefits that attract tourists and residents, there is no evidence that the three projects significantly enhance overall environmental indicators such as air and water quality. Also in representational terms, these three projects do not engage directly with the particular history of their landscape of colonisation, immigration and development - the tin mines, the plantation, the horseracing club, the Chinese commercial zone. Putrajaya's grand new urban architecture largely ignores the Malay vernacular housing or mosque forms with their tiered roofs and open walls and their intimate relation to water. In terms of appearance, use and

development process, these waterfront projects are formulaic, similar to urban waterfront redevelopments elsewhere. The use of international design consultants to shape KLCC Park and the River of Life suggests this was actively sought.

These three projects conform to King's (2008) assessment of Malaysian urban landscapes generally as being collages of contradictory, largely exogenous influences and objectives. Such contradictions are perhaps at odds with the very idea of an 'ecology', undermining any prospect that sets of forces can be brought into balance. Malaysia's planners and designers are clearly seeking to forge distinctive outcomes by drawing on a range of external exemplars, but the predominantly Western models, which are mostly former industrial areas in temperate climates, are of questionable relevance to the Malaysian context. The greatest lack seems to be in Malaysia's new urban waterfronts learning from their own local spaces and traditions and developing new, distinctive paradigms. Four more authentic possibilities for Malaysian waterfronts are suggested by existing sites within our study areas. The first is the numerous street-art murals currently lining the concrete flood walls around Kuala Lumpur's river junction (fig. 8). The very inaccessibility of this riverfront has made it a sheltered site for this rare kind of contemporary public expression. There is little public art in KL and Putrajaya, especially not depicting people. The second locally-derived waterfront public space is the numerous modern, open-sided pavilions facing onto Lake Putrajaya, such as the large fish restaurant overlooking the lake's remote southern end, next to its retaining wall (fig. 9). Third, Putrajaya's two main lake bridges (fig. 11) are very popular locations for evening socializing because of their breezes, views and night-time illumination. More could be made of the opportunities for public life encouraged by these predominantly-vehicular bridges. The fourth is the steps that lead up from the river to Kuala Lumpur's first mosque, Masjid Jamek, now being reinstated (fig. 12). This links the intimate religious practice of washing the feet to the city's founding location. These latter examples encourage people to have prolonged, frequent engagement with the river in their everyday lives. Rather than jet-ski rentals, high-rise luxury apartments and school visits to retention ponds, these seem to be activities that Malaysians readily associate with urban waterfronts.

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PEOPLE'S EVALUATION TOWARDS MEDIA FAÇADE AS NEW URBAN LANDMARKS AT NIGHT

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Abstract

This paper attempts to help designers to turn a building into media facade as an attractive landmark for people's urban night life. The literature survey points towards being dynamic and interactive with observers as the two quality dimensions for implementing this emerging lighting technology. Based on a survey of eleven selected media facades using video films to 250 students and staff at a public university, results identified twelve attributes for these two qualities. However, item analysis and exploratory factor analysis of the results determined only ten attributes actually support people's attention towards media facade. The attributes of unique landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, on going process, and dynamic advertisement could be categorized under the visual quality dimension. On the other hand, attributes of covert interaction, overt interaction, and predesigned interaction could be categorized under the interactive quality dimension. This study contributes in prioritizing visual qualities for guiding the attractiveness of buildings' appearances at night, hence enabling the creation of new dynamic urban spaces when designing buildings.

Keywords: Architecture; Nocturnal Appearance of Buildings; Exterior Lighting Technology; Media Façade; Sustainable Design Informatics.

INTRODUCTION

The recent history of the built and urban environment is, to a great degree, about advances in building technologies. Late nineteenth- and twentieth-century developments in new materials led to a revolutionary transformation of cities and buildings, which are not initially associated with the construction systems, but, in turn, transformed the ways in which we live and work within the built environment (Haeusler, 2009). Schieck (2006) theorizes the possibility of altering the form and dynamics of cities through the effects of technologies. The role of electricity is obvious for the architecture after dark when the value of night in modern life—as the main part of the day for spending leisure time outside—would make it notable.

Electricity is the technology that has been a source of profound wonder from the first moment of its recognition (McQuire, 2005) through its ability to increase the duration of liveability and usability of a city and hold the attention of people for a longer period (Santen, 2006). However, lighting is no longer exclusively functional but should be pleasing (Neumann, 2002) in order to follow the purpose of 'beautification of the city' to make a city more attractive and inviting even after dark. Therefore, the importance of lighting for urban spaces would be highly appreciated in order to keep the city dynamic for a longer period and also enhance the nocturnal scenery of the city.

Users are the key components of urban places where the physical features and architectural appearance play an important role in influencing their sense of place and the degree of attachment (Ujang, 2012). In this regard, people's emotional responses to buildings are prominent among many personal and contextual factors that affect the assessment of the

architectural beauty and the environment in general (Nasar, 1994; Mehrabian and Russell, 1974). The facade is the face and the image of the building to the public (Nicolai, 2008), which plays a key role in the emotional and rational communication between the building and the public. Therefore, exterior façade lighting has a vital role in urban spaces and predominantly influences the environment and memories of a city at night. The possibility of programming the new lighting technology would consider the potential for architecture to go beyond the stasis of a frozen process or repetitive script (Moloney, 2007). As a result, architecture is no longer considered an unchangeable constant appearance, and, hence, the static impression of buildings is disappearing. The dynamic behaviour and the diversity of aesthetic opportunities are gradually changing the image of modern architecture (Nicolai, 2008).

According to Ujang and Muslim (2014), there is a need to enhance the attractiveness of building and spaces in the city centre of Kuala Lumpur for visual fulfilment for the pedestrian. The purpose of our study is to determine whether the emerging media facade has the potential for turning a building into an attractive landmark for people's urban night life. The literature review in the following section covers the history of exterior lighting for building facades and develops the main concepts of media facade as the theoretical bases of this study. This is followed by a presentation case study analysis of eleven distinguished buildings from the Media Façade Festival in Berlin (2008) and London (2009), which highlight the characteristics of media façades. We later present the survey methodology of people's evaluation towards these characteristics and the relevant analysis and results before concluding with recommendations for further studies on the use of media façades.

LITERATURE REVIEW

This study intends to determine whether the emerging media facade has the potential for turning a building into an attractive landmark for urban night life. Disregarding the studies related to the technology aspect of this phenomenon, the existing literature is reviewed for identifying the distinctive concepts of this new technology compared with the conventional approach of exterior façade lighting. From the unique dimensions of the technology, we formulate our theoretical proposition for further qualitative analysis of selected projects in order to redefine the attributes pertaining to these qualities and then evaluating people's perception.

From Conventional Façade Lighting To Media Facade

Electric lighting began in the 1890s by introducing various forms of incandescent and arc lighting (Boyce, 2006), whilst the history of public lighting began in the sixteenth-century by using candlelight (Santen, 2006). The first systematic explorations of the possibilities for using electric light to alter the appearance and ambiance of urban space occurred in the controlled environments of the world's fairs of the nineteenth-century (Krylov, 2008; McQuire, 2005). By that time, a new level of control over the living environment was achieved by the wide adoption of electrical systems for practical uses (McQuire, 2005). However, the first century of this invention/discovery was almost allocated to developing a system for quantifying and measuring light and also introducing many new light sources (Boyce, 2006). Over the same period, which is considered as the reign of the illuminating engineer, the focus was mostly on the science of lighting and the main functionality, safety, security, and visual task. Whereas, the new era, from about 1970, is seen as a transformation associated with a shift in emphasis from the science to the art of lighting by the rise of the lighting designer. In this regard, accentuating the architectural form of building was the most common approach in exterior façade lighting for a long time; such as delineating the outlines of buildings (outline lighting), and illuminating those features of a building that deserve attention (floodlight illumination) (Santen, 2006; Neumann, 2002).

Most recently, a new dimension has been applied in façade lighting design, which belongs neither to architecture nor lighting, as they were traditionally understood. The new level of exterior

lighting for building facades appeared through the use of computer-based technologies in the 1980s, since when there has been an increasing revival and renewed interest in artificial light as an artistic tool (Neumann, 2002). This has become possible due to the proliferation of transparent and highly reflective surfaces and the new ways of illuminating the cityscape. In relation to this, the new environment is progressively characterized by the overlap of the material and immaterial and urban surfaces function as illuminated screens in the modern city (McQuire, 2005).

Media facades are an innovative trend in the world of lighting design, which emerged through a combination of striking lighting design and interactivity (Lighting Academy, 2006b), in order to influence people psychologically and “tickle the user’s joy button” (Delores, 2000). Based on Frenchman (as cited in Lighting Academy, 2006a), this new lighting is integrated, programmable and interactive. While being integrated with the urban functions and able to satisfy demands on the spot of people, lighting has to be programmable according to the users’ wishes and thus, facilitate experiences in the urban space, changing contents, moods and messages. It should also be interactive as it responds directly to people and the environment. Therefore, lighting is no more simply lighting but becomes information. Striking the attention with interactivity is the key concept of media facades, which is expressed through dynamic lighting (Lighting Academy, 2006b). An interactive relationship between the user, the building and the city can be created by applying media architecture as a spatial and temporal programming of light (Vermang, 2007). Therefore, interaction with the surrounding environment and its inhabitants is the unique dimension of this technology. According to the significance of connectedness, interactive installations fill an important role in engaging people with architecture and connecting them with others (Knapp, 2007).

From another perspective, artificial light, which allows a building to be illuminated, and can underline parts of the building and create an atmosphere by using different colours and brightness, is considered as “light architecture” by Haeusler (2009). In the following respects, media architecture differs from light architecture and the important difference here is the dynamic aspect. Media architecture includes all aspects of displaying dynamic graphics, dynamic text, dynamic image and spatial movement. In other words, the projection of a light source on a surface, such as a lamp, would be classified as light architecture whereas the integration of a moving graphic, text or image is classified as media architecture. Schieck (2006) believes that the moving images as architectural surfaces play a critical role in our understanding and evaluation of the new form of architectural space. Therefore, the dynamicity is the other unique characteristic of the new technology of exterior lighting.

Our literature survey reviewed also the contents and design purposes of media facade by considering “dynamicity” and “interactivity” as the main dimensions. There is not one single goal that media facades try to achieve so that different contents are offered (Alt et al., 2012). Media facade’s contents that have been employed in urban displays are categorized in a broad range of possibilities. For example, where Diniz et al. (2012) point out aesthetical, information, adaptive landscape, and community reflection or mediation as different categories, Vande Moere and Wouters (2012) only focus on commercial, artistic or entertainment purposes. Haeusler (2009) demonstrates that media facades are regarded as a multipurpose design due to the variety of its possible contents, such as illumination only, text and/or graphic with different resolutions, and different formats of video. It provides a living canvas for public art, a brave new tool for advertising and branding, and innovative ways for designers to interact with large-scale built environments (Knapp, 2007). Media facades are early manifestations of architecture adapting to an information rich society by mediating between the physical and information space (Moloney, 2006). However, most large public displays have been used for conveying information to passers-by through their one-way information channels (Peltonen et al., 200) which merely present them as visual displays. Today’s urban space is not mediated by just the current levels of visual display, rather should be considered with interaction and communication (Townsend, 2004).

Thus, media facade contents can be reviewed and analyzed based on the degree of user engagement. In this regard, media architecture would be considered as a field that comprises physical structures utilizing digital media to broadcast information to their immediate vicinity, passively or interactively (Vande Moere & Wouters, 2012).

This theory is also supported by media facade classification into expressive and interactive categories. "Expressive display" is the term used by Park et al. (2011) for those media facades without any interaction with users and environments. Designers and artists are the main creators of such digital contents to inform and entertain urban dwellers through uni-directional communication in visually diverse formats; such as video, animated text, and graphics (e.g. African Pavilion, BIX, Spots, and Uniqa Tower projects). Compared to the more wide-spread, passive public screens, "interactive media facades" not only provide an interface between the media and the audience but are designed to facilitate interaction in response to changing conditions in their surroundings and handling variations on audience flow and engagement at real-time (Hespanhol & Tomitsch, 2012). In this regard, the artist is not the sole creator, rather often plays the role of a mediator or facilitator for audiences' interaction (e.g. Tower of Wind, and Allianz Arena projects). "Reactive" could be defined as another form of content in which content is not fixed and changed based on data collected from environmental stimuli; such as weather, lighting conditions, sounds, user movement, traffic density, population density, and other socio-cultural quantitative data (Park et al., 2011). Even though people can play a role in some types of reactive content, but their interaction with the media facade is unintentional without awareness about their role. In other words, people have the opportunity to decide and influence only the interactive contents of media façade, but not its expressive or reactive ones.

From our selected literature survey, the paper found that being dynamic and interactive are the two main concepts differentiating the new trend from the conventional approach of exterior façade lighting. Hence, we are proposing that dynamicity and interactivity could attract the public towards the urban spaces that a building belongs to at night. Therefore, it is critical to identify the attributes of these dynamic and interactive exterior lighting features to support novel entertainment, information seeking, and social discourse in a way that involves and attract urbanites. In this regard, the study had proposed a qualitative case study analysis of the selected buildings to identify the dynamic and interactive attributes of media facade in the first step, and then a questionnaire survey to determine the people's evaluation of them and accordingly towards such a new landmark at night.

METHODOLOGY

This study carried out a mixed-method (Creswell, 2007) research approach involving qualitative and quantitative methods in order to design a research process for investigating new exterior facade lighting and determine the potential for increasing the attractiveness of the nocturnal appearance of buildings, and thus creating new dynamic urban spaces.

First, a collective or multiple case study (Stake, 2005) was employed for concentrating qualitatively on a single phenomenon (Media Facade) through which the study aims to uncover the interaction of significant factors characteristic of the phenomenon (Cronbach, 1975). In this sense, the samples were chosen purposefully from which the most can be extracted (Patton, 2002). Maximum variation (Creswell, 2007) was considered for initial sampling among the media facades introduced in the international conference of Media Architecture in London (2008) and Berlin (2009). The process of analysis included two stages, within-case analysis and cross-case analysis (Yin, 2008). While the study started with the most information-rich cases (Patton, 2002), it continued until nothing new was being added, and, therefore, a sample size of eleven was determined based on the saturation point (Kumar, 2005). Table 1 illustrates the information of the buildings, which were selected as the final samples.

In the second part, a questionnaire-based survey was used as a tool for data collection (Kumar, 2005). It was designed based on the findings of the first part. This self-administered questionnaire was developed in two languages—*Bahasa Melayu* and English—for enabling the researchers to achieve better feedbacks from the respondents. In order to measure how people perceived the quality of the new exterior lighting for building facades, respondents were asked to rate each of 12 statement items using a 7-point Likert scale (1 extremely disagree - 7 extremely agree). The 12 statements represent the 12 characteristics found from the earlier qualitative part. Since the respondents needed to watch a video film before filling up the questionnaires, a suitable place was considered to gather a number of participants for each session. For ease of the research, a laboratory survey of a sample population at a public university was considered.

A total of 250 respondents were selected based on a systematic sampling among local students, lecturers and staff of a public university to represent the Malaysian population. The validity and reliability of the instrument design were considered through different steps; the questionnaire was drafted based on the literature and first qualitative analysis of the phenomenon, and then discussed with the supervisory committee to review it. Moreover, participants of the pilot study were asked to assess the questionnaire to gauge for clarity and validity of items in terms of content and construct. The scale used in every question and statement in the questionnaire was tested on its reliability by using Cronbach’s Alpha. We discuss the results and analysis below. Ultimately, the conducted statistical analysis (Item Analysis and Exploratory Factor Analysis) on the results of the questionnaire survey and further discussions on the interpretations provided an adequate basis for the final conclusions (see Figure 1).

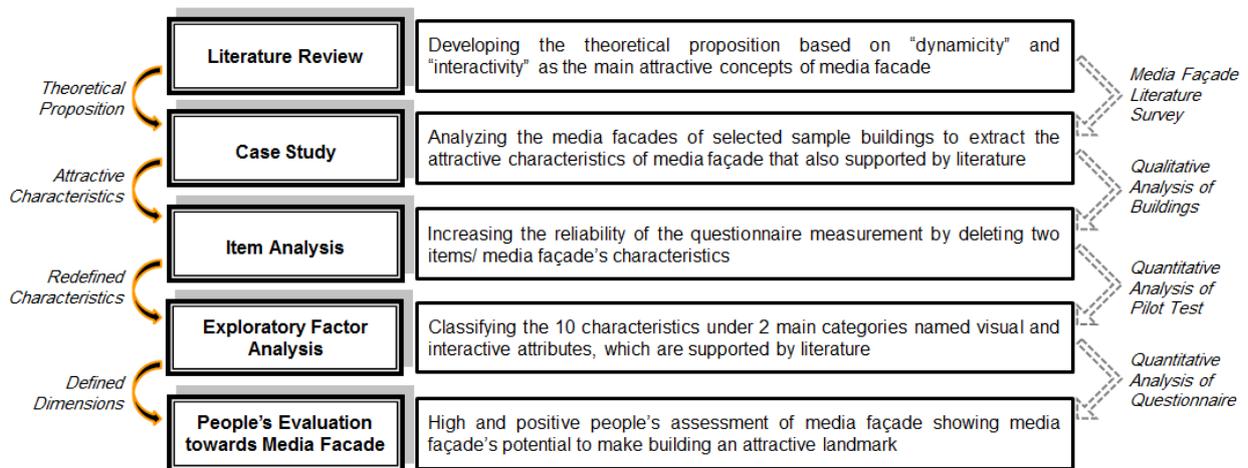


Figure 1. Data collection and analysis steps of the employed research methodology (Source: Authors).

RESULTS AND ANALYSIS

Characteristics of Media Façade

This section presents the results of our qualitative analysis on eleven selected buildings, which have media facades (see Table 1). The study found twelve characteristics: uniqueness landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, on-going process, match content with building, permanent Installation, dynamic advertisement, covert interaction, overt interaction, and predesigned interaction. All the found attributes are related to dynamicity and interactivity as the main dimensions. Their attributes are supported by relevant literature mentioned following Table 1 below.

Table 1: List of buildings having media facade for the study (Source: Authors).

Project Name	Location	Year	Description – Building Uses
1. Uniqa Tower	Vienna, Austria	2004	The headquarters of insurance company
2. African Pavilion	Saragossa, Spain	2008	The pavilion of the African countries
3. Dexia Tower	Brussels, Belgium	2006	An office building
4. Blinken Lights	Berlin, Germany	2001	The upper eight floors of the Chaos Computer Club
5. BIX	Graz, Austria	2003	A museum
6. Spots	Berlin, Germany	2005	An empty office building
7. National Library	Minsk, Belarus	2006	A library
8. Channel Ginza	Tokyo, Japan	2004	A leading, luxury and historic fashion brand
9. Galleria Store	Seoul, South Korea	2004	A department store
10. Allianz Arena	Munich, Germany	2005	A stadium
11. Tower of Winds	Yokohama, Japan	1986	A ventilation for an underground shopping centre

Uniqueness landmark

In contrast with ambient lighting, which favours uniform lighting (Hanyu, 1997), exterior lighting would make buildings stand out from their neighbours (Warson, 2007). Non-uniformity has been reported as a preferable characteristic in interior lighting (Flynn, 1988; Hendrick et al., 1977; Flynn et al., 1973), and it could be generalized to the new approach in exterior façade lighting with the purpose of attracting people's attention. In this regard, the most common attribute of using media façade is altering the structure of the building to an outstanding edifice and distinctive in its vicinity or on a bigger scale, which could be a town, country or even the world (Figure 2).



Figure 2. Unique lighting of exterior façade makes Dexia Tower distinctive in the vicinity.

(Source Left: <http://www.hediger.be/uk/eclairage-tour-dexia.php>;

Middle and Right: <http://www.webvolution.it/blog/leds-change-the-world/>)

Different nocturnal appearance

Unlike the conventional approach in exterior façade lighting, the media façade is somehow independent from architectural form, structure and detail. They cause different nocturnal appearance of a building emerging at night compared to its daytime appearance (refer Figure 3). In this aspect, these media façades present different views of a building at night, which would not have been experienced with the conventional exterior façade lighting approaches. Such as, the effects of outline lighting or floodlight illumination. The results support Neumann's (2002) opinion that since artificial light could never compete with daylight, any attempt to give a forced daytime appearance of buildings at night is rejected. Therefore, the study finds the collaborative potential

between digital designers and architects for enhancing or altering the structural image, while creating a new identity in the darkening sky.



Figure 3. Independence of Uniqa Tower exterior lighting to the building structure.

(Source: <http://www.lichtkunstlicht.com/en/projects/media-facades-and-light-art/uniqa-tower-vienna.html>)

Dynamic colour

Colour is also defined as one of the visually perceived factors in conventional exterior lighting for building façades (Masuyama, 2003), which has become one of the most effective commanding factors by removing the cornice in modern architecture (Neumann, 2002). Colourful lighting as the main and basic factor in attracting people to buildings at night would be more prominent in media façades due to the possibility of continuous change based on the programmed pattern (Figure 4).

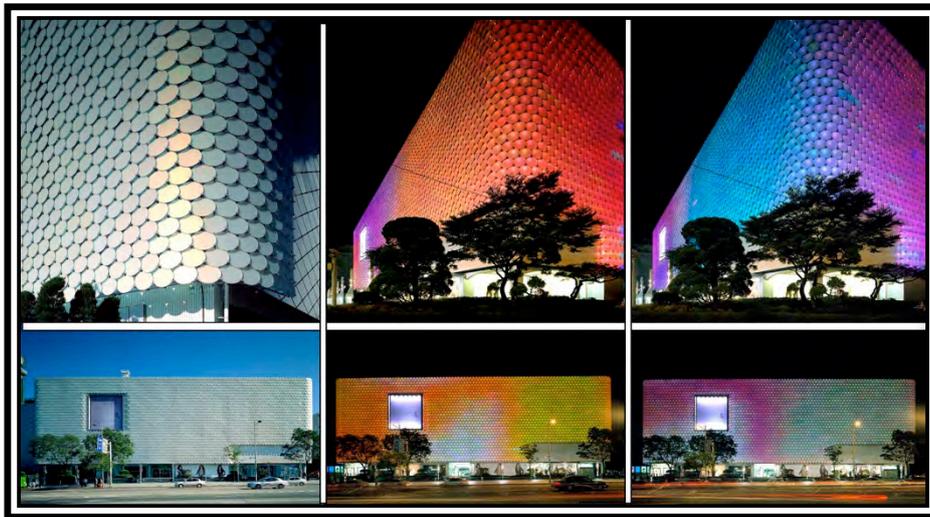


Figure 4. Different colour for exterior façade lighting of Galleria Store.

(Source: <http://www.unstudio.com/projects/galleria-department-store>)

Dynamic advertisement

The dynamic character of contents for media façades has good potential for advertising purposes in that they could direct people's attention towards a specific product or process (Figure 5). Since dynamic images can offer much more than a static image, which often stays on the level of a sign (Haeusler, 2009), media facades are now introduced as an important tool for advertisers by reaching the primary goal of attracting and bringing people together to visualize certain themes and values (Lighting Academy, 2006b). The dynamic potential of this technology means it is not

boring and repetitive, and, as a result, time-based media would take a leading role in broadcasting art through a commercial and advertising base (Kumra, 2006).



Figure 5. Chanel Ginza store presenting different advertising contents relevant to the Chanel brand.
(Source Left: https://mgbarahona.files.wordpress.com/2011/09/chanel_tower.jpg
Right: <http://www.deankaufman.com/worka/imgs/img07.jpg>)

Ongoing process

The dynamic character of content in media façade transforms the building from static status towards a dynamic one, which brings a further characteristic to the building appearance. According to Dorin (2001), who illustrates 'painting, acting, and gardening' as 'fixed, repetitive and ongoing' approaches in the process of creation, conventional lighting is presented as a fixed process while media architecture could be offered as repetitive (Figure 8) or ongoing (Figure 6). However, contingency and unpredictability play a greater role (McQuire, 2006) for the contents, which are defined based on the received information from the environment or people's participation.



Figure 6. Tower of Wind lighting reacts to the direction and the force of the wind and surrounding noise.
(Source: <http://www.archdaily.com/344664/ad-classics-tower-of-winds-toyo-ito/>)

Permanent Installation

Even though the media have to be an integral part of the architecture, media facades could be seen as an additional option to the conventional building shell in order to extend the ways of expressing architecture (Nicolai, 2008). In this respect, the investigated media façades are

categorized into two different groups, those designed to have media as an integral part permanently (e.g. Spots), and the ephemeral ones, which present media content for limited periods of time or in specific events (e.g. Blinken Lights). Media Facades, either permanent or temporary, could be applied based on the existing conditions and desired purposes.

Artistic lighting performance

Lighting design is a combination of an art and a science, and, therefore, designers should be concerned not only about the aesthetics, but also about the digital world and the latest technical knowledge. While the mastery of new technologies influences the production of art, twenty-first century artwork is dominantly formed by employing computers. Hence, 'Kinetic Art' as the new interpretation and use of light and motion (Popper, 1993) enables designers to exert an influence on the public to such an extent and becomes one of the most noticeable factors in the new approach of exterior façade lighting (Schieck, 2006). Therefore, being aware of the progress in science and the art of lighting seems inevitable to create a new architecture, which is responsive to the needs of our age (Neumann, 2002). As a result, Media Facades provide a living canvas for public art for designers to interact with large-scale built environments (Knapp, 2007) (Figure 7).



Figure 7. Artistic performances in BIX (Left) and Spots (Right).

(Source Left: <http://realities-united.de/#PROJECT,69,3>; Right:<http://realities-united.de/#PROJECT,81,3>)

Matching content with building

Since cities have recently become more and more engaged in the struggle against a feeling of 'placelessness' (Struppek, 2006), relevance of content to the context is another highlighted criterion (Figure 8). Media Facades have a social responsibility and a civic function beyond advertising, and, accordingly, should not be considered just as video billboards for rent (Velicescu a.c.f. Popper, 1993). The narrative on the façade should be expressive of the building, its architectural stance and its interior (Sauter, 2007), as irrelevant content fails to obtain the appreciation of the surrounding community (Knapp, 2007). If the content of media facades bears no relation to the building or the place where it is located, not only may unavailing media architecture arise, but also poor advertisements (Tscherteu, 2008). The paper agrees with Struppek (2006) that the consideration of the locality and site-specificity of such screens could help to prevent further disconnection in the perception of urban space.



Figure 8. Repetitive video content of African Pavilion match with the building and its purpose.
(Source: <http://www.mediaarchitecture.org/wall-of-africa-expo-2008-zaragoza/>)

Informative lighting

Due to the ability of being networked and conveying information, such architectural surfaces as visual interfaces become a medium of communication in the age of information (Knapp, 2007; Schieck, 2006). This potential for communication gives architecture a dimension other than the purely decorative due to computation and sensing, which are moving from computers and devices into the environment itself (Sparacino, 2002). One way communication is a unique characteristic of architecture adapting to an information rich society by mediating between physical and information space. In this regard, this kind of surface could respond to changing contexts, such as environmental and socio-cultural (Moloney, 2007), and could present the information in different visual forms while being decoded by observers (Figure 9). The result is an “augmented space” referring to the physical space, which is overlaid by dynamic data (Manovich, 2006).



Figure 9. The different colours of Allianz Arena stadium show whether Bayern Munich (red) or Munich 1860 (blue) has a home game; on an occasion irrelevant to these two teams, the stadium becomes white.

(Source Left: https://commons.wikimedia.org/wiki/File:Allianz_Arena_Pahu.jpg;
Right: <http://www.thefootballstadiums.com/allianz-arena-one-of-the-most-modern-stadiums>)

Overt interaction

The immediate effect on media facade could be accomplished in another form of interaction when a distinctive platform/kiosk or medium is considered for the interaction. In such cases, the action is generally not about playing or texting by personal devices but making decisions on the colour and pattern of the geometric shapes for being displayed on the façade concurrently. The difference of this attribute with the previous one is its performative perspective which makes such interaction interesting not just for those who are involved but also for the other spectators. In this respect, pedestrians could easily show their impression on the lighting appearance by changing

the colour or graphical forms based on their favourites and others' recommendations (Figure 10). The idea of participation and interactivity between the artist and the general public would be considered as the most noticeable factor of this lighting technology (Schieck, 2006).



Figure 10. A platform in Dexia Tower allows instant changes of the colour and pattern of lighting by the public. (Source: <http://www.mediaarchitecture.org/dexia-tower-brussels/>)

Covert interaction

Entertaining is the quality that amuses visitors through different approaches, such as playing simple games or sending text onto building facades (Figure 11). Tscherteu (2008) believes that the biggest potential for the identification of occupants with media architecture consists of an interactive media concept, through which the users are given different possibilities to communicate with the building itself. In this respect, the two-way communication would enable people to become involved with the building and its content. Since this participation is mostly about spending leisure time to have fun with personal cell phones, it could play a vital role in attracting people. The main point here is doing the interaction, not in a performative way where others usually notice the result not the interaction itself.

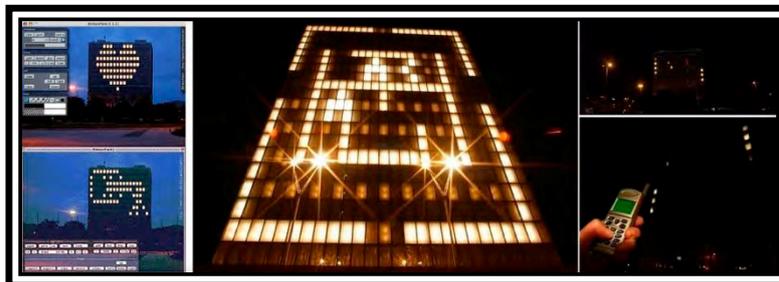


Figure 11. (Right) Playing simple graphical games on Blinken Lights façade through cell phone; (Left) Easy use program enables people to design different animations for the project. (Source: <http://blinkenlights.net/project>)

Pre-designed interaction

There is another opportunity for people in the public domain of having communication with media façades. While this is not an immediate interaction with this kind of buildings, each person who is

interested in designing any content for a media facade have the opportunity to simply download the software, which is presented by the lighting designers of the building. After the proper contents, which mostly include simple graphic forms are designed, they would be sent to the building by the users. Accordingly, they would be presented in the allocated time. It seems that the possibility of interacting with a facade by designing its content appeals to a whole urban population not only the individual users (Tscherteu, 2008).

Influential Factors Based on People Evaluation

The following section now presents the results of the succeeding quantitative survey research methodology for the study. The study had hypothesized that the attributes of the emerging media facade have potential in attracting people towards the buildings as an attractive landmark for urban night life in Malaysia. In this respect, item analysis and exploratory factor analysis were applied to define latent dimensions for better understanding of people's evaluation towards media facade.

Table 2: Item-total statistics for new lighting attributes (Source: Author).

New Lighting Attributes	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Uniqueness landmark	63.4792	52.605	.611	.827
Different Nocturnal Appearance	63.3912	53.473	.671	.826
Dynamic Colour	63.1520	55.446	.580	.833
Informative Lighting	63.4876	54.613	.455	.838
Artistic Lighting Performance	63.6152	51.528	.655	.824
Match Content with Building	63.9792	55.221	.290	.852
Ongoing Process	63.5840	52.328	.655	.825
Permanent Installation	63.9552	53.702	.336	.851
Dynamic Advertisement	63.6296	51.915	.572	.829
Covert Interaction	64.1380	49.743	.471	.842
Overt Interaction	63.6696	51.250	.609	.826
Pre-Designed Interaction	63.7064	53.246	.553	.831

Item analysis of new lighting technology

This part further analysed the 12 identified potential lighting characteristics to capture the domains of new nocturnal lighting technology. After careful inspection of the 12 item content for domain representation, 2 items (match content with building, and permanent installation) with low corrected item-total correlations (.29 and .34, respectively) were deleted (Arnold and Reynolds, 2003; Tian et al., 2001). While the Cronbach's Alpha was .845 for the measurement with 12 items, Table 2 shows that deleting each of these two aforementioned items resulted in increasing the reliability of the measurement. It is concluded that since the data were collected in laboratory conditions, these two items do not seem to be clear to the respondents while they would be more apprehensible when respondents are familiar with the building and experience the environment in the real world. Therefore, even though both of these characteristics have been removed in our study, their impact on people could be comprehended in future studies conducted in the real world context. Thus, the item analysis resulted in a pool of 10 items retained for further analysis.

Exploratory factor analysis of new lighting technology

Following the item analysis, the item content for each domain representation was inspected. The remaining 10 items were subjected to a series of exploratory factor analyses with varimax rotation to reduce the set of observed variables to a smaller, more parsimonious set of variables. While examination of the Correlation Matrix reveals fairly high correlations between the ten items, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.899) illustrates a meritorious acceptance by exceeding the minimum requirement value of 0.6 (Tabachnick and Fidell, 2007; Pallant, 2005). In addition, the significance value of Bartlett’s Test of Sphericity ($p < 0.05$) in this study, indicated that the data set of distributions was acceptable for conducting factor analysis (Ho, 2006; Pallant, 2005).

Since the appropriateness of the data was ascertained by the results of the preliminary analysis, the study proceeded with a factor analysis procedure (Hinton, 2004). In this respect, the eigenvalues criterion and variance explained (Hair et al., 2010) were used to specify the number of factors that should be extracted. In this way, the result of exploratory factor analysis with varimax rotation, which was delineated by Principal Component Analysis (PCA), reveals the presence of a two-factor structure with eigenvalues of 1 or greater (Ho, 2006). In this study, the 10 items yielded two components, which were able to explain 58.79% of the cumulative variance, whilst the total variance for each component was 34.63% and 24.16%, respectively (Table 3).

Varimax rotation with Kaiser Normalization was used to clarify the factor loadings into a certain dimension, considering .4 as good rule of thumb for the minimum loading (Hair et al., 2010). Examination of the factor loadings shows that all of the ten variables loaded highly (> 0.40) on the two factors representing the new lighting qualities, without any significant cross loadings (Table 3). Furthermore, examining the communality criterion (Garson, 2009) shows that they range from .50 to .68 and no low communalities (less than .40) need to be dropped. However, although they could not be considered as high communalities due to the values that are not greater than .80 (Velicer and Fava, 1998), the range of .40 to .70 are more common magnitudes in social sciences (Costello and Osborne, 2005). Finally, according to Costello and Osborne (2005), both of the extracted factors were considered acceptable with more than two items.

Table 3: Results for New Lighting Technology Dimensions (Source: Author).

Exteracted Factors for New Lighting Attributes (Reliability Alpha)	Factor Loadings	Eigenvalues	Variance Explained	Item Means	S.D.
F1: Visual Quality (.85)		4.76	34.63		
V1: Uniqueness landmark	.75			5.96	.97
V2: Different Nocturnal Appearance	.74			6.04	.81
V3: Dynamic Colour	.71			6.28	.71
V4: Informative Lighting	.71			5.95	.97
V5: Artistic Performance	.68			5.82	1.02
V6: Ongoing Process	.55			5.85	.94
V7: Dynamic Advertisement	.65			5.81	1.09
Grand mean				5.96	
F2: Interactive Quality (.72)		1.11	24.16		
I1: Covert Interaction	.82			5.30	1.52
I2: Overt Interaction	.78			5.77	1.11
I3: Pre-Designed Interaction	.71			5.73	.98
Grand mean				5.60	
Total Variance			58.80%		

In the next step, each factor was named based on the characteristics of its composite variable. The first factor contained seven items and was labelled, “Visual Quality”, because all of them are related to the visual aspect of nocturnal appearances of buildings. Visual quality represented an important aspect of the new lighting technology, which is mostly influenced by its dynamic characteristic. Transforming the immutable appearance of architecture to the changeable and dynamic performance is the major visual difference between the new lighting technology and its former ones. The seven items in visual quality comprised uniqueness landmark, different nocturnal appearance, dynamic colour, informative lighting, artistic lighting performance, dynamic advertising, and ongoing process; all of which were visual characteristics of the new lighting technology in the creation of an aesthetic and attractive atmosphere. As expected, “Visual Quality” captured a larger variance of the characteristics of new lighting technology compared with the other dimension, accounting for 34.63% of the total variance.

The remaining variance (24.16%) is expressed by the second factor, “Interactive Quality”, which included different forms of interactivity that could happen between the buildings and the people. As discussed in the literature review, interactivity is the other significant concept that is considered as a distinction between the new and conventional type of lighting. In this study, “Interactive Quality” featured three attributes – covert interaction, overt interaction, and predesigned interaction – all of which pertain to the two-way interaction between the observer and the building. In different levels and degrees, the role of the people is changed by these possibilities from only observer into an effective factor in what is displayed on the buildings.

People’s evaluation of two different qualities of media facade

Respondents positively rated all items of the lighting attributes, where grand means (see Table 3) indicated that both of the dimensions (Visual Quality and Interactive Quality) were consistently highly rated (5.60 and 5.96). Interestingly, all the items belonged to the visual qualities were assessed as relatively positive at higher than 5.80: uniqueness landmark (M=5.96, SD=.97), different nocturnal appearance (M=6.04, SD=.81), dynamic color (M=6.28, SD=.71), informative lighting (M=5.95, SD=.97), artistic lighting performance (M=5.82, SD=1.02), ongoing process (M=5.85, SD=.94), and dynamic advertisement (M=5.81, SD=1.09). Despite occupying a lower place in ranking by interactive quality items comparing with visual quality items, these items are also highly rated, at equal or higher than 5.30: covert Interaction (M=5.30, SD=1.52), overt Interaction (M=5.77, SD=1.11), and pre-designed Interaction (M=5.73, SD=.98). Thus, the findings confirm the hypothesis that the emerging media facade has enough potential in turning a building into an attractive landmark for people.

In the final section, the study intends to compare the level of people’s interest towards different aspects of media façades. Therefore, a paired sample *t*-test was performed to determine whether or not there is any significant difference in people’s mean interest towards the visual and interactive quality of media architecture. The results indicate that the mean score of the respondent’s interest towards the interactive quality of media architecture (M=5.60, SD=0.98) was significantly lower than the mean score of the respondent’s interest towards the visual quality of media architecture (M=5.96, SD=0.68), $t_{(250)}=6.99$, $p<.05$. The 95% confidence interval for the mean difference between the two mean scores was .26 to .46 (Table 4).

The effect size calculated using eta squared was .16 indicating a large difference in mean scores of people’s interest towards visual and the interactive quality of media architecture. In this respect, the findings show that respondents were more interested towards the visual quality of media architecture compared to the interactive quality of this phenomenon. Even though social embarrassment has been discussed as the main reason of peoples’ hesitance to interact with such systems (e.g., Bedwell and Caruana, 2012; Chen et al., 2013; Finke et al., 2008; Tomitsch et al., 2014), preferring the visual qualities rather than interactive qualities needs to be explored and examined in future studies.

CONCLUSION

This research employed mixed method research methodology to determine whether the emerging media facade has potential in turning a building into an attractive landmark for people's urban night life. The result of first qualitative part is identifying the twelve potential attributes of new exterior façade lighting to enhance a building's role in its urban space. Eleven buildings with media façade were analyzed resulting in identifying twelve potential attributes of the new exterior façade lighting to enhance the building's role in urban space. Then, the following public questionnaire survey revealed people's high positive tendency toward such buildings. Therefore, the identified attributes are considered as potentials to attract people toward these new urban landmarks and accordingly influence people attachment towards such urban spaces at night.

Further statistical analysis showed that new exterior façade lighting could be assessed and explained based on their visual and interactive dimensions. Even though the findings show that people are interested in both dimensions of media façades, visual quality has significantly captured more attention compared to the interactive quality. However, the role of interactive qualities of media facade is undeniable supporting scholars' perspective (e.g. McQuire, 2006 and Struppek, 2006) about the enhancement of urban spaces livability through changing the law-abiding consumers to pro-active citizens. With such positive inclination towards interactive qualities of media facade in engaging people with the system and built environment, the authors are recommending further research on the different effects of these two dimensions on people's interest and intention towards media façade. In this regard, the study would like to recommend further study on utilizing these new found attributes for developing an environmental psychology model about people's perception towards this kind of modern urban spaces at night. The results from this study are expected to help designers to increase the attraction of buildings in Malaysia to attract more people at night thus making new nocturnal landmarks in urban spaces. The study supports Ibrahim and Meor Razali's (2013) recommendation in advancing the content of designed products in sustainable product development.

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KNOWLEDGE ECONOMY AS AN INITIATOR OF SUSTAINABLE URBANISM IN EMERGING METROPOLISES: THE CASE OF DOHA, QATAR

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Abstract

This paper is a comprehensive coverage of a research project of the National Priority Research Program of the Qatar National Research Fund, entitled 'Investigating the Qualities of the Urban Environment in Emerging Regional Metropolises', and carried out between 2011 and 2014 through the joint collaboration of Qatar University and Technische Universität München. Through the shift of global economic forces Gulf cities, such as Qatar's capital Doha, are developed as central hubs between developed economies in the West and the rising economies of Asia. In the context of international competition between cities new challenges are emerging where cities need to find ways to sustain and extend their position in a globalizing world. Therefore the research process placed emphasis on the complex interrelationship of knowledge economies and spatial developments in the Gulf region. The work is premised on the assumption that non-physical economic aspects and the qualities of the urban environment are interdependent. It analyses the qualities of the urban environment of Doha as an important regional metropolis through a comprehensive investigation utilizing a set of interdisciplinary research methods that include analysis of historic documents, Delphi interview series, company network analysis, GIS analysis, cognitive mapping, behavioural studies, media surveys, attitude surveys, and space syntax analysis. The outcomes promise important results regarding urban qualities in the city of Doha culminating into various recommendations aimed at potential beneficiaries including public sector organizations, private sector and real estate development companies, and academia.

Keywords: Urbanism; Knowledge Economies; Urban Qualities; Spatial Transformation; Sustainability; Identity; Qatar

INTRODUCTION

Background

Since the 1970s cities worldwide have been competing to become international service centres within growing global networks. These 'global cities' (Sassen, 1991) have become the main drivers of the world economy and junctions through which flow transactions of people, goods and information ('space flows', Castells, 1989 and 2004 and Appadurai, 1996). This phenomenon was made possible by the introduction of new infrastructural technologies such as aviation, fibre optic wires and satellites (Alderson and Beckfield, 2007; Friedmann, 1986; Friedmann and Wolff, 1982). Thus, for any new player to be successful in entering the global network it must invest in the establishment of infrastructure that will enable it to access foreign markets and international producers. To be a truly key hub within this global network however the emerging city must attract the business of international and transnational firms and ideally their headquarters in order to diversify its economy toward independence from heavy industries and the export of natural

resources (Beaverstock, Smith and Taylor, 2000). This kind of innovative evolution in a city's economy is highly dependent on and is driven by the presence of a population equipped with the knowledge and ambition to create and sustain new and diverse sectors and services. In turn, this kind of knowledge-based innovation and creativity, at the same time as sustaining a city's self-existence, is highly attractive to the type of international firms needed to make an emerging city a contender on the global playing field. Today, cities worldwide are facing a fierce competition to attract globally connected service sectors in order to secure economic growth (Savitch, 2002; Simmie, 2001; Simon, 1995).

One of the key challenges that particularly emerging cities in the Global South face in this competition is that many sectors of the knowledge economy, especially the advanced producer service sector, are centralized in and monopolized by the existing global cities that already possess the advantages described above. Consequently, emerging cities are engaged in intense competition for international investors to accelerate and generate the urban growth required to become the kind of agglomerations that would attract the relocation or establishment of international companies (Malecki, 2000). In this respect, tourism is a commonly used strategy to initiate urban growth and is regarded as a marketing tool to attract investment. This is often referred to as 'city branding'. This strategy includes investment in multi-mode transport systems, cultural facilities and the development of services and amenities. In addition, the expansion of transportation capacities is needed to transform cities into global and regional trading hubs (Witlox and Derudder, 2007).

One major challenge emerging cities face is to develop an urban environment that integrates liveability parameters that would draw long-term investment. This high-quality built environment is, in contrast to the previous industrial urbanization, crucial to a city's development toward becoming an international service centre because of the expectations relevant to the liveability of cities of the high-income and qualified workforce that the city would need to attract and retain for its knowledge economies (Stillerman, 2006). Without a large body of qualified workforce successful economic diversification is not possible in contrast to other economic sectors, companies in knowledge economies are highly dependent on the long-term employment of qualified staff and thus a highly attractive urban environment (Cohen, 1981). A particular challenge in establishing these attractive environments is a rather diverse multiculturalism due to vast migration in a short period of time and the resulting complexity of various needs and perceptions (Sanderock, 1998; Salama and Wiedmann, 2013d).

In the Gulf region the initial success of Dubai's development model for establishing a regional hub by liberalizing local markets during the 1990s had a huge impact on the entire region and seemed to introduce a fast track as to how to diversify Gulf economies and enter global networks (Wiedmann, 2012). One of Dubai's early competitors was Qatar and its capital Doha, the rulers of which were keen to diversify by building on a limited but key number of elements in contrast to Dubai's less discriminating approach. While Dubai has pursued development in almost all its economic sectors in parallel, Doha has focused on specializing in its main sectors only and developing its future economic role in the global network (Adham, 2008). In this respect, exclusivity defines its economic development strategy rather than undefined expansion. Today international sports events and investment in cultural projects have been attracting regional and worldwide attention (Salama and Wiedmann, 2013a & b).

One unique aspect of contemporary urbanism in the Gulf is the generation of cities in the desert supplied with state-of-the-art infrastructure intended to attract global immigration and transform these newly built shells into vibrant business centres (Fox, Mourtada-Sabbah and Al-Mutawa, 2006). The possibility of applying this approach to the development of cities from scratch is enabled not only by the remaining wealth of oil resources but also by the potential of the Gulf's geopolitical location close to rising markets in Asia, which is of great interest to regional and international speculation. While in global cities urban governance has reacted to expanding

knowledge economies by accommodating their specific needs, leading to a morphological transformation of cities, urban governance in the Gulf has itself been the initiator of space for evolving knowledge economies. This can be seen in the recent public investment in the development of infrastructure and the introduction of marketing strategies to attract international attention (Salama, Wiedmann and Thierstein, 2013).

Over the years as the number of immigrants has increased, an 'airport society' with an ever-exchanging population has evolved. In this context policy makers and planners must draw plans and construct visions for entire cities that should foster urban consolidation. However, the urban population that should be served by these plans is as yet unknown while architects who must design buildings for this undefined society are left with little orientation other than generic forms and traditional decoration in a commercially driven urban environment. A successful diversification process relies on the integration of all the complex needs of knowledge economies in all layers of urban development. The successful establishment of knowledge economies in emerging cities such as Doha relies on a highly diverse and efficient urban environment with a certain degree of unique identity (Salama, 2012; 2013; 2014). Thus, there is an increasing need to analyse contemporary urbanism in the Gulf region in order to detect the factors that contribute to urban qualities as well as consequences for the successful establishment of knowledge economies (Wiedmann et al., 2014). Today, Knowledge based economies have been identified as the key driver for spatial and urban development processes. They include services, high tech industries, and higher education institutions, and are characterized by strong international presence and transnational practices. Yet, how exactly can cities balance the pressure of rapid urban growth and the increasing need for urban qualities to become attractive hubs for the international elite of companies and their employees is at the core of this investigation.

Key objectives of the research project

This research project aims to deliver in-depth insights into the various mechanisms of urbanism in an emerging city, whose development is mainly driven by public investments in establishing new knowledge economies to gain independence reliance on oil resources. Due to the very particular roots of Doha as one of the most recently emerging cities in the Gulf region, four key objectives can be pursued. They are envisaged as a series of questions to provide a multi-dimensional view on the interdependencies between economic and urban and spatial transformation processes:

- 1) How urban governance evolved historically and how it is structured today: Urban governance has a direct impact on urban transformation processes by introducing new public investment strategies as well as a new development vision and subsequent physical planning. The project aims to analyse the various forms of how urban governance is rooted in Qatar and how it is transforming to accommodate the new challenge to establish a diversified economy including the introduction of new master planning processes.
- 2) How companies establish networks within their local surroundings, the region, and worldwide: The new knowledge economies have led to a complex network of multi-branch companies, which have established their offices in Doha. In order to understand the local, regional and global connectivity of the new economic sectors, the various networks should be analysed. Based on these network analyses the various degrees of connectivity can be explored, which is a main indicator for the current state of economic transformation in Qatar and its capital city.
- 3) How the emerging 'creative class' uses and perceives their urban surroundings: Due to the investment into establishing new economic sectors in addition to the subsequent construction boom a large number of highly educated migrants have moved to Doha. This new socioeconomic class, often referred to as 'creative class' (Florida, 2002), is decisive

to redefine urbanism in an emerging city. The project thus aims to examine how this new social group is living in Doha and how individuals perceive their new surroundings depending on their cultural and socio-economic backgrounds. Moreover, the project aims to understand how public spaces are used by this expanding migrant groups.

- 4) How spatial structures have been transformed to accommodate the needs of companies and inhabitants as well as the high urban growth rate itself: In addition to the various factors defining urban development, the project aims to deliver insights into the spatial dimension of urban growth as well as the very particular redefinition of new urban centres and their spatial accessibility in order to adjust to new economies and their spatial practice.

METHODOLOGICAL APPROACH

Research framework based on Henri Lefebvre's theory of space production

The first research stage involved the implementation of a research framework, which would enable the interdisciplinary research of the complex interrelationship between spatial developments and the dynamics of emerging knowledge economies. The framework was developed on the basis of an extensive literature review regarding the theory of space production in emerging cities. After a first review Henri Lefebvre's theory of space production has been detected as a main basis for a framework that combines analyses of all the various factors that impact urban growth and development. Lefebvre expressed his idea of the production of space using a triad that amalgamates three types of spaces: the conceived, the perceived and the lived.

Firstly, Lefebvre defined 'conceived space' as the space conceptualized by scientists, planners, social engineers, etc., also known as 'representations of space'. These representations are abstract as they are rooted in the principles, beliefs and visions held by such practitioners, decision makers and others who are in a position to impose their personal notion of 'order' on the concrete world and so create a practical impact on space within social and political practice (Lefebvre, 1991, p. 41). 'Perceived space' is the space of 'spatial practice', which Lefebvre defined as the space where movement and interaction take place, where networks develop and materialise. Thus, it includes both daily routines on an individual level and urban realities such as the networks that link places designated for work, leisure and 'private' life (Lefebvre, 1991, p. 38). Lastly, 'lived space' is understood by Lefebvre as the unconscious, non-verbal direct relation between humans and space. Also known as 'representational space', it is directly lived through associated images and symbols (Lefebvre, 1991, p. 39). Products of representational space are often symbolic works such as art, design and aesthetic trends (Lefebvre, 1991, p. 42).

Based on Lefebvre's ideas, the production of urban space can be analysed by investigating each factor in this process using the perceived-conceived-lived triad (Figure 1). Thus, all the factors that affect the nature and structure of the urban fabric in the production of space in emerging cities such as Doha can be sought for and examined with a special focus on understanding the role of knowledge economies and their impact. Thus, a framework has been developed in which all aspects are analysed utilizing various methodologies in order to investigate the development of urban qualities in direct relation to factors that weaken or strengthen them.

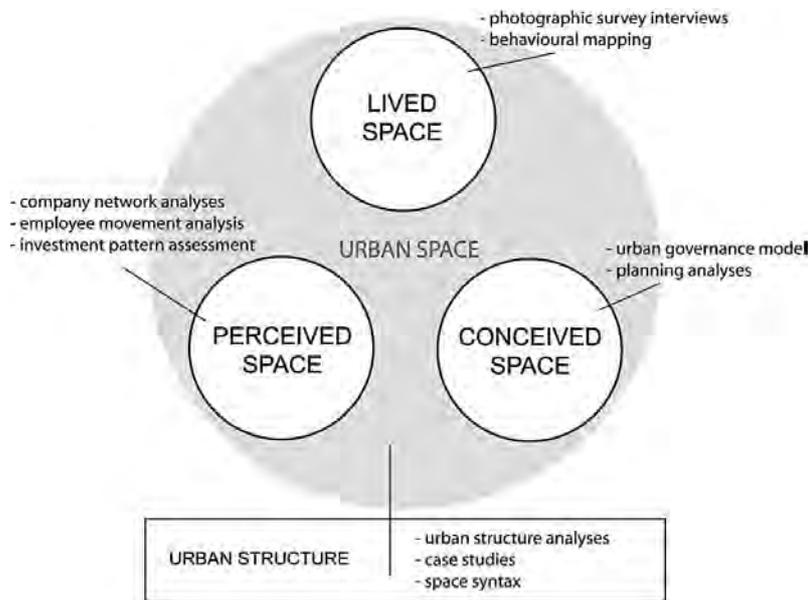


Figure 1. Framework model (Source: Authors).

Research tools and techniques

The framework involves comprehensive analyses of urban planning decision making processes as well as in-depth investigation that applies interlocking network models to examine how urban space is currently used by companies and knowledge intensive economic sectors. Taking into account the importance of the role played by the employees working in these companies and their perception of contemporary urban space in the city, the framework employs empirical research approaches that involve survey studies, focused interviews, observation, and behavioural mapping. In addition to investigating the various factors driving spatial transformation, the evolutionary aspects of the city's urban structure are traced and analysed using GIS data and space syntax studies. The framework is based on three main hypotheses:

- Urban space is a product of conscious decision making within the public sector.
- Urban space is a product of the collective spatial practice of all users.
- Urban space is a product of accumulated subjective attachment and identification.

Based on these three main factors producing urban spaces and thus urban qualities, the research team developed a unique set of four main research modules to explore the emerging and newly urbanised areas of Doha:

- The analysis of past and present urban governance.
- The investigation of how the urban environment is used by companies, inhabitants and developers.
- The exploration of how the existing urban environment is perceived by inhabitants.
- The examination of the resulting spatial configuration and current development tendencies.

The nature of the preceding questions, objectives, and hypothesis required the development of a trans-disciplinary approach. More than nine different methodologies were envisaged:

- Evaluation of Historic Documents:** In order to understand current urban development dynamics and the urban structure itself the historic development of Doha was explored by evaluating historic maps and statistics as well as reports. Key data were gathered from the Ministry of Municipality and Urban Planning (MMUP), which provided the project team

- with GIS data and high-resolution aerial photography of Doha from 1947, 1959, 1971, 1977 and 1988.
- b) Delphi Interview Series: An interview series with ten urban planning officials was implemented on the principles of the Delphi interview methodology. The Delphi method is a frequently used communication technique, originally developed as a systematic, interactive forecasting method, which relies on a panel of experts. In the case of this project ten experts responded to questions in two rounds. After the first round the experts were informed about the evaluated first interview results as well as the reasons they provided for their judgments. Thus, all planning officials could revise their earlier answers in light of the replies of other members of their panel. During this process the range of the answers decreased and the group converged towards certain responses. Finally, the process was stopped and the mean or median scores of the final round determined the results.
- c) Company Network Analysis: The main objective of this analysis was to clarify global and local connectivity of multi-branch companies within international and regional company networks. After the selection of 160 multi-branch companies within advanced producer service and high tech sectors by using company data networks, such as the regional data base Zawya, the company network analysis was implemented. It encompassed three main methodologies:
- *Interlocking network analysis*: The interlocking network analysis estimates the connectivity of cities from the intra-firm office networks of multi-branch multi-location enterprises. It is based on the methodology of the Globalization and World Cities Study Group (GaWC). The primary output of this analysis is a model of network connectivity; a measure that estimates how well connected a location is within the overall intra-firm network.
 - *Value chain analysis*: Knowledge exchange and business activities do not only arise through intra-firm branch office networks, but primarily from the division of labour between companies in one city. By means of a web survey that combines relational data on firm locations with the degree and importance of working interrelationships along individual firms' chain of value light was shed on the value added process of companies.
 - *Face-to-face interviews with business practitioners*: In addition to the interlocking network analysis and the value chain analysis, the company network analysis included a series of in-depth face-to-face interviews with senior business practitioners and organizations.
- d) GIS Analyses: Based on GIS data from 2003, 2006, 2009 and 2012 the land use development and urban growth rate were investigated by using the software application ArcGIS. Basic GIS data were provided by the Ministry of Municipality and Urban Planning. The data set included the contemporary state of urban development. In order to investigate previous development stages the project team reduced the GIS data from 2012 manually by comparing the data to high-resolution satellite images. Subsequently all data were extracted and evaluated. In addition to the calculation of settlement growth and land use distribution the project team calculated the distances between residences and main weekly activities of employees engaged in high service sectors. Therefore, the locations of residences, working places, preferred grocery stores and leisure spaces were assessed based on 130 questionnaire respondents and integrated within the GIS model of Doha. Subsequently the average distances were calculated and evaluated depending on the various locations of inhabitants.
- e) Cognitive Mapping: Cognitive mapping was utilized, which is composed of a series of psychological transformations by which individuals acquire, code, store, recall, and

decode information about the relative locations and attributes in their everyday spatial environment. In order to examine the experience of the city's inhabitants in terms of movement and their comprehension of the city in terms of where they live, work, entertain, and what travel routes they use, a survey questionnaire was developed with two objectives in mind. The first aim was to gather data for interpretations of how the city is experienced based on the inhabitants' reactions to certain parameters, rather than utilizing the more standard practice of reading and interpreting the city based on analyses of reports by specialized professionals or observers. The second objective was to investigate the way in which inhabitants perceive movement in the city in relation to the geographical locations most important to them such as living areas, work areas, and the public places they frequent.

- f) Behavioural Studies: The investigation of human behaviour within urban environments is a key to understand the various qualities as well as shortcomings of certain spatial configurations (Rapoport, 1990 and 2005). In order to implement a wider analysis of behavioural patterns and trajectories the project team envisioned mapping the movement and activity within 12 key urban open spaces by systematically recording them at different times of the day and week. The 12 key spaces were selected according to a preliminary evaluation of questionnaires regarding most frequently visited urban spaces. The observation records provided the project team with data representing the dynamic use of the selected spaces and facilitated comparison between different spaces in terms of broad similarities and differences in use and user types. This methodology of behavioural observation added an important quantitative perspective on the subject of how the urban environment is being used by inhabitants.
- g) Media Survey: Printed media also has a significant impact on the impressions the readers develop and the mental images they acquire as a result of their reading (Salama, 2013). Such an impact is based on a number of factors, namely, the credibility of the media and the way in which their content is presented, understood, and interpreted. In essence, printed media plays a key role in building an image in the minds of readers, especially when targeting specific groups. In answering the question of how Qatar wants to portray itself and its capital Doha to the global community in the printed media, an examination of the influence of printed media was conducted. Two important monthly magazines were selected: Oryx, the official in-flight magazine of Qatar Airways, and Edge magazine, which represents itself as Qatar's catalyst for business.
- h) Attitude Surveys and Questionnaires: 350 Employees of 30 different companies participated in an attitude survey regarding the quality of urban life in Doha. Questionnaire forms were distributed after an official agreement has been met between the project team and the company managements. The questionnaire placed emphasis on the assessment of the individual perception of Doha regarding the quality of urban life. Participants received multiple-choice questions regarding mobility, housing, working environments, services and leisure spaces. They were also asked to provide the project team with their general information, such as age group, country of origin and how many years they have stayed in Doha. The final section of the questionnaire included a short photographic survey of key urban spaces in Doha in order to examine how attractive or alienating certain urban spaces are perceived by a majority of participants. In addition to the quantitative evaluation of questionnaires, questionnaires were evaluated regarding the role of the cultural backgrounds of participants.
- i) Space Syntax Analyses: Based on the theories of Bill Hillier (1999) Space Syntax was implemented to investigate spatial development and transformation patterns. By elaborating a comprehensive Space Syntax model of Doha the various levels of spatial integration were analysed with a focus on the general layout of the city as well as the

locations of business centres. The space syntax method enabled the project team to assess the data gathered during the GIS analyses systematically. Configuration is considered a key quality of space on a local as well as on an urban scale, since it affects movement patterns, public-private delineation and environmental conditions. The two Space Syntax analysis methods of Doha's street network included Integration and Choice. Integration measures how many turns one has to make from a street segment to reach all other street segments in the network, using shortest paths. The street segments that require the least amount of turns to reach all other streets are called 'most integrated' and are usually represented with hotter colours, such as red or yellow. Integration can also be analysed in local scale, instead of the scale of the whole network. Choice measure is easiest to understand by imagining water flowing in the street network. Each time an intersection appears, the remaining value of flow is divided equally amongst the splitting streets, until all the other street segments in the graph are reached. The streets with the highest total values of accumulated flow are said to have the highest choice values. Both Space Syntax methods were applied to investigate the general spatial configuration of Doha and its evolution. Furthermore, the spatial integration of company locations was examined by implementing the Integration technique.

RESEARCH MODULES

RESEARCH MODULE I: INVESTIGATING THE 'CONCEIVED SPACE'

The historic evolution of urban governance in Qatar

In order to understand the complex dynamics of contemporary urbanism in Doha the historic evolution of the city and its various transformations were explored. Many current developments are still heavily affected by the first modernization period, which took place during the 1950s and 1970s when the oil production began (Wiedmann, Salama and Thierstein, 2012). Based on the evaluation of aerial photography and satellite images from the years 1947, 1959 and 1971 and 1977 and 1988 as well as the time period from 2003 to 2011 the historic urban development was analysed. The main objective of this methodology was the elaboration of comparative maps in order to illustrate the rapid growth of the city between 1947 and 2011. In addition various technical reports as well as publications of previous studies were evaluated with respect to planning policies and spatial urban development in order to gain insights into the various factors impacting urban transformations in Qatar. This included the evaluation of population growth statistics as well as the analysis of immigration patterns.

At first the research team focused on the origin of Doha, which was founded during the 19th century, and the historic social, economic and environment context of its initial settlement. Therefore historic photography from the 1940s was evaluated in order to analyse the built environment and architecture of that time period. This study led to the identification of the first settlement areas regarding their location, size as well as role. As many Gulf cities historic Doha was a small port settlement spread along the coast. In addition fishing and pearl diving was one of the key economic drivers at the beginning of the 20th century (Al Buainain, 1999).

As second step the historic documents from the time period between the 1950s and 1980s, when the oil production commenced and led to rapid urban growth, were evaluated. The main objective was to explore the socio-economic transformation as well as its impact on the urban environment. First infrastructural networks became the key drivers of spatial development, which was not yet guided by a local planning department.

The final step was the investigation of how new development dynamics during the past 20 years were a direct result of new urban development strategies introduced during the 1990s. Therefore various documents were evaluated including official public reports. The main outcome has been a set of comparative maps illustrating the rapid urban growth during the last 70 years.

The recent mega projects have redefined Doha, which grew to a metropolis covering a region of almost 2 million inhabitants. The continuous urban sprawl and the focus of developments along the shoreline have led to the contemporary urban structure of Doha (Wiedmann and Salama, 2013).

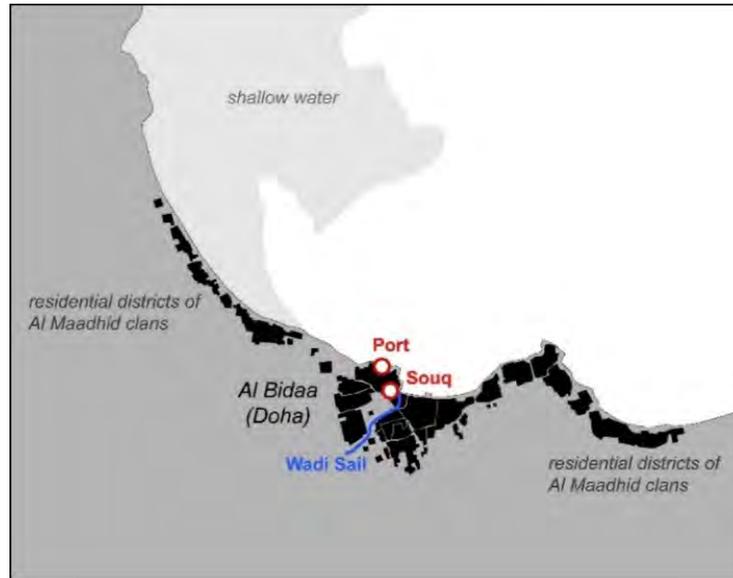


Figure 2. An elaborated map of the historic settlement of Doha in 1947 (Source: Authors, 2012).

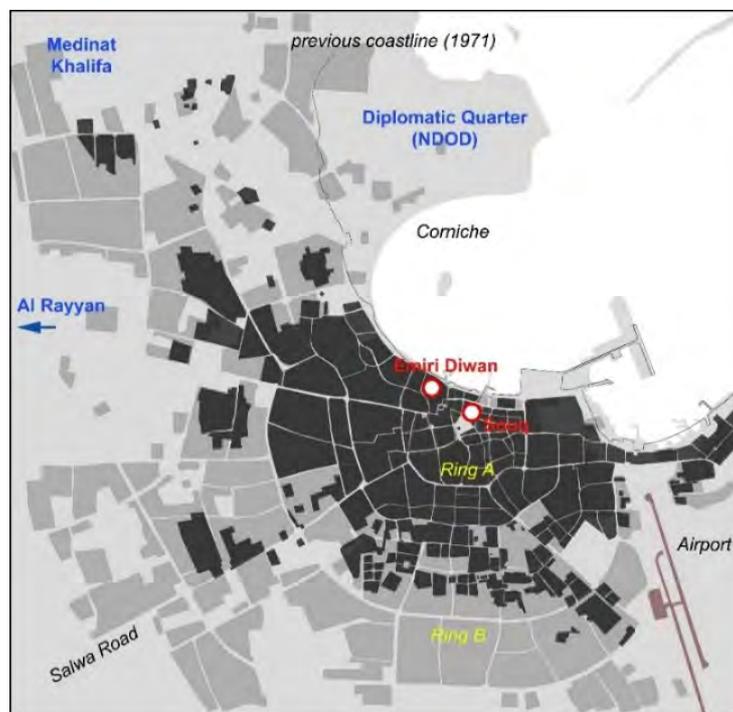


Figure 3. A comparative illustration of urban growth in Doha during the oil boom in 1971 (Source: Authors, 2012).

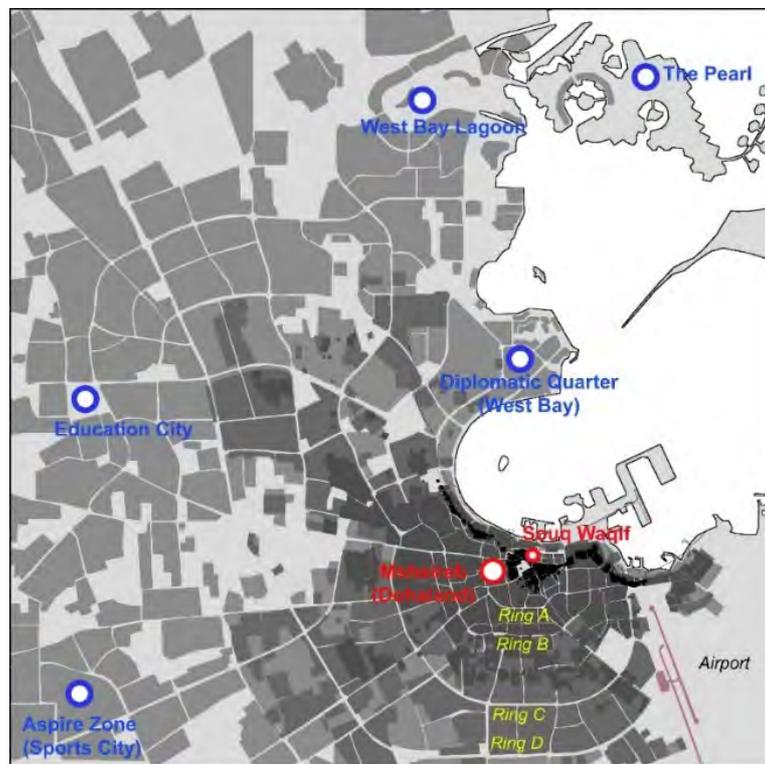


Figure 4. A comparative illustration of the contemporary settlement expansion (Source: Authors, 2012).

Urban planning analyses

Based on the elaborated research framework public urban planning was analysed in order to understand the impact of decision making on spatial developments as well as interdependent economic developments. Thus, an interview series with senior urban planners at the Ministry of Municipalities and Urban Planning was carried out at the end of 2011. All in all, ten key planning authorities at the Qatar National Master Plan department of the Ministry of Municipalities and Urban Planning (MMUP) were interviewed. The interviews were carried out by following the principles of the Delphi methodology and by using a matrix of a limited number of key questions. The ten interviewees were selected according to their role in developing and implementing new strategies and plans.

All ten interviewees are involved in key positions analysing and evaluating urban developments. The major aim was the investigation of main public development strategies that have been launched as well as the identification of all factors having led to a decentralized form of urban governance and the definition of consequences regarding urban structure and built environment. After the first series of interviews, which was evaluated to identify the most frequent answers, the participants were asked in a second round to respond to a questionnaire built on these assessed interviews in order to identify the most important investments and decentralization factors within governance as well as the most significant consequences for contemporary urban morphologies. They rated the importance in their view of the various items on a scale from 1 (least important) to 5 (most important).

In addition to the series of interviews all recently published documents by government agencies have been examined. The main effort was centred on the evaluation of the Qatar National Vision and the Qatar National Development Strategy (GSDP, 2008, 2009 and 2011).

Table 1. Summary of key interview questions (Source: Authors, 2012).

I. Public Development Strategies
1. What major investments were carried out by the public sector over the last 15 years?
2. Which public organisation is behind these investments?
3. What are the particular projects within each development sector?
II. Urban Governance & Planning
1. How has urban governance changed since the 1990s?
2. What were the factors for the decentralisation process of urban planning?
3. How is urban governance currently being restructured?
III. Urban Morphologies
1. How did urban morphologies change during the last ten years?
2. What was the particular impact of recent strategies on existing urban structures?
3. Which new urban typologies were introduced?

Based on the evaluated interview series the ten urban planners from the MMUP identified five main public development strategies to establish Doha as an international and regional service hub: (1) Real Estate, (2) Infrastructure, (3) Cultural Events, (4) Education & Science and (5) News & Media. Public engagement and investment in real-estate projects were seen as the main factor impacting recent urban growth and spatial transformations (Table 2). The subsequent construction boom has shaped contemporary Doha not only morphologically but also socio-economically due to the businesses and foreign workers that have moved there as a result. In addition, the interviewees are convinced that in future, urban developments in Qatar will be primarily driven by public investments in infrastructural projects. This is a clear indicator of an increasing demand in consolidation strategies. Future projects such as the Doha Metro are perceived as new catalysts in reconfiguring general urban morphologies in Doha.

Table 2. The evaluated interviews regarding public strategies (Source: Authors, 2012).

I. Public Strategies	Which public strategies have had the biggest impact on urban developments over the last 15 years?	I. Public Strategies	Which public strategies will have an increasing impact on urban developments in the future?
A. Real Estate	40/50	A. Real Estate	31/50
B. Infrastructure & Services	31/50	B. Infrastructure & Services	42/50
C. Culture & Sports	29/50	C. Culture & Sports	33/50
D. Education & Science	29/50	D. Education & Science	38/50
E. News & Media	13/50	E. News & Media	13/50

Furthermore, all interviewees encountered a weakened position of public urban planning in recent years when compared to the 1980s and 1990s. Four main factors for the decentralization of urban governance were identified by the interviewees: Insufficient staff capacity, inefficient organizational structures, extensive legal rights of private and semi-public developers and out-dated master and zoning plans. Most interviewees shared the opinion that inefficient organizational structures in combination with out-dated existing policies were the main factors for the decentralization of urban planning in Qatar (Figure 5). Additionally, staff capacity deficits exacerbated and accelerated this process, particularly at the beginning of the construction boom. The allocation of legal rights to master developers regarding the design and implementation of

zoning plans was however seen as the least important factor in spite of its indisputable role in decentralizing urban planning.

Table 3. The evaluated interviews regarding urban governance
 (Source: Authors, 2012).

<i>II. Urban Governance</i>	What were the main factors for the decentralisation of urban planning?
A. Staff capacity	38/50
B. Organisational structure - lack of coordination and monitoring	43/50
C. Legal rights of Master Developers	29/50
D. Outdated zoning plans and regulations	42/50

By referring to the urban structure analysis interviewees were asked to identify the most significant morphological consequences of recent urban development resulting in the main challenges for future urban planning. According to the evaluated interviews the fragmented patchwork structures caused by mega-projects are perceived as the main resulting characteristic and challenge of the recent construction boom. Furthermore, the increased sprawl of low rise residential developments and the deficient standards in construction are seen as major consequences. Other challenges have been identified in form of an increasing privatization of urban space and thus limited access for public planning as well as an increasing urban density due to high rise clusters in certain areas, like West Bay, where the main challenge is to integrate sufficient infrastructure.

Table 4. The evaluated interviews regarding urban morphologies
 (Source: Authors, 2012).

<i>III. Urban Morphologies</i>	What are the main consequences for the current urban structure and built environment?
A. Patchwork structures	47/50
B. Expanding peripheries - continuous urban sprawl	37/50
C. High rise clusters	25/50
D. Construction standards - low quality vs. land mark design	35/50
E. Privatised urban landscapes	33/50

Based on recent planning documents and separate interviews with the management of the planning department the organizational structure of contemporary urban planning was explored. The result has been an organizational chart of all public bodies involved in urban planning today (Figure 5).

Since 2008 and the official introduction of the Qatar National Vision the General Secretariat of Development Planning (GSDP) has occupied a key role in analysing and defining development goals (GSDP, 2008 and 2009). In 2011 the Qatar National Development Strategy was introduced to define more detailed development goals for the year 2016 (GSDP, 2011). While the GSDP has been in charge of a macro vision for the entire nation and its economic development direction, the Ministry of Municipality and Urban Planning (MMUP) has elaborated the Qatar National Master Plan in parallel by following the general development goals. The Qatar National Master Plan itself is divided into a macro planning framework, known as Qatar National Development Framework,

defining the key spatial development strategies and Municipal Spatial Development Plans in order to implement new regulations. In addition to the MMUP and its various departments, Ashghal (Ministry of Public Works) has played a key role in redefining development patterns and the general speed of urban growth in Qatar.

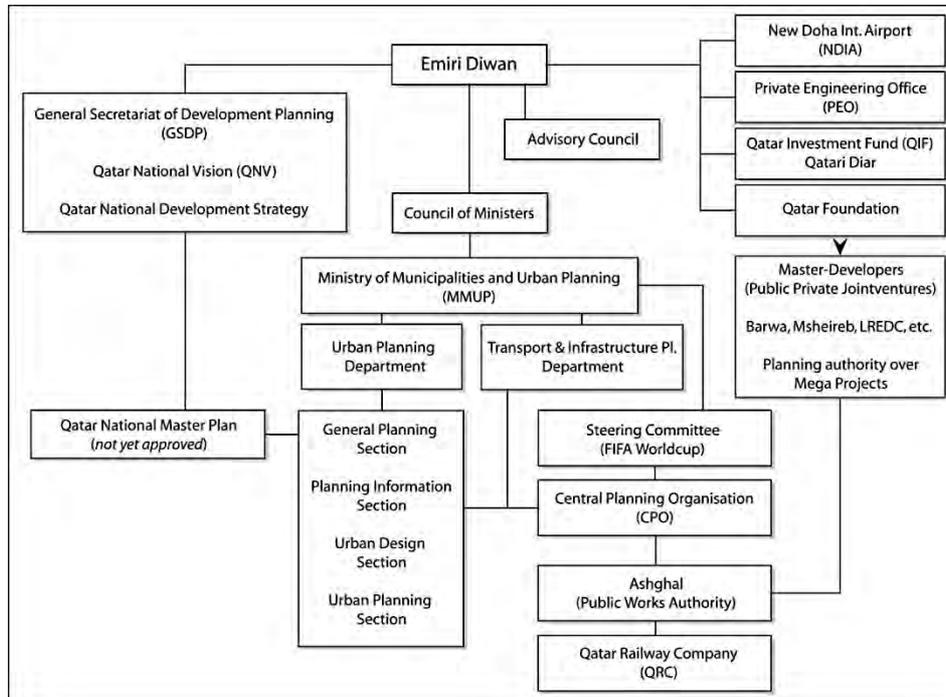


Figure 5. An organizational chart of public urban planning in the case of Qatar (Source: Authors, 2012).

RESEARCH MODULE II: INVESTIGATING THE ‘PERCEIVED SPACE’

Company Network Analysis

In order to assess the current state of emerging knowledge economies in the case of Doha a comprehensive company network analysis was implemented. Main objective of this research module was to clarify how international multi-branch companies are connected regionally and globally as well as to investigate how companies are locally connected in the case of their value chains. The in-depth understanding of company networks and their development is an important indicator for economic and subsequently spatial development tendencies (Lüthi et al., 2010). To understand the structure of the current patterns of knowledge-based companies in Qatar’s capital city it was necessary to investigate their functional logic and the networks in which the firms interact. The project team analysed the networks of multi-branch firms and measured the flows of information between business partners and their locations on different spatial scales.

The analysis of the intra-firm networks is based on the methodology of the GaWC at Loughborough University. This approach estimates city connectivity from the office networks of multi-location of APS and High-Tech firms. The basic premise of the model is that the more important the office, the greater its flow of information to other office locations. In the first stage of this empirical work, a company database was created. In identifying knowledge-based firms within the emerging city of Doha the Zawya Database was utilised. The firms were allocated to the sectors using its (NACE) codes (Table 5). The following lines of business have been analysed in the present research project:

Table 5. Operationalization of the knowledge-economy with NACE-codes (GaWC)
(Source: Authors, 2012).

High-Tech	Advanced Producer Services (APS)
<i>Chemistry & Pharmacy</i> 2330, 2413, 2414, 2416, 2417, 2420, 2441, 2442, 2451, 2461, 2463, 2464, 2466, 2511, 2513, 2615	<i>Banking & Finance</i> 6511, 6512, 6521, 6522, 6523, 6711, 6712, 6713, 7011, 7012
<i>Machinery</i> 2911, 2912, 2913, 2914, 2924, 2931, 2932, 2941, 2942, 2943, 2952, 2953, 2954, 2955, 2956, 2960	<i>Advertising & Media</i> 7440, 2211, 2212, 2213, 2214, 2215, 9211, 9220, 9240
<i>Electronics</i> 3110, 3120, 3140, 3150, 3161, 3162, 3210, 3320, 3330	<i>Information and Communication Services</i> 6430, 7221, 7230, 7240, 7250, 7260
<i>Computer-Hardware</i> 3001, 3002	<i>Insurance</i> 6601, 6602, 6603
<i>Telecommunication</i> 3220, 3230	<i>Logistics (3p & 4p)</i> 6030, 6110, 6220, 6230, 6340
<i>Medical & optical instruments</i> 3310, 3340	<i>Management- and IT-Consulting</i> 7210, 7222, 7413, 7414, 7415
<i>Vehicle construction</i> 3410, 3430, 3511, 3520, 3530	<i>Design, Architecture & Engineering</i> 7420, 7430
	<i>Law</i> 7411
	<i>Accounting</i> 7412

In addition to this, the collected firms were crosschecked and where necessary completed with a company list provided by the GaWC Research Group and by Forbes. All in all, 162 knowledge-intensive companies have been identified and mapped. To carry out an interlocking network analysis requires the construction of the so-called service activity matrix. Each cell in the matrix is a service value that indicates the importance of the location i to firm j . The importance is defined by the size of an office location and its function. By analysing the firms' website, all office locations are rated on a scale of zero to five. In a first step, the connectivity between two locations (a,b) of a certain firm (j) is analysed by multiplying their service values (v). In this respect, the following equation respects the so-called elemental interlock between two locations for one firm:

$$rab_j = v_{aj} * v_{bj} \quad (1)$$

To calculate the total connectivity between two locations, the elemental interlock for all firms located in these two locations has to be summarized. This leads to what is known as the city interlock (rab):

$$rab = \sum rab_j \quad (2)$$

Aggregating the city interlocks for a single location produces the interlock connectivity (N_a). This describes the overall importance of a location within the network:

$$N_a = \sum r_{ai} \quad (a \neq i) \quad (3)$$

Finally, if we relate the interlock connectivity for a given city to the city with the highest interlock connectivity, we gain an idea of its relative importance in respect to the other cities that have been analysed. These scores – creating a scale from 0 to 1 – will be used to indicate hierarchical tendencies.

Table 6. Numerical values of global connectivity of Qatari advanced producer services (Source: Authors, 2012).

Rank	City	Country	Gross Connectivity	Proportionate Connectivity (1=New York)
1	New York	United States	60747	1,00
2	London	United Kingdom	59431	0,98
3	Hong Kong	China	49972	0,82
4	Tokyo	Japan	49216	0,81
5	Paris	France	48042	0,79
6	Singapore	Singapore	47210	0,78
7	Sydney	Australia	47056	0,77
8	Frankfurt	Germany	46364	0,76
9	Milan	Italy	46124	0,76
10	Shanghai	China	45474	0,75
11	Sao Paulo	Brazil	44515	0,73
12	Vienna	Austria	44171	0,73
13	Dubai	United Arab Emirates	43684	0,72
14	Hamburg	Germany	42838	0,71
15	Istanbul	Turkey	41961	0,69
16	Moscow	Russia	41811	0,69
17	Copenhagen	Denmark	41772	0,69
18	Madrid	Spain	41771	0,69
19	Mumbai	India	41302	0,68
20	Prague	Czech Republic	41030	0,68

Table 6 shows the spatial dimension of intra-firm connectivity for Doha and illustrated the 20 most intensively connected locations on an international scale. New York as the world's most important financial centre shows the highest interlock connectivity value for APS firms based in Doha. This finding indicates that these APS firms most often choose New York as their second most important location. APS firms based in Doha show a strong orientation towards Europe and Asia. Among the top 20 agglomerations two are located in the Americas; six are located in Asia, one in Australia while the majority of 10 cities are situated in Europe. With Moscow, Sao Paulo, Shanghai / Hong Kong and Mumbai four cities of the emerging BRIC-States are represented among the 20 most connected cities. Within the Gulf region the neighbouring city of Dubai, the region's top economic centre, shows the most intensive connectivity patterns with Doha.

Figure 6 shows the spatial patterns of the intra-firm connectivity between APS firms on supra regional scale. The thickness of the lines and the darkness of the colour illustrate the relative connectivity between the different cities on a supra-regional scale. These connectivity values are related to the highest interlock connectivity of the case study, which is the connection between Doha and Dubai. On the supra-regional level connections to the United Arab Emirates' cities of Dubai, Abu Dhabi, Al-Ain and Sharjah seem to play the biggest role. Taken all together, the UAE accounts for 30 % of overall connectivity, followed by Saudi Arabian with 15 % and Lebanon with 10 %. A very pronounced degree of linkages can be seen with Riyadh and Jeddah and to the Lebanese cities of Beirut and Tripoli. In contrast to this, Kuwait and Manama account for 8 % each, Jordan cities like Amman come up to 7 %, while 6 % of the total connectivity can be ascribes to Omani cities. Weaker connections of approximately 5 % exist with cities Israeli cities like Tel Aviv or Haifa. Damascus and Tehran with 3 %, Ramallah and Sana with 2 % each, and Bagdad with 1 % are nearly not integrated within the Qatari regional network. Towards a regional orientation Doha shows the strongest connections with Dubai the regional leader and according to the GaWC Research Network the internationally best-connected City of the Gulf region. The high value is due to the fact that many Advanced Producer Service companies have relatively important and highly rated offices in Dubai and Doha.

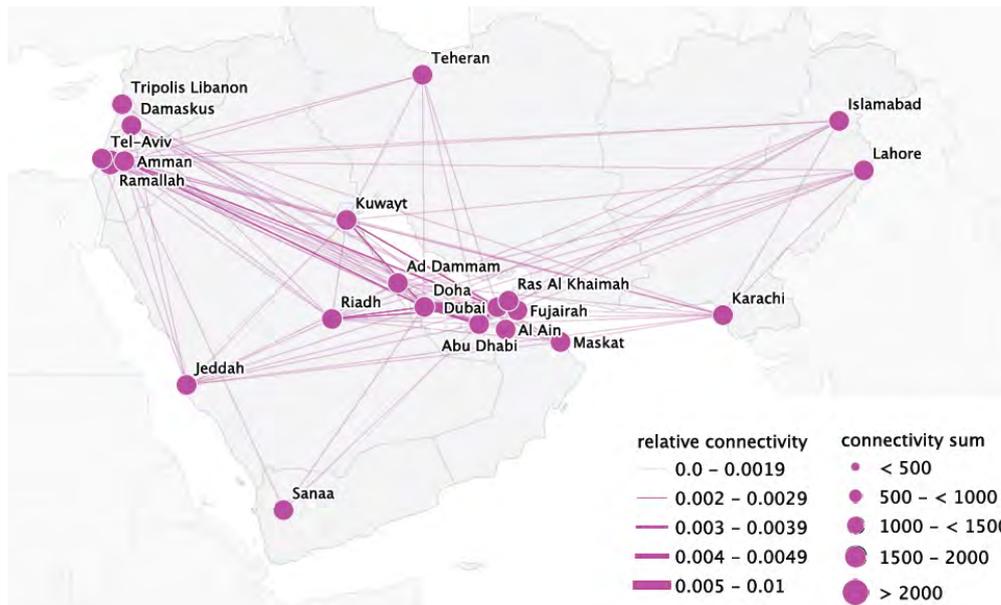


Figure 6: Regional connectivity of Advanced Producer Service companies based in Doha (Source: Authors, 2013).

In contrast to Advanced Producer Service sector, High-Tech seems to be networked much more with Asian locations while North-American locations play no role. Singapore, Moscow, Paris, Sao Paulo and Buenos Aires are the most connected cities. The most important region is still Europe. Interestingly, there are also two Latin American cities among the top ranked cities: Sao Paulo ranked 5th and Buenos Aires ranked 6th. Both cities represent the economic gateway to their respective countries.

Table 7: Numerical values of global connectivity of Qatari High-Tech firms (Source: Authors, 2012).

Rank	City	Country	Gross Connectivity	Proportionate Connectivity (1= Singapore)
1	Singapore	Singapore	30462	1,00
2	Moscow	Russia	28478	0,93
3	Paris	France	28034	0,92
4	Sao Paulo	Brazil	27756	0,91
5	Buenos Aires	Argentina	27067	0,89
6	Shanghai	China	27037	0,89
7	Brussels	Belgium	26610	0,87
8	Vienna	Austria	26415	0,87
9	Seoul	South Korea	25788	0,85
10	Beijing	China	25518	0,84
11	Tokyo	Japan	25364	0,83
12	Prague	Czech Republic	25147	0,83
13	Milan	Italy	24764	0,81
14	Johannesburg	South Africa	24505	0,80
15	Hong Kong	China	24367	0,80
16	Bangkok	Thailand	23991	0,79
17	Istanbul	Turkey	23506	0,77
18	Budapest	Hungary	22904	0,75
19	Madrid	Spain	22552	0,74
20	Mexico City	Mexico	22480	0,74

As in case of APS-firms the different ranges, directions and importance of spatial scales can be visualized for High-Tech companies. Figure 7 clearly shows the relevance of the European and Asian spatial scale for Qatari High-Tech companies within their value chain processes. More

than 46 % of all connectivity is going to Europe. In contrast to this Asia only accounts for 27 %, North America for 11%, South America for 7 %, Australia and Oceania for 3 % and Africa for 6 % of all connectivity. On a supra-regional spatial scale Doha shows the strongest connection with the United Arab Emirates and Saudi Arabia. While the United Arab Emirates accounts for approximately 20%, Saudi Arabia accounts for around 17% of all connectivity. In contrast Syria accounts for 5%, Israel, Lebanon and Kuwait for 8% each, Palestine 1%, Bahrain and Oman for 6% each, Iran for 7% and finally Yemen for 4% of all connectivity.

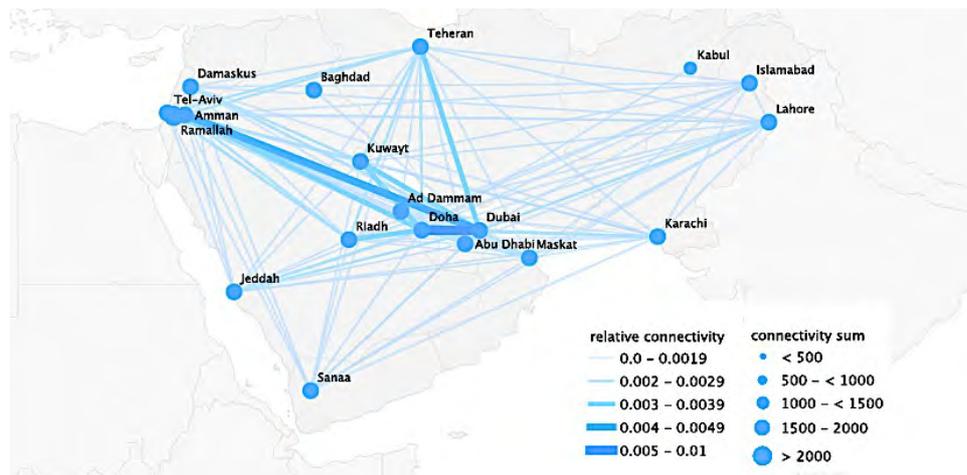


Figure 7: Regional connectivity of High-Tech companies based in Doha (Source: Authors, 2013).

The Interlocking Network analysis outlines the structural organizations and spatial impacts of intra-firm networks. In order to explore the extra-firm networks of knowledge-intensive firms a value chain analysis has been applied in form of a web-survey and face-to-face interviews. The firms are from various backgrounds like for example accounting and finance, real estate as well as information and communication services. Based on the evaluated data and interviews the most frequent interactions of the participating firms are with other APS firms, in particular insurance, law, advertising & media companies. This can be seen as clear indicator that APS firms in Doha are highly interdependent as in other cases worldwide. These branches assume an important role as an entrepreneurial support network within the city. On the European scale, a high number of extra-firm relations in banking & finance, marketing and research can be observed reflecting the fact that many firms in Doha have to attract financial and marketing services as well as research inputs from outside of the State of Qatar. Figure 8 shows quite clearly that geographical proximity to other enterprises appears to be a driving force generating extra-firm networks and interactions.

This finding provides evidence that extra-firm linkages of advanced producer service firms concentrate in Doha and that there is currently very little interaction concerning the extra-firm linkages with companies outside Qatar. These empirical findings correspond with the findings of the qualitative network analysis. The most important finding of the web-survey is that Doha's APS firms organize their external-firm linkage predominately on a local spatial scale or supranational scale that is to say the Gulf region. Spatial scales beyond these scales play nearly no role.

In order to identify the various potentials and challenges for knowledge-intensive firms in Doha from the standpoint of internationally acting business practitioner seven face-to-face interviews were carried out. According to the interviewees Doha offers a unique combination of strengths that will be very helpful to establish and promote the emergence of Doha as an influential city on the regional and global stage. The tremendous wealth on oil and gas makes

Qatar to one of the richest economies in the world. During the current global economic downturn Doha is still characterized by a prospering economic landscape with economic growth rates that are far above average. The revenues of the oil and gas production permit large-scale infrastructure developments, including the construction of a new port and new international airport. The ability to embark on new projects and far reaching development activities of the urban landscape in times of a global crisis and global instability illustrates the power and potentials of Qatar. The economic potentials of Doha are thus along two key dimensions: One is capital, which permits state-of-the-art infrastructure and the ability to launch various new initiatives, such as Education City. And the second key dimension is the fortunate geopolitical location of Doha within the Gulf region itself between the Kingdom of Bahrain and Kuwait in the north, main urban centres in Saudi Arabia in the west and the UAE and Oman in the south (Conventz et al., 2015).

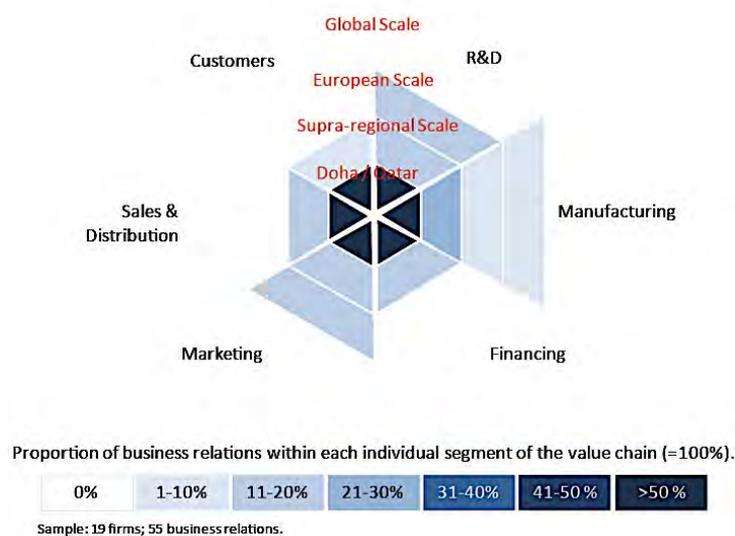


Figure 8: Extra-firm relations of knowledge-intensive companies in Doha (Source: Authors, 2013).

GIS assessment of spatial practice

In addition to the analysis of company networks and how they connect to their branches and markets globally, regionally and locally, the project team followed the objective to assess the urban development tendencies in recent years, which are a direct consequence of the investment interests of developers. Utilising GIS data to investigate the distances medium to high-income groups have to travel within Doha in order to follow up their weekly activities.

As first step the GIS data, provided by the Ministry of Municipality and Urban Planning, were examined. In order to analyse the rapid change of land use distribution a comparative set of various GIS maps were assessed by using existing data and satellite maps. The key effort in this respect was a comparison of land use development over three periods: a) 2003 – 2006, b) 2006 – 2009 and c) 2009 – 2012. All data were evaluated via the GIS software application ArcGIS.

As final step 130 questionnaires, distributed to employees engaged in APS sectors, were assessed regarding the locations of homes, offices, services and leisure spaces. The main objective of this task was to calculate the distances one individual has to travel within the city in order to commute between home and office as well as home and weekly activities, such as shopping. Therefore the locations mentioned in the questionnaires were implemented in a GIS model of Doha and the distances were calculated via ArcGIS. The results were evaluated with

reference to the three most frequent locations for mid-income homes: Downtown districts between B Ring and D Ring, suburban compounds in the urban periphery and high rise apartment along the waterfront.

Based on the five major public development strategies rapid urban growth was initiated particularly after 2003, when the population increased from around 744,000 inhabitants to about 1.8 million in 2013. Thus, almost one million people moved to Doha within only nine years. Based on the project teams' GIS survey the recent construction boom increased total settlement area of metropolitan Doha from around 162 square km in 2003 to around 292 square km in 2012, which is more than 80% of its previous size (Figure 9).

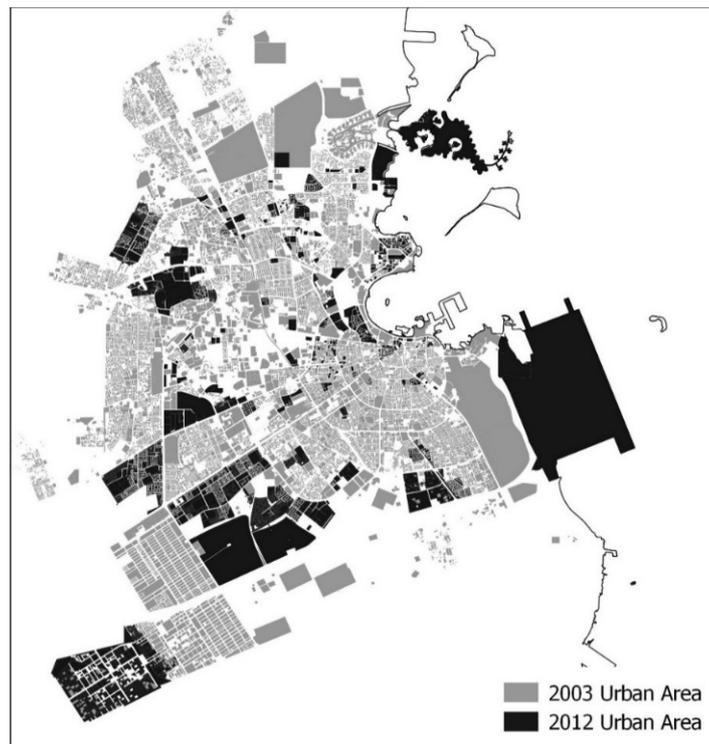


Figure 9: The settlement growth between 2003 (grey areas) and 2012 (black areas) (Source: Authors, 2013).

Table 8: Evaluated land use statistics based on GIS survey (Source: Authors, 2013).

Land Use	2003		2006		2009		2012	
	EXISTING	NEW	TOTAL	NEW	TOTAL	NEW	TOTAL	
Residential	109.1	17.8	126.9	10.6	137.5	60	197.5	
Commercial	21	24.8	45.8	1.1	46.9	1.6	48.5	
Public & Private Services	34.1	6.6	40.7	4.9	45.6	0.6	46.2	
Total Area (sq km)	164.2	49.2	213.4	16.6	230	62.2	292.2	

During the first period between 2003 and 2006 developers focused on commercial projects, which had a share of around 50% of the total built-up area (Table 8). These commercial developments were mainly office buildings located in West Bay and along C-Ring Road in addition to several shopping malls. After the first period of rapid growth, which was fuelled by initial investments and the Asian Games in 2006, a total area of almost 50 square km was added. Due to the international financial crisis in 2008 and an oversupply of commercial projects less

than 17 square km of settlement area was built during 2006 and 2009, which meant a decrease of 66% in the growth rate. However, the growth rate picked up again during 2009 and 2012 when a total area of 62 square km was developed in addition to the new airport development of approximately 22 square km. In contrast to the first extensive development period between 2003 and 2006 over 95% of the total development area between 2009 and 2012 is occupied by low-rise residential projects in the periphery of Doha. According to the GIS data and field surveys developers and their investors focused on four distinct development types:

Another focus of particularly smaller developers has been on building residential developments including villas, detached or semi-detached, in Doha's suburban areas. Many of these projects took the form of compounds and were financed by individual Qatari landowners, who rent their developments to companies and their staff. According to the GIS survey, more than 50% of Doha's entire urban area is currently occupied by low-rise residential developments, initiating a low average density of less than 6,000 people per square kilometre.

In addition to the general GIS survey a questionnaire was used to investigate how higher income groups have to travel in Doha in order to meet all their needs. Most participants live in proximity to the old city centre along B- and C-Ring or in compound developments in Doha's inland periphery. The location analysis conveys that 70% of these participants are accommodated in apartment blocks along A-, B- and C-Ring, while around 20% reside in compounds in the periphery and the remaining 10% are housed in waterfront developments along the northern shore. According to GIS calculations most participants live on average at distances of around 7 kilometres to their working places, 6 kilometres to their favoured grocery stores and 8 kilometres to their favourite leisure spaces. The main leisure spaces include hotel developments in West Bay, the Corniche / Waterfront, the Souq Waqif in the old city centre and shopping mall complexes in the periphery.

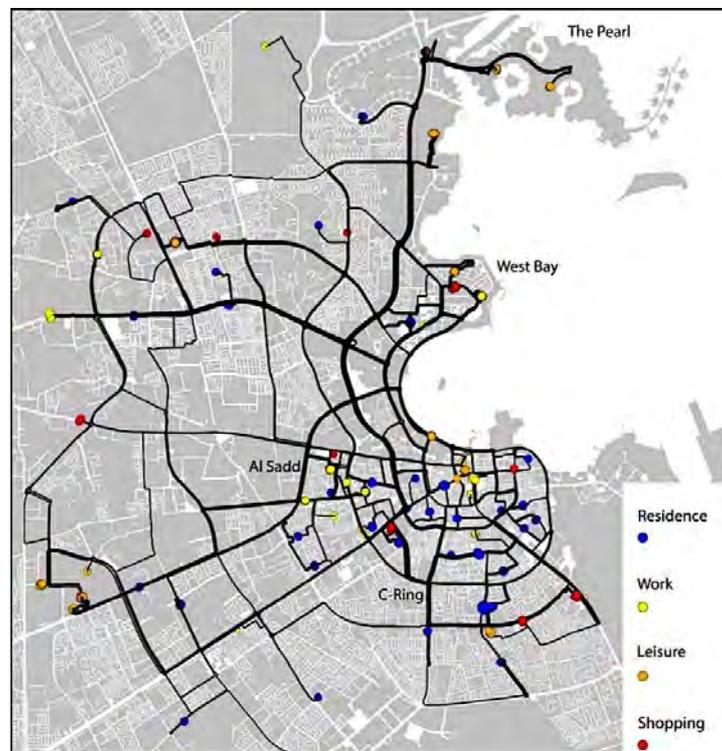


Figure 10: The movement map of 130 inhabitants and their weekly activities. The map clearly indicates a higher level of land use integration in Al Sadd due to shorter travel distances (Source: Authors, 2014).

The map of inhabitant movements (Figure 10) illustrates the long distances between various locations and the lack of integration of services on district scales. Today, the most integrated urban area is the Al Sadd district due to its high spatial accessibility along C-Ring on a global and local level (Mirincheva et al., 2013). Therefore, it can be argued that in the future the tendency of inhabitants to prefer services at short distances will lead to more integrated and diverse urban districts. The continuous exchange of immigrants however currently still hinders the demands of communities from having a more efficient impact on development patterns.

RESEARCH MODULE III: INVESTIGATING THE LIVED SPACE

Cognitive Mapping

Various studies were implemented to explore the impact of the existing built environment on the general public. One of the main objectives of this research project was the investigation of emerging urban qualities during the recent phase of economic diversification. Since urban qualities are to a certain extent dependent on the individual perception of inhabitants, their conscious and subconscious reaction to existing urban environments was examined (Burgess, 1925; Altman, 1975 and Lynch, 1960). The analysis of human behaviour in public spaces has allowed the project team to assess the various factors attracting or resenting the use of urban space. Thus, exploring how the city's inhabitants' experience their surroundings should go beyond interviewing a small group of inhabitants as this may support what is already self-evident.

As a first research step cognitive mapping was utilized, which is composed of a series of psychological transformations by which individuals acquire, code, store, recall, and decode information about the relative locations and attributes in their everyday spatial environment. In essence, cognitive maps are a mental representation of physical locations and movement between them. When reviewing and analysing how the city of Doha is experienced by its residents and users, two critical urban elements appear as predisposing factors governed by the spatial perception of the structure of the city; these are the understanding of geographical locations and urban mobility or movement within the city, and the way in which people relate to both.

In order to examine the experience of the city's inhabitants in terms of movement and their comprehension of the city in terms of where they live, work, entertain, and what travel routes they use, a survey questionnaire was developed with two objectives in mind. The first aim was to gather data for interpretations of how the city is experienced based on the inhabitants' reactions to certain parameters, rather than utilizing the more standard practice of reading and interpreting the city based on analyses of reports by specialized professionals or observers. The second objective was to investigate the way in which inhabitants perceive movement in the city in relation to the geographical locations most important to them such as living areas, work areas, and the public places they frequent.

The questionnaire provided a map of greater Doha and included queries about basic information related to the gender, age, and cultural background of the participants; they were required to name them and indicate the area where they live and work on the map. Participants had to select the three public spaces that they frequented the most, as well as indicate the routes they take from their residence to their workplace, and the routes taken to the most visited public spaces on the map. Relying on cognitive mapping procedure, the questionnaire required participants to mark the home zone and home range on the map. Home zone was defined to the participants as the immediate context around their homes, which reflects a shared or collective hypothetical ownership of communal space or area while home range was delineated as the respondents' mental image, based on their understanding of what defines such an environment and their perception of its boundaries, of the entire residential environment or district around their home.

Over 50% of the targeted population responded to the survey with a total of 108 responses received. The profile of the respondents was representative of a wide spectrum of people, from different cultural backgrounds: 65% of the respondents were Qatari nationals while 35% were expatriate professionals, mainly from neighbouring Arab countries. Sixty-nine per cent of the respondents were between 20 and 40 years old, the majority of whom (65%) were female.

Utilizing frequency, cross-tabulation, and cumulative mapping procedures for the total number of respondents and four groups of Qataris and Arab expatriates, results were categorized into three bands that pertained to: (1) living, working, and visiting; (2) home range, home zone, and movement; and (3) ethnic affiliation: Qataris and other Arab expatriates.

Living, working and visiting patterns: The areas where the participants in the survey live vary greatly. However, three areas or districts stand out from the responses; these are Mamoura, Gharrafa, and Khraitiyat: 9% of the respondents live in Mamoura district, while Gharrafa and Khraitiyat districts each received 8% of the responses. This result corresponds with the overall profile of the respondents: for example, the Mamoura district is characterized by a mix of Qataris, who reside in privately owned homes, and other Arab nationals. In contrast, the Gharrafa and Khraitiyat districts, located in close proximity to the north-western peripheries of the city, are primarily characterized by Qatari homes thus reflecting their preference for living on the outskirts and periphery of the city. In terms of the areas where survey participants work, four areas are clearly identified from the responses: 32% of the respondents work in the Tarfa district while 12% work in the Dafna area. This may be due to the fact that the former is characterized by the presence of the Qatar University campus, while the latter represents the emerging business and financial district in the West Bay area. The Al Sadd and Shaqab districts received 7% and 6% as respectively as workplace areas. This suggests that while the Al Sadd area represents a more traditional business district, close to the city centre core, the Dafna or West Bay financial area has already started to attract more businesses and employees. Four public spaces appear to compete for the most frequently visited urban open spaces: Katara Cultural Village received 58% of the total responses, followed by Souq Waqif, Aspire Zone, and the Corniche waterfront area which received 57%, 56%, and 49% respectively. This suggests a strong interest, by the respondents, in culture and sports, which are specific attributes of these particular spaces. The result could be attributed to the fact that these places offer a wide variety of facilities, functions and activities including cultural events and art exhibitions.

Comprehension of home range, home zone and movement experience: Mapping the respondents' identification of home and work locations, home zones, home ranges, and the routes taken from living areas to work areas reveals interesting findings (Figure 10). Based on the responses, the distribution of homes clearly reflects the fragmented nature of the city where residential areas are located far from the business or commercial districts. The perception of home zone is rather varied as some respondents depict it as an undefined bubble while others portray it with clearly defined perimeters or boundaries. The responses with regard to home locations and home zones reveal three major areas that can be considered home zones for the participants: these are Al Waab, Dahil Al Hamam, and Khraitiyat. Responses to home range also vary with regard to size of representative areas and the demarcation of boundaries. Notably, the cumulative mapping and the intersection of home ranges show specific residential areas as representative of home ranges for the respondents. Areas of significance include Mamoura, Al Waab, Azizya, Dahil Al Hamam, Madinat Khalifa, and Gharrafa. The distant location of certain residential areas could also reflect difficulties with mobility and access across the city. Interestingly, the concentration of private sector residential areas seems to be moving toward the West Bay; the new business and financial district. This trend could eventually initiate better access routes to the residential areas located northwest of the city, in addition to benefiting businesses because of the closer proximity to certain governmental institutions that have recently relocated to the West Bay area. The results of mapping the respondents' indications of roads and

routes taken to work areas and to the most visited places reveal significant findings. For example, D-Ring Road, as part of the new Doha Expressway which later merges into Al Shamal Road, appears to be the most commonly used route for respondents to reach their workplace (Figure 11). This is likely due to its connectivity as a main artery to the most important areas of the city. Its vehicular capacity and flow of movement makes it an important urban transport spine that links different parts of the city.

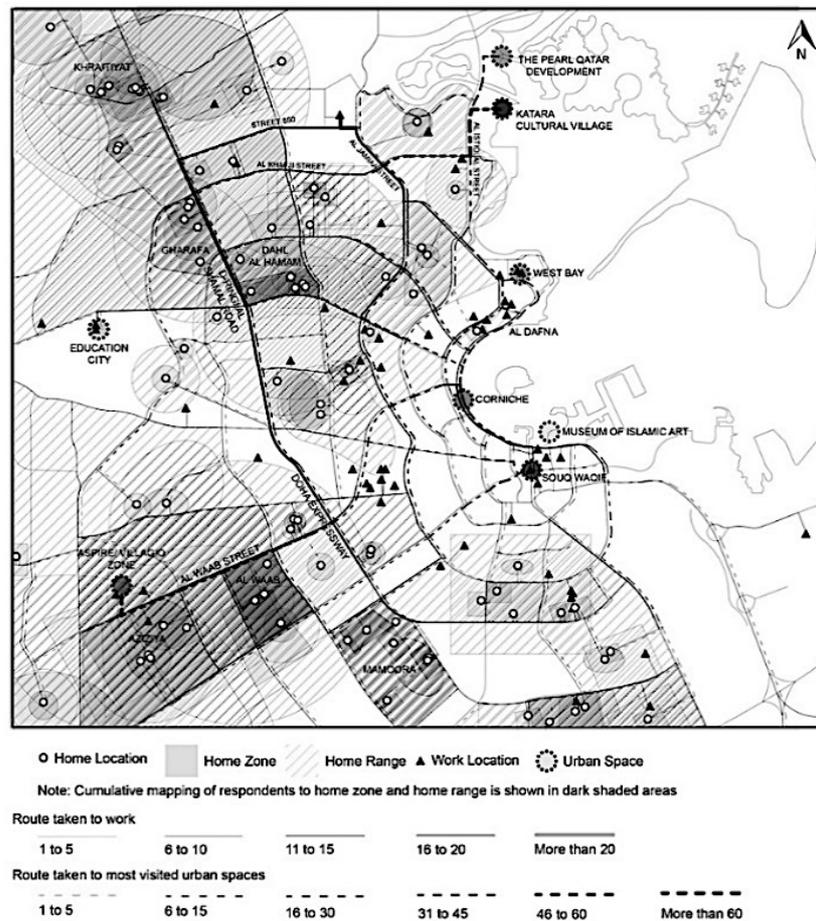


Figure 11: Cumulative mapping of respondents' reactions to geographical location and movement across the city (Source: Authors, 2013).

Ethnic affiliation: Qataris and Arab expatriates: A number of usage and destination differences were found in the responses of Qataris compared to other Arab expatriates, for example, Aspire/Villaggio Zone, Katara Cultural Village, and Souq Waqif appear to be the most visited urban spaces for Qatari respondents, receiving 42%, 38%, and 34% respectively. In contrast, Souq Waqif, the Corniche, and Katara Cultural Village were identified as the most visited by Arab expatriate respondents, receiving 23%, 22%, and 20% respectively. Both groups agreed on the least visited urban spaces: Education City and the Museum of Islamic Art Park. In essence, the preceding results reflect the preference of both groups to visiting urban spaces that are closer to their residence. Since the majority of Qatari respondents live in the northwest or southwest part of the city, they usually visit urban spaces like Katara Cultural Village and Aspire Zone that are in close proximity to where they reside. As Arab expatriate respondents tend to live closer to the centre core, their two most visited places, Souq Waqif and the Corniche waterfront

area, are also closer to the centre; however, Katara Cultural Village rated as the third most visited urban space, is just a few kilometres further north of the centre (Figure 12).

In generic terms, there is no clearly defined area for Qatari respondents of a significant dense concentration representative of their interests with regard to their perception of home zones and home ranges. The Qatari respondents are more distributed and reside further away from the centre core, around the peripheries of the city in areas where their requirements are more easily met with the availability of larger properties, bigger houses and more private space. In contrast, for Arab expatriates, home zones and home ranges are much more clearly defined and are larger in size and area as evidenced in the cumulative responses (Figure 13).

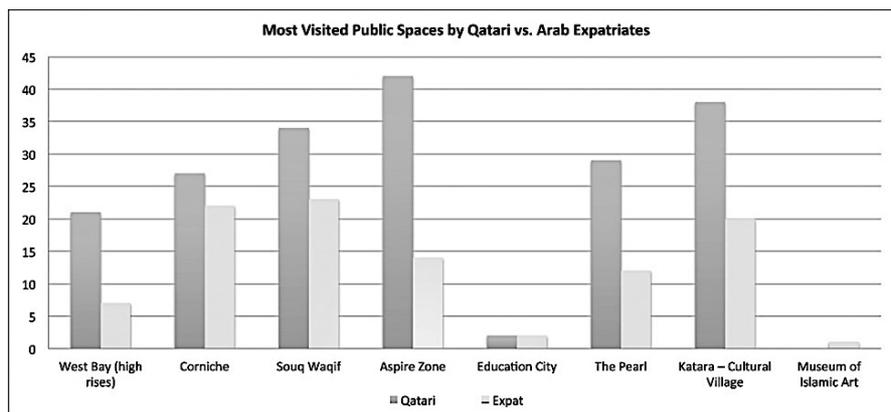


Figure 12: Most visited public spaces by Qatari vs. Arab expatriates respondents (Source: Authors, 2013).

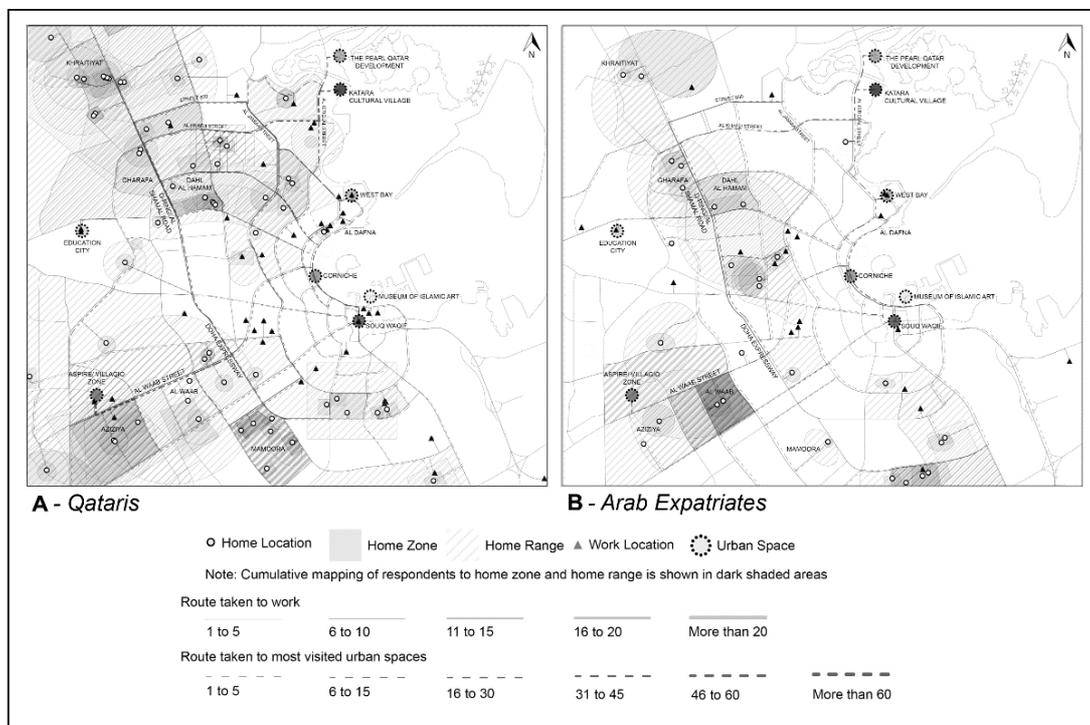


Figure 13: Cumulative mapping of Qataris' and of Arab expatriates' reactions to geographical location and movement across the city (Source: Authors, 2013).

Behavioural Studies

In addition to cognitive mapping direct observation and behavioural mapping are systematic methods for describing what visitors and users of a space actually do there. It is a direct approach, unlike the methods that require the indirect involvement of inhabitants in seeking information about the understanding of geographical locations and urban movement. Observation and mapping are additional tools for understanding the dynamics of people and their interaction with the urban environment; it is an alternative approach to data collection that views people as 'objects' by recording their periodic behaviour (Salama and Azzali, 2015). Valuable information can be obtained when behaviour is systematically recorded. Unplanned observation may result in inadequate findings that may reveal only what seems to be already obvious. Systematic observation of behaviour involves four aspects; these are: people, activities, setting or space, and timing (Salama et al., 2013).

In this procedure a combined unobtrusive mapping technique, which integrates 'place-centred' mapping and "individual-centred" mapping, was used. Place-centred mapping aims at observing actions in a particular setting or portion of a public space; these were recorded on floor plans, maps, or diagrams. Individual-centred mapping records the tasks, activities, and movements of people throughout the investigated space: it represents a systematic learning about a particular group of individuals whose activities are distributed throughout a specific period of time.

Based on the results of investigating geographical locations and movement, 12 urban open spaces were identified to conduct direct observation and behavioural mapping studies. These included: Katara Cultural Village, Corniche Waterfront Area A, Souq Waqif Area B, and Aspire Zone. In planning the study, a series of visits to the various spaces was conducted to explore key settings within them; these were selected because of their importance in terms of intensity of visitors and variety of activities. Original maps were obtained and re-drawn and timings were identified: each of the spaces was observed twice during the week and twice at weekends. Times of observation varied on weekdays and at weekends. Observation took place on weekday mornings from 10.00 to 11.00 p.m. and during weekend mornings from 10.30 to 11.30 a.m. For weekday and weekend evenings, observation times were from 6.30 to 7.30 p.m. and from 7.00 to 8.00 p.m., respectively. Users were classified into five groups: children, male visitors, female visitors, female domestic workers or cleaners, and male labourers. Maps were generated for each observation and mapping period and combined maps were then developed to illustrate the overall profile of behaviour and activities in each space.

In order to assess the various ways public spaces are used in Doha a total of 12 urban spaces was selected and observed. After a comparative study of all collected data four urban open spaces were identified as key spaces representing the current conditions in Doha. All four urban spaces reveal significant narratives about the physical and social aspects of the contemporary urban environment:

Katara Cultural Village: In observing the mixed types of users at the selected at Katara Cultural Village space, including children and male and female visitors, the actual use can be clearly discerned. The users represent different socio-economic strata and cultural backgrounds, including a substantial presence of Qataris. Male labourers are represented in the space for restaurant staff and beach helpers. Female labourers are mostly cleaners or maids accompanying Qatari families to keep an eye on children. Cleaners seem to be available at all times, but appear to be moving more within the space in the evenings. Since most of the restaurants open late morning or at noon, the number of users is significantly less at these times than during the evenings. Beach use and activities are not common whether during the week or at weekends; this could be due to the high entrance fees. Even though the spaces, particularly the waterfront esplanade, are dark and poorly illuminated at night, Katara is more crowded in the evenings, both during weekday and weekend evenings. Interestingly, this lack of adequate

lighting on the esplanade impacts in two contradictory ways; first of all, it enables substantial and most likely desired privacy for users, particularly Qataris, and secondly, it minimizes the feeling of comfort and safety, which even so does not prevent people strolling along the esplanade in the concealing darkness. Overall, it was observed that both adults and children seem to enjoy their time in the space. However, the space lacks adequate outdoor furniture such as benches and chairs in addition to sufficient green spaces and landscaped features that would make it more amenable and attractive for use. The minimal use of green spaces creates a rather stark but not unpleasing leisure environment.

Corniche: The mapping of the Corniche elucidates the reality of this space and how it is actually used by a wide spectrum of people of different age groups and from different ethnic backgrounds. The space caters more to lower and middle-income groups. A strong presence of male visitors is evident on weekday evenings; male labourers working in the space are also represented, these include cafeteria staff and Msheireb Enrichment Centre (MEC) security staff. Both males and females, taking exercise in the form of jogging, or casually strolling, were also recorded as passers-by. Additionally, the children's playground at the far northern end of the site is a major attraction for families. Family groups were also observed gathering in the space around the cafeteria, both in front of and behind it: in fact, the cafeteria appears to be the major attraction to the space, especially in the evenings when people come for refreshments. The space is generally crowded with different types of users on weekdays; at weekends they proliferate in the early morning and early evening. However, fewer users were noted on weekday mornings, probably due to the fact that most people are at work. In contrast, maintenance workers and gardeners were strongly represented in the mornings when they are on duty during hours where they are less likely to disturb visitors. It was also noted that a considerable number of male users visited the space specifically to drink traditional tea (karak) while sitting individually or in groups along the seawall, a protective barrier separating the promenade from the sea, chatting and seemingly enjoying the views of the cityscape or the other side of the bay. Interestingly, motorbike riders (a very small interest group in the Doha population) were frequently noted congregating at the drop-off area, near the car-park.

Souq Waqif: As a rehabilitated traditional market and tourist destination area, the Souq Waqif represents one of the most important and attractive leisure spaces in Doha; it caters to diverse groups including tourists, Qataris, and expatriate residents. Conducting behavioural mapping of the selected setting within the Souq reveals the authentic use of the space. Typically, groups of tourists were observed to visit traditional shops prior to relaxing in cafés or dining at one of the many restaurants. It was also noted that there was a very low representation of children, probably due to the lack of activities and facilities that would cater to them. Asian male workers would sometimes visit the space from nearby residential areas located south of the Souq. However, security police stand in front of and near the station and have been known to hustle certain visitors away, particularly unwelcome labourers or those who have been observed annoying visitors. Mounted policemen also frequently patrol the streets and are one of the attractions, especially for tourists. The mapped space is one of the major arteries of the Souq (Figure 14); it is lined by various restaurants with roof terraces and outdoor cafés. In generic terms, the space is lively and well-frequented both in the morning and evening. However, it is more vibrant at weekends than during the week, and in the evenings rather than the mornings. This is likely due to the restaurant and café opening times. Visitors generally go there for a meal or coffee with friends and family and some may go shopping. It was observed that the space was primarily used in the mornings as a passing-by space en route to the shops or the immigration office while in the evenings it was used for dining in restaurants or cafés, as well as shopping in the adjacent traditional market or handicraft shops. Crowds were bigger in the evenings rather than during the morning since the majority of visitors, other than tourists, were more likely to be at work. The space, as part of a pedestrian passageway to the traditional market area, seemed to be

functioning very well; however, the complete lack of children-oriented activities and venues was also noted.

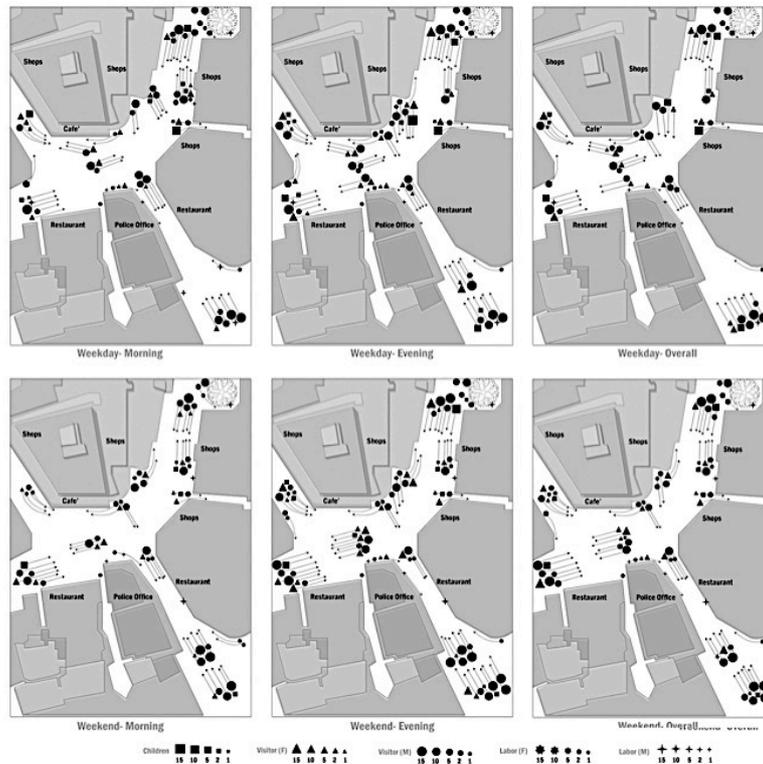


Figure 14: An example of generated maps based on observation periods conducted at Souq Waqif (Source: Authors, 2013).

Aspire Park-Zone: Mapping behaviour in the Aspire Zone and Aspire Park uncovered some important aspects related to its activities and the users engaged in those activities. People of different backgrounds, gender, and ages were observed to use the space for various purposes. It was noted, however, that most visitors were either Qataris or Arab expatriates; very few Europeans, Americans or people from other western backgrounds were represented during observation times. Typically, users visited the space in groups, as friends or with families; children were well represented in the space since it has extensive landscaped green areas, in addition to a well-appointed children's playground. The space was rarely used during the morning when only a few individuals could be seen in the designated sports area. Strikingly, the number of visitors was higher during the weekdays than at weekends, presumably most visitors came from nearby residential areas. Casual, unscheduled observation revealed that space-use was quite flexible, for example, it was observed being used for special, booked events, such as children's birthday parties, national day celebrations, or sports competitions. Most visitors used the space primarily to enjoy the outdoors prior to or after shopping in two popular nearby malls located east and south of the park. Morning users tended to visit the area for fitness purposes such as walking, jogging, or taking exercise. Evening visitors, however, appeared to use the space for relaxation purposes such as eating, sitting and chatting, etc. The overall experience of users seemed to be a pleasant one. It was further noted, however, that the lack of adequate shaded areas with trees, parasols or other forms of shade, could be an important factor for the minimal use during weekend mornings.

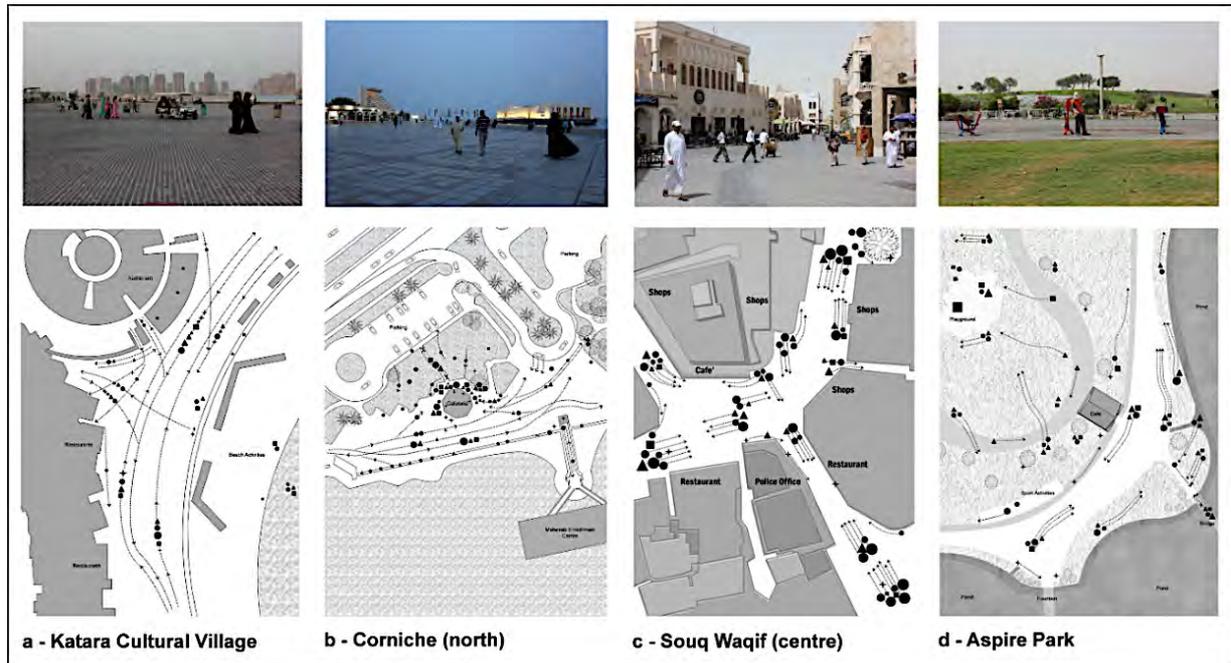


Figure 15: Combined behavioural maps for the four spaces selected for investigation (Source: Authors, 2013).

The overall experience of users in the four spaces examined demonstrates that people experience and interact with urban open spaces differently and as such their needs vary according to the purpose for which they visit the space. The mapping studies of urban open spaces delineate the fact that there is an absence of landscape features and a dearth of green spaces and of appropriate outdoor furniture, such as benches and seating, in Katara Cultural Village; similarly, there is an absence of adequate shaded areas and shading devices in both Corniche Area A and Aspire Zone. In addition, a lack of children's facilities or a specially designated area for children was noted in Souq Waqif. These observed lacks and absences could be viewed as deficiencies that hinder the maximum efficient and effective utilization and use of such spaces. Addressing the lack of features that enhance people's activities and use of the space, or those that would cater to a specific type of user would make the space more conducive for use by different types of users and at different days and times. In sum, pertinent recommendations can be made with the aim of instigating improvement of existing urban open spaces in Doha or offering guidance for designing new spaces (Salama and Wiedmann, 2013c).

Media Survey

A media survey was carried in order to investigate the various images of Doha. The business category includes articles and advertisements that promote Qatar's interest in establishing partnerships in the fields of information technology, oil and gas petrochemical industries, sustainable technologies, energy production and conservation, and construction industries. Images associated with this category showcase views of factories, advanced industries, industrial plants, banking, or scenes from the business districts. The category of sports includes materials that represent the role of Doha throughout the past decade in developing its resources to enable it to become key tourist destination and an effective host of regional and international sporting events, championships, and league matches. Images in this category include existing facilities and proposals for new stadiums, while emphasising the technologies and sophistication involved in such structures. The culture and tourism category has materials that depict the recent role the

country has played in investing in cultural projects and museums, promoting conservation of the arts, and the protection of architectural heritage. They represent Qatar as a centre for diverse cultures, a cultural hub that hosts art exhibitions, high profile cultural events, and international concerts and festivals. Images in this category include artwork, existing museum buildings and proposals for new cultural projects. The fourth category is education and knowledge, which includes materials that showcase Qatar as a centre of excellence in education and research and the role of Doha as an emerging knowledge-based economy city. Images associated with this category include laboratories, conference halls, and educational institutions. The fifth category is real estate; this includes materials that picture Doha as an interesting and liveable environment with many new career options and lifestyles that support business and attract a highly qualified and talented workforce. Images in this category include scenes of recently completed residential projects, projects in progress, or future proposals that exhibit vibrant, upscale work and residential environments.

With regard to both articles and advertisements, it should be noted that a single article could cover more than one of the preceding categories while one advertisement might provide messages or images that could relate to one or more categories. For the articles examined in Oryx magazine, a total of 272 responses to the categories were recorded while 388 responses to the same set of categories were noted in the articles examined in Edge magazine (Table 9). In Oryx, culture and tourism received the highest number of responses with over two-thirds of the total responses (66.00 per cent), while business was ranked as the second category, receiving 14.33 per cent of the total responses. The categories of sports and real estate received equal responses and were ranked as the third with 9.19 per cent of the responses. A surprising result emerged from the education and knowledge category in that it received the lowest responses (1.1 per cent) despite the fact that Qatar Foundation, Qatar University, and the Supreme Education Council are making a considerable investment in the architecture of educational facilities, as for example those at Education City which are designed by famous international architects. The results with regard to the articles published in Edge magazine were anticipated: since the magazine's focus is on business, the business category received the highest number of responses (64.94 per cent), followed by real estate (13.91 per cent), and culture and tourism (9.2 per cent). The category of education and knowledge is ranked as fourth (6.18 per cent) while the sports category received the lowest number of responses (5.92 per cent).

Table 9: Analyses of articles published in Oryx and Edge magazines (Source: Authors, 2013).

Oryx Articles	Dec 09–Dec 10	Jan 11–Dec 12	Jan 12–Jul 12	Total %
Business	6	22	11	(39) 14.33%
Sports	20	4	1	(25) 09.19%
Culture/Tourism	32	105	43	(180) 66.0%
Education/Knowledge	1	1	1	(03) 01.10%
Real Estate	6	14	5	(25) 09.19%
Total	66	146	61	(272) 100%

Edge Articles	April 10–Dec 10	Jan 11–Dec 12	Jan 12–Jun 12	Total %
Business	79	110	63	(252) 64.94%
Sports	6	11	6	(23) 05.92%
Culture/Tourism	13	17	5	(35) 09.02%
Education/Knowledge	7	11	6	(24) 06.18%
Real Estate	18	25	11	(54) 13.91%
Total	123	174	91	(388) 100%

Advertisements examined in Oryx magazine received a total of 692 responses to five categories while a total of 244 responses were recorded for Edge magazine (Table 10). In Oryx, with regard to advertisements, the category of business received the highest number of responses (42.19 per cent), while culture and tourism ranked second with 27.31 per cent of the total responses. This was followed by real estate (19.50 per cent), education and knowledge (7.94 per cent), and sports (3.0 per cent). Comparing these results to the results obtained from analysing the articles, the categories of business and culture and tourism exchange positions in the ranking; however, they occupy the first and second ranks in both articles and advertisements. The category of education and knowledge ranked fourth- higher in the responses to the advertisements, and slightly higher than the same category in articles. The sport category does not appear to be of much interest since it received the lowest number of responses. The results of examining the advertisements published in the Edge magazine were similar those of the articles where the business category received the highest responses (63.11 per cent), followed by real estate (21.72 per cent), and culture and tourism (8.19 per cent). Education and knowledge is ranked fourth (3.68 per cent) while the sports category received the lowest number of responses (3.27 per cent).

Table 10: Results of analysing advertisements published in Oryx and Edge magazines (Source: Authors, 2013).

Oryx Adverts	Dec 09–Dec 10	Jan 11–Dec 12	Jan 12–Jul 12	Total %
Business	121	116	55	(292) 42.19%
Sports	17	2	2	(21) 03.0%
Culture/Tourism	56	71	62	(189) 27.31%
Education/Knowledge	22	20	13	(55) 07.94%
Real Estate	60	50	25	(135) 19.50%
Total	276	259	157	(692) 100%

Edge Articles	April 10–Dec 10	Jan 11–Dec 12	Jan 12–Jun 12	Total %
Business	65	65	24	(154) 63.11%
Sports	6	2	00	(08) 3.27%
Culture/Tourism	9	5	6	(20) 8.19%
Education/Knowledge	6	3	00	(09) 3.68%
Real Estate	18	24	11	(53) 21.72%
Total	104	99	41	(244) 100%

These results corroborate the commitment toward image-making: they unequivocally portray an image of Doha as an emerging international hub in different fields to the global community. The three categories examined in the print media that emphasise such a vision are business, culture and tourism and real estate. On the one hand, business images represent Doha as an investment and transit hub thanks to its key geopolitical position and enormous wealth. Images of business districts, bank headquarters, and industrial plants in the magazine are designed to promote businesses and encourage partnerships. The category of culture and tourism is tasked with creating an image of Doha as an international cultural hub with vast potential for attracting tourists to fascinating cultural facilities as well as exotic desert destinations. However, while Qatar is busy promoting its capital city as an international knowledge and tourism hub through major capital investment in the architecture of educational and sport facilities, the images in the articles

and advertisements examined do not convey such a vision due to their limited frequencies in the two magazines.

Attitude Survey

In addition to the surveys of inhabitants and their perception, the research team analysed medium to high-income groups by conducting an attitude survey study. These groups are of particular importance for the emerging knowledge economies in Doha. Therefore around 30 companies were approached and 350 employees participated in this survey about the quality of urban life in Doha. The most important objective of this research task was to clarify if the current urban environment suites the needs of a large number of higher income groups and thus to identify the main challenges for urban planners and decision makers.

After the distribution of all questionnaires in 2012 all 350 responses were collected and subsequently evaluated. All participants were from medium to high-income background. Due to their positions as employees within the emerging private sector, all of the participants were expatriates, who immigrated to Qatar during the last fifteen years. The questionnaires contained six sections:

- **General Information:** In this section the research team asked for age, gender and professional background as well as how many years participants have already worked in Doha.
- **Mobility:** In the case of mobility the questions focused on car use as well as liveability concerns such as traffic congestions and missing parking spaces.
- **Housing:** First participants were asked in which area and in which housing typology they live. Further questions focused on the quality of housing and how it can be improved from the participants' perspective.
- **Work Place:** After participants were asked where they work. The office environment and the urban surroundings were investigated.
- **Services:** In order to assess the quality of services such as schools and leisure facilities the participants were asked to mention general concerns. The participants furthermore were asked which leisure spaces they prefer to visit.
- **City Image:** Finally participants were asked to share their general impressions regarding Doha as place for long term settling and their particular subjective perception on certain images created by recent urban developments.

The first evaluation focused on a general quantitative assessment of questionnaire answers in order to gain general insights who the participants are and how they perceive their working and living experience in Qatar.

Residents' Experience of the Quality of Urban Life in the City of Doha Questionnaire	
General Information	
Country of origin: _____ Your profession: _____ Your employer: _____ Age: _____ Gender: male () female ()	
1) How many years/months have you stayed in Qatar so far? _____ Years _____ Months	
Mobility	
2) How do you normally commute in Doha? () Drive your own car () have a driver	
3) How many hours do you estimate driving per day? _____	
4) How do you experience the traffic conditions? (select one only) () Chaotic () Moderate () Pleasant	
5) Do you experience parking as a major problem in your daily life? () Yes () No	
6) Would you prefer to use public transport? () Yes () No	
Residence	
7) In which area do you live? _____	
8) Are you happy with the location of your residence? () Yes () No If not, what kind of location would you prefer? _____	
9) What type of residence are you living in? (select one only) () Villa () Apartment in a villa () Villa in a compound () Apartment in a residential block () Apartment in a compound () Apartment in a high-rise building	
Working Place	
10) Are you generally happy with your residence? () Yes () No	
11) Is the quality of your residence better than that of the residence you lived in before outside Qatar? () Yes () No	
12) Which of the following do you miss in your neighbourhood? (select all that apply) () Green areas () Playground for children () Shopping facilities () Restaurants () Pedestrian walkways Others: _____	
13) Which of the following do you think needs improvement in your accommodation? (select all that apply) () Daylight () Electricity & Utilities () Layout of rooms () Room sizes () Kitchen () Interior design (furniture, etc.) () Exterior design of the building itself	
14) Did you have the chance to choose your accommodation yourself? () Yes () No	
15) If not, what kind of residence would you prefer? (select one only) () Villa () Villa in compound () Apartment in compound () Apartment in villa () Apartment in block () Apartment in high-rise	
16) Do you like the location of your office? () Yes () No If not, what kind of location would you prefer? _____	
17) Did your company move to a different office location during the last 5 years? () Yes () No	

Figure 16: Sample page of the distributed attitude survey/ questionnaire (Source: Authors, 2013).

General Liveability Concerns: Based on the evaluated questionnaires the main factors that impact the employees' perception of liveability in Doha are mobility concerns related to traffic congestions, driving distances and a lack of parking spaces and insufficient services. Another factor is the low standard of construction quality in the case of their residences and offices.

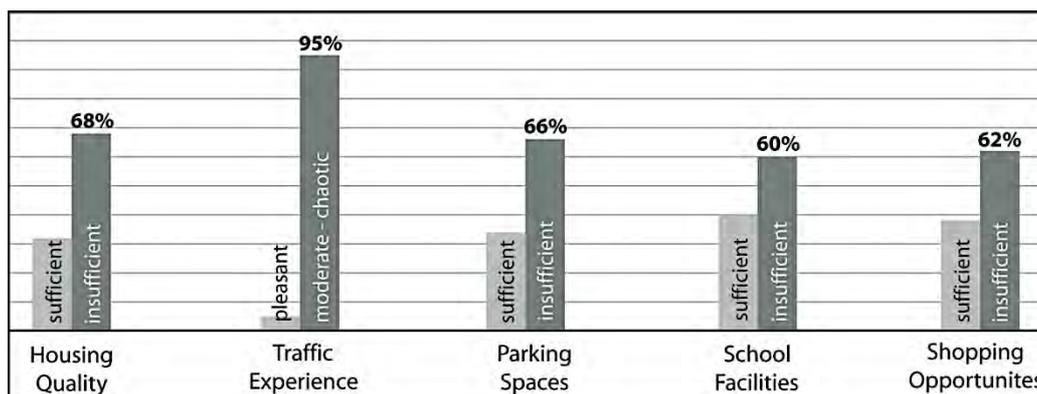


Figure 17: Frequency of employees' responses to issues related to liveability factors in Doha (based on 344 responses). (Source: Authors, 2013).

Career Perspectives: While the perceived liveability of a city is the immediate result of how people feel about Doha regarding their current needs, the individual perspectives to settle long-term in Doha are dependent on future economic aspects as well as legal rights for immigrants. Today, Qatar's service economy is to a large extent dependent on foreign guest workers, which make up 93% of the private sector (Qatar Statistics Authority, 2012). While public incentives to

integrate the local population in developments is necessary for implementing the end of welfare mechanisms, these strategies also imply reduced long-term perspectives for guest workers in certain areas. Based on the evaluated questionnaires 66% of the participants perceive Doha as a potential place to settle due to career opportunities and high salaries, among other factors.

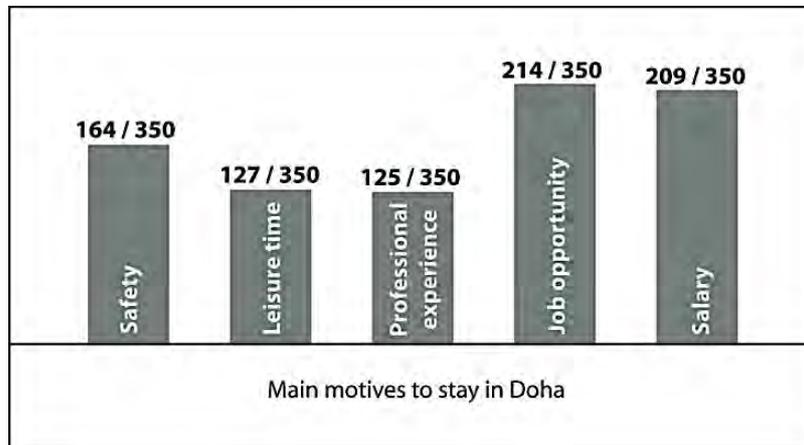


Figure 18: Frequency of employees' responses related to their long-term individual perspectives (based on 350 responses). (Source: Authors, 2013).

Aesthetics of the Urban Environment: The third factor in producing an identification process is based on the image of a city and its aesthetics from an inner cultural perspective. Only 13% of participants identify the Souq Waqif as the most prominent landmark in Doha. However, a majority of 65% of participants perceive it as a highly attractive leisure space. In addition to landmark projects, general urban design, particularly in the case of public spaces, can have a large impact on how space is aesthetically experienced. Due to its low built density Doha is dominated by low-rise housing and because privacy is usually manifested by walls, large urban areas are experienced as rather rejecting and unwelcoming by most participants.

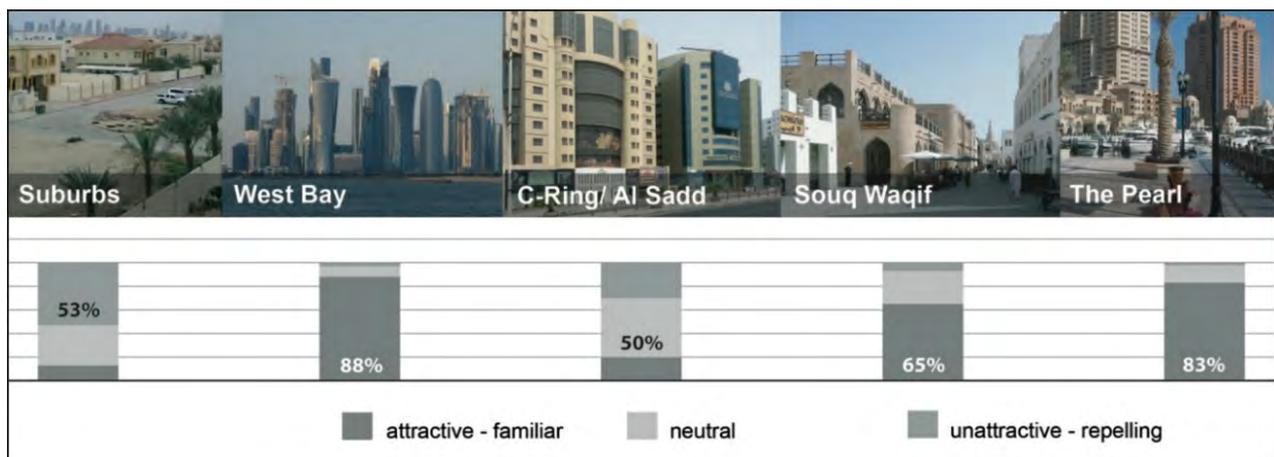


Figure 19: Employees' perception of urban spaces in Doha (based on 350 responses). (Source: Authors, 2013).

In addition to the general assessment of how the majority of participants perceive the quality of urban life, the project team focused on the role of the country of origin and the various cultural

backgrounds. Therefore the questionnaires were evaluated by distinguishing three main groups: South Asians, Arabs and Westerners. A large majority of the 350 participants were from South Asia (India and Pakistan), while the Westerners and Arabs were similarly represented. This result is in coherence to general immigration statistics (Figure 20).

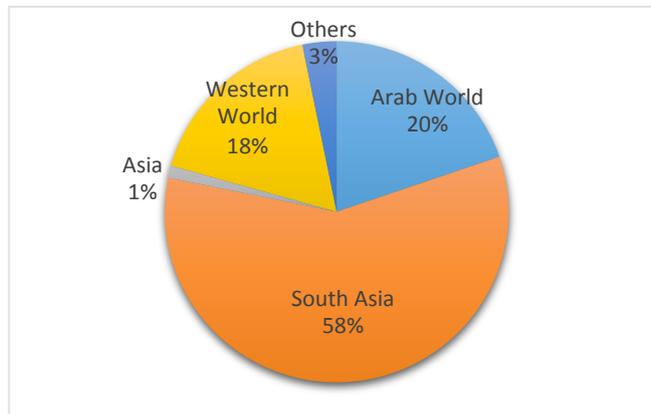


Figure 20: The distribution of percentages regarding the origin of participants (Source: Authors, 2014).

Traffic conditions: Due to the various backgrounds and the past experience of respondents traffic conditions are perceived rather differently. While a majority of South Asians experience traffic as moderate, a majority of Westerners perceive it as chaotic. The group of Arab origin is divided, although a slight majority would interpret traffic moderate rather than chaotic (Figure 21).

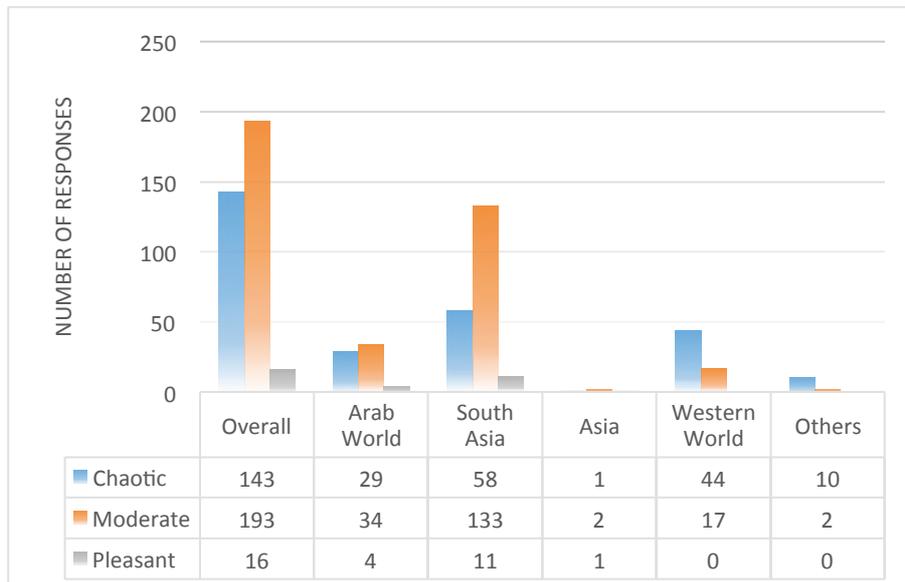


Figure 21: The perception of current traffic conditions (Source: Authors, 2014).

Preferred residence types: The South Asian group mainly lives in apartments within multi-story blocks or high rises, while the Arab group equally prefers to live in villas. In the case of the Westerners a clear majority is housed in villas within compounds followed by apartments in serviced high-rise buildings (Figure 22).

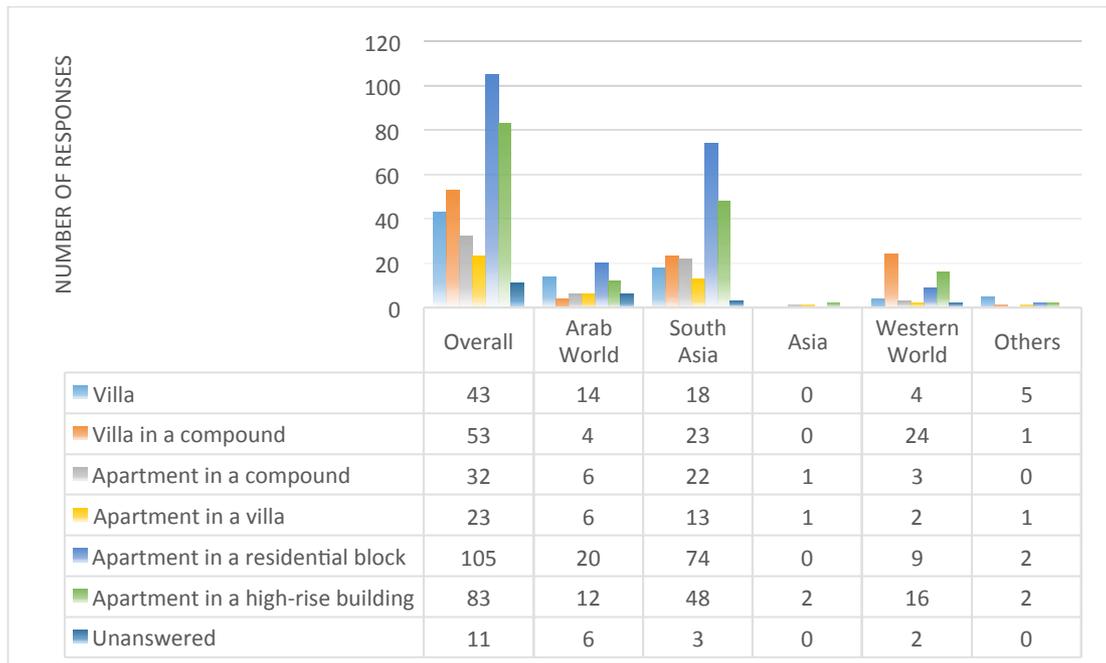


Figure 22: Residence types according to the origin of participants (Source: Authors, 2014).

Preferred leisure spaces: In the case of the preferred leisure space all three groups mainly prefer shopping malls due to the climatic conditions in Doha. But in contrast to Westerners a large percentage of South Asia identify the Corniche as their favourite leisure space in Doha. While a significant percentage of Arabs prefer the Souq Waqif as their leisure destination, a large amount of Westerners prefer to spend their leisure time in hotels, where restaurants are permitted to serve alcohol (Figure 23).

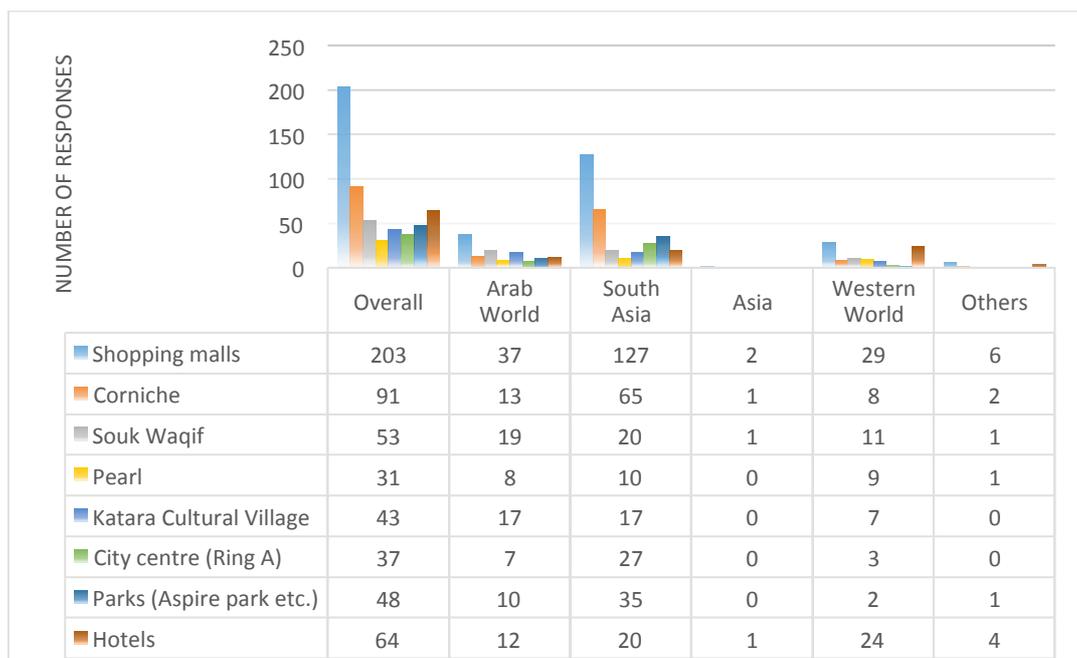


Figure 23: Preferred leisure spaces in Doha according to the origin of participants (Source: Authors, 2014)

Frequency of visits to the historic city core: One particular interest of the research team was to explore the significance of the historic core of the city. In recent years the historic centre has witnessed a major transformation process due to the development of various mega projects (Wiedmann et al., 2013). Therefore participants were asked: how often they visit the old downtown area including Souq Waqif. While a large percentage of Arabs visit the area on a monthly basis, South Asians and Westerners have rather limited interest to spend their time in the historic parts of the city. This is a clear indication that the Souq Waqif area mainly attracts tourists and Arabs, who feel culturally attracted to the vernacular urban environment as well as to ethnic restaurants and crafts shops.

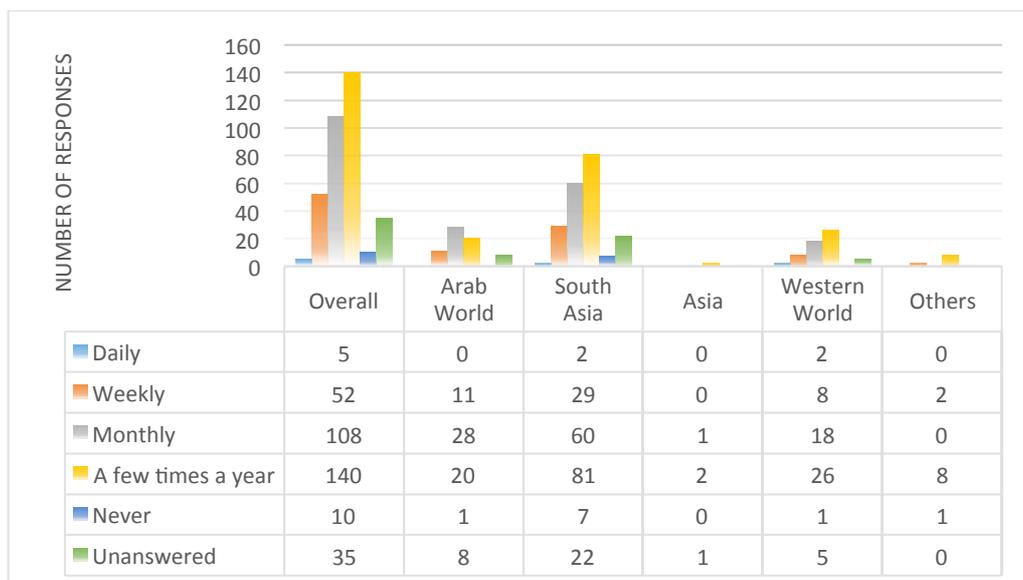


Figure 24: The frequency of visits to the historic centre of Doha (Source: Authors, 2014).

Main motives to visit the historic city core: In the case of the reasons of visiting the historic centre of Doha, a majority of Arabs and Westerners identified dining out as the main reason, while South Asians mainly visit the old centre to go shopping (Figure 25).

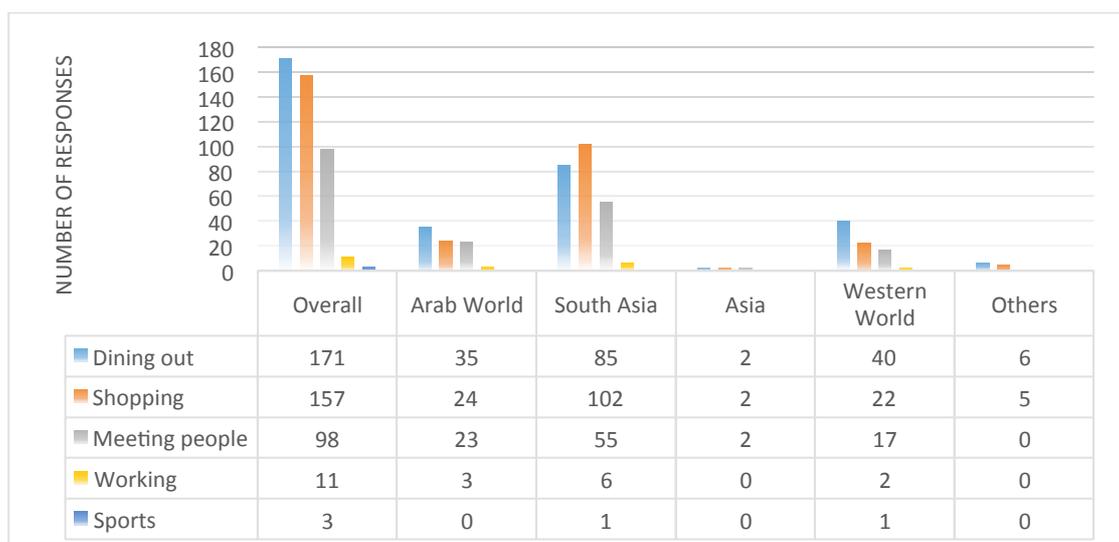


Figure 25: The reasons for visiting the historic centre of Doha (Source: Authors, 2014).

The most frequently associated images with Doha: Last but not least the research team focused on understanding the main images associated with Doha by participants of various cultural background. While Arabs and South Asians perceive the Corniche as the key feature of Doha’s urban environment, Westerners identify the cluster of high-rise building as the most significant image representing Doha. This can be interpreted as a clear indication of a rather short-term stay of many Westerners and thus a lack of historic or cultural awareness (Figure 26).

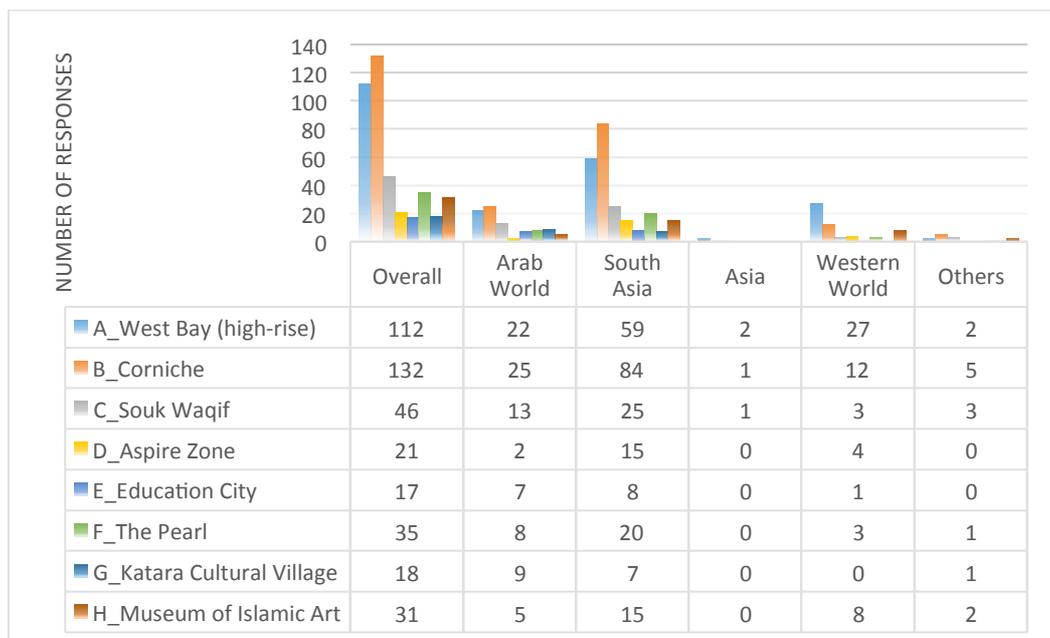


Figure 26: The most frequently associated images with Doha (Source: Authors, 2014).

Notably, medium to high-income groups in emerging service sectors play an important role in securing economic growth in Qatar. Thus, their identification with Doha as a highly attractive place for living and working is decisive for a successful economic diversification and the long-term establishment of knowledge economies. The outcomes of the survey reveal that South Asians, who form a significant majority in the private service sector, are generally attracted to Doha. Main reasons are the high levels of security and safety and the perceived living standards in comparison to their countries of origin. The results furthermore indicate aspects urban planners find as main challenges for creating a liveable urban environment in Doha: Traffic conditions, insufficient social infrastructure, insufficient services such as schools, and the architectural and construction quality of residences.

RESEARCH MODULE V: SPATIAL IMPACT ANALYSES

Urban Structure Assessment

The final research module focused on the spatial consequences of the recent economic diversification and the emergence of knowledge economies in Doha. This module is of high importance for the overall objective of this research project and helps to clarify how emerging service sectors have transformed the urban environment during a rather short period of rapid growth. Therefore the spatial transformation of Doha was investigated between 2003 and 2012.

At first the spatial configuration of the existing street network was analysed. Preliminary analyses showed that the syntactic variables were most effective in discovering systematic relationships. The analysis led to the recognition that the highest level of integration at a global radius R_n (in red) can be found along most ring roads with an existing high density of commercial

activities. On the contrary, at a local radius (R500) the highest level of movement integration can be found in local areas within the old core of Doha.

Global Accessibility: After measuring the degree of global accessibility of each segment of streets in the whole system (city-wide scale) the study led to following results:

- The most accessible streets (in red) are located mostly in urban roadways, such as main roads, ring roads and highways. Some of these roadways start from the centre and extend to reach the city edge in a different direction. Others cross from the north to the south of Qatar extending to other towns near Doha.
- The shoreline of Doha city (Corniche) is picked out in yellow and orange, which reflects a generally accessible space at the global radius.
- A number of local areas, such as suburban areas, and new urban developments, such as Lusail, visibly disappear from the global accessibility, being the least accessible (in blue), and thus almost disconnected from the global urban network of Doha.

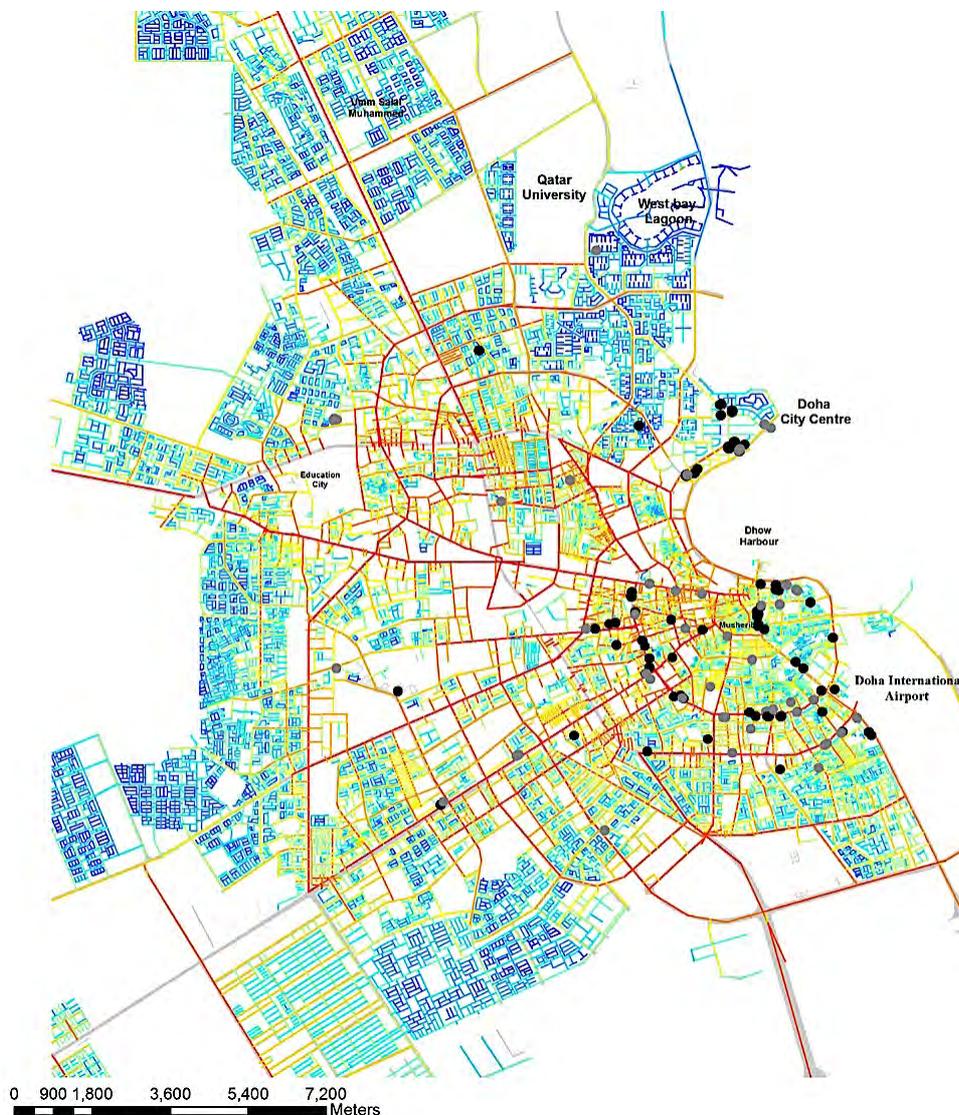


Figure 27: Doha street network - segment integration at global radius Rn (Source: Authors, 2013).

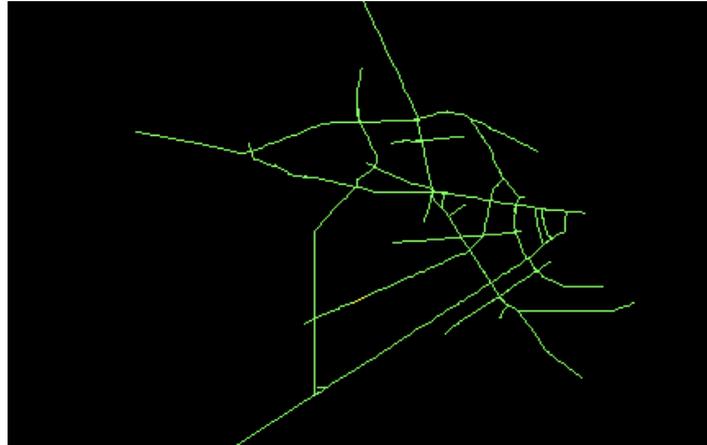


Figure 28: High potential movement space of normalized integration at global radius (Source: Authors, 2013).

Local Accessibility: The following results were found based on the analysis of Doha's spatial network at local radius R500 measuring the degree of local accessibility of each segment of the local street network (at a local scale of 5 minutes' walk away from all streets):

- Most of the local centres disappear in the case of the global accessibility analysis; this could indicate an imbalance within the spatial fabric.
- The shoreline of Doha city (Corniche) is highly accessible in the case of both local and global scale.
- The industrial area is highly accessible at the local scale, while it is least accessible (in blue) in the case of the global scale.

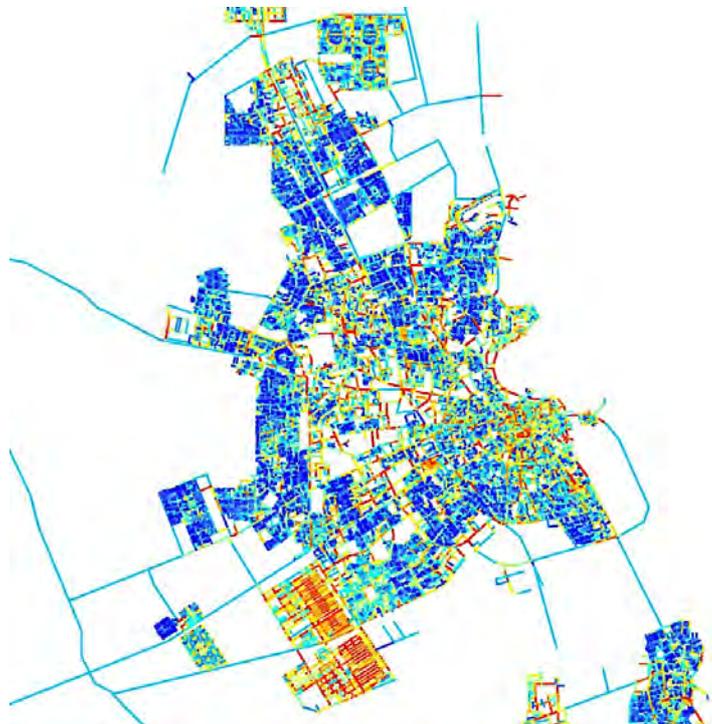


Figure 29: Doha street network - segment integration at Local radius R500 (5 minutes' walking distance) (Source: Authors, 2013).

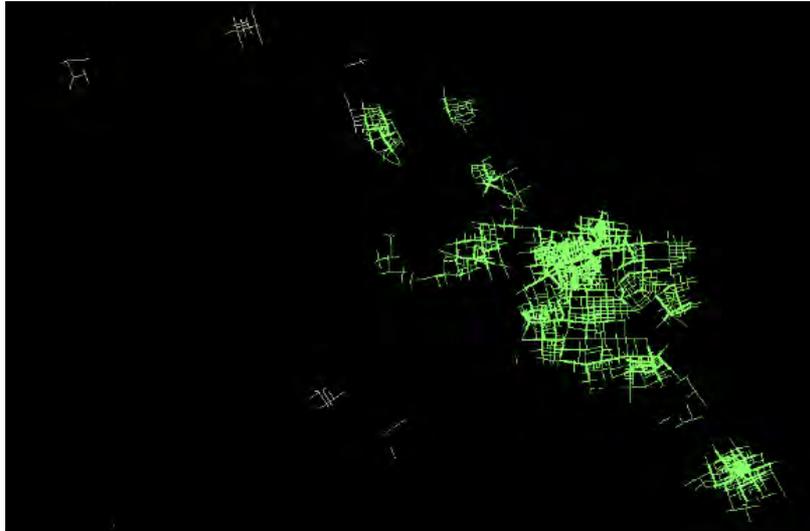


Figure 30: High potential movement space of Integration T.
Local radius Integration R500 meters (Source: Authors, 2013).

General spatial layout: Figure 31 shows the normalized integration of the urban fabrics from local to global scale. The red segment represents the most accessible space at multi-scales of distance. At the radius of 250 meters, the most accessible and integrated space is located on an intensified local grid within the old city centre. By increasing the radius to 500 meters the segment moves to the local structure of a deformed wheel shape within the old core of Doha. In the case of a radius of 1000 meters it shifts to the boundaries of the old centre. And in the case of the intermediate radius of 2000 meters the centre shifts to the first ring roads A and B. At a global level the highest level of spatial integration can be found along the main highway axis (ring roads C and D) of the city. Thus the level of spatial integration shifts from the old city centre to the urban motorways in the outskirts if the radius is increased from local to global scale. There is almost no overlap between the locally and globally highly accessible spaces. This research outcome mirrors the high level of accessibility in the case of the C Ring Road from most housing areas in Doha as well as the still existing grid of small side roads within the historic centre, which enables accessible areas for pedestrians and thus a high level of land use integration.

At the global integration level, the most integrated roads are Al Sadd Street and Salwa road, the C ring-road and a section of D ring-road, where the main retails and commercial activities take place. This indicates that the fast urban growth of Doha in recent years has led to an insufficient integration of a main urban centre on a metro scale. In the case of the local integration (500 meters), another pattern emerges for the highest integration level. The most integrated districts are found in the old core of the city and its proximity. This leads to the implication that Souq Waqif is still considered as a strong centre but for the local level and not on a metro scale. Further local centres are found rather isolated within the urban fabric. This isolation was further increased by the extension of the main road grid during the last years. Subsequently the local urban fabric of districts is disconnected from the main urban structure.

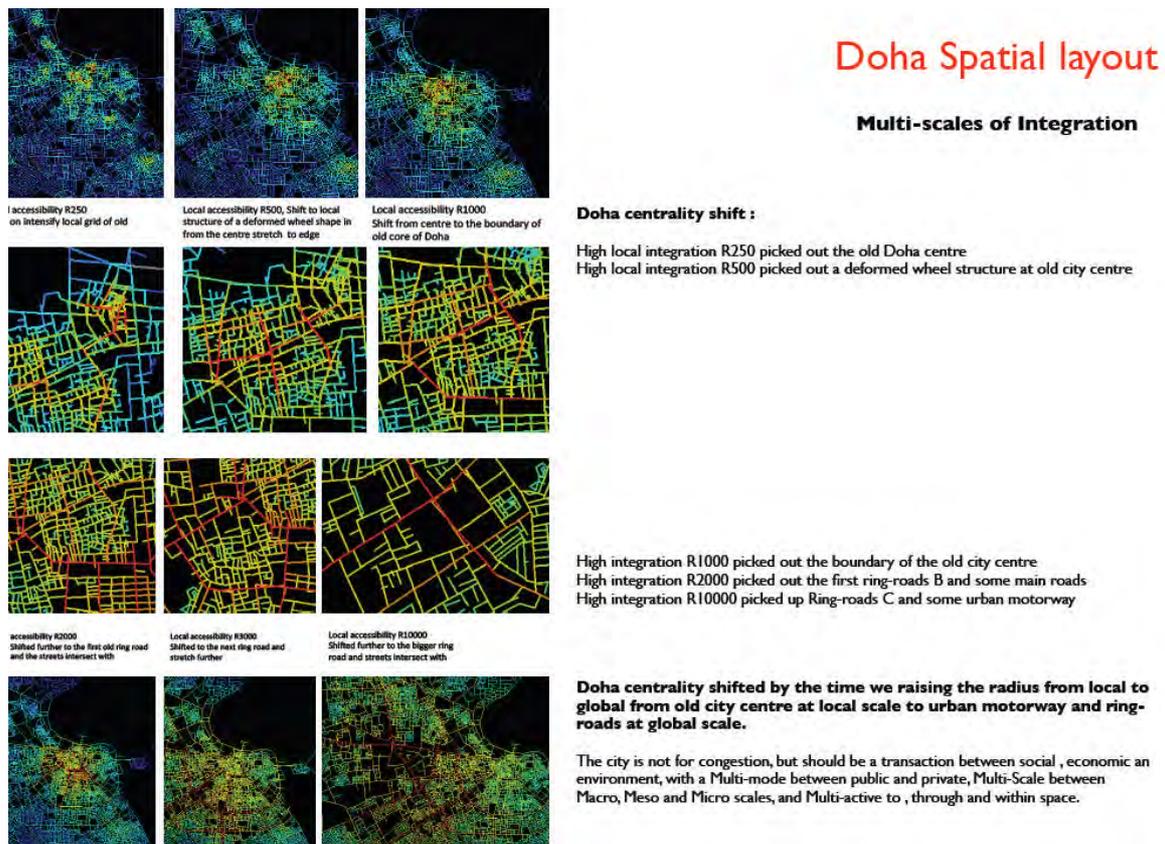


Figure 31: Doha's varying levels of accessibility from local to global radius (Source: Authors, 2013).

The syntactic analysis aimed to investigate the spatial structure of Doha in the case of both local and global scale. The resulting patterns of recent urban developments were examined regarding accessibility potentials such as:

- To-movement (integration measure)
- Through-movement (choice measure)

Angular Step Depth analysis (ASD): This research task was needed to test the degree of accessibility and deviation of different areas within the urban grid of Doha. By using the angular step depth (ASD) from a selected segment in different areas it was possible to maintain the direction that facilitates the minimum depth calculation. First, the measure of the angular step depth begins from the inner space of central urban areas. The path length in the selected segment showed significant networks within the urban context of Doha. In some areas there is a strong linear space extended horizontally; this gives an indication of a well-integrated system, which is easy to reach from surrounding areas. Others have a very limited graph, showing a deep system, which means that they are hard to be reached from the main structure of the city and almost segregated from the surrounding context (Figure 32).

Most residential areas within the urban layout of Doha, such as the diplomatic area, the Al-Duhail residential area and Madinat Khalifa, have well integrated urban fabrics. The most segregated urban patterns can be found in the case of the West Bay Lagoon project (ASD mean = 9.3). This indicates that new urban development areas in the north are rather fragmented and detached from the main urban network. Furthermore, main urban centres such as the old city centre or the Aspire Zone are better integrated than areas for mono-typological residential use (ASD mean = 6.6), while the ring-roads and highways are most accessible.

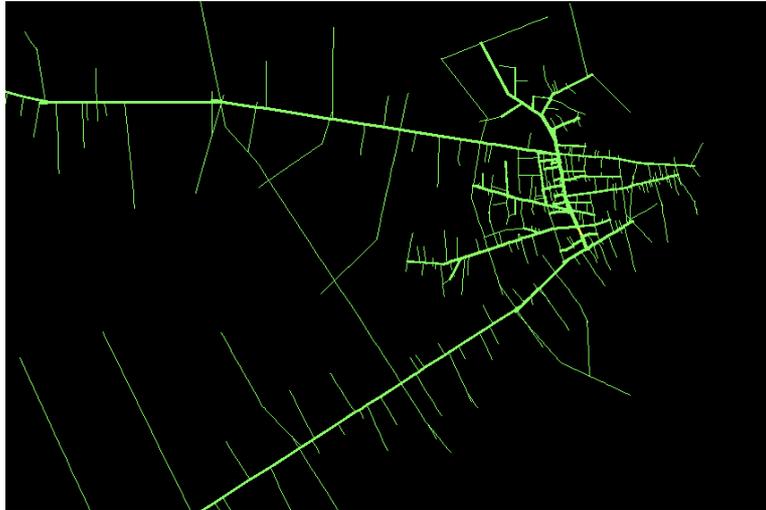


Figure 32: Angular segment depth analysis in the case of the first B Ring-road closer to old core (Source: Authors, 2013).

Land Use Integration Analysis: The analysis of the spatial integration level of certain land uses is an important tool to understand the overall spatial configuration of a city. The main research focus of this task included three steps:

- Global and local assessment of commercial areas used by businesses.
- The location of business clusters.
- Syntactic differences between the different degrees of urban grid geometry (intensify/disperse) of these centres.

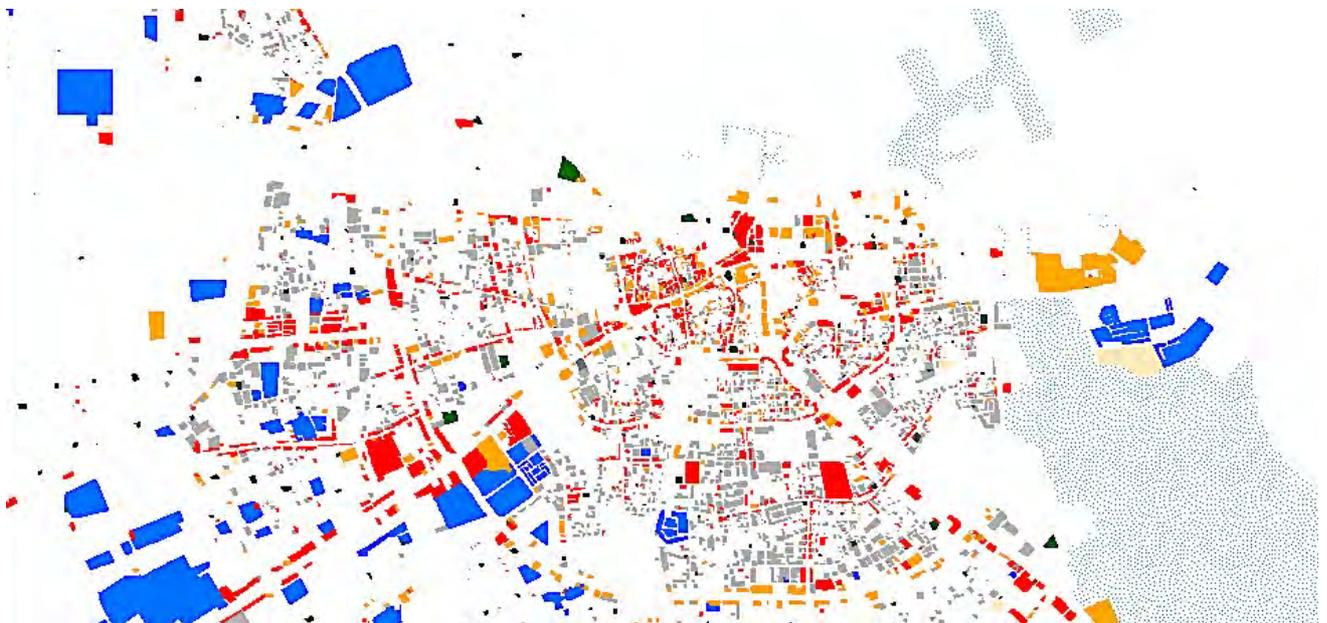


Figure 33: Retail (red), compound residences (blue) and apartment buildings (grey) and offices (orange) (Source: Authors, 2013).



Figure 34: The three main commercial hubs:
Salwa Road (left), Ring Roads (middle) and West Bay (right) (Source: Authors, 2013).

There are three types of commercial activities in Doha:

- Economic activities found within local districts.
- Economic activities found along high streets.
- Shopping malls scattered in different locations in the city.

These commercial activities have certain spatial characteristics. Some commercial activities are distributed following a linear form and others with high density follow a convex form and some are segregated surrounded by very low densities.

A segmental angular analysis of the city of Doha at global scale between 2003 and 2013 illustrates how the old core and local districts developed to isolated urban areas within an emerging super-grid structure. The graph representation of the syntactic models at 2003 and 2013 mirrors quite accurately the development (Figure 35). The shopping streets located along highways and ring roads are the most integrated entities. The residential areas have witnessed an increasing segregation process during recent years. Due to missing land use integration on local level districts have become more and more dependent on the supra-district network of services, such as large shopping mall complexes.

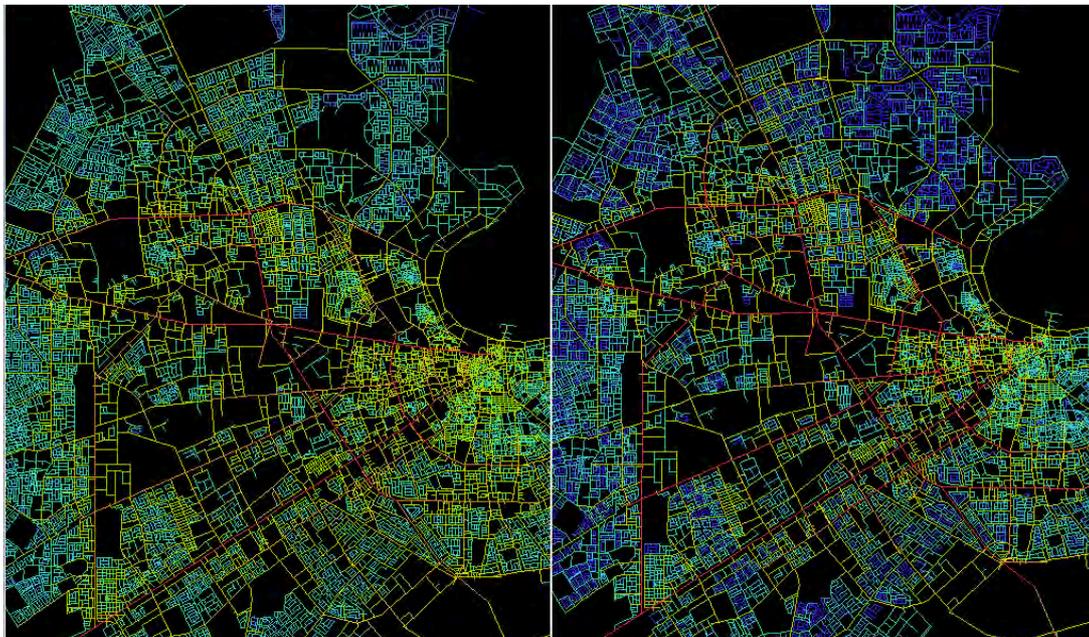


Figure 35: The Space Syntax model of Doha in
2003 (left) and in 2013 (right) (Source: Authors, 2013).

THE ROLE OF KNOWLEDGE ECONOMIES IN REDEFINING SPATIAL CONFIGURATIONS

In addition to a general survey of the contemporary spatial configuration of Doha, the project team focused on urban areas, which are of major importance for emerging knowledge economies. Therefore the locations of 160 companies engaged in various service sectors were identified and Space Syntax was implemented to investigate the level of spatial integration depending on business branch and the global connectivity level of companies.

- The first step of this procedure was the identification of all 160-company locations by using official data. All company locations were marked within an ArcGIS file.
- The second step was to investigate if the office locations of companies can be seen as an indicator for certain spatial preferences within knowledge economies. Therefore spatial integration, choice measure and whole-part relationship between local and global distance were analysed. For each company location a 100-meter buffer was created in order to enable a more precise measuring of the spatial variables (Figure 36).

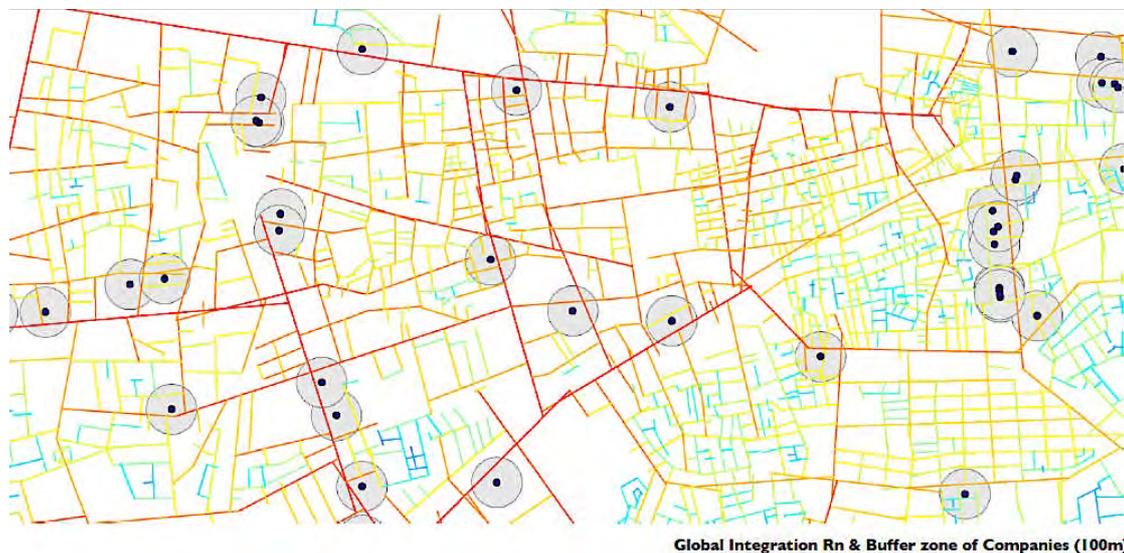


Figure 36: The buffer zone of the companies (100 m) to combine the companies' data with the Space Syntax model (Source: Authors, 2013).

Each company location was analysed with respect to the level of accessibility within the urban fabric. This resulted in clear evidence that most companies preferred highly accessible office locations along the C-Ring Road (Figure 37).

After the general assessment of the spatial integration, each company type was analysed in order to detect, which service sector is dependent on a higher accessibility within the urban structure. In spite of the fact that each sector has a similar need for highly integrated offices, telecommunication and advertising companies appear to be the most integrated at the current stage of development. Insurance, Electronic and Management companies are least integrated in the urban system in the case of this comparison (Table 11).

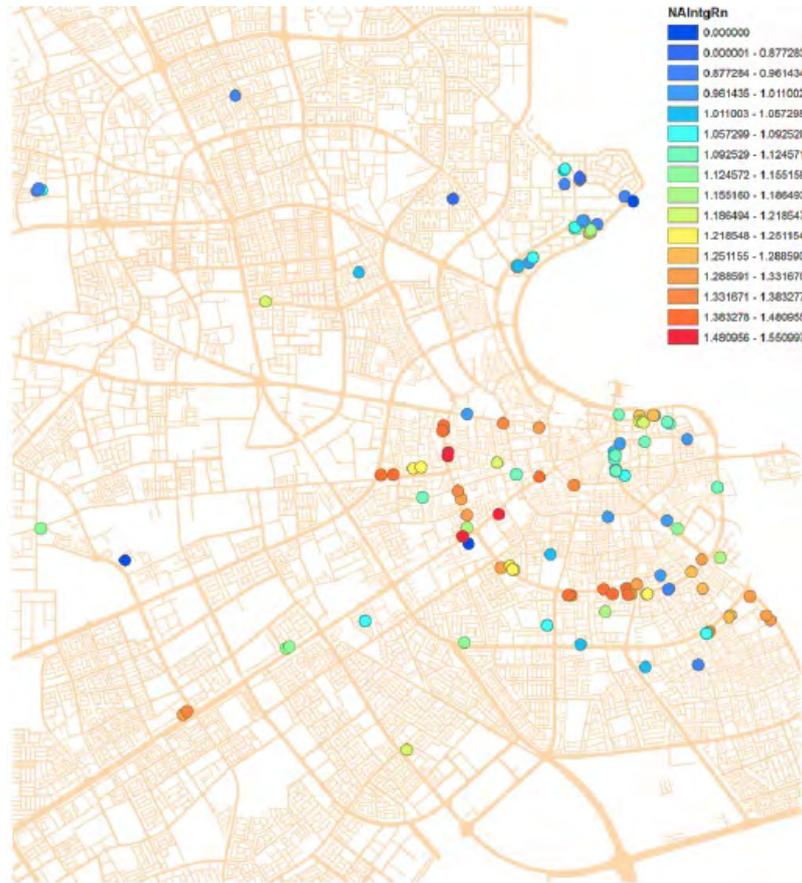


Figure 37: The spatial integration of company locations. Highly integrated (red) to highly isolated (blue) within the urban fabric (Source: Authors, 2013).

Table 11: The companies syntactic mean values of integration at different scales (Source: Authors, 2013).

Company Type	Mean NA Integration R500	Mean NA Integration R2000	Mean NA Integration Rn	Mean NA Choice R500	Mean NA Choice Rn
Insurance	1.167	0.969	1.027	0.883	0.832
Management/IT Consulting	1.159	0.896	1.069	0.851	0.762
Electronics	1.279	1.150	1.074	0.929	0.767
Logistics	1.237	1.108	1.119	0.904	0.880
Law	1.402	0.865	1.124	0.932	0.959
Medical & Optical	1.127	1.132	1.125	0.838	0.829
Banking/Financial	1.240	1.235	1.157	0.904	0.915
ITC	1.259	1.260	1.167	0.965	0.962
Computer Hardware	1.309	1.252	1.169	1.005	0.983
Machinery	1.342	1.217	1.182	0.890	0.919
Architecture&Engineering	1.200	1.082	1.184	0.904	0.869
Vehicle Construction	1.314	1.192	1.209	0.917	1.011
Chemistry&Pharmacy	1.291	1.250	1.210	0.979	0.941
Accounting	1.193	1.147	1.222	0.916	0.950
Advertising&Media	1.178	1.145	1.233	0.948	0.886
Telecommunications	1.312	1.352	1.308	0.877	1.035

The main result of this study has been the recognition of a general tendency of companies to prefer the C Ring Road and Al Sadd area for their office locations. In addition to the high level of accessibility the C Ring Road benefits from a public zoning regulation, which permits high-density residential and commercial developments. The former business district in Al Salata at the old city core has therefore lost its previously predominant role for the service sector. The emerging West Bay CBD cannot yet challenge the C-Ring area as main business hub due to missing infrastructure and a lower rate of accessibility.

POTENTIAL BENEFICIARIES

The Public Sector in Gulf Cities

This project is of high significance for the public sector and its urban planning authorities in the Gulf region. The appraised data will enable clear insights into how certain economic developments will reconfigure urban structures as well as how the existing urban environment is playing an important role in attracting or inhibiting the growth of knowledge economies. Thus, the advantage of an interdisciplinary project based on a holistic framework can come into play allowing planners to gain various insights and explore their own role in reconfiguring urban development paths. The main project results that are of particular interest for the public sector include:

- The needs of multi-branch companies for highly accessible and integrated business districts, which provide sufficient residences for their employees as well as amenities and services in order to attract skilled international workforce long term.
- The fragile nature of economic diversification processes in the Gulf and the high dependency on local growth.
- The long travel distances of high-income groups in order to follow up weekly activities due to a lack of land use integration.
- The perception of high-income groups regarding missing urban qualities, such as sufficient modes of transportation, lack of services and low construction quality standards of housing typologies.
- The limitations within existing public spaces, which usually do not offer diverse activities to attract various cultural groups leading to fragmentation and segregation.
- The spatial transformation of a rapidly growing city with respect to the shift of global and local accessibilities.
- The emergence of extensive linear business spines instead of main or clustered business districts.
- The missing definition of urban centres on a macro scale which is leading to continuous urban fragmentation and to the dissolution of neighbourhood centres.

As the focus of this study is on Doha, the project is of particular interest for the planning authorities in Qatar. The project was therefore developed in close cooperation with the Ministry of Municipality and Urban Planning (MMUP), particularly the Qatar National Master Plan Department. The QNMP team provided the research project with GIS data and recent planning documents. The project team presented and discussed research results at the QNMP department in West Bay.

Private Sector in Doha

The private sector can benefit from the outcomes of this research. In this respect, such a sector includes developers, architects and urban planners. Due to the rapid urban growth in recent years most experts engaged within the urban development process have recently moved to Doha in order to be engaged in large-scale projects. The rather short term stay of many

consultants and the lack of publications regarding the city and its specific roots have led to a lack of awareness of development backgrounds and urban dynamics. Various publications and newspaper interviews were therefore disseminated during the entire research process in order to close this knowledge gap and to support a proactive discussion of how to shape the future urban environment of Doha. The main project results that are of interest for the private sector include:

- Key data and information regarding the historic evolution of Doha from a small fishing village to an emerging city.
- The analysis of public urban planning and its organization.
- An overview regarding the current cooperation between public, semi-public and private sector in the case of mega projects.
- The demands of companies regarding suitable urban environments and office space: The evaluation of interviews has led to the recognition that most advanced producer service companies prefer medium scale buildings in highly accessible locations.
- The demands of high income groups regarding housing units: Based on the questionnaires a large percentage of participants prefer to live in well serviced and well located apartment buildings instead of compounds.
- The general interest of many social groups to use outdoor spaces rather than being limited on shopping malls.
- The high need for innovative and integrated urban design.

Academia Worldwide

The academic world will benefit from this interdisciplinary research project by its attempt to comprehensively analyse complex interdependencies between fast urban growth, emerging knowledge economies and the qualities of the urban environment. The newly developed framework can be discussed on various international and regional platforms with respect to its suitability for implementation in other cities in the Gulf and worldwide. The particular approach to integrate analyses of current planning, demand-driven aspects within company networks and the various perceptions on urban spaces of a multicultural society make this project unique. Furthermore, a city is investigated, which has hardly been discussed by the international research community. Doha is one of the rare examples, where extensive urban growth is mainly driven by public investment strategies. Therefore the results of the project will be of high interest for the general international research on cities. The main project results that are of high interest for international and regional academia include:

- A newly tested framework to assess urbanism in the case of emerging cities based on Lefebvre's triadic theory of space production in order to integrate all factors defining spatial development.
- A new perspective regarding the establishment of sustainable urban structures.
- A comprehensive analysis of economic factors triggering urban transformation processes throughout the history of Doha.
- The scientific prove of how multi-branch companies use an emerging city, like Doha, to develop their business, which is primarily focused on local markets.
- The dependency of Doha on Dubai as main service hub in the region.
- The limited number of high tech companies in Doha.
- The main share of construction related businesses within the medium and high service sectors.
- The decisive role of cultural backgrounds regarding the perception of urban qualities in Doha.
- The South Asian dominance of employees within international multi-branch companies.

- The lack of public spaces and their limited response to the needs of a multicultural society.
- The rapid spatial modification of an urban structure due to extensive urban sprawl.
- The dissolution of integrated urban centres and their replacement by fragmented clusters as well as the resulting lack of efficient urban structures (far travel distances).
- The disintegration of local neighbourhoods and the high level of spatial isolation in the case of a newly initiated Central Business District due to the lack of sufficient infrastructural networks.
- The emergence of an improvised business spine along a main urban growth corridor.

CONCLUSION

Due to the interdisciplinary nature of the project various recommendations can be made for future research attempts in analysing emerging cities and their complex situation between fast growth, economic diversification and urban qualities. In order to understand the interdependencies between rapid urban growth, economic transformation and urban qualities a research framework was implemented following the theory of space production. Thus, the project did not focus on visible spatial developments only but also the various factors impacting urban structures. While functional qualities can be assessed by analysing data, such as land use integration, urban qualities are mainly defined by the way inhabitants perceive their surroundings. The particular dynamics in emerging cities and their vast migration patterns have led to an urgent need in understanding missing urban qualities in order to initiate consolidated growth within established networks.

The case study Doha has proven to be a valid choice due to its emerging significance in the region and its rather unique development conditions. The recent evolution of Doha has been mainly affected by a new public development vision and parallel public investment strategies in key economic sectors, such as trade, education and tourism (sports events). Subsequently, the city has entered a new and rather distinguished stage of urban development during the beginning of the new millennium. Capacity deficits within planning departments in combination with the unexpected exponential urban growth have led to uncoordinated and fragmented development patterns, mainly defined by mega projects.

The initiated construction boom has attracted a large quantity of international companies. Thus, a large percentage of the present service sector in Qatar is depending on an expanding market within construction related sectors. Furthermore, many companies have only relocated project offices to Doha, while headquarters still operate from other locations, particularly from the Emirate of Dubai due to its proximity and already established free zones. Companies within these newly emerging advanced producer service sectors need a high diversity of accessible office locations in Doha. Due to the extensive urban sprawl in the West of the city, the most integrated and accessible urban area has shifted from Al Salata and A- Ring Road to Al Sadd and C- Ring Road. The newly built West Bay business centre lacks accessibility as well as infrastructure and therefore lacks attractiveness for most companies. Consequently, the C- Ring Road has recently emerged as the main central business spine of Doha.

In general, the urban area of Doha has doubled since 2003. This exponential growth of the overall urban area was mainly caused by urban sprawl. The fast increase of urban sprawl was mainly fuelled by extensive low rise compound developments for international workforce. Subsequently, most residential districts for high income groups within Doha's urban periphery are currently undersupplied regarding services and facilities. This has resulted in long travel distances (such as an average of 7 km from residences to grocery stores). Moreover, favoured public spaces are limited to a rather small number considering the size of the city and number of inhabitants (less than 2 square meters of green space per inhabitant). Based on various

observation studies there is a general lack of integrating the various cultural needs of local and migrant communities.

Traffic congestion, diverse housing options, lack of construction standards and missing social services have been identified as the key challenges to establish liveability in Doha. Fast urban growth has led to the need for the extension of highway networks, which has led to the disintegration of local districts and their urban centres. The missing development of integrated urban centres has thus led to a high dependency on shopping malls and thus the experience of Doha as a highly replaceable city by a majority of migrants. Place making and the creation of functioning neighbourhoods are thus further key challenges to attract the creative class to settle in Doha long term and to establish a diversified economy.

ACKNOWLEDGEMENTS

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EXPLORING CONTEXTUAL CHARACTERISTICS OF TRADITIONAL MEDINAS IN NORTH AFRICA

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Abstract

In an age of globalization and standardization, cities around the world are losing their historical and cultural identity. Traditional cities of the Muslim world, in particular, are witnessing an increased transformation in their urban fabric, which is extremely different from their original one, and not necessarily better. This paper explores the historical precedents of three traditional medinas in North Africa, which are Tripoli, Tunis and Fez, from a comparative perspective. The aim of this study is to analyse key contextual characteristics of these cities in an attempt to derive key principles that are capable of improving the contemporary built environment and safeguarding the cultural identity of traditional medinas. The paper concludes with a number of lessons learned from the visual form, urban pattern and land-use of traditional medinas, and sets out challenges that face decision makers and designers in manifesting the essence of traditional medinas in contemporary urban form.

Keywords: *Traditional Medinas; Contextual Characteristics; Urban Pattern*

INTRODUCTION

Since the mid-20th century many cities in North Africa, and elsewhere in the Muslim world, have witnessed increasing implementation of contemporary urban projects due to rapid economic growth and associated increase in population. Many countries sought quick urban housing solutions and consequently implemented foreign strategies and models in the new urban developments. The newly-adopted strategies were completely different from the original morphological pattern of traditional cities, and seldom had any regard for their historical and social context. In his book, 'The Failure of Modern Architecture', Brolin (1976) states that the ideology of modern architecture mostly deals with the way people should live, rather than the way they do live. In the contemporary, so-called 'Modern' housing types, courtyard houses along with their concepts and formal elements were forgotten and replaced by new types, usually in the form of linear apartment buildings, tower blocks or suburban villas.

Traditional cities of the Muslim world are an endless motivation for research projects. This study explores three traditional medinas in the region of North Africa. The main objective is to derive principles from historical precedents, in order to improve the quality of contemporary built environment, and to develop a framework that allows cultural identity to be clearly reflected in contemporary architecture and the overall built environment. Whereas the exploration of traditional built environment usually involves two aspects; social and physical context, social context is not the focus of this paper, which focuses on the physical aspects of traditional cities, and explores contextual characteristics of three major traditional medinas in term of their visual form, urban fabric and land use.

There is no single accepted definition of the term 'North Africa'. The region is defined by some as the area expanding north of the Sahara from the Red Sea on the east to the Atlantic Ocean on the west. However, this area is more commonly referred to as Northern Africa. Others refer the term to the area known by the French during colonial times as *Afrique du Nord*, which covers modern Morocco, Algeria and Tunisia. The most common accepted definition, and the

one used in this study, is the area expanding from the western border of Egypt in the east to the Atlantic shores of Morocco in the west, which includes the coastal plain of Libya, Tunisia, Algeria and Morocco (Warmington, 2015).

The three traditional medinas explored in this study are; Tripoli, Tunis and Fez. The old medina of Tripoli is chosen because of its historical and regional importance as the capital of Libya, in addition to its special importance to the researcher. The old medina of Tunis is chosen because it is the capital of Tunisia and one of few cities that are listed as world heritage sites. The old medina of Fez is chosen in this study for various reasons. Although it is not the current capital of the country; it was the capital of Morocco three times during its twelve-hundred-year history and it is the oldest of the four imperial cities of Morocco: Fez, Meknes, Marrakesh and Rabat. In addition, Fez is known to have the best preserved old city in the Arab world and it stands out as the world's largest urban area with no car traffic.

This study is divided into three sections. The first looks at the natural setting for each city and traces its historical formation and development; the second explores the contextual characteristics of the three cities through analysing the visual form, urban pattern and land use of these cities; the third section reaches conclusions on the key qualities that can contribute to creating better contemporary built environment that clearly reflects the cultural identities of these cities. The methodology applied in this study is based on case studies and a mixed-method approach, where case studies are defined by an interest in the chosen cases rather than the investigation technique used (Stake, 1998). The required information is gathered through maps, photos, historical documentations and previous studies, and investigated through comparative analysis.

NATURAL SETTING AND HISTORICAL DEVELOPMENT:

This section introduces the three cities of Tripoli, Tunis and Fez by looking at their natural setting and historical development. This is believed necessary in order to visualize the urban pattern and understand the contextual characteristics of these cities.

Natural Setting:

Tripoli and Tunis are both coastal cities, while Fez is further inland. However, the three cities benefit from being on major routes that connect different regions and even different continents together. This brought the cities great importance, seen by the different civilizations that recognised this and fought hard to control them. The city of Fez further benefits from its natural water sources. Apart from the river and its tributaries that were easily canalised and turned to urban use, the city contains numerous water springs. All three cities benefit from pleasant climate, despite their different locations and topography. Their populations are similar. Yet, it is important to note that the population in this paper refers to the people who live in the whole city and not just the traditional. Table 1 shows these similarities in brief.

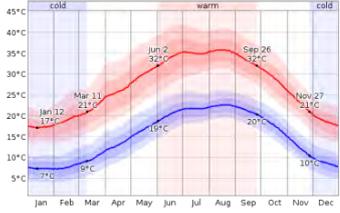
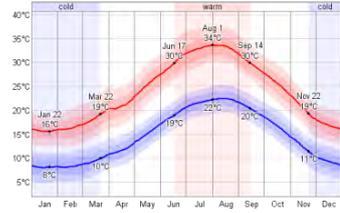
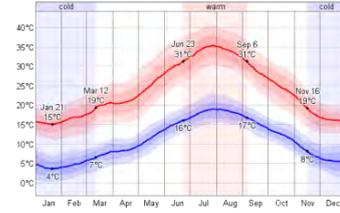
Tripoli is located on the northwest side of Libya 32° 54' N 13° 11' E, along the coast on a rocky headland that projects into the sea forming a natural bay. Having a central location on the southern coast of the Mediterranean, Tripoli served through history as a connection point between Europe and the sub-Saharan region. As a matter of fact, due to the direction of the prevailing wind in North Africa and the difficulty in navigating across it, the main sea route was usually between Tripoli and southern Europe, rather than between Tripoli and Cyrenaica. Based on the census of 2004 the population of Tripoli is around 1.065 million. It benefits from a Mediterranean climate, which makes it hot/dry in summer and cold/rainy in winter. Temperature ranges between 36°C in summer and 7°C in winter.

Tunis is located in the north-eastern part of Tunisia, 36° 50' N, 10° 13' E, on the Gulf of Tunis, behind the lake of Tunis and the port of Halaq al Wadi. The city of Tunis is always connected to the more powerful and ancient city of Carthage, which was the capital of the

Carthaginian Empire and one of the most important cities of the Roman Empire. Although both cities are located at the intersection of natural routes serving the diverse regions of the country not very far from each other, Carthage was founded on the coast by the Phoenicians, while Tunis was constructed back from the coast on the landward side of the lagoon by the Arab-Muslims. According to the 2014 population Survey, the city has a population of 1.056 million inhabitants. It has a Mediterranean climate that makes it hot/dry in summer and cold/rainy in winter. Temperature ranges between 34°C in summer and 8°C in winter.

Fez is located in the west-central part of Morocco, 33° 58' N 04° 59' W, on the banks of Wadi Fez and surrounded by low hills. It has a central geographical location, with regard not only to different regions of Morocco, but also to the whole of North Africa. It lies on the easiest route between the Rif and Middle Atlas Mountains and is situated at the intersection point of two great communication axes: the first is north-south between the Mediterranean and the Sub-Saharan region, and the second is west-east between the Atlantic coast and central North Africa. This unique location gives the city of Fez a special importance politically, economically and culturally that was realized by the different dynasties that ruled it. According to the 2014 Census, the city has a population of 1.8 million. It has a tropical climate that makes it hot/dry in summer and cold/rainy in winter. Temperature ranges between 35°C in summer and 4°C in winter.

Table 1: Natural Setting (Source: Author, 2015).

		Tripoli	Tunis	Fez
Natural Setting	Location	Coastal city Overlooking the Mediterranean 32° 54' N 13° 11' E	Coastal city Overlooking the Mediterranean 36° 50' N, 10° 13' E	On the banks of Wadi Fez, surrounded by hills 33° 58' N 04° 59' W
	Population	1.065 Million 2004 Census	1.056 Million 2014 Census	1.8 Million 2014 Census
	Climate	Mediterranean Climate Hot/Dry in Summer Mild/Rainy in Winter  Tem. 7°C ~ 36°	Mediterranean Climate Hot/Dry in Summer Mild/Rainy in Winter  Tem. 8°C ~ 34°	Mediterranean Climate Hot/Dry in Summer Mild/Rainy in Winter  Tem. 4°C ~ 35°

Source: <http://www.geohive.com/cities/>
Source: <https://weatherspark.com/averages/>

Historical Development:

The cities of Tripoli, Tunis and Fez have long histories, as various civilizations occupied the cities and added their own footprints to them. The origin of Tripoli and Tunis is believed to be Phoenician, dating back to the 1st and 4th century BC. After the formation of the Carthaginian

Empire, Tripolitania, with its three cities, and Tunis became part of this empire. In the 3rd and 2nd centuries BC Carthage was weakened, and after a three-year siege the city was destroyed in 146BC by the Romans, and its site ceremonially crushed. Tripolitania and Tunis, along with other Carthaginian settlements, became Roman protectorates. Tripoli flourished during Roman rule, especially when *Septimus Severus*, a native of Tripolitania from Leptis, became emperor of Rome (Metz, 2004). However, the Romans were more interested in reconstructing and developing Carthage rather than Tunis.

The most significant historical and cultural change in the cities of North Africa occurred during the 650s, when the Muslim Arabs came to North Africa, bringing with them a religion, a culture, a language and a certain pattern of living, which created the region's enduring character (Wright, 1969). The two cities of Tripoli and Tunis were developed, and the city of Fez was established during this Era. Under Islamic rule, Tripoli became an increasingly important centre for the trans-Saharan caravan trade, and attracted foreign interest in the city. Tunis, on the other hand, was established around 698 as a Muslim marine arsenal, where troops were living on a permanent basis ready to oppose any enemy landing on the coast, or to raid the coast of southern Europe (McGuinness, 1992).

Fez was the latest of the three cities to be established. Although historians are unsure of the exact date of its foundation, the history of Fez is believed to have started in 789, when *Idris I* founded the first nucleus of the town on the right bank of the Oued River (Bosworth, 2010). However, *Idris I* died before he had time to develop it. Twenty years after his death, his son *Idris II*, is believed to have established a second town on the left bank, giving the city its final form, making him regarded as the true founder of the city of Fez.

During that time the city of Fez was two [distinct] towns located on both sides of the river; each constructed in a different era and each surrounded by walls that were flanked by several towers. For several centuries the two cities co-existed and developed until *Al-Moravids* combined the towns into one in 1070, and transformed it into a strong military base. During *Al-Moravids* dynasty, Fez experienced an era of development and prosperity. Bridges were constructed to bring the two sides together and new neighbourhoods and military buildings were built. *Al-Moravids* ruler, *Youssef Ibn Tachfin*, constructed a single wall around both cities to further combine them into one. *Al-Moravids* also reconstructed the Qarawiyyin mosque, a medium-size mosque built in 859, and changed it into a great mosque of vast dimensions and astonishing Andalusian ornamentation. *Al-Moravids* are seen by some historians as the second founders of Fez.

The three cities, Tripoli, Tunis and Fez, fell into the hands of *Al-Mohads*, who between 1152 and 1160 succeeded in unifying the entire region of North Africa under one central indigenous authority for the first and last time in its history (McKenna, 2011). Despite the great achievements of *Al-Mohads* in Tunis and particularly in Fez, their ruling period in Tripoli did little for the development of the city. By 1453 North Africa was divided into three different Muslim states, each ruled by a different Berber dynasty: The *Hafsids* controlling Tripolitania, Tunisia and eastern Algeria, The *Zayyanids* ruling most of western Algeria, and the *Marinids* ruling over Morocco.

The *Hafsids* period is considered by historians as the most essential period in the history of Tunis, when the city reached the limits of its stability and prosperity. During their dynasty the original urban core of the city was extended by the construction of two suburbs that were protected by the ramparts. It is stated by Habib Saidi (2011) that Tunis only became capital when the *Hafsids* who, for the first time in the history of the country, dared to take away the central power from *Kairouan*. The Kasbah, inherited from *Al-Mohads*, became the seat of the new dynasty; a new arsenal was constructed to the east of the town, the *Al-Zaitouna* mosque was enlarged, and new city gates and towers were added (Bosworth, 2010).

By 1520 the Ottomans, who occupied Egypt in 1517, became involved in the fighting between Muslims and Christians in North Africa. The Ottoman rule in North Africa, excluding Morocco, began when locals in the region requested the help of the Ottomans, the strongest Muslim empire at the time, against the Christians of the Iberian Peninsula. At first, the region was ruled by different governors sent from Istanbul, but one by one the cities of North Africa became independent from the Ottoman government, yet retained strong ties with the Ottoman Sultan by recognizing him as Caliph.

During the 159 years of the first Ottoman rule the city of Tripoli expanded and emerged as a real urban centre in North Africa. This urban growth continued during the *Karamanli* rule (1710~1835). New hammams, private houses and shops were set to accommodate the growing population. In 1835 the Ottomans resumed direct rule of Tripolitania in an attempt to forestall the French expansion in North Africa. The first period of their rule (1835~1862) was characterised by great instability, due to a series of rebellions by the locals. However, during the second period (1863~1911) the Ottoman governors introduced serious urban and economic measures to improve the living conditions of the locals, who had suffered great neglect by the previous Ottoman authority. Among the social, economic and urban schemes was the establishment of educational buildings, such as primary and secondary schools, a military college, an Islamic Schools for arts and crafts, and an industrial training school. A new court and a hospital were constructed, and the castle and city walls repaired during this period.

By 1920 all of North Africa was under European colonial control. After invading Algeria in 1830 the French invaded Tunisia in 1881 and proposed a treaty of protection to Sadok Bey of Tunis the same year. Under this treaty the French preserved the administration of the Bey of Tunis, yet applied an indirect form of rule, which they later applied to Morocco as well. The French conquest of Morocco started in 1911, when Moroccan forces besieged the French-occupied city of Fez. After the French troops brought the siege to an end they forced Abdelhafid of Morocco to sign the Treaty of Fez, which formally put Morocco under the French protection and allowed them to divide the country with the Spanish. The seizure of Morocco coincided with the conquest of Libya, which was similarly invaded in 1911 by the Italians. A year later the Ottomans surrendered, and made peace with Italy. However, the locals rejected the treaty between the Italians and the Ottomans, and denied the Italian control of the country. Copying France's terrible acts of repression in Algeria, the Italians only managed to turn Libya into an Italian colony after over twenty years of resistance.

During the colonial powers, the three cities were subjected to similar colonial strategies, when new colonial cities were constructed beside the existing traditional ones. Yet, it is fair to say that the French approach in maintaining the traditional cities of Fez and Tunis was much more effective than that of the Italians. In Tripoli, connecting roads were added to the existing routes that emerged from the castle to create the new street network. These connecting roads were compared by Luigi Luigi, the designer of the master plan, to the Ring in Vienna, the Boulevards of Paris, and the Crescents in London (McLaren, 2006). The Italians did not make any detailed program to preserve the old Medina. Their main focus was to simply strengthen whatever was already standing, and to support the city just enough so that it would require the least investment possible.

In Tunis, a new colonial city with methodical planning, straight lines, chequered patterns and modern buildings started to emerge alongside the ancient city, which was partly deprived of its administrative and commercial functions. Major transformation took place in the old medina in order to create the necessary connections between the two cities. The major undertaking, with no doubt, was the planning of a ring boulevard around the medina, replacing the walls of the city (Saidi, 2011). In Fez, following the Treaty of Fez and the arrival of more French in Morocco, a new French-style 'Ville Nouvelle' was constructed. Yet, due to the traditional city's topography,

the new colonial city was sited two kilometres west of the ancient city, allowing the traditional medina to develop independently and operate in its traditional manner.

A FRAMEWORK OF ANALYSING CONTEXTUAL CHARACTERISTICS OF THE THREE CITIES

This section explores the contextual characteristics of Tripoli, Tunis and Fez, by looking at each city's visual form, urban pattern and land use. These three characteristics are believed to be clear indicators of each city's historical precedents, and consequently essential in concluding key principles capable of improving the contemporary built environment and safeguarding the cultural identity of traditional medinas.

Tripoli:

In an article that was published in Saudi ARAMCO World, Charles O Cecil describes Tripoli as the Crossroad of Rome and Islam. This is strongly reflected in the urban pattern that makes it a typical Muslim city, with a clear Roman history.

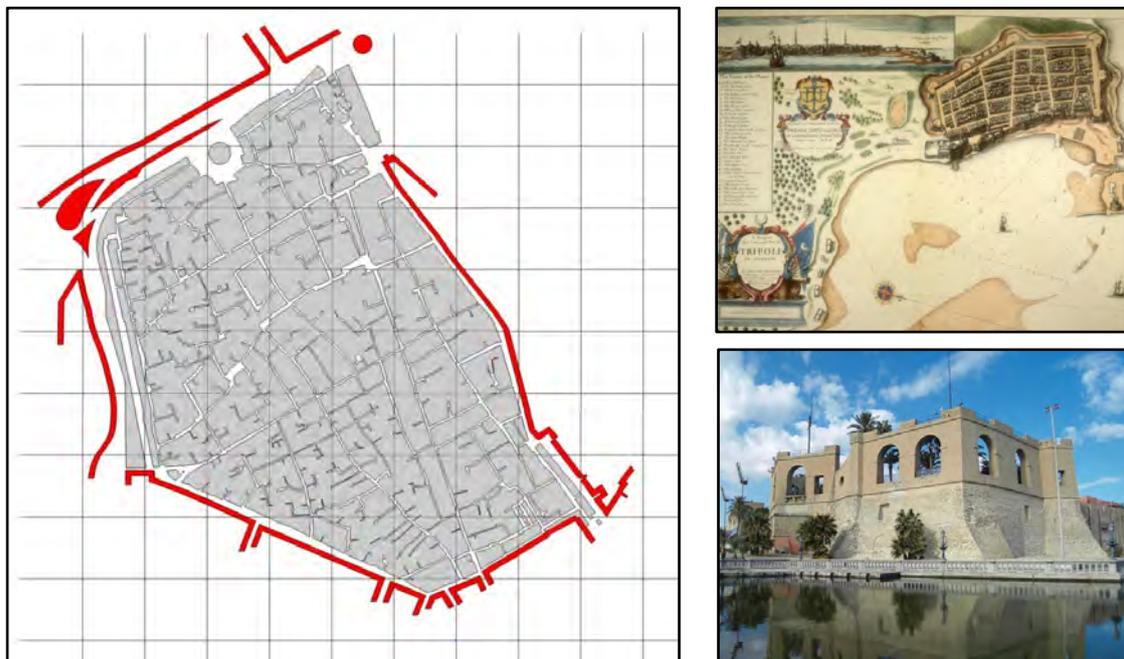


Figure 1. (Left) Tripoli general layout (Source: Author, 2015); (Top Right) The city & port of Tripoli (Source: Seller, 1675); (Bottom Right) Al Saraya Al Hamra (Source: www.milosaleem.wordpress.com)

The urban fabric of the city has witnessed the passage of several civilizations over time. Each civilization has left a mark on the city's physical characteristics, with the exception of Vandal and Spanish rule, when the city experienced great destruction (Remali et al, 2015). In describing the city Pedro Navarro, who was a Spanish military engineer and general during the 15th~16th century, states that *the city is larger than I thought, and although those who admired it spoke well about it, I can see that they were saying only half the truth; and among all the cities I have seen in the world, I do not find any that is comparable to it* (cited in Micara, 2008, p387). Today, Tripoli's visual form is dominated by its castle and the remains of its walls, its compact courtyard houses and narrow alleys. The old medina of Tripoli has a pentagonal form and is surrounded by strong masonry walls. It is divided into five residential quarters, where each quarter is made up of

clusters of households based on social ties, common interests and shared moral unity (Eilelman, 1981). It is stated by Ludovico Micara (2008) that the city of Tripoli reflects clearly the orthogonal street grid of the classic Roman layout, which is based on *cardo* and *decumanus*, and the irregular and curvilinear passages of the Arab-Muslim city, along with its *cul-de-sacs*.



Figure 2. An overview of traditional medina of Tripoli (Source: www.fayeandsteve.com, 2015).

The original Roman street network of the traditional city of Tripoli consists of the *cardo*, which runs parallel to the coast from southeast to northeast, and two major *decumani*, which run from southwest to northeast, leading to the port. The intersection between the *cardo* and the northern *decumanus* was marked by a Tetrapylon of Marcus Aurelius, constructed in 163 AD. During the Roman period, sea trade played a major role in the city's life. In addition to being on an intersection of trade routes between the sea and the hinterland, the location of the city provided the Romans with a deep harbour that was well protected by a promontory to the northeast, and guarded by a low hill to the west.

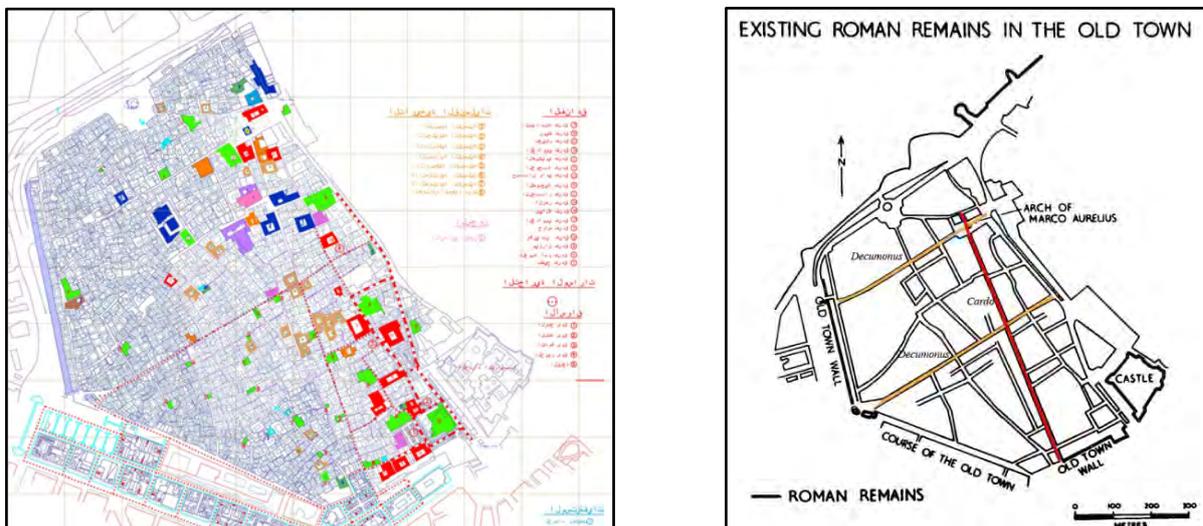


Figure 3. (Left) Land-use in traditional medina of Tripoli (Source: Historic Cities Administration Tripoli, 2013); (Right) Historical Roman layout (Source: Author, 2015).

With the Arab-Muslim arrival in 642 AD the street network started to follow irregular patterns, which is a typical character of many Arab-Muslim cities. During this period the city focused more on its connection with its hinterland than with the sea. The western part of the medina is believed

to have developed during this period. As for the street network, the intersection between the *cardo* and the southern *decumanus* became the new public centre. It was marked by the remains of four beautiful Roman columns situated on the corners of the crossing, and was known as *Arba'a Arsat*, meaning 'the four columns'. For this reason it is fair to say that the Roman *cardo* and *decumani* had, and still have, a strong role in the street network of the old medina, as their intersections contain the main public centres of both the Roman and the Arab-Muslim city. Like other Islamic cities, the traditional medina of Tripoli is famous for its compact structure, courtyard houses and narrow lanes with flying buttresses between the opposite walls of the street facades. As the Arab city grew, the urban plots became large complex shapes and no longer corresponded to the standard measures of Roman cities. Numerous *cul-de-sacs* started to emerge in the street network, in order to penetrate into the large urban plots and reach their internal areas. Courtyard houses, in a range of sizes became the main components of the city's urban structure.

The commercial centre of the city is mainly located in the south and southeast of the medina. Different *suqs* (markets), such as *Suq at-Turk* and *Suq Er-Rba*, together with some workshops, are located close to each other giving shoppers easy access from one market to another. A number of Hammams (Turkish baths) and *funduqs* are mostly located in the eastern sector of the city along the main arteries of the Roman grid (Sibley & Fadli, 2008). Small mosques along with Koranic schools, small shops and bakeries are well distributed throughout the residential quarters. Large mosques, mostly built by ottoman governors, are located in the eastern part of the medina.

It is interesting to note that, unlike traditional Arab-Muslim cities, there is no central mosque in the traditional medina of Tripoli, despite the great number of both small and large mosques located within the city walls. It is stated by At-Tijani in his *Rihlah to Tripoli* in the years 1306-1308 that it was a flourishing city, *where the mosques were so numerous that they exceeded the number of the houses* (in Micara, 2013, p74). However, a number of great mosques described by At-Tijani no longer exist, as all traces of Arab-Muslim existence before the Ottomans were completely destroyed by the Spanish and Maltese knights of Saint John. Ludovico Micara (2013, p51) states that *in the case of Tripoli the disastrous Spanish occupation and the resulting urban decay that affected the city for a period of about forty years (1510~1551) strongly modified the urban topography, deleting important traces of its ancient past*. The real reason behind the absence of a central mosque in the traditional medina of Tripoli may not be known but, nevertheless, the city's Islamic characteristics can never be denied.

Tunis:

The traditional city of Tunis was originally a walled city overlooking the Mediterranean. The city walls were demolished during the French colonization and were replaced by a ring road. Today a few portions of the wall exist as free standing monuments, mainly representing the gates of a great Arab-Islamic city, as is that which used to be the eastern gate of the old medina.

The city of Tunis is famous of Al-Zaitouna mosque, constructed at the end of the 9th century by Abu Ibrahim Ahmad. The great mosque with its minaret and domes dominates the city's skyline, along with other smaller mosques distributed throughout the city. The street network of the traditional medina of Tunis is based on two sets of principal routes. The first one leads from each gate of the city to the great mosque, located in the centre; the second from one gate to another (Amodei, 1985). Although the city walls, along with some gates, were demolished, the importance of this street network is still evident today. The main streets of the medina create large urban blocks, which are further divided into residential clusters through connecting streets and *cul-de-sacs*.



Figure 4. An overview of traditional medina of Tunis (Source: www.mornarius.wordpress.com, 2015).

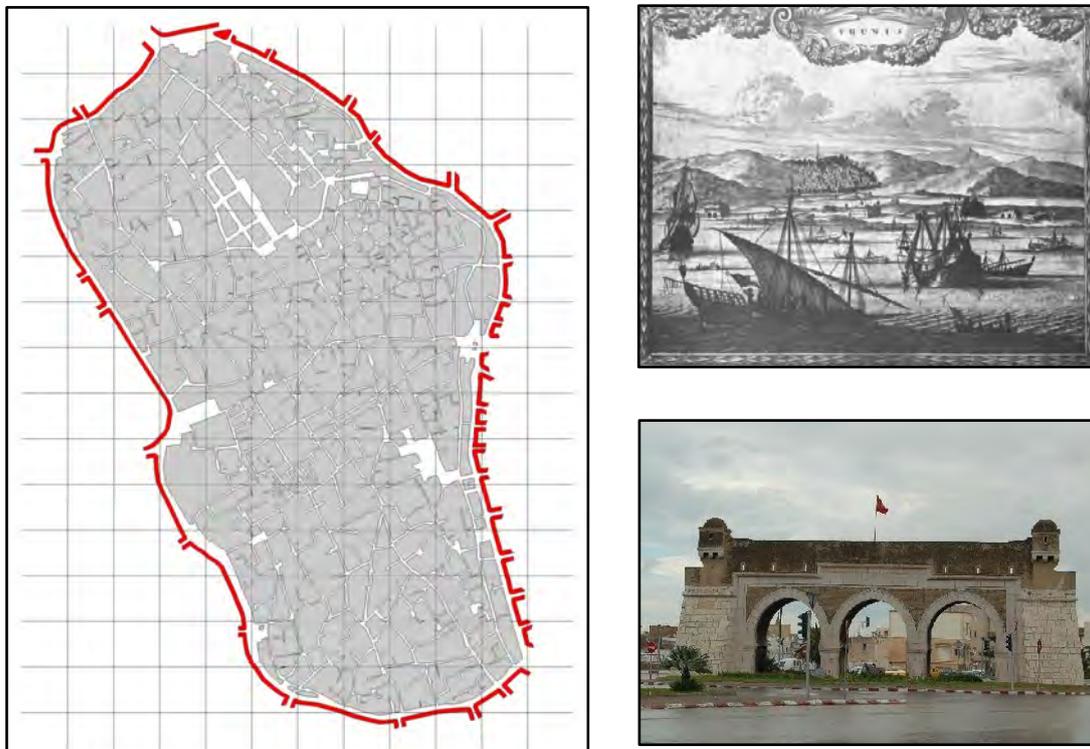


Figure 5. (Left) Tunis general layout (Source: Author, 2015); (Top Right) The city & port of Tunis (Source: wikwand.com/fr/oire_de_tunis, 2015); (Bottom Right) Historical Gate (Source: www.virtual Tourist.com, 2015).

Like many other traditional Arab-Muslim cities, Tunis is characterized by its compact courtyard houses, which are mostly one or two stories high. The central mosque is surrounded by several suques (markets), making the area around the mosque the central public place, where residents meet, pray and shop. Being originally an Arab-Muslim city, the medina of Tunis can be said to be completely designed around a central mosque, Al-Zaitouna, making the commercial area concentrated around the grand mosque, where certain trades and crafts grouped together, surrounded by clusters of residential areas (Sauod, 2002). Small shops, Hammams, small mosques and bakeries are distributed within the residential areas, providing the residents with their everyday needs. Certain polluting activities such as dyeing, tanning and pottery kilns were

located on the edge of the city (McGuinness, 1992). It is important to note that as the city became a tourist destination and as the walls of the city no longer existed, small shops around the city perimeter started to emerge.

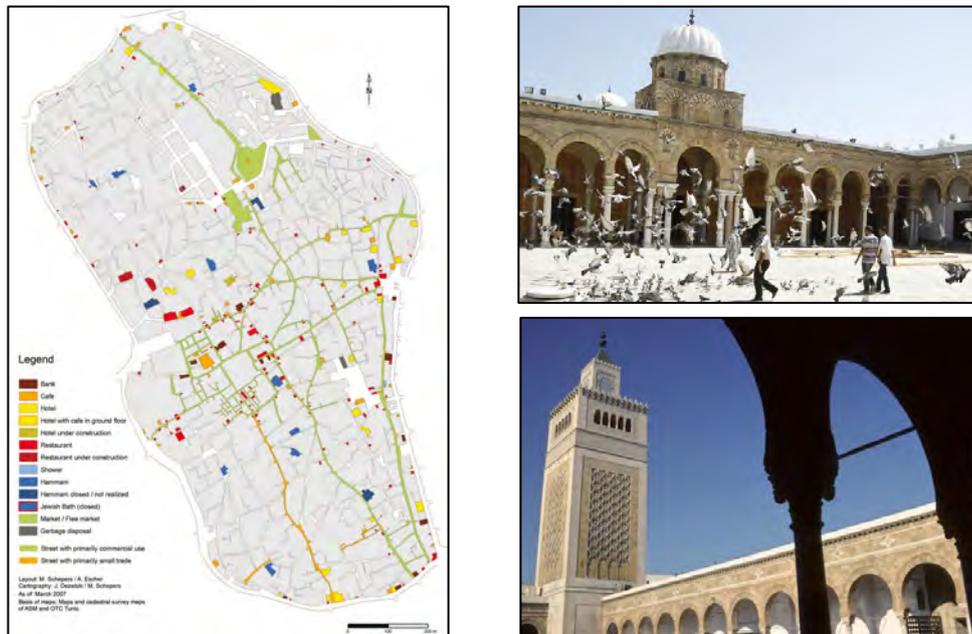


Figure 6. (Left) Land use in traditional medina of Tunis (Source: Anton Escher, 2007); (Right) Al Zaytuna Mosque (Top Source: <http://www.al-monitor.com/>), (Bottom Source: <http://en.tunisientunisie.com/>, 2015).

Fez:

The traditional city of Fez was originally formed as two separate towns, one on the right river bank by *Idris I*, and one on the left bank by his son *Idris II*. Each city was surrounded by a wall. *Idris II* encouraged immigrants from different regions to settle in his city while it was still under construction. Immigrants expelled from Cordoba in Spain occupied the right bank of Fez and constructed a mosque called the Andalusian mosque. A year later immigrants from Qayrawan in Tunis occupied the left bank, reconstructed the mosque that was originally founded in the mid-ninth century and called it the Qarawiyyin mosque. The two towns developed separately around their great mosque until 1070, when *Al-Moravids* combined the two towns into one and constructed one wall around both, to further unite them. They also reconstructed the Qarawiyyin mosque and changed it into a great mosque with astonishing Andalusian ornamentation, which has been the city's landmark ever since.

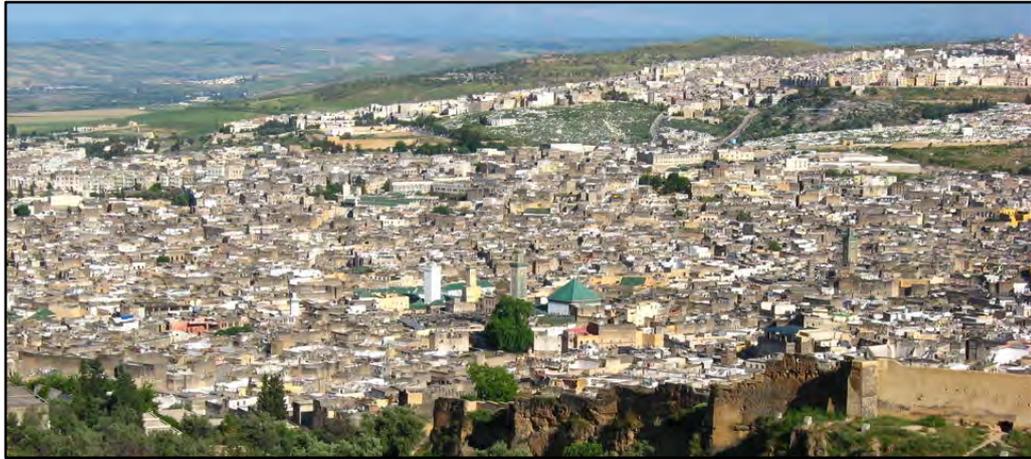


Figure 7. An overview of traditional medina of Fez (Source: www.godsmurf.com, 2015).

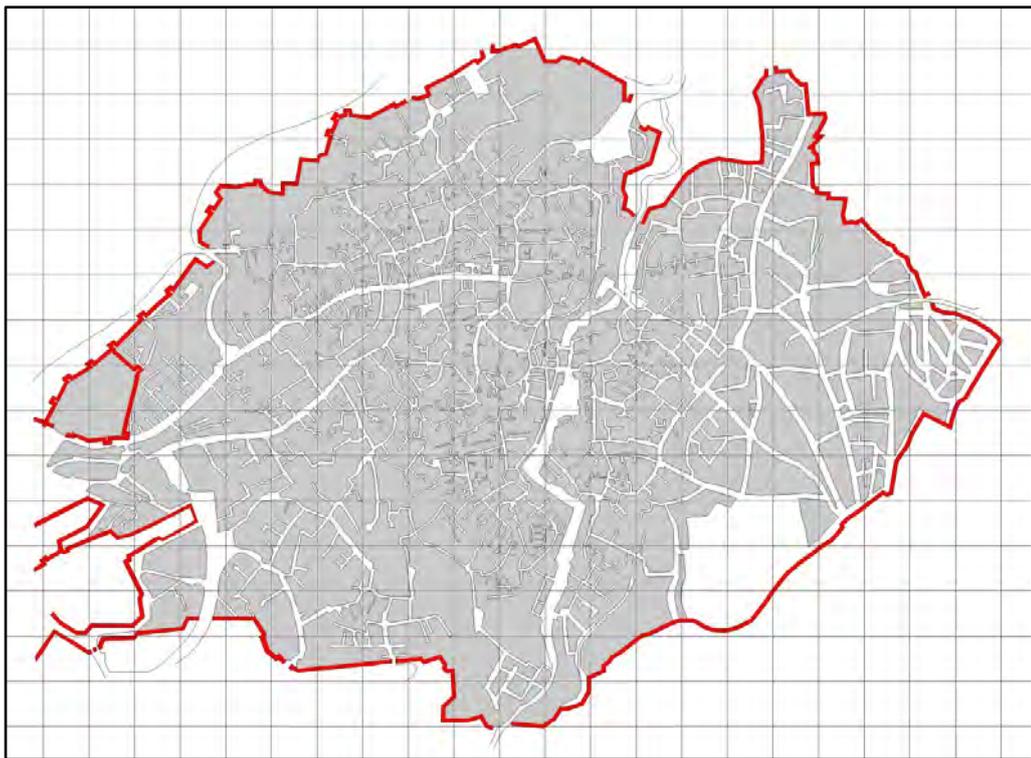


Figure 8. Fez general layout (Source: Author, 2015).

The visual form of the traditional city of Fez is dominated by its great mosques and its great walls, large portions of which still surround the present day city. The two portions of the city are separated by the river that runs between them, yet they are connected by a number of bridges. The area covered by the street network in Fez is very small compared to the area of the built fabric. Like many other Islamic cities, this street network mainly provides connections between

the different city gates and the centre of the city, at the same time ensuring selective accessibility of the residential quarters (Bianca, 2000).

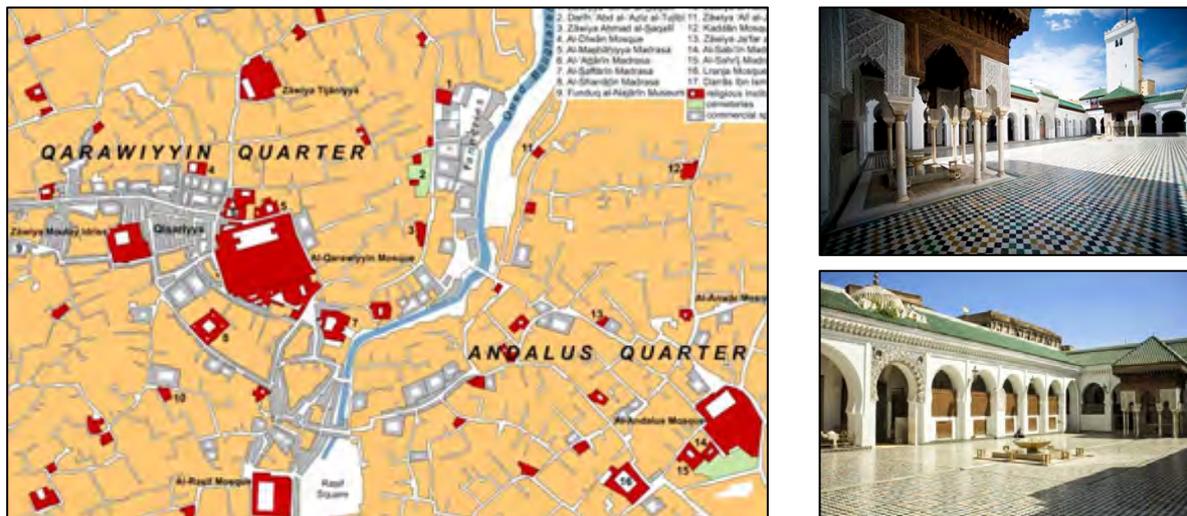


Figure 9. (Left) Land use in traditional medina of Fez (Source: www.ericrossacademic.wordpress.com, 2015); (Right) Qarawiyyin Mosque (Top Source: <http://www.mithaqarrabita.ma/>, 2015), (Bottom Source: www.chezmamielucette.eklablog.com/, 2015).

The compact urban structure of Fez is characterized by courtyard houses and narrow alleys. Cul-de-sacs contribute to its extensive street network. It is important to note that the irregular nature of the street network is mostly caused by the irregular, hilly topography. The city is characterized by the great contrast between the very dense fabric and the open green areas that surround its walls (Bianca, 1983).

Like many other Arabic-Muslim cities, Fez is divided into several residential quarters, each containing clusters of courtyard houses that are mostly two or three stories in height. As stated earlier, the city of Fez is mainly developed around its great mosques. Consequently, the main commercial activities are located around the great mosques, especially those of the Andalusian and the Qarawiyyin. The city also contains countless small mosques and colleges, located in different parts of the city. Small shops, bakeries and Hammams are evenly distributed within the residential quarters. The separation between public and private domain, the interaction of public space and the volumetric articulation of space, which are basic Islamic structuring principles, are rigorously maintained in the medina of Fez (Bianca & Katz, 1980). Significantly, the Qarawiyyin quarter contains more commercial activities than that on the right bank of the river.

LESSONS LEARNED:

The three cities of Tripoli, Tunis and Fez exhibit many similar urban characteristics. However, each has certain features that make it unique; this uniqueness is caused by a natural setting that affected its urban pattern, historical foundations that affected its original layout, or indeed by an evolution over time that made it transform and develop differently.

Current State:

Due to both the formation of new colonial cities, and the deterioration of traditional cities, many locals left traditional cities looking for a better living standard. Following Libya's independence and the discovery of oil, and the departure of Italians and British from Libya, many rich families

abandoned the old medina and moved into newly built colonial quarters. Some people left mainly because of the deterioration of the old medina, while others viewed living in the garden city as a sign of social promotion. This turned the traditional city into a place for the less fortunate and non-skilled immigrants. Today, the old Medina of Tripoli is still surrounded by some remaining portions of its great walls on the north, west and south-eastern borders. The Castle, with its hanging garden, dominates the south-east corner of the city. Despite some restoration works undertaken by the Libyan government, the old medina of Tripoli is facing great challenges caused by poor maintenance, lack of adequate infrastructure and overcrowding. In adopting a selective approach to heritage conservation, most of the restoration works are focused on important historical buildings or certain tourist areas, rather than on the whole urban fabric of the old medina.

The old medina of Tunis slowly began to lose its importance due to the domination of the newly-built French city. Many wealthy Tunisian families left the medina in favour of the fancy modern villas that were built around the colonial city. This exodus of the rich increased after independence in 1956 and the massive departure of the European population. The traditional city of Tunis is now listed as a world heritage site but, despite some rehabilitation and renovation attempts, such that of the Hafsia quarter, some Tunisians believe that the public authorities have been unable to halt the decline of the old medina.

When Morocco gained its independence in 1956, the Moroccan royal family started various restoration programs, which consequently led to the recognition of Fez as a universal heritage to be preserved. In 2000 the Moroccan government adopted a development plan for Fez, which was to be re-evaluated every ten years, and undertook certain measures to safeguard the city. Despite the number of families that left the old medina in search of better living, and the poor condition of some areas that are in great need of restoration, Fez is without doubt one of the best preserved medieval cities in the world.

In general, and despite the renovation and maintenance efforts applied to traditional medinas of Tripoli, Tunis and Fez, the cities are dealt with today as if they were dead artefacts rather than living entities. The renovation and rehabilitation works vary from one city to another, yet they all face similar problems and challenges.

Visual Form:

The visual form of the cities is usually dominated by great buildings. Sometimes the great building is in the form of a great mosque that is located in a central location within the city, as with Al Zaituna mosque in Tunis and Qarawiyyin mosque in Fez. At other times the great building represents a governmental palace or a fortress, as Al Saraya Al Hamra palace in Tripoli. The three cities were originally surrounded by great walls containing a number of gates, which through time become original features of the cityscape. However, the walls are partly demolished, as is the case in Tripoli, where certain portions were demolished during the Italian colonization, or completely demolished apart from major gates, as in Tunis, where the walls were replaced by a ring road during the French colonial era, or are mostly preserved, as in Fez.

It is important to note that Fez benefited from continuous evolution compared to Tripoli and Tunis, as its rulers were more interested in competing with their predecessors through erecting new architectural works, rather than destroying previous works. Tunis was demolished alongside Carthage by the Romans after the 3rd Punic war, and Tripoli is believed to have been completely destroyed, apart from the castle and the defensive wall, by the Spanish in 1509. This might explain the richness and the size of Fez compared to the other two cities, which were both to be reconstructed in a certain point in their history. The three cities are characterised by a clear consistency in building heights, but, while houses in Tripoli and Tunis are mostly one and two stories high, the houses in Fez mostly exceed two stories.

Table 2: Main Buildings & State of Defensive Wall (Source: Author, 2015).

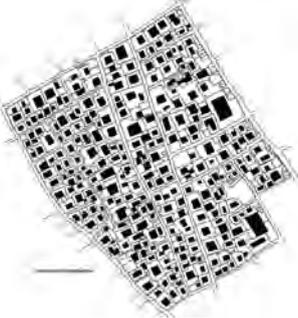
	Tripoli	Tunis	Fez
Main Structure	 Al Saraya Al Hamra Palace	 Al-Zaitouna Mosque	 Qarawiyyin & Andalusian Mosques
Defensive Walls	 Wall partly exists	 Only Few gates exist	 Wall mostly exists

Urban Pattern:

The three cities are characterized by compact urban fabric made of courtyard houses and narrow alleys. The size of the urban plots in the three cities is relatively large, containing a number of cul-de-sacs, in order to provide access to the internal area of the blocks. Friedrich Ragette (2003) describes the street network in traditional medinas as a living organism, where streets branch out from a central place to become lanes and narrow alleys and finally come to a dead end. Although the street network is made up of main streets, connecting streets and cul-de-sacs, the main streets' pattern and connecting points vary from one city to another. Sometimes the main streets follow original roman roads (cardo and decumanus), as in Tripoli. At other times the main streets serve to connect the different city gates and to connect the gates with central mosques, as in Tunis and Fez.

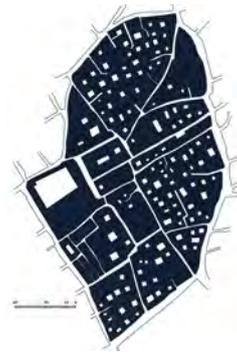
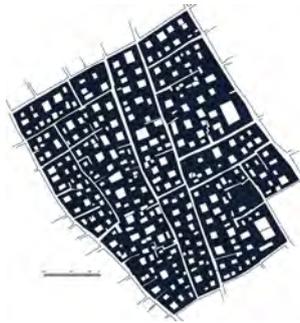
The urban fabric of the three cities clearly reflects the concept of social solidarity or Ummah, in which religious beliefs and values, especially those relating to organization and authority, encourage social interaction and discourage dispersal (Saoud, 2002). This can easily be seen in the residential clusters, which each contains a variety of house sizes where rich and poor families live next to each other without any division. Other public areas in Islamic towns are cafés, and hammams or public baths. As these places, together with small mosques and markets, are dominated by men, there is a great emphasis on accessibility and unrestricted contact. The access to residential quarters from public areas is usually broken into successive sections hierarchically, indicating increasing degrees of privacy. The houses are not directly exposed to the external world, as circulation is gradually filtered by different intermediate sections of the street network, providing a great degree of protection, and preserving the privacy of the family sphere (Bianca, 1981).

Table 3: Urban Pattern of the three cities (Source: Author, 2015).

	Remarks	Tripoli	Tunis	Fez
Street Network	<ul style="list-style-type: none"> • Main Streets (Public) • Connecting (Semi Public) • Cul-de-sac (Semi Private) • Central mosques and commercial activities are usually located on main streets • Fez's network is characterised by very complex cul-de-sacs 			
Courtyard Pattern	<ul style="list-style-type: none"> • Variety of courtyard sizes depending on house size • Mostly central courtyards • Buildings with no courtyards are usually shops • Some large houses in Tunis & Fez contain two courtyards • Tripoli mosques do not have singular large courtyard, unlike those in Tunis & Fez 			

Solid/Void Pattern

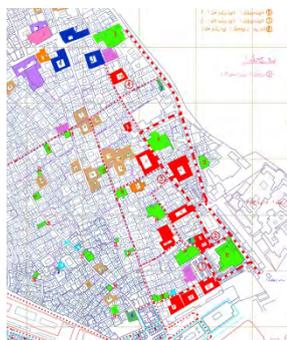
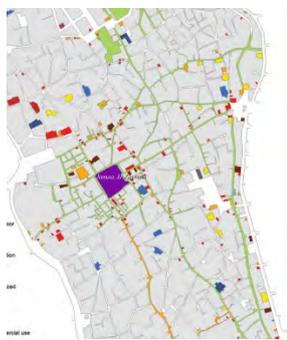
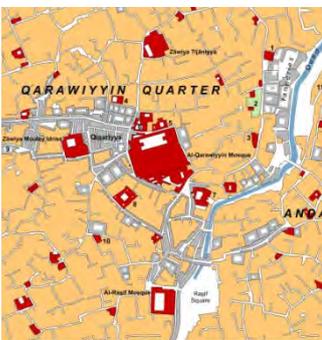
- Compact urban fabric
- Relatively large block sizes, each surrounded by main or connecting streets with cul-de-sacs penetrating through them
- Block shapes are more regular in Tripoli compared to those of Tunis and Fez.



Land Use:

In the three cities commercial centres mostly surround the big mosques in the city. The central mosque usually intends to serve several quarters or even the whole town on Fridays and on feasts (Ragette, 2003). Despite the absence of a central mosque in Tripoli, commercial activities are concentrated in the eastern south corner of the city, where most of the big mosques are located. In Tunis the main commercial activities surround the great mosque of Al-Zaytuna and in Fez they surround Qarawiyyin Mosque.

Table 4: Land Use (Source: Author, 2015).

	Tripoli	Tunis	Fez
Commercial Activities	<p>On the area that contain most of the big mosques</p> 	<p>Surrounding Al-Zaitouna Mosque</p> 	<p>Surrounding Qarawiyyin Mosques</p> 

As in many other cities in the Muslim world, the distribution of land uses in the traditional environment of the three cities is always seen as a mixed-pattern, emphasising social integration. Yet, there is a certain degree of separation between public and private realms, which reflects the Islamic concern for privacy in residential quarters.

Tripoli, Tunis and Fez characteristically comprise a tripartite system of public, semi-public and private spaces, with various degrees of accessibility and enclosure. The mosque, being the main public core, is usually embraced by markets, forming a coherent architectural complex (Bianca, 1981). The quarters were formed by homogenous communities bound by common religious, ethnic or social ties, providing a strong social identity and security. However, a balance was always maintained between the social self-sufficiency of the quarter and its participation in the communal affairs of the city as a whole (Petherbridge, 1978). Areas around big mosques in the three cities still form, today, active commercial areas and still preserve their function as public gathering spaces.

CONCLUSION

The traditional medinas of Tripoli, Tunis and Fez have a rich and complex urban fabric that reflects the history of each city, and which has developed over time. It is stated by Besim Hakim (2008, p13) that Arabic Islamic cities in the Maghrib, especially those founded by Arabic Muslim leaders were the *purest in terms of their general Islamic framework and their specific Arabic attributes*. The contextual characteristics of these cities, therefore, provide us with valid lessons that can contribute to improving the quality of the contemporary built environment in the Arabic Islamic cities, and safeguard the city's historical and cultural identity, which is in danger of being totally lost. Culture heritage should be understood, protected and enriched, since *without history and memory the present is devoid of context: it exists more or less in a vacuum* (Rghei & Nelson, 1994, p143).

In the analyses of the traditional medinas it is evident that religious values were greatly reflected in the urban form, especially those relating to social solidarity and privacy. Although today's life style is different from that of tradition, most of the people in the three cities, especially those of Tripoli and Fez, are still greatly guided by religious values. Maintaining social solidarity and privacy within the built form is, therefore, essential when creating contemporary projects in these cities. The visual form of these traditional cities clearly reflects their history and rich heritage. Tradition in these cities is a multi-layered complex that evolved over centuries, and which should be studied, preserved and enhanced in contemporary planning policies and design practice. Lessons obtained from the visual form of traditional medina do not necessarily require the adoption of the exact traditional architectural forms, but the recognition of the way in which these forms reflected the people's cultural identity and responded to their social and religious values.

Compact urban fabric with the use of the courtyard concept proved to be ideal in enhancing social solidarity as well as limiting solar heat absorbed by building surfaces. However, compactness and the reuse of the courtyard concept should be developed in a way that meets today's needs, and benefits from modern materials and technology. The street network should always maintain the aspect of main (public), connecting (semi-public), and cul-de-sacs (semi-private), with large public buildings located on main and connecting roads, and cul-de-sacs being mainly residential. Yet, with automobiles being an essential part of life today, considerable thinking should be put into providing appropriate solutions for parking and movement routes. The urban pattern of traditional medinas is a direct response to two main principles of the people who lived in them, which are social solidarity and privacy. Social solidarity is manifested through three concepts. First is a variety of plot sizes in order to meet different financial abilities within the same residential cluster, allowing social integration between rich and poor. The second is the use

of the cul-de-sac, which enhances neighbour relations by acting as a semi-private meeting space for those who live on it. Finally, there is the distribution of small mosques throughout the residential quarters, which provides public spaces within walking distance for residents to meet for daily prayers. Privacy, on the other hand, is manifested through the use of the courtyard concept, which provides a high degree of privacy for houses, and the range of street types, where privacy degree varies depending on the street type. These principles should be taken into consideration when designing contemporary urban patterns, not only because they respond to social requirements, but also because they can support the interrelation between decision makers and society.

Land-use in the contemporary built environment should provide people with everyday needs within walking distance of their homes. Distributing small mosques, bakeries and small shops within walking distance will automatically encourage people to walk and consequently encourage social interaction. However, this should be done in a way that preserves the privacy degree required in residential quarters. Many argue that the gap between decision makers and users is a major cause of people's dissatisfaction in our contemporary urban environment. Therefore, designing contemporary urban patterns that provide residents with easy access to everyday requirements, and respond to their social and religious values, can help decision makers and designers to realign with their own people, and regain their trust.

The medina of Tripoli, Tunis and Fez all represent traditional Islamic cities that have gone through cycles of development and transformation, yet they have always maintained a sense of continuity throughout their history. Direct copying from traditional Islamic medinas, however, is not an option, as this will only create an urban fabric that is neither Islamic in character, nor contemporary in technology. The real challenge for decision makers and designers is finding the way to practically manifest the essence of traditional medinas in an urban environment dominated by automobiles, and new forms of urbanisation in societies that are suffering greatly from fractured identity. The big question is whether or not they are willing to take that challenge.

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THE TEN-MINUTE NEIGHBORHOOD IS [NOT] A BASIC PLANNING UNIT FOR HAPPINESS IN EGYPT

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Abstract

This paper investigates the relationship between inhabitants' happiness and the right to the city in the status quo of Egyptian neighborhoods. Although services are easily accessible, by ten-minute walks in a suitable ambience, happiness is not achieved. The research aims to, first, review the literature that provides a guideline for ten-minute neighborhoods. Second, this study conducts a comparative content analysis of recent online articles on the right to the city. Third, the study tests findings from Egyptian neighborhood settings. The idea of a ten-minute neighborhood is manageable. The hypothesis concerns a compliant design. It is a logical assumption that people who live within ten minutes walking distance of essential facilities in their area can minimize several problems and maximize a healthy lifestyle. The supposed issue causes the right to the city to affect the relationship between ten-minute neighborhoods and citizens' happiness. This assumption can be established through site observation and oriented questionnaires. This paper contributes by presenting new planning units that suit the current context of the old cities in the Middle East and North Africa region, based on walking distances of ten minutes or less with reference to the right to the city. This planning unit can result in citizens' happiness.

Keywords: *Happiness; Ten-minute Neighborhood; Urban Design; Well-being*

INTRODUCTION

In Western communities, neighborhoods have been significant places for decades, especially in terms of social, economic, and political exclusion processes and civil society initiatives that attempt bottom-up strategies for redevelopment and regeneration. In many circumstances, these efforts have resulted in the creation of socially innovative organizations, seeking to provide the fundamental human needs of deprived cultural groups, on the one hand, and citizens' well-being on the other (Oktay & Bala, 2015, pp. 203, 210). In Egypt, the neighborhood can be clearly identified as a basic planning unit in the seven regions' new towns throughout several of their twenty-seven governorates. In Cairo, the capital, the basic planning unit is the *Shiyakhaa*, which is bigger in size and involves a walking distance longer than a neighborhood.

The present research investigates whether the old cities or the new communities are happier, based on how both groups adapt the two basic planning units. This manuscript considers a design approach to achieve the concept of happiness in Egyptian cities. The idea of ten-minute neighborhoods is manageable and the hypothesis concerns a compliant design. It is a logical assumption that people who live within a ten-minute walking distance of essential facilities in their area can minimize several problems and thus maximize a healthy lifestyle. The supposed issue causes the right to the city to affect the relationship between ten-minute neighborhoods and citizens' happiness. This assumption can be established through site observation and oriented questionnaires. This paper contributes by presenting new planning units that suit the existing context of the old cities in the Middle East and North Africa region, based on walking distances of ten minutes or less with reference to the right to the city. This planning unit can lead to citizens' happiness.

Research Justification: Is Cairo a Happy City?

The justification for this research is based on observations made during the author’s daily trips in Cairo. She began to observe citizens’ behavior as being an action within and reaction to the built environment. These observations were followed by a survey by an interviews* in 2014. The interviews’ aim was to obtain information about the initial observations. The selection of the interviewees is illustrated in Figure 1 twenty-five individuals were selected randomly from each district (Table 1). The research districts were selected based on their similar periods of construction. In addition, this investigation assumes that Egyptians feel happy based on their religious beliefs.

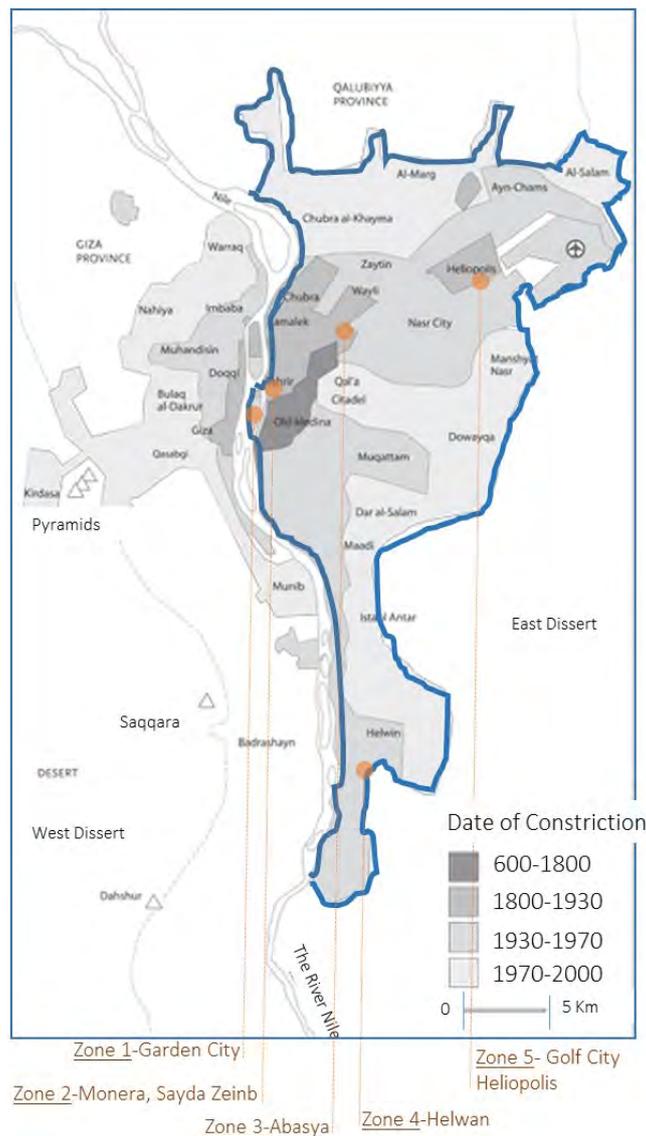


Figure 1. The locations of interviewee samples. The blue line represents the administrative borders of Cairo city (Source: Author).

* <https://www.surveymonkey.com/r/PZF3W6B>

Table 1: The interview results in the five-selected area each zone is represented in 5x5 squares. The total percentage is in green, (Source: Author).

Interview Questions	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	125 Total
Q1: How often do your environment help you to share your feelings and ...						64 (51%)
Sum	51%					
Q2: I know what my strengths through relations with neighbors and virtues are and I use creatively to improve the quality of life.						88 (70%)
Sum	70%					
Q3: I find a deep sense of fulfilment in my life by using my strengths and skills of participation towards a purpose greater than myself.						78 (62%)
sum	62%					
Q4: How often do you walk, at least 20 minutes, as physical exercise?						25(20%)
Sum	20%					
Q5: I engage in outdoor activities that I find challenging and absorbing						58 (46%)
	46%					
Q6: While walking around my area, I am able to focus on the present moment and do not get distracted the past /future.						76 (60%)
Sum	60%					
Q7: I am optimistic about the future in my city and I have feelings of gratitude towards people and ex events.						36 (29%)
Sum	29%					

The current research selects the Subjective Happiness Scale (SHS) with a modifications to adequate the research interest (Lyubomirsky & Lepper, 1999). It is a four-item scale, measuring global subjective happiness. The scale requires participants to use absolute ratings to characterize themselves as happy or unhappy individuals, as well as it asks to what extent they identify themselves with descriptions of happy and unhappy individuals. The outcomes of the interviews conclude that subjective well-being (SWB), including money and mental health, depends on a broad range of interactions with entire communities rather than only on touchable physical factors. Admittedly, Sonja Lyubomirsky concludes in her book *The How of Happiness* that 50 percent of a given human's happiness level is genetically determined (based on twin studies), 10 percent is affected by life circumstances and situation, and a remaining 40 percent of happiness is subject to self-control (Lyubomirsky S. , 2008). Additionally, social interaction between citizens plays a significant role in supporting the SWB. The middle class areas, such as the third and fourth zone, have a strong relationship between citizens which may give a rational, happy life despite being suffering from urban problems. Walking in most Cairo's streets does not enhance the ability to do physical activities which have a direct impact on the person's mood. The survey offers a new twist. It doesn't precisely measure how happy the person is presently but instead explores what people are doing that is well related to various correlates of psychological well being, or what could unscientifically call 'Seven Habits of Happy People' (Covey, 1989) in a community (Figure 2). For the sake of full disclosure, it was designed by the researcher through this manuscript. It is more of an instrument than a psychometric one, offering respondents insight into how people can improve their life skills with the inclusion of neighborhood social life.



Figure 2. The seven habits of happy people and its relation to the interview questions, (Source: Author).

Research Questions and Limitations

This research aims to follow the question raised by several previous studies (Bluyssen, 2014), (Bramley, Brown, Dempsey, & Power, 2010), (Diener, Subjective Well-Being: The Science of Happiness and a Proposal for a National Index, 2000), (Hagerty, 2000), and (Jaffe, 2013) regarding the possibility of engaging different specializations to provide people with pleasurable and meaningful experiences and thereby positively influencing their happiness. This work is

based on several questions, starting with whether there is a difference in the progression of structural units of Egyptian urban planning and design. However, happiness is considered here as a means rather than an end in normative arguments for increasing well-being. Happiness is insufficient to of the neighborhood unit in traditional Egyptian cities and in its presence in new cities. Does this difference make inhabitants in new communities happier than those who reside in traditional areas? Alternatively, is there a reason why Egyptian citizens in both new and traditional areas do not feel happy even when there are neighborhood units available that may make them feel happy? This assumption leads to the most pressing question: What are the reasons for Egyptian citizens not feeling happy even with a neighboring unit? Moreover, it is worthwhile to restructure core units that create happy neighborhoods to determine the causes of this loss of happiness. This investigation sets out to search for a design approach to achieve the concept of happiness in Egyptian cities.

LITERATURE REVIEW: HAPPINESS AND OBJECTIVE WELL-BEING

Happy people not only know that happiness is a choice, but also that it is a reaction to the present conditions of a community. Happiness is an attainable state. Happy people have eliminated the type of thinking that makes them wait for everything to be precise and right before they can find joy in life (Becker, 2013). Happiness depends upon a person's characteristics as well as on a community's feelings toward that person's context (Adams, 1992), (Hagerty, 2000, p. 764). "For years, urban designers and architects have claimed happiness as their goal" (Jaffe, 2013). Montgomery (2014) stated, "And yet none of the claims have been supported by empirical evidence. Which isn't to say they're not right. It's just to say that we don't know. That we have not known." It is important to clarify what we mean when we use the terms "happiness," "well-being," "SWB," and "life satisfaction," among others. These terms are often used interchangeably in economics literature, while psychologists take much more care in distinguishing the nuances between them. The nascent discussion on policy and national well-being indicators, meanwhile, forces more definitional clarity precisely because the differences in the meaning of these terms could have vastly different policy implications (Michalos, 2014, p. 4257). Human well-being affects outcomes of interest, such as make the case for well-being (Helliwell, Layard, & Sachs, 2013, p. 55) (Petermans & Pohlmeier, 2014). The determination of SWB is often assumed to be limited to measuring "happiness." In particular, SWB comprises a wider assortment of thoughts, rather than just happiness. For the limits of these different works, a relatively broad definition of SWB is used. SWB is interpreted as the positive mental states, including all positive and negative evaluations, that people create during their lives, and their affective reactions to their experiences (Diener, Subjective Well-Being: The Science of Happiness and a Proposal for a National Index, 2000) (Diener & Tov, National Accounts of Well-Being, 2012) (OECD, 2013).

The concept of UN-Habitat provides a better understanding of the objective benefits of increasing happiness, which helps to place happiness at the center stage in policy making and to refine policy evaluation (Aknin, Dunn, & Norton, 2012). This matches the objective of overcoming obstacles in the creation of better urban places, except by happy accident, unless we have a reasonable grasp of how built forms are produced (Bentley, 2002, p. 7). Happiness has a unique character and community characteristics (Adams, 1992) (Hagerty, 2000) that are highly dependent on social relationships, coherence, and local amenities. There is a growing awareness that social bonds may be shaped by characteristics of the built and social environment (Putnam, 1995), (Talen, 1999), (Duany, Speck, & Lydon, 2009), (Wilson, 2012). These social bonds, in turn, may help overcome community threats that could diminish residents' happiness and weaken their social cohesion. Montgomery reflected in an interview (Vossen, 2014) that the recipe for a happy city is how it fits the psychological focus and needs of the people who experience life inside that city. When acquainted with psychology, brain science, economics, and public health, the procedure to societal happiness is a simple account of just seven elements:

- Feeling safe and secure.
- Feeling healthy (interestingly, feeling healthy is more important than actually being healthy).
- Experiencing more pleasure than pain.
- Feeling a sense of equality and inclusion.
- Feeling free and empowered.
- Having economic security (money matters for happiness).
- Having strong positive social connections.

Since the 1990s, different studies and experiments have been attempting to analyze and determine what produces happiness. Scholarly articles have been written about this happiness legend, and the knowledge accumulated has been assembled under the umbrella term of “happiness studies.” Scholars involved in happiness studies have mostly been behavioral economists, psychologists, and sociologists, confused by how the everyday decisions that people make change their future lives and their feelings of well-being. A study from the University of Wisconsin observed that, on average, residents are more likely to be happier when there are green spaces in their neighborhood. The study’s conclusions were based on a state-wide public health survey of over 2,500 inhabitants of 229 cities and towns, who answered questions about their levels of distress, anxiety, and stress. Their replies were then scaled according to an index of plants per square mile in their district. The study’s most remarkable finding was possibly the fact that happiness was connected more with green space than with socioeconomic status. Participants living in blocks with 10% fewer green areas than the standard amount were more likely to report stress and depression. Pursuing this deduction, a “poor” citizen living in an area with more trees and open space would be happier than a “rich” resident living in an area with no access to green spaces.

Another study from University of Exeter in the United Kingdom applied 18 years of review data from over 10,000 participants across the United Kingdom. The investigation found a definite relationship between access to green spaces, self-reported well-being, and even physical health. The researchers even detected that the sensations associated with living close to green spaces brought feelings and levels of satisfaction similar to those experienced when getting a new job or getting married. While this may seem to be a normal experience, there is no harm in reinforcing it: green spaces in urban centers are essential for creating healthy, livable cities. While most urban residents have been aware of this relationship for years, it is relatively new—and quite promising—to have both qualitative and quantitative studies to back it up. Some studies have demonstrated the positive impact that access to urban nature can have on the levels of people’s social interaction, and ultimately on the strength of social ties between neighbors (Michalos, 2014, p. 4267).

The basic recipe for urban happiness is drawn from the insights of philosophers, psychologists, neuroscientists, and happiness economists. What should a city accomplish after it meets the basic needs of food, shelter, and security? To answer this question, Montgomery (2014, pp. 40-41) provided seven keywords for urban happiness: joy, health, freedom, justice, social interaction (conviviality), common fate, and economic affairs. Montgomery (2014) offered a structured survey of some of the big mistakes that underpin this design and planning, and that have produced unsustainable urban sprawl and convivial lives. Another research from the UK presents the results of eight elements of composite measures that capture the different aspects of social sustainability, as defined above: pride and attachment, interaction, safety, environment satisfaction with home, stability vs mobility, and participation in collective/group activity (Bramley, Brown, Dempsey, & Power, 2010, p. 112), (Tezgelen, 2014, p. 82). Although social interaction was deemed the most important factor in studies of happiness, Montgomery (2014) concluded, based on a Swedish study (Hilary Weston Writers' Trust Prize for Nonfiction, 2014), that a long daily commute has a severe negative impact on our happiness. Residents seemed willing to support

density for improving their happiness through increasing along commercial corridors, but not in residential areas. Emily Talen mentions (Talen, 2008, pp. 100-101), 'We want to get enough density to support a Starbucks'. A city planner assigned to Portage Park said that residents there were 'fine with chains' – they just wanted their retail district to be strong." Figure 3 represents the inverse/indirect relationship between happiness and different elements in the city scales. Residents seemed willing to support density increases along commercial corridors, but not in residential areas. The ability to sustain a walkable environment help residents to have a kind of physical activities outside their homes. Empirical studies have demonstrated that users will frequent public space most often if they can walk to it, and, if it is within 3–5 minutes walking distance from their residence or workplace (Kaplan & S. Kaplan, 1989).

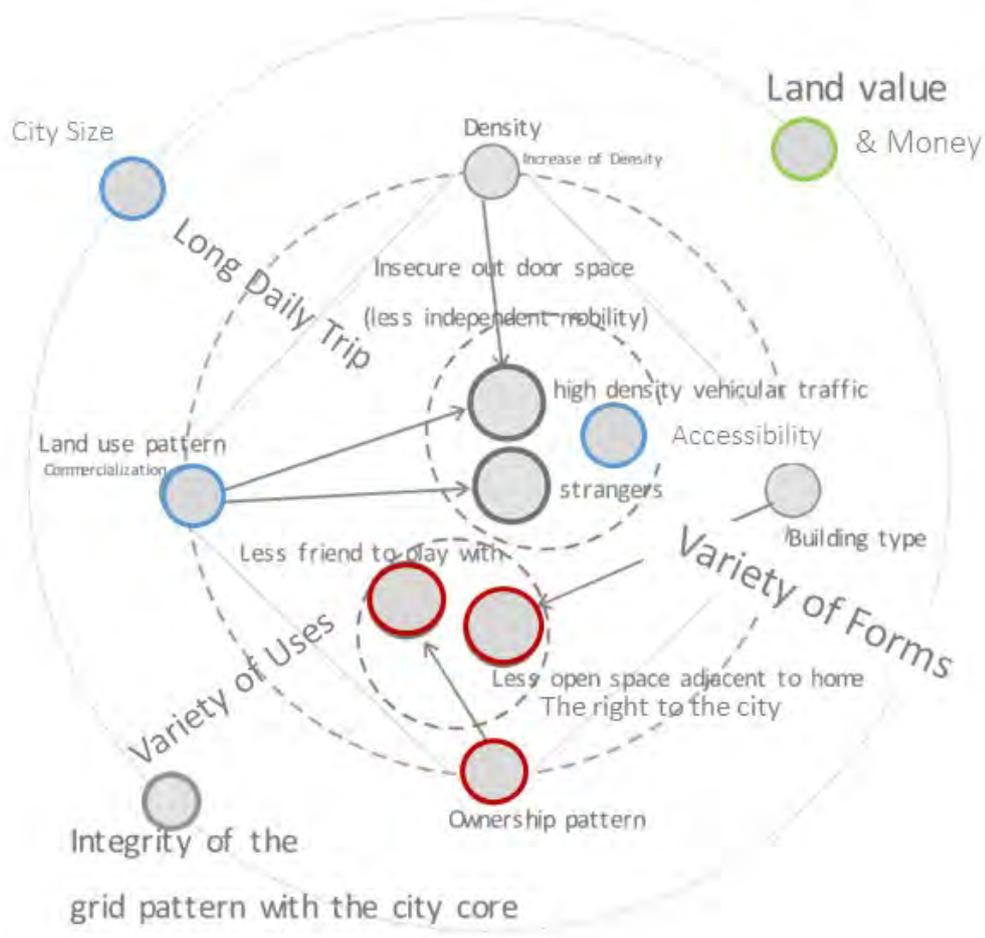


Figure 3. The inverse/indirect relationship between happiness and different elements in the city scales. The red color is supposed to refer to the social factors; the blue is for the built environment; and the green for is the human physical appeal. (Source: Author).

The Notion of Ten-Minute Neighborhoods

Neighborhoods are places of social, economic, and political segregation processes (Allaire, 1960, p. 8), and where civil society initiatives attempt bottom-up strategies of redevelopment and regeneration (Moulaert, Martinelli, Swyngedouw, & González, 2010). In many circumstances, these efforts are produced as part of the creation of socially innovative organizations that seek to provide basic human needs for deprived cultural groups. They also try to increase their political

capabilities and improve social interaction internally and among the local communities, the wider urban society, and the political world.

In 1936, Clarence Perry presented the idea of societal correlation between residential areas. This represents the “residential neighborhood” as a basic planning and design unit and, with its various repetitions, the district’s competence and subsequently the city. The paradigm is to create a safe and healthy physical environment: “To create spatial community, not merely residential areas” (Rofe, 1995, p. 108), (Kim, Park, & Wang, November 2015, p. 49). This is “used to refer both to a physical place and to the group of people who occupy that place” (Caves, 2005, p. 482). It is very important because “they provide one of the gateways to the social life of cities” (Rofe, 1995, p. 120). It is also known as “a social/spatial unit of social organization” (Hunter, 1979, p. 270) where, according to the theory of urbanism, “the available knowledge is concerning the city as a social entity” (Wirth, 1938, p. 8). Moreover, it is “one of the major landmarks in twentieth-century urban planning” (Patricios, 2002, p. 21). In American communities, it “was taken for granted” (Patricios, 2002, p. 26) and the basic idea of the local communities is based on “social interaction, common ties, and co-residency” (Taylor, 1997, p. 3). Perry developed his concept of planning and designing neighborhoods based on the following six factors: “Clear boundaries, the character of the internal street system, the social interaction in the streets themselves, the types of land uses, the presence of the central areas, and the provision of open space” (Patricios, 2002, p. 23). The city is a synthesis composed of smaller units; in other words, a cluster.

Critical commentary of the neighborhood unit centered on its [mis]use as an instrument for the segregation of different social/economic groups by developers willing to utilize the gated-community aspects of the neighborhood units’ physical design for this purpose (Banerjee & Baer, 1984, pp. 1-11). Supporting this argument, Isaacs (1948) referred to examples of promotional material for new preplanned neighborhoods, as well as excerpts from government planning reports and information provided by social scientists, all of which championed the neighborhood unit as a bastion for the gentry, keeping the undesirables as well as through traffic out (Isaacs, 1948, p. 19). In February 1998, the Western Australia State Government identified the need to redress the impact of the conventional development planning policies that had facilitated car dependence and urban sprawl across the city of Perth to create more sustainable suburban communities, subsequently launching the “Livable Neighborhoods Community Design Guidelines” (LN) (Western Australian Planning Commission, 2007). The LN were based on the vision of New Urbanism, which originated from the Congress of New Urbanism (Hall & Porterfield, 2001), (The Congress of New Urbanism, 1996), (Porbunderwala & Taarup) to advocate mixed-use, pedestrian-orientated, compact developments, and human-scaled neighborhoods by means of eight elements to enhance quality of life. In other words, the guidelines provided a distinctive objective to investigate how a livable neighborhood within a ten-minute walking distance of local amenities would constitute a way to a better life. This could be regarded as the following objectives:

- Compact: livable neighborhoods conserve land and have sufficient density to support frequent transit services and neighborhood-serving businesses.
- Mixed use: livable neighborhoods provide a mix of housing, workplaces, and neighborhood-serving shops and services.
- Diverse: livable neighborhoods offer housing choices suited to all types of households and household incomes, provide a range of jobs, shops, and services, and support diverse local businesses.
- Healthy: livable neighborhoods support the physical and mental health of residents, are clean and safe, and promote social inclusion and sociability.

- Green: livable neighborhoods are well served by parks, playgrounds, plazas, and greenways. Trees and plantings are integrated into street designs. Buildings are designed to provide compact gardens, courtyards, terraces, and green roofs.
- Accessible: livable neighborhoods support car-free living by being well connected to citywide and regional destinations through sustainable transportation modes (walking, cycling, public transit, paratransit, and taxis). Streets and public transits are designed for universal accessibility.
- Sustainable: livable neighborhoods use natural resources and energy sparingly and efficiently, and generate little waste.

WHAT ELEMENTS SHOULD BE SELECTED FROM OTHER CITIES TO BUILD A HAPPY CITY IN EGYPT?

If Egyptian planners and urban designers are to consider the social function of a happy city, Copenhagen would be recommended. A good example from that city is the fact that traffic planners, when they realized that cyclists were having a hard time chatting on their way to work, decided to build double-width lanes. It is thought that a happy city is actually a rational market; a good example of this is Vauban, an experimental suburb of Freiburg, Germany. Here, the external costs associated with car ownership are internalized. If a person owns a car in Vauban, he/she has to buy a parking spot at the edge of the village, in the form of a beautiful garage. Not only do many residents save money, but their days are infused with these convivial experiences of local walking. Another remarkable example is found in Davis, California; on N Street, neighbors pulled down all their fences and agreed to share one large yard. They found it so spacious that they all applied and were granted the right to add more units to their homes, so that more people could live there.

Proposal for a Happy Ten-Minute Neighborhood Methodology

The suggested methodology for citizens' SWB or happiness is determined by three core groups of factors, as illustrated in (Figure 3). The three groups are associated with built environment (in blue), social interaction (in red), and human physical appeal (in green). Most of these factors have a direct relationship with happiness, apart from the factors of being in a big city, care dependency, and long daily social interaction, which are inversely related with happiness. For example, more daily interaction between citizens in the same neighborhood leads to negative interaction between residents. The following section examines these groups of factors for Cairo.

Discussion: Detection of SWB Indicators for Ten-Minute Neighborhoods

The scale of the factor of happiness and SWB in the communities investigated in Egypt first represents citizens in bigger cities, where there are more services available. This can be compared to the above-mentioned unwillingness of interviewees to move to other places outside of Cairo and indeed to the dream of some of the other interviewees to move to Cairo. The second and third factors that most affected citizens' happiness were car ownership and access to vital places, respectively. The green places came lowest on the scale of happiness demands. Although most international researchers mention the importance of green areas in improving SWB, people living in areas that lack green spaces avoid giving a clear explanation of this matter, and call it an option of luxury. Other studies mention that they have not yet investigated this, but they suggest that access to green spaces would be an improvement. People who live close to suitable green spaces also came lowest on the scale of happiness demands, based on the green areas in private zones. This can be explained by their unwillingness to have social interaction with people from different social classes. They also prefer segregation between multi-economic classes.

In general, as can be concluded from the interviews, the interviewees could be divided into the following sections: the first and largest section of interviewees considers happiness to be

a kind of well-being and luxury, which is more than what they can afford to change or manage. Specifically, the problem of happiness has a direct effect caused by the process of urban planning and the design of cities and towns. In Egypt, this process may not prioritize the well-being of citizens through [new] developing projects. The second section of interviewees regards happiness as essential for human beings. This group blames planners and designers for the bad situations and chaos in Cairo's streets. These Cairenes also consider it the planners' task to provide them with a better life, a safe environment, separated from those of different social classes. They appreciate the separation of communities, which offers them more happiness. Concerning the increasing numbers and size of informal communities in Cairo, the interviewees considered this a result of immigration from rural to urban areas. The third section of interviewees, who live in deteriorating areas, consider themselves happy despite suffering from shortages of or deteriorating services in their area. Moreover, they have to commute to reach their daily services.

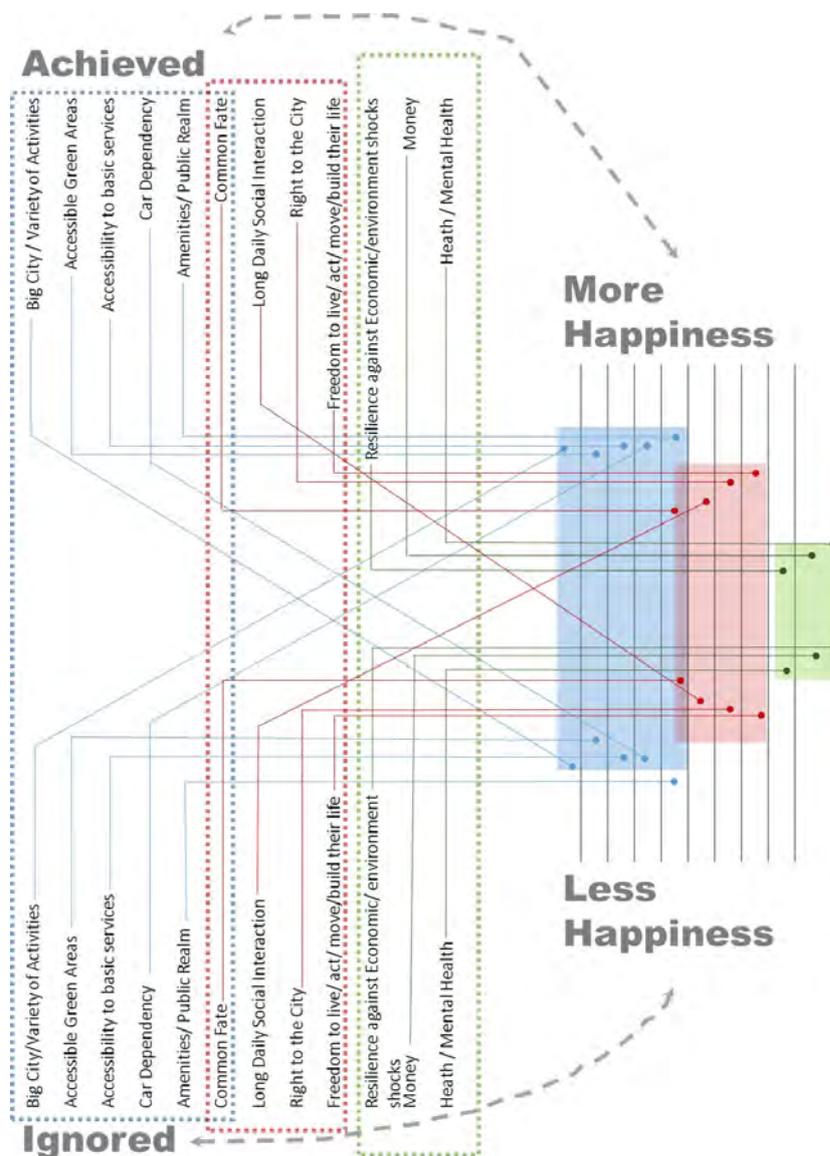


Figure 3. The proposed module (Source: the author)

Additionally, the interviewees have a deep belief that happiness is attainable in the lives to which they are accustomed or afterwards. The interviews conducted also showed that living in a bigger city may make people happier than living in smaller settlements, new towns, or in suburban communities. This outcome differs from the conclusions drawn by international studies (Helliwell, Layard, & Sachs, 2013), (Hilary Weston Writers' Trust Prize for Nonfiction, 2014). This is because the bigger communities in Egypt feature a broad range of accessible facilities and services, despite being located in a chaotic context. Some of the interviewees also mentioned that living in an old context makes them happier than living in a new one. In a contemporary sense, the chaotic context provides various answers to the question of whether or not citizens are in the urban chaos. To achieve social connectivity, planners may concentrate on the alternative routes and entree points that can be designed by improving street connections. They may attract attention to the size and form of blocks, which define both the urban space interface and the corresponding patterns of movement. It is recognized that large-scale blocks, cul-de-sacs and dendritic (tree-like) street systems are less likely to provide good connectivity.

This different answer may refer to people's socioeconomic base. People living further down the socioeconomic scale regard a calm context as a sign of isolation that negatively affects their happiness. The present author noticed that the larger the size of the car that people owned, the happier they were. Additionally, the more dependent people were on public transportation, the less happy they were. This is also different according to the national standard of achieving SWB (Caves, 2005) (Bluyssen, 2014). The faces of drivers on Cairo's main roads frequently reflect sadness and dissatisfaction during rush hours, compared to Fridays and vacation days. In different Western communities, "[C]ars are happiest when there are no other cars around. People are happiest when there are other people around" (Project for Public Spaces, 2015). The high dependency on a private car also refers to the problems that pedestrians face while walking, such as sexual harassment, unsuitable sidewalks, and high crime rates.

In conclusion, happiness in Egyptian cities is not an issue of anxiety. This relies on the majority's belief that what is happening in their area is better than what could happen elsewhere. This point of view may change after a person moves to Europe, for example, for a short visit. The gradation of points that make up a citizen's happiness goes as follows: ease of access to services, ease of access to daily commutes, and good designs of outdoor space for children and elderly people to participate in various social activities. In addition to providing this outdoor space, the freedom and safety to act and carry out several activities in this space rank as priorities for the middle class. The results of the interview also recommend cleaning, lighting, and beautiful streets. A silent environment represents an outstanding position to achieve happiness.

CONCLUSION: POLICY FOR A HAPPY CITY WITH THE TEN-MINUTE NEIGHBORHOOD AS A BASIC PLANNING UNIT

Cities in Egypt can apply their living streets policy to support happiness along all pathways within a ten-minute walk. These involve operations, maintenance, new construction, reconstruction, retrofits, repaving, rehabilitation, or changes in the allocation of pavement space of existing roadways. The objective is to include privately built roads intended for public use. This public use should be accommodated with attention to the right to the city and the fair distribution between inhabitants. Livable streets may be achieved by means of single projects or, incrementally, through a series of smaller improvements or maintenance activities over time. Small communities could draw on all sources of transportation funding to implement living streets.

The aim of achieving livability in streets and happy communities should be included in all street development, reconstruction, repaving, and restoration/rehabilitation projects, except when one or more of the following conditions apply. First, if a project involves only ordinary maintenance activities designed to keep assets in a serviceable condition, such as mowing grass, cleaning, sweeping, spot repairs, concrete joint repairs, or pothole filling, or when interim measures are implemented on a temporary detour or on haul routes. Second, if the *Shiyakhaa*

(district) Council releases a new or [re]development project due to the excessively disproportionate cost of establishing uncommon faculties, such as a bikeway, walkway, or transit enhancement that may need adoption within Arabian culture. Third, if city engineers and the director of the planning department jointly determine that the construction is not practically alternative and cost-efficient. On the one hand, the inefficiency is caused by the significant or adverse environmental impact on waterways, floodplains, and remnants of native vegetation, wetlands, mountainsides, or other critical areas. On the other hand, incompetence is caused by the impact on neighboring land uses, including right-of-way acquisitions.

In conclusion, communities can adopt designs for new living streets within a ten-minute walk of essential facilities. The living street policy guides the planning, funding, design, construction, operation, and maintenance of new and modified streets, while simultaneously remaining adaptable to the context of different streets, where sound planning experiences will produce context-sensitive designs. Cairo incorporates the street design guidelines' principles into all plans, manuals, rules, regulations, or programs for the city's districts, as is appropriate. Other cities can follow Cairo as the capital of Egypt, as they always do. Cities should provide well-designed pedestrian convenience in the form of sidewalks or shared-use pathways on all arterial, collector, and local streets. Streets within the ten-minute neighborhood should provide regular, convenient, and secure road intersections. These may be located at crossings designed to be pedestrian friendly or at mid-block locations where they are needed and appropriate. To establish a clean mode of transportation in Egypt, small, local communities can encourage youths and teenagers to use bicycles along well-designed avenues, boulevards, and connector streets. If physical conditions warrant it, cities can plant trees and manage street water whenever a street is newly constructed, reconstructed, or relocated. Cities should provide a plan for their streets that is harmonious with adjacent land uses and neighborhoods. This can be achieved with full input from local stakeholders. Cities should design their streets in harmony with natural features, such as waterways, slopes, and ravines. In general, communities should provide designs for their streets according to a powerful sense of place. Through this aim, development design can use architecture, landscaping, streetscape, public art, and signage to display the community, neighborhood, history, and natural setting of specific areas. Moreover, the sense of place is highly coordinated with merchants along main street corridors to develop vibrant retail districts.

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THE CLIMATE AS A KEY FACTOR OF PUBLIC LIFE IN EUROPEAN CITIES

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Abstract

Is weather a factor that determines the efficiency of public life in European cities? It can be said that every six months public life changes radically in European cities in response to changes in the weather, such as, the type of activities that take place. Furthermore, in these European cities, culture is another important characteristic of public life. In the first stages the results of this research, identified the following characteristics as factors of efficiency of public life in these cities: climate, the mobility system, the historic area, vitality, materials, vegetation and buildings. These variables define the quality of public life in the cities studied. Weather conditions determine many of the patterns of urban organization. All these features would require the analysis of multiple variables which would be impossible to carry out manually. Thus, this article suggests the design of a software application that could enable the analysis of public life in light of these efficiency factors, to guide the city to sustainability.

Keywords: Efficiency; Public Space; Public Life; Climate

INTRODUCTION

A city is more complex when its organization is greater and its energy expenditure smaller, this equation is synonymous with efficiency (Rueda, 1997). This variable determines a city's adaptation to its location and formal responses to climatic conditions (Oke, 1988). The organization of a city includes common spaces available to everyone, as a characteristic of public life. For example, cities in Italy and France, such as: Aosta, Milan, Verona, Venice, Florence, Rome, and Paris, each have long histories and prove to be a model of the relationship between place, public life and climate.

Public space is understood as everything that can be considered part of the built environment, for example streets, buildings, alleys and squares. Public life should be understood as everything that happens in public space. I. e. the interplay between life and space in all its guises. Weather and Life are difficult to predict (Gehl, 2013), for this reason it is necessary to evaluate aspects of public life in order to understand the interaction between life and public space. If it is possible to identify some tools that help to improve public spaces, then urban public spaces can be better designed. One of these tools is observation of human patterns in public spaces and how these patterns are related to climate. Observation methodology was proposed by the architect Jan Gehl (2010; 2013) and it was used to study public life in cities (RIBA, 2009). This methodology is composed of six (6) steps summarized in Figure 1.

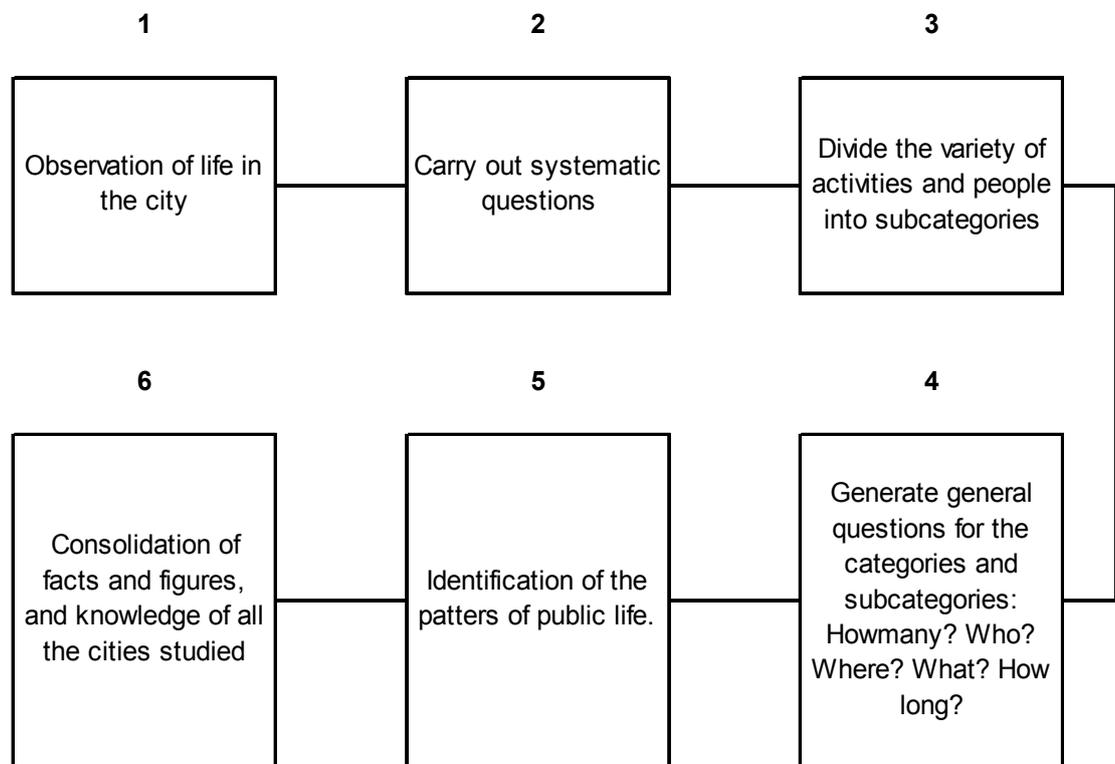


Figure 1. Methodology for the study of public life (Based on: Gehl, 2010; 2013).
Prepared by the authors.

Regarding this point, climatic conditions determine many of the forms of organization in European cities. So, is weather an efficiency factor that determines public life in European cities? All of these scenarios require the analysis of multiple variables that are impossible to review by hand. Thus, it is necessary to design a computer application that is able to establish relationships between different variables to provide sustainability guidelines in a city, and also to optimally identify human activities within it (Gehl, 2004; 2014). The main aim of this study is to identify the value of the climate factor in public life and how it impacts the public space.

This article is the result of research regarding the evaluation of the efficiency of public life in European cities carried out by the "Computer Applications in Architecture" hotbed of research, belonging to the Faculty of Design at the Catholic University of Colombia. Work was developed in the second half of 2014 and is currently in its second phase during 2015. As a result of the first stage of work, the following article aims to present the partial results of the identification of basic characteristics, required by a city at a general level to be efficient in generating optimal public life. With these variables, it is intended that a software application will be developed evaluate qualitatively and quantitatively the efficiency of public life in cities from a baseline that studies different cities worldwide.

METHODOLOGY

This research focused on six (6) European cities, which were chosen from a subjective sampling by reasoned description. The selection was made based on the number of inhabitants in the city and the city's density (see Table 1). The other variable was the behavior of the population in

relation to public life, as well as the relationship between the pedestrian and the car in the city. The methodology used to develop this research followed the outline of the methodology below:

Establishment of a baseline.

Construction of indicators to assess the quality of public life in cities.

Design of a computer application.

Development of the engineering process to implement the IT application on different devices
Validation of the computer application and formation of a Start Up program to assess the impact and market opportunity.

Table 1 : Object of study (Source: Cubillos & Castillo, 2014).

EUROPEAN CITIES			
County	City	Population size	Density Hab /Km2
ITALY	Aosta	34934	1616
	Florence	378236	3709
	Milan	1345900	7404
	Rome	2796102	2176
	Venice	270884	654
	Verona	265083	1254
FRANCE	Paris	2249975	21347

This article only refers to the first two steps of the methodology, in which the baseline was established and indicators for assessing the quality of public life in cities were decided upon. The results identified the following characteristics as factors that define public life in the cities. In public life human beings seek, conditions that relate environmental, social and physical components (Casals-Three, 2009; Edwards, 2001; Gehl, 1987). Our research explains how the city constantly relates these three components. The analysis of fieldwork in European cities led to the following partial results:

- Firstly, it considers the climate as a key factor between environmental and social components, since this marks all human behavior.
- Secondly, activities related to social and physical components are reflected in scenarios that change over time.

In short, the physical components are the basis of a system of multiple forms that are connecting to environment and gives character to the space of the city; this is particularly true in European cities. The following features, which can be used to guide efficiency in aspects of public life in cities, will be discussed below, these are: vitality, the mobility system, the historic city, materials, buildings, vegetation and climate.

PUBLIC LIFE VARIABLES

VITALITY - Connecting the new and the old, mixed uses, tourism, customs and routine.

The function of European cities has various uses, allowing pedestrian streets to produce an almost uncontrollable vitality (Dalsgaard, 2012). The new and the old are continuously mixed, restored buildings are the usual form of construction, and the diversity of uses well matched amongst them. However, the optimum use of land is more important, for example, in Paris, a main road passes under the Paris Saint Germain football stadium, linking it to commerce, housing and the entrance to the subway.

MOBILITY SYSTEM - Integrated Transport, scale distances.

In European cities different means of transportation are used according to the scale of the journey. The high-speed train connects international routes, the regional train is used for national journeys and the Metro across the city. Buses are used for short trips throughout the city and the public bicycle system is used in the city, as it is an effective way to reduce the environmental impact of travel and to significantly decrease CO2 emissions (Dekoster, 2000; Hill, 2014).

PUBLIC SPACE VARIABLES

HISTORICAL CITY - Medieval City, irregular, radial, connecting roads, pedestrian streets and squares, historical layers.

Narrow, pedestrian streets and irregular squares of various sizes are an essential part of the sense of discovering a European city. Squares are irregular spaces, often containing some architectural or sculptural object to observe. For example in Florence, the Piazza del Duomo church of Santa Maria del Fiore has the baptistery in the middle, in the Piazza della Signoria, the Palazzo Vecchio is to the side and the entrance of the Louvre museum in Paris is found in the middle of the square.

MATERIALS – Climate, need, culture.

Seasons and altitude generate certain needs that must be met, which change cyclically, and are different with respect to each place. For example, in northern Europe, materials like stone baseboards are used, and wooden decks for the upper floors and the interior. The materials are different to those used in construction along the coast of Italy and other warmer places in Europe. In these cases, the use of concrete, larger windows, higher ceilings and a more diverse handling of materials are observed. But one thing common to all European cities is the improved use of technology, for example, basic building elements using window air chambers are widespread, both in new buildings and restorations, and the implementation of improved heating systems, which respond to climate and comfort efficiently (Comfort et al, 2010).

BUILDINGS – Scales, public space oriented configuration.

European cities are characterized by their typology and scale. Buildings set the stage for the many different activities that take place in a city. It is difficult to speak of an urban typology that configures these buildings. For example, the streets of Milan and Paris are often covered by platforms. In Florence, there are two important loggias, which are city halls, one for traditional markets and the other to exhibit Greco-Roman and Renaissance sculptures. Another example of these architectural elements is the estoaas surrounding the plaza of the Cathedral of St. Peter in the Vatican. The ratio of the scale of the buildings to urban space has aesthetic perceptual benefits; the ornamentation of the facades is close to the observer, which gives comfort and fosters a more pleasant interior-exterior relationship.

VEGETATION - Character space

In European cities, vegetation gives character to spaces; flowers and vines are incorporated in gardens, terraces, patios, balconies, walls and roofs. In public spaces they are purposely positioned alongside trees and shrubs. For example, in one of the first French gardens (The Tuileries Gardens, Paris), trees and shrubs are planted in a logical order, such that they form small spaces where sculptures can be observed; the trees that border the Champs Elysees are another example.

KEY FACTORS

CLIMATE – Seasons, awareness of time, patterns of public life versus patterns of public space.

Public life in European cities changes cyclically according to the seasons. Depending on these, public activities in cities increase or decrease, as does the flow of people in public spaces. Thus the climate determines these flows and the type of activities that take place in public spaces.

To identify the variables of the city, fieldwork was conducted over two months in the selected European cities. To develop the observation methodology it was necessary to modify the observation method to add the climate factor. This methodology is composed of eight (8) steps summarized in Figure 2.

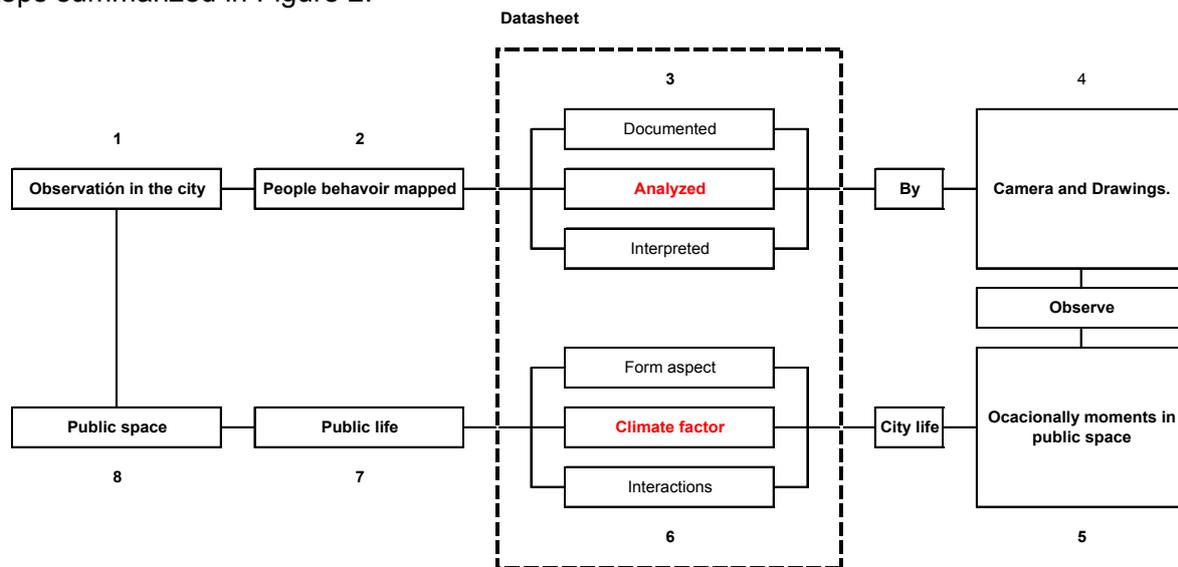


Figure 2
Study of public life: Methodology applied to fieldwork. Prepared by the authors.

The proposed methodology focused its analysis on the relationships between and characteristics of the stated independent variables: public space and public life. To identify the relationships between and the characteristics of the selected variables one technique was applied; factor analysis (See Table 2). Factor analysis identified the interrelationship of four independent variables through the construction of a two level matrix.

To test the climate variable over the European cities it was necessary to carry out fieldwork and implement a pilot. The design experiment consisted of selecting public spaces that are easily identifiable to people and to which all the variables of the study could be applied at the same time.

Table 2: Factorial design matrix tool. Prepared by the authors.

Public Life (Factor 1)	ITEM	Public Space (Factor 2)				Relationships
		Historical City B1	Buildings B2	Materials B3	Vegetation B4	
		Vitality A1	Climate (A1, B1)	Climate (A1, B2)	Climate (A1, B3)	
Mobility system A2	Climate (A2, B1)	Climate (A2, B2)	Climate (A2, B3)	Climate (A2, B4)		

PARTIAL RESULTS

The fieldwork consisted of observing the variables of the climate factor in the cities. To test this concept it was necessary to design two datasheets to evaluate the variables (See Table 3). To identify the relationship of public life and public space factors, the first datasheet evaluated the vitality variables against the historical city, buildings, materials and vegetation. The second datasheet evaluated the mobility system against the same four variables used in the previous datasheet. All variables had a measuring system from 1 to 10 points. The fieldwork was done in specific public spaces of the cities studied: 1) Big canal Venice, Italy. 2) Paninoteca Down town Venice, Italy. 3) Loggia craft market Florence, Italy 4) Eiffel tower, Paris, France. 5) Down Town Milan, Italy. 6) Tabacchi Rome, Italy.

Table 3: Datasheet fieldwork results. Prepared by the authors.

Factor	Public life (Factor 1)		Public Space (Factor 2)		
Variable	Vitality A1 (1-10 points)	Historical City B1 (1-10 points)	Buildings B2 (1-10 points)	Materials B3 (1-10 points)	Vegetation B4 (1-10 points)
Aosta	5	7	2	8	5
Florence	5	9	9	8	5
Milan	10	5	4	4	5
Roma	6	7	5	3	9
Venetia	1	8	9	8	4
Verona	5	7	9	9	2
Mean	5	7	6	7	5
Media	5	7	7	8	5
Mode	5	7	9	8	5

Factor	Public life (Factor 1)		Public Space (Factor 2)		
Variable	Mobility system A2 (1-10 points)	Historical City B1 (1-10 points)	Buildings B2 (1-10 points)	Materials B3 (1-10 points)	Vegetation B4 (1-10 points)
Aosta	4	8	4	5	7
Florence	5	2	8	2	7
Milan	7	2	6	3	6
Roma	5	6	4	4	3
Venetia	2	8	6	5	3
Verona	8	8	2	3	7
Mean	5	6	5	4	6
Media	5	7	5	4	7
Mode	5	8	4	5	7

Chart 1 shows the relationships between the variables studied. The historical city variable has a 35% vitality impact in comparison with the Mobility System variable which has an impact of 30%. However the Buildings variable has a 30% vitality impact, meanwhile the mobility is lower at 25%. The materials variable exhibits a greater impact equivalent to 35% vitality variable, and at the same time the mobility system decreases to 20%. Finally the vegetation variable presents an increase in the mobility System- equivalent to 20%- and the vitality variable decrease to 25%.

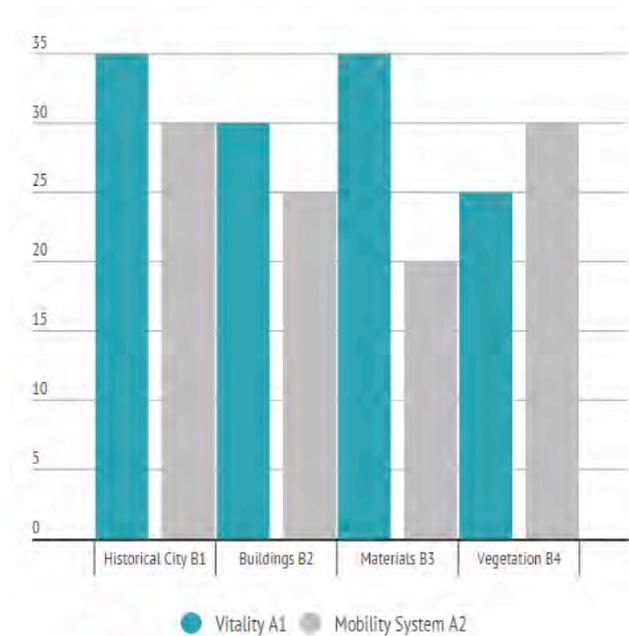


Chart 1

Analysis of partial results; relationships between variables. Prepared by the author

DISCUSSION

Regarding the question posed in the introduction, is climate an efficiency factor that determines public life in European cities? It can be said that every six months, daily life changes dramatically in European cities, for example, family activities take place during the winter season (December-February) over the course of normal activities. In contrast, in the summer season there is a long holiday in which many people rest for two to three months (June-August). This means that it is in summer when the greatest number of people is felt, whether it be those on vacation in their own city, or as tourists elsewhere, also adding to the tourist population that comes from other continents (see Figure No. 3).

The response to a given climate that occurs is determined by the type of activities taking place in cities. In Italy, cities and towns often arrange all kinds of events in parks and public spaces. In response to the increased population demand the activities carry on throughout the day, as the sun rises at 6 am and it gets dark at 9 pm. Tourist offices have plans in these major cities. Galleries and museums develop strategies in order to avoid congestion in access to public spaces.

Additionally, in Italian cities, food culture is an important factor in that lifestyle. For example, lunch is reduced to something light which gives provenance to the cafes at noon, that place their furniture on the pedestrian streets and squares (see Figure No. 4). Consequently, these sites become meeting places, and almost any place that has space for coffee will be occupied by all kinds of people. Later, when people leave work, (again there is a noted increase in the amount of people in the streets), meetings take place in bars and restaurants (see Figure No. 5). It is observed that at around 8pm the restaurants are full, this is a key activity people devote time to and it can last until 11 pm.

These activities cause the gathering of people and public space is used in relation to their need. Thus, conveniently cafes, bars and restaurants occupy public space, but also artisanal and food markets. This means that buildings set the stage for these activities and generate curiosity on the streets, which become small meeting points, in all possible ways (see Figure No. 6). It is necessary to clarify that the cities, because of their history, are walled and a river usually flows

through them; several have ruins and pedestrian streets, as is the case in Milan, Rome or Paris (see Figure No. 7). However, the highways between cities are a definite frame shaping the outer roads of the city and preventing cars from crossing the city, instead making them drive around it and enter at the correct point.

In European cities, transport systems can be described by their scope or scale, as follows:

- High-speed trains travelling long distances between major and international cities which reach speeds up to 300 km. / H. Regional trains run between towns and villages and are slower. Railways are the same for both transport systems and do not necessarily go along the line of the highway.
- Milan is a special case, in which the tram runs to the city centre with fixed bus stops and rail stations (See Figure No. 8)
- In Venice, the vaporettos run as buses, there are gondolas that operate small tours and taxis that circulate through the channels. Towards the island, there are walkways called streets. The continental urban area of the city is industrial, residential, corporate, and is served by a small city bus.
- The public bike system is found on larger pavements and varies according to each city's method of payment or renting. In Paris for example, you pay by card. The bikes are adapted to be supported by bollard on the street and so that they can be paid for by card (see Figure No. 9).
- Finally, pedestrian walkways are a way to connect squares or villages, as is the example in Italian medium-sized cities such as the intersection of Selva Val Gardena - Santa Cristina - Ortisei; these routes are commercial, cultural or scenic. It should be noted that vegetation, which gives colour and joy depending on the time of year (see Figure No 10) is always present.

CONCLUSIONS

In summary, the weather does determine public life in European cities, because how a city responds to the climate determines the type of activities that take place within it. Weather conditions determine many of the patterns of urban organization, this leads us to understand the relationship that is established between vegetation, the type of materials used and the building, which thus define the quality of the perception that people have of the city. For example, the weather defines the system of mobility in the city, the relationship between the different buildings, the environment and how it is perceived.

Consequently, guiding the city towards sustainability requires greater urban organization and lower energy consumption, allowing optimum adaptation to the location and climate. The analysis of public life has the potential to define the efficiency of a city, because it allows one to evaluate qualitatively and quantitatively, identifying common features in any city. The European cities studied showed a close relationship between location, climate and public life.

It is for this reason that the design of a software application that enables the analysis of public life in light of the efficiency factor, which shows the behavior of the people within the city, is justified. Finally, these tools would generate optimal responses that would provide the design criteria of any public space, understanding that better answers in the urban and architectural sphere enable better responses to the environment and better adaptability to the climate.



Figure 3. (Left) Big canal, Venice Italy (Source: Castillo, 2014); Figure 4. (Right) Paninoteca, Verona Italy (Source: Castillo, 2014).



Figure 5. (Left) Tratoria, Venice Italy (Source: Castillo, 2014); Figure 6. (Right) Loggia craft market, Florence Italy (Source: Castillo, 2014).



Figure 7. (Left) View of the River Seine from the Eiffel Tower, Paris, France (Source: Castillo, 2014); Figure 8. (Right) Tram, Milan Italy (Source: Castillo, 2014).



Figure 9. (Left) Public bicycles, Paris (Source: Castillo, 2014); Figure 10. (Right) Tabacchi, Rome Italy (Source: Castillo, 2014).

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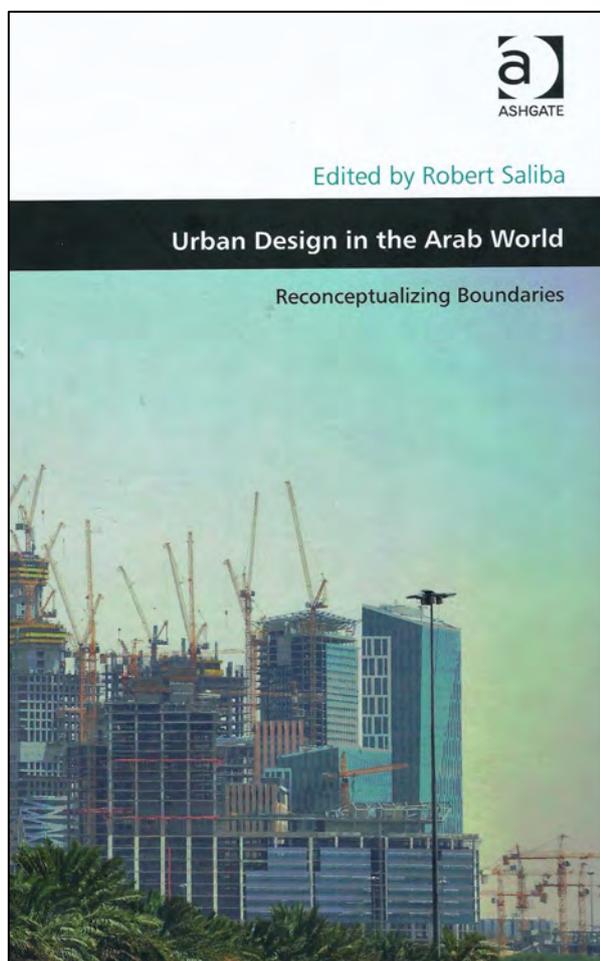
BOOK REVIEW:**URBAN DESIGN IN THE ARAB WORLD: RECONCEPTUALIZING BOUNDARIES**

Robert Saliba (Ed), Ashgate 2015, ISBN 9781472409768 (New Edition, Routledge, 2016)

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Urban Design in the Arab World: Reconceptualizing Boundaries, by Robert Saliba, he successfully publishes an edited book that discusses the theory and application of Urban Design in the Arabian context and the locational aspects of new urban interventions.

The work of various scholars narrates the diverse urban experiences in respect to the global, regional and local trends. By having a closer look into this unique volume, I personally see it among the few publications that focus on contemporary urban design interventions in detail rather than overviewing the comprehensive urban setting of cities and nations of this part of the world. The main focus is Urban Design both via theory and practice. Moreover, Robert puts it under four main parameters or tracks of discussion; such as, *'the Discursive, the Hybrid, the Operational and the Visionary.'* The book examines the methods of synthesising urbanism of Arab cities, determining the philosophical context and the evolutionary advancements. The book highlights the urban transformation and contestation of Arab urbanism along the various architectural shifts between the past century and now.

The book extensively tackles the various discourses of urban design in the Arab World, whichever these urban interventions are new, redevelopment, or reconstruction. This significant publication covers various examples of urban design projects at different cities throughout the Arab World. The book starts by stating the Urban Design theories which would have impact on urbanism in this geographical region. It consists of five sections that reflect the four different tracks and finally ends with a prospective section.

The first section discusses the 'Discursive Design Approach' and consists of four chapters. This section is well composed to investigate the various design trends in Urban Design revealing the degree of complexity and questioning the unitary philosophy of the Arab city. For instance, Omar Hallaj presents a chapter that discusses how the Aga Khan Award for

Architecture is highlighting the diversification of Urban Design practice in this region. He provides an argument based on the various urban interventions presented at the award to examine the impacts on stylistic and discursive practices of the urban environment. Another chapter by Howayda Al-Harithy discusses the strategies for community participation in the post-war reconstruction approaches by professional activism. Al-Harithy presents a participative discourse in various districts of Lebanon of different scales of intervention, offering pragmatic lessons learned from the professional activism group while supporting in the reconstruction of destructed districts. As for chapters five and six, they discuss the 'Corporate' and 'Greening' discourses respectively; Angus Gavin in chapter five focuses on the inner-city regeneration of Beirut's post-war central area. Angus highlights the Public Private Partnership framework on various levels of management, governance, and operations. In chapter six, Jala Makhzoumi focuses on the Ecological landscape design in the Easter Arab States, the argument presented challenge the global urban design interventions driven by neoliberal forces in these cities and creating loss of national identities.

In the second section, Robert Saliba presents 'the Hybrid Discourse' to highlight the emerging trends of urban design, that stresses on ecology over morphology and network surface over urban form. The section consists of two chapters; in chapter seven, again taking Beirut as a case study, Lee Frederix focuses on the Beirut River as a site of cultural infrastructure based on a process-based intervention that acts as a systemic catalyst by community members and leaders. In chapter eight, Sam Jacoby examines what kind of urban interventions emerging from the methodologies of typological reasoning within the Arab world, surprisingly being proposed by young and innovative student minds of the Architectural Association.

Afterwards, section three of the book presents the third discourse called, 'the Operational', here the editor managed to build this part out of three chapters. This part demonstrates the various governance and planning systems, while investigating participatory models in managing spaces of the Arab cities. In chapter nine, Saad and Stellmach present Aleppo with a new innovative operational approach imported from previous European experiences which empower local communities to engage in the strategic planning mechanism. In chapter ten, Rabih Shilbi presents new operational methods of cooperation between the academic and local community to cover up for the absence of government. Rabih and the students of the American University of Beirut present urban design solutions following community-based design methodologies. In continuation to the participatory approach, chapter eleven by Sandra Frem rethinks of Beirut River as a platform of a socio-economic and ecological incubator. Interestingly, all three chapter of this section highlights the necessity of research during the planning phase and community engagement. Notably, this section discovers the designers' degree of effectiveness toward acknowledging the community empowerment in urban scale interventions. The final discourse is 'the Visionary,' presented at the fourth section and including four different chapters mostly questioning the diverse urban landscapes and the capabilities of adapting toward modernity and globalisation. This part introduces other cases studies, such as Cairo, Baghdad, and Makkah. In addition, establish theoretical and visionary connections among these case studies according to their ultimate goals and perception of public urban spaces. Thus, in chapter thirteen, Robert Saliba presents how design philosophies and practices envision the urban developments of the Holy Shrine cities considering the holy services and infrastructural needs while addressing the socio-cultural diversification and identities of these cities. While within chapter fourteen, Hussam Salama and Nathan Cherry reveal the secrets of Tahrir Square in Cairo and its political role in shaping the future of Egyptians.

Finally, the book ends with a futuristic agenda of how to practice and interpret urban design in the Arab World. Specifically, the notion of sustainability and urban design is brought up through policies reformulation and methods of implementation within Abu Dhabi. In addition, John Madden introduces the 'Pearl Rating System' initiated by the United Arab Emirates to monitor

and measure sustainability with the continuous emerging built environment. The final chapter by Anne Vernes contribute not just to the built environment development, but goes further and reconnects Urban Design and transportation methods with the people's public health. This is a great experience to attempt at such an investigation.

Ultimately, 'Urban Design in the Arab World: Reconceptualising Boundaries' provides a new and well developed ideas of how to envision Urban Design within defined contexts of various circumstances and challenges, either socio-cultural, environmental, political or economic. The book cross the conventional boundaries of limiting Urban Design and introduces innovative trends of design practices while embedding research as a design tool. The major goal achieved in this publication is to examine and synthesise Urban Design of Arab cities with actual reference to global trends of practice with less reliance on historical interpretation or subjective criticism of aesthetics of urban settings. Personally, I recommend this book to all scholars teaching Urban Design theories or urban design studios, especially in the Middle East and the North African region.

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