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RESILIENCE

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Contact
İTÜ A|Z Yayın Sekreterliği
İstanbul Teknik Üniversitesi, Mimarlık Fakültesi Taşkışla, Taksim, 34437 İstanbul Türkiye
Fax: 90 212 251 4895 • ***E-mail:*** az@itu.edu.tr • ***Web:*** www.az.itu.edu.tr

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Resilience: A catalyst for a reliable future

Editorial

Aliye Ahu GÜLÜMSER • *Editor*

Although time flies at its own pace, change is inevitable and everywhere. Radical transformations can significantly impact human behaviour whether they are driven by obligation or necessity. Yet, such radical shifts often meet resistance within urban and environmental contexts, unsettling communities. Hence, sustainability and resilience have emerged in scholarly discourse as essential pillars of our disciplines, especially due to unprecedented challenges like climate change, rapid urbanization, and socio-economic disparities.

With these ever-evolving challenges, resilience has risen to prominence in the realm of the built environment. Fundamentally, resilience embodies the capacity of systems and communities and creates structures to anticipate, adapt to, and rebound from adversity.

At its core, resilience entails embracing change while acknowledging the consequences of resisting it. Although often perceived as a novel paradigm, resilience represents a recollection of age-old survival strategies—forgotten during the routines of modern life.

Traditionally, architectural and urban design prioritized static, aesthetically pleasing structures. However, the escalating frequency and severity of natural disasters and urban complexities necessitate a paradigm shift. We must now foster adaptable, sustainable, and inclusive built environments. For instance, designing modular structures adaptable to evolving needs or integrating green infrastructure to mitigate climate impacts exemplify resilient design in action.

In an era of rapid urbanization and environmental unpredictability, resilience catalyzes transformative change. It challenges conventional design norms, compelling stakeholders to embrace innovative solutions. This reimagining calls for a holistic approach to urban planning, architectural design, and community development emphasizing flexibility, redundancy, and sustainability.

Integrating resilience into architectural and planning frameworks demands a multifaceted approach. This approach addresses the structural integrity of buildings and the socio-economic and environmental dynamics essential for resilient communities. It involves creating spaces capable of withstanding climate impacts, mitigating disaster risks, and nurturing social cohesion. Achieving this entails leveraging cutting-edge technologies, indigenous knowledge, and community-driven initiatives.

While integrating resilience into design presents vast opportunities, it also poses challenges. Balancing competing interests, navigating regulatory frameworks, and securing funding are among the barriers, practitioners face. Additionally, achieving resilience demands a shift towards long-term thinking and interdisciplinary collaboration, necessitating the dissolution of disciplinary habits.

Resilience embodies a profound acknowledgement of communities' agency and inherent resilience. Inclusive, participatory processes empower diverse stakeholders to co-create solutions aligned with their contexts and aspirations. Such initiatives catalyze socio-economic development, amplifying marginalized voices, fostering social capital, and driving grassroots innovation.

Despite the opportunities presented by resilience, challenges persist. Overcoming institutional inertia, navigating regulations, and securing resources require sustained commitment and collaboration across sectors. Addressing systemic inequities and fostering interdisciplinary dialogue is crucial to ensuring inclusive, equitable, and sustainable resilience initiatives.

In conclusion, resilience is a cornerstone guiding the future of architecture, planning, and design. It urges us to transcend conventional boundaries, embracing a holistic, adaptive approach to building resilient communities and cities. We can forge a more equitable, sustainable future by harnessing resilience's transformative power. As architects, planners, and designers, let us rise to the challenge

of co-creating resilient built environments that embody equity, sustainability, and social justice.

While we may resist change and challenge nature, it is increasingly evident that nature also challenges humanity in our modern era. One year ago, we experienced the reaction of nature in an unpleasant way both in Türkiye and Syria still suffering and struggling to overcome what happened.

To secure our future, we should allow the change to happen while offering resilient and sustainable solution as a catalyst not as a resistance.

On the other hand, we have to keep in mind that technological advancements are not only for creating aesthetically pleasing static design but having and enduring World.

Let us remember the aims over the tools which replace them nowadays. Enjoy our first issue of 2024 while deciphering the way to be resilient!

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Skills, competencies and knowledge for construction management graduates

Ecem TEZEL[1]*, Pınar IRLAYICI ÇAKMAK[2]
[1] tezele@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey
[2] irlayici@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey

**Corresponding author*
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Abstract
The ever-changing nature of the Architecture, Engineering and Construction (AEC) industry requires construction management (CM) professionals to be competitive in both theoretical knowledge and management abilities. CM programs are responsible to equip their graduates with the right knowledge and fundamental skills for their future careers. This study identifies skills, competencies and core knowledge for construction management graduates through a quantitative approach. A purposive sampling procedure targets the AEC professionals with an established academic background in the CM field. The relative importance index (RII) analysis reveals that project managers should be highly skilled in communication, problem-solving and decision-making, leadership, and ethical practices. Moreover, there is a need to demonstrate a sound knowledge of time management, project and construction management, decision-making, and cost management. A prominent finding from the Kruskal-Wallis test shows that higher-level managers considerably appreciate time management knowledge over other domains of CM. Overall, the outcomes not only guide CM programs to align their curricula with the industry requirements but also support future CM professionals to decide on the right program among numerous alternatives.

Keywords
Competency, Construction management, Graduate program, Knowledge, Skill.

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1. Introduction

The concept of project management, which is used synonymously with construction management (CM) in the Architecture-Engineering-Construction (AEC) industry, is defined as the use of specific knowledge, skills, tools, and techniques to deliver something of value to people (PMI, 2017). According to the Construction Management Association of America (CMAA), which sets the standard for managing capital construction projects since 1982, construction management is a professional service that provides a project's owner with effective management of the project's schedule, cost, quality, safety, scope, and function. As stated by the Chartered Institute of Building (CIOB), construction management is the improvement of the built environment through professionals working together to meet the changing needs of the global society by including a wide range of specialist services together with support from an independent academic discipline. Therefore, in addition to being a profession, construction management is also an established academic and research area that has evolved and expanded over the years (Pietroforte and Stefani, 2004; Arditi and Polat, 2010; Harty and Leiringer, 2017).

The new era of technological developments and evolving knowledge triggers the need for competent professionals for all industries, and AEC is no exception. Construction management programs correspond to the industry's needs by providing prevalent knowledge to their students and promoting critical skills (Ahmed et al., 2014; Benhart and Shaurette, 2014; Aliu and Aigbavboa, 2023). Similar to the AEC industry, CM education has to reflect the changes due to a shift toward digitalization, a dynamic economy, new sector forces, updated regulatory requirements and innovative ways of doing business. Recent evidence suggests that these drivers reinforce programs to assess and restructure their academic curriculums (Ahmed et al., 2014; Benhart and Shaurette, 2014; Wu et al., 2015; Vaz-Serra and Mitcheltree, 2021). Yet, there is a limited research effort on CM curriculum development (Posillico et al., 2022).

This study, therefore, explores the skills, competencies and core knowledge areas of construction managers through a two-fold approach. The paper initially reviews the top CM programs offered by architecture and civil engineering departments of well-known universities worldwide. The courses introduced in these programs are thoroughly examined and grouped into thematic categories to determine the core subject areas of CM education. Then, a questionnaire survey with CM students and graduates is applied to identify the distinguishing skills, competencies and knowledge domains for professional construction managers. Finally, a detailed discussion on the most valued CM skills and knowledge is presented to guide CM programs to align with the industry expectations. The present research contributes to CM knowledge as it addresses the gap between academic programs and industry by revealing the core knowledge areas and essential competencies of CM professionals and deriving actionable conclusions for CM curriculum enhancement.

2. Construction management education and knowledge

Since the 1970s, construction management has been recognized as a research domain mainly within the engineering departments of universities (Arditi and Polat, 2010; Harty and Leiringer, 2017). The inclusion of construction management expertise in education programs started about 50 years ago with pioneering master's programs at a number of universities in the United States, and soon followed by doctoral programs (Carr, 1997). In the mid-1990s, there was a significant increase in the number of CM graduate programs not only in the United States but also all over the world (Atalah and Muchemedzi, 2006). Today, numerous undergraduate and graduate programs worldwide are training future professionals who specialize in scheduling construction works, controlling project budgets, ensuring safety and quality, enhancing efficiency, and avoiding disputes.

Each construction project is inherently unique, and academic programs in the construction management discipline are only able to provide a broad perspective on the subject. As a result, CM professionals have to improve their knowledge and skills by experiencing a myriad of different cases throughout their careers. However, while working experience is of great importance for project managers to develop and maintain business competency, that has to be built upon a profound academic background (Edum-Fotwe and McCaffer, 2000). Previous studies indicate several areas of knowledge to include in CM education. For instance, Tatum (1987) advocates that a technical understanding of construction engineering, methods and technology, together with the managerial understanding of planning, directing and monitoring construction operations, legal aspects, financial issues, and human relations in project execution are the key needs in a CM curriculum. In line with this scheme, a longitudinal study by Arditi and Polat (2010) reveals that contract administration, project management, scheduling, equipment management, construction technology, and construction engineering management research are the most common course subjects of the CM master's programs in the United States. This being said, a recent study with mid and upper-level construction managers adds cost and finance, company organization and management, risk management, and business acumen as the essential knowledge competencies for senior-level construction managers (Pathuri et al., 2022). On top of all, the Construction Extension to the Project Management Body of Knowledge (PMBOK) Guide launches construction-specific knowledge areas for professional construction managers; namely, project health, safety, security, and environmental management, project financial management, and management of claims in construction (PMI, 2016).

In short, the changing dynamics of the AEC industry also change the knowledge expected from prospective managers. Graduate programs in the CM field need to closely monitor these fluxes and restructure themselves to ensure their graduates are well-prepared for the unpredictable industry conditions (Farooqui and Ahmed, 2009; Benhart and Shaurette, 2014; Vaz-Serra and Mitcheltree, 2021).

3.Construction management skills and competencies

Managerial roles demand cooperation between advanced knowledge in that particular field and various supervising abilities. There is extensive literature on a project manager's skills, yet not all those skills can be directly attributed to construction managers because CM requires a particular technical understanding of the construction process together with a general sense of project management (Vaz-Serra and Mitcheltree, 2021). As a result, there is a great effort to identify the specific skills for construction project management. Among them, for instance, the American Council for Construction Education (ACCE) claims that accredited master's programs in construction should equip their graduates with the following abilities, namely: communications, critical thinking, problem-solving, decision-making, research, advanced communication technology, professional ethics, advanced construction management practices, risk management, and leadership (ACCE, 2021). Likewise, the Chartered Institute of Building (CIOB) in the United Kingdom indicates that critical thinking and creativity, complex problem solving and decision making, effective communication, competent use of computer applications, leadership, industry analysis, and learning from industry practices are the required skill outcomes for all built environment master's programs graduates (CIOB, 2019). Moreover, CIOB customizes the list with additional technical, legal, advanced project management, and high-level planning and programming skills for project management master's programs (CIOB, 2019). As the principal accrediting bodies for the built environment and construction programs, ACCE and CIOB emphasize similar skill sets for graduate degree alumni (see Figure 1).

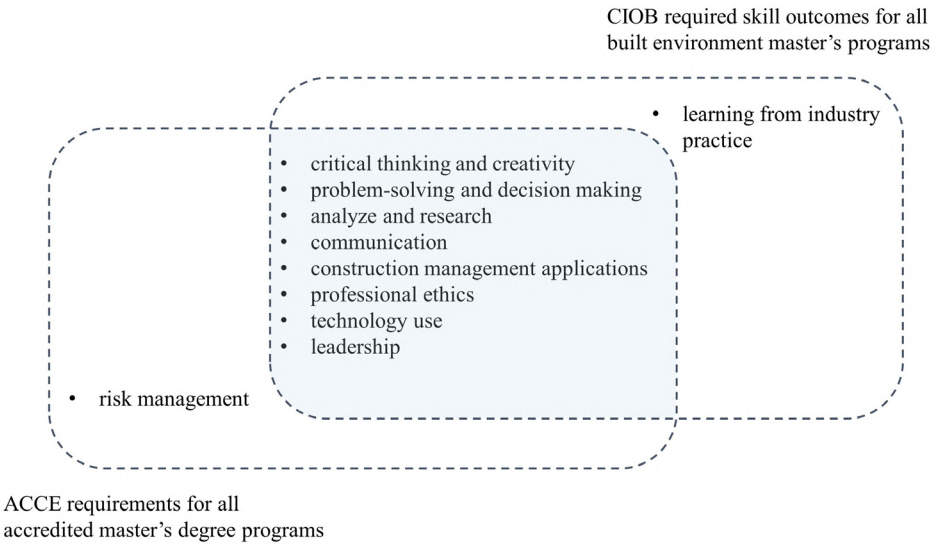

Figure 1. *ACCE and CIOB skills for master's degree program graduates.*

In addition to the institutions above, several researchers focus on the question of what are the essential skills for a construction manager to work efficiently in the industry. Earlier, Odusami (2002) shows that decision-making is the most important skill perceived by the construction industry actors followed by communication, leadership and motivation, and problem-solving. A few years later, Russell et al. (2007) expanded the list of skills by adding managing cultural diversity in a multidisciplinary environment. In a further study, both employers and students agree that problem-solving, teaming and adapting to changing environments as the top skills for career success (Bhattacharjee et al., 2013). Today, built environment graduates are expected to demonstrate leadership, critical thinking and analytics, problem-solving, and entrepreneurship skills to succeed in business (Aliu and Aigbavboa, 2023).

It is evident that skills and competencies are the foundation for the CM curriculum (Pathuri et al., 2022; Posillico et al., 2023). As noted by Magano et al. (2020), Generation Z members, as the "promissory assets" in the project management field, are arriving in the labor market. Thus, CM programs should align themselves to promote skills and competencies valued by the industry.

4. Research framework

This paper concentrates on the skills, competencies and core knowledge of CM professionals and provides insight into the future strategies for graduate programs that aim to train well-educated and competent professionals. Figure 2 illustrates the two-fold process adopted in this study. First, in addition to the graduate skills and competencies identified by ACCE and CIOB, what core knowledge to include in the CM curriculum was determined based on a systematic review of top CM programs. Then, a questionnaire

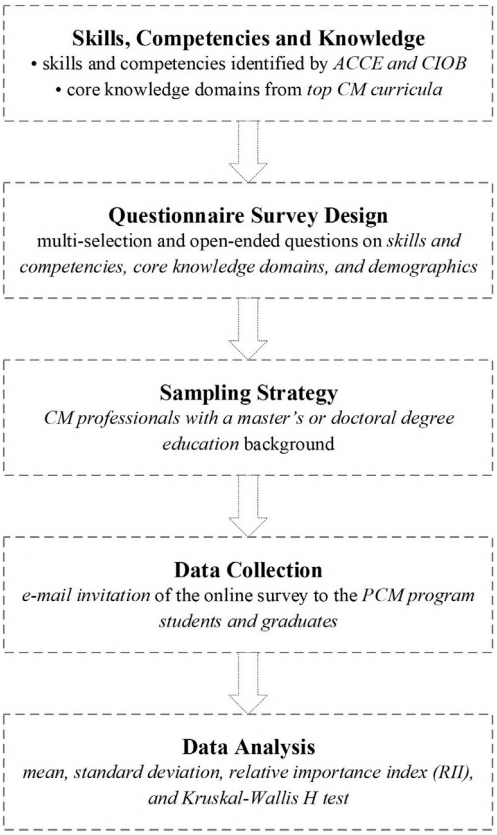

Figure 2. *Research framework.*

survey was designed to identify the desired skills and competencies for CM professionals as well as the knowledge domains supporting these skills.

4.1. A systematic review on CM knowledge

The top CM graduate programs were identified based on global university rankings. QS and Times Higher Education are the two well-known assessment systems for higher education institutions across the globe. The former system compares university performance using six indicators: academic reputation, employer reputation, faculty/student ratio, citations per faculty, international students' ratio, and international faculty ratio (QS Top Universities, 2022). The second system assesses universities based on thirteen performance indicators under five categories: teaching, research, citations, international outlook, and industry income (Times Higher Education, 2020). This study acknowledges QS world university rankings since it assesses the reputation and performance of the institutions that are highly respected by the industry and academic community.

It is a fact that both architecture and civil engineering schools taught CM-related topics in graduate programs. Therefore, all universities in architecture and civil engineering fields were listed using the subject area filter, and 18 universities were shortlisted depending on whether they have CM programs. Then, the curriculum of each selected program was examined to spot the necessary subjects to specialize in the CM field. Initial outcomes disclosed 317 courses on different aspects of CM. Finally, the courses were grouped according to course contents and represented by their occurrence within programs' curricula to identify the core knowledge for CM professionals. Table 1 below shows the selected universities and a detailed list of courses within their CM graduate programs.

As seen in Table 1, Europe is the prime continent that hosts well-respected CM programs, accompanied by the United States, Asia, and Oceania. In a general sense, top CM programs seem to comprise 18 different subject domains within their curricula. Whilst university-based differences are observed, overall, most programs provide a similar knowledge basis to their students. Unsurprisingly, legal

Table 1. *Top PCM programs and core subject areas.*

	Project and Construction	Contemporary Mng	Decision Making	Cost Management	Time Management	Quality Management	Risk Management	Design Management	Legal & Contractual	Financial Issues	Information Technologies	Construction	HR & Org. Behaviour	Health, Safety, and	Sustainability, Energy, &	Prof. Practice & Ethics	Research & Thesis	Seminar
Chalmers University of Technology, Sweden	•			•				•	•	•			•		•		•	
Delft University of Technology, Netherlands	•	•		•			•	•	•	•	•	•	•			•	•	
Illinois Institute of Technology, United States		•	•						•			•						
Istanbul Technical University, Turkey	•	•	•	•	•	•	•		•	•	•		•		•	•	•	•
Michigan State University, United States	•	•		•	•				•	•	•				•	•	•	
Middle East Technical University, Turkey	•	•		•	•		•		•	•	•	•		•	•	•	•	•
National University of Singapore, Singapore	•			•	•			•	•	•	•					•	•	
Texas A&M University, United States	•	•		•	•		•		•	•	•	•			•	•	•	•
The University of Melbourne, Australia	•	•		•	•		•	•	•	•	•	•	•		•	•	•	
The University of New South Wales, Australia	•	•		•	•		•		•	•	•				•	•	•	•
Tsinghua University, China	•	•	•	•					•	•						•	•	
Universitat Politècnica de Catalunya-BarcelonaTech, Spain	•	•	•	•	•	•			•	•	•		•		•		•	
University College London, England	•	•		•					•	•	•		•		•	•	•	
University of California, Berkeley, United States		•			•				•		•				•		•	•
University of Cambridge, England	•	•		•	•				•	•		•				•		
University of Michigan-Ann Arbor, United States	•	•	•	•	•		•			•	•	•			•	•	•	•
University of Reading, England	•	•		•				•	•	•	•	•	•		•	•	•	
University of Salford, England	•			•	•		•		•	•				•	•	•	•	

Note. Mng. denotes Management, HR denotes Human Resources, Org. denotes Organizational, Env. denotes Environment, and Prof. denotes Professional

and contractual issues are the most common course subject in CM curricula that covers construction laws and regulations, international contracts, reasons for disputes in construction projects along with resolution techniques. This is followed by project and construction management, contemporary management practices, cost management, financial issues, and research and thesis courses. Project and construction management is a generic title for the courses that introduce management concepts, functions and principles of management, major actors of construction projects along with their roles and responsibilities in the project process, and basic project delivery methods of construction works. On the other hand, contemporary management practices focus on recent management approaches at company and project levels such as strategic management, supply chain management, and lean methodology. Cost management and financial issues are two distinguishing subjects in CM education and practice. While the former concept directly refers to the processes required to maintain monetary control of a project throughout the project life cycle, the latter is more related to economics and economic decisions. Finally, the research and thesis course aims to guide students to conduct scientific research in the CM domain. Although many programs request students to submit a thesis study as a part of a graduate degree, few of them offer non-thesis graduate program alternatives.

It is interesting to note that, although quality management is one of the core knowledge areas in project management, most CM programs do not offer a separate course solely focusing on quality subjects; instead, they introduce the concept, tools and techniques of quality management within other associated courses. A similar case is also valid for health, safety and security subjects. Even though it is a distinctive knowledge area for construction projects' management, only two of the selected programs have modules specifically encapsulating HSS-related topics. Seeing Table 1, it can be concluded that a typical CM graduate curriculum involves (1) project and construction management in general terms, (2) contemporary management practices, (3) scheduling and time management, (4) cost management and financial issues, (5) legal and contractual issues together with dispute resolution, (6) prevalent information technologies, (7) sustainability and environmental issues, (8) professional practice and ethics, and (9) research methods to support thesis/dissertation studies.

4.2. Quantitative survey on CM skills, competencies and knowledge

The survey consists of three major sections. The first section aims to understand the importance of having a set of skills that ACCE and CIOB commonly suggest. In this section, respondents were asked to indicate the level of importance of 8 different skills on a five-point Likert scale (from 1-not important to 5-very important). The second section identifies how important it is to receive an education in different subject areas. Again, respondents were asked to indicate the level of importance of 18 different course subjects for CM graduates, observed in the top CM curricula, on a five-point Likert scale (from 1-not important to 5-very important). The final section of the survey collects a set of personal information regarding the respondents' job titles, years of industry experience, and educational levels.

4.3. Sampling

Following the survey development, a purposive sampling strategy was adopted to collect quantitative data on the importance of specific skills, competencies and knowledge for CM professionals. Purposive sampling is a non-random sampling method that enables individuals who may be associated with the questioned phenomenon to be present within the sample (Robinson, 2014). Even though it is primarily preferred in qualitative studies (Teddlie and Yu, 2007), the rationale for employing purposive sampling in this paper is to congregate the opinions of the most convenient group of people with knowledge and experience in the CM

field. The online survey invitation has been sent via email to 220 individuals who are studying or have studied the Project and Construction Management graduate program at Istanbul Technical University. The survey was available for data collection between June and July 2022 and a total of 80 valid responses were received. The limited response rate (36%) might question the representativeness of the results. However, when working with purposive sampling the major concern is to ensure that the sample involves suitable respondents rather than to meet a specific sample size (Mason, 2018). Table 2 represents the respondent characteristics.

The respondents who participated in the questionnaire survey were AEC professionals with a graduate education background in the Project and Construction Management (PCM) program at Istanbul Technical University. PCM provides each of two levels of graduate education, namely, master's degree and doctoral degree, within the body of the architectural department. As a result, architects were the major respondents (89%) of the survey compared to civil engineers (11%). The respondents were able to select their industry experience among the following categories: (1) less than 2 years, (2) 3-5 years, (3) 6-10 years, (4) 11-15 years, and (5) more than 15. Almost half of the respondents (49%) have more than 10 years of experience in the AEC industry, while only 11% of them have been working for less than 2 years. The smallest group of the respondents (11%) were either the founders, co-founders and top-level managers or first-line managers within their companies, whereas the largest group (31%) were mid-level managers. In addition to that, 20% have been working in non-managerial (or operational) positions and 26% were academicians. As previously mentioned, this study invited master's/doctoral students and graduates of the PCM program. Of these respondents, MSc graduates were the largest group (36%), followed by PhD students (31%), MSc students (20%), and PhD graduates (13%), respectively. Overall, the survey data were collected from professionals who have notable experience in a variety of roles in organizations with an established CM education. Therefore, it is evident that this study will provide a reliable understanding of the required skills, competencies and knowledge for CM professionals to work in a challenging environment.

5. Results and discussion

Internal consistency analysis of the survey items was carried out using Cronbach's alpha method. Cronbach's alphas for the skills and competencies

Table 2. *Characteristics of survey respondents.*

Demographic variable	Categories	Number of responses (n)	Percentage of responses (%)
Profession	Architect	71	89%
	Civil engineer	9	11%
Years of experience	≤ 2 years	9	11%
	3-5 years	14	18%
	6-10 years	18	23%
	11-15 years	20	25%
	> 15 years	19	24%
Educational background	MSc student	16	20%
	MSc graduate	29	36%
	PhD student	25	31%
	PhD graduate	10	13%

subscale was .81, and the knowledge domain subscale was .89, respectively. Consequently, the overall survey was found to be highly reliable (α>.80).

Collected data were analyzed using the Relative Importance Index (RII) to prioritize skills and competencies for CM professionals, and to determine the predominance of subject areas pertaining to CM education. RII is calculated as Equation 1

RII =Σ W / A x N

where: W = weighting assigned by respondents on the Likert scale (ranging from 1 to 5); A = the highest weight (i.e. 5 in this study); and N = the total number of respondents. The RII value had a range of 0 to 1; the higher the RII value, the more important the skill and competency and the more dominant the subject area. The RIIs were then ranked, and the results are presented in Table 3 and Table 4.

The RII ranking shown in Table 3 presents that all of these skills and competencies are considered important from the respondents' perspective. Hence, communication with the highest score (RII=0.965), followed by problem-solving and decision-making (RII=0.960), is perceived as the most important one. This is consistent with the findings of Pathuri et al. (2022), who recently identified the knowledge, skills, and abilities required of senior-level construction managers. Not surprisingly, leadership (RII=0.915) is still a predominant skill as noted in previous studies (Back et al., 2012; Slattery and Sumner, 2011). It is followed by professional ethics (RII=0.905), which was also highly ranked in the study of Benhart and Shaurette (2014). These results corroborate the ideas of Hsu et al. (2019), who suggested that a CM curriculum should prioritize leadership and execution, innovation, and ethics and law subjects in the learning hierarchy. Critical thinking and creativity (RII=0.850) have gained much importance, unlike preceding research (Ahmed et al., 2014; Benhart and Shaurette, 2014). Despite their high scores, the reason why skills of construction management practices (RII=0.845) and technology use (RII=0.800) were placed at the bottom could be because they were perceived as knowledge rather than skill.

Table 4 provides RII rankings of knowledge domains supporting the above-mentioned skills. Being one of the critical aspects of managing construction projects, it is not surprising that time management was ranked first with 0.930 RII. This confirms the findings of Bhattacharhjee et al. (2013), who found that identifying project activities and their relationships, and developing and updating a project schedule are the knowledge required to work efficiently in the construction industry. Although senior-level managers are not necessarily expected to have expertise in construction scheduling, it is undoubtedly a knowledge area of a construction manager (Pathuri et al., 2022); moreover, it plays a distinguishing role in the recruitment of new graduates (Vaz-Serra and Mitch-

Table 3. *Relative importance index and rank for skills and competencies.*

	Respondent Scores						
Skills and competencies	≤2	3	≥4	SD	Mean	RII	Rank
Communication	0	0	80	.382	4.83	0.965	1
Problem-solving & decision making	1	0	79	.488	4.80	0.960	2
Leadership	0	2	78	.546	4.58	0.915	3
Professional ethics	0	5	75	.616	4.53	0.905	4
Analysis and research	0	5	75	.591	4.33	0.865	5
Critical thinking and creativity	3	5	72	.738	4.25	0.850	6
Construction management practices	0	8	72	.616	4.23	0.845	7
Technology use	1	13	76	.636	4.00	0.800	8

eltree, 2021). The second most important knowledge domain was project and construction management with an RII of 0.925. This overlaps with the study of Arditi and Polat (2010), which observed a prominent increase in the ranking of project management courses. Courses offering knowledge and technique necessary for decision-making (RII=0.913) was ranked one of the highest ones, in accordance with the rank of its supporting skill. Having one of the highest scores (RII=0.905), cost management was observed as another prevalent knowledge domain. Although this result differs from Arditi and Polat (2010) that presented a drastic fall in raking of cost estimating courses, it is consistent with those of Bhattacharhjee et al. (2013) who reported estimation (i.e., quantity take-off, components of bid documents) has still also been regarded as an important knowledge to work efficiently in the construction industry. In contrast to earlier findings (Arditi and Polat, 2010; Pellicer et al., 2013); risk management (RII=0.895), quality management (RII=0.858), and other management courses cover contemporary practices (RII=0.850) were appeared to be gaining more importance as they have been successfully adapted over the years to the AEC industry. Legal and contractual issues have still been one of the core knowledge domains with an RII of 0.883. This result agrees with the findings of other studies, in which contract administration/legal issues were at the top of CM programs' priority list (Arditi and Polat, 2010), and contract management and legal aspects in construction were highlighted as one of the most needed topics (Pellicer et al., 2013). Although it is included in cost-related courses in some curriculums, financial issues were discussed separately and were listed among the important domains with 0.870 RII. In line with their importance, the rest of the knowledge domains were ranked as follows: human resources and organizational behavior (RII=0.848), professional practice and ethics (RII=0.848), information technologies (RII=0.823), construction technologies (RII=0.808),

Table 4. *Relative importance index and rank for knowledge domains.*

	Respondent Scores						
Core Subject Area	**≤2**	**3**	**≥4**	**SD**	**Mean**	**RII**	**Rank**
Time Management	0	1	79	.506	4.65	0.930	1
Project & Construction Management	1	1	78	.582	4.63	0.925	2
Decision Making	0	3	77	.570	4.56	0.913	3
Cost Management	0	3	78	.573	4.53	0.905	4
Risk Management	1	2	77	.616	4.48	0.895	5
Legal & Contractual Issues	0	7	73	.650	4.41	0.883	6
Financial Issues	0	9	71	.677	4.35	0.870	7
Quality Management	0	8	72	.640	4.29	0.858	8
Contemporary Management Practices	0	8	72	.626	4.25	0.850	9
HR & Org Behaviour	1	8	71	.733	4.24	0.848	10
Prof Practice & Ethics	2	9	69	.799	4.24	0.848	10
Information Technologies	3	14	63	.827	4.11	0.823	11
Construction Technologies	4	14	62	.878	4.04	0.808	12
Health, Safety & Security	3	21	56	.868	3.93	0.785	13
Design Management	3	23	54	.862	3.88	0.775	14
Sustainability, Energy & Environment	1	23	56	.769	3.88	0.775	14
Research and Thesis	6	21	53	.938	3.74	0.748	15
Seminar	12	31	37	.971	3.36	0.673	16

health, safety and security (RII=0.785), and design management (RII=0.775).

The final analysis was carried out to understand whether CM professionals working at different managerial levels have different perspectives on the most important skills and knowledge areas for CM graduates. To this, first, skills, competencies and core knowledge were categorized according to their relative importance. Based on Akadiri (2011), RII values of each skill and knowledge were transformed to important levels, namely, High (0.8≤RII≤1), High-Medium (0.6≤RI<0.8), Medium (0.4≤RI<0.6), Medium-Low (0.2≤RI<0.4), and Low (0≤RI<0.2), and the items with 0.8 or higher RII score were selected for further analysis. The remaining items were not considered since the respondents did not reach a clear consensus. Then, collected data were tested for the violation of normality using IBM SPSS 28.0 software. The results of the Shapiro-Wilk test of normality showed that the data varies significantly from the normal distribution (p<.001). Correspondingly, a comparison of importance among respondent groups was carried out using the Kruskal-Wallis test, a non-parametric equivalent of one-way ANOVA. The decision to use the Kruskal-Wallis test instead of one-way ANOVA was made because the latter assumes that the data follows a normal distribution, which was not met in this case. The results are presented in Table 5 and Table 6.

Results of the Kruskal-Wallis test for CM skills and competencies are as follows: communication (H(4) = 2.181, p = .703), problem-solving and decision making (H(4) = 2.820, p = .588), leadership (H(4) = 4.060, p = .389), professional ethics (H(4) = 1.879, p = .758), analysis and research (H(4) = 5.129, p = .274), critical thinking and creativity (H(4) = 1.022, p = .906), construction management practices (H(4) = 1.975, p = .740), and technology use (H(4) = 2.128, p = .712). Given the results in Table 5, it is evident that there is a complete consensus among respondents on all identified skills and competencies for CM graduates. None of the different managerial levels prioritize one particular skill over others (p>.05).

A similar conclusion can be drawn for the core knowledge areas except time management. As seen in Table 6, respondents' perception of the importance of time management within the CM curriculum significantly differs depending on their position (H(4) = 11.594, p = .021). That is to say, a top-level manager values time management knowledge more than a first-line

Table 5. *Kruskal-Wallis test results comparing skills and competencies.*

	Position	N	Mean Rank	df	χ^2	p
Communication	Top-level managers	9	38.61	4	2.181	.703
	Mid-level managers	25	39.50			
	First-line managers	9	47.50			
	Non-managerial staff	16	40.00			
	Academicians	21	39.88			
Problem-solving and decision making	Top-level managers	9	43.11	4	2.820	.588
	Mid-level managers	25	39.32			
	First-line managers	9	47.50			
	Non-managerial staff	16	40.09			
	Academicians	21	38.10			
Leadership	Top-level managers	9	39.17	4	4.060	.398
	Mid-level managers	25	37.78			
	First-line managers	9	52.17			
	Non-managerial staff	16	37.44			
	Academicians	21	41.64			
Professional ethics	Top-level managers	9	44.50	4	1.879	.758
	Mid-level managers	25	41.34			
	First-line managers	9	44.50			
	Non-managerial staff	16	35.16			
	Academicians	21	40.14			
Analysis and research	Top-level managers	9	40.00	4	5.129	.274
	Mid-level managers	25	34.54			
	First-line managers	9	37.28			
	Non-managerial staff	16	42.38			
	Academicians	21	47.76			
Critical thinking and creativity	Top-level managers	9	39.44	4	1.022	.906
	Mid-level managers	25	39.96			
	First-line managers	9	45.00			
	Non-managerial staff	16	37.13			
	Academicians	21	42.24			
Construction management practices	Top-level managers	9	40.50	4	1.975	.740
	Mid-level managers	25	38.70			
	First-line managers	9	36.50			
	Non-managerial staff	16	38.81			
	Academicians	21	45.64			
Technology use	Top-level managers	9	36.56	4	2.128	.712
	Mid-level managers	25	37.28			
	First-line managers	9	40.22			
	Non-managerial staff	16	42.25			
	Academicians	21	44.81			

Table 6. *Kruskal-Wallis test results comparing knowledge domains.*

Time Management	Top-level managers	9	49.61	4	11.594	.021
	Mid-level managers	25	40.82			
	First-line managers	9	49.61			
	Non-managerial staff	16	44.13			
	Academicians	21	29.55			
Project and Construction Management	Top-level managers	9	41.00	4	5.483	.241
	Mid-level managers	25	40.44			
	First-line managers	9	32.33			
	Non-managerial staff	16	49.13			
	Academicians	21	37.29			
Decision Making	Top-level managers	9	33.33	4	4.838	.304
	Mid-level managers	25	42.00			
	First-line managers	9	52.22			
	Non-managerial staff	16	38.66			
	Academicians	21	38.17			
Cost Management	Top-level managers	9	45.17	4	7.825	.098
	Mid-level managers	25	42.74			
	First-line managers	9	49.44			
	Non-managerial staff	16	42.47			
	Academicians	21	30.50			
Risk Management	Top-level managers	9	29.72	4	3.450	.485
	Mid-level managers	25	41.76			
	First-line managers	9	46.67			
	Non-managerial staff	16	40.25			
	Academicians	21	41.17			
Legal and Contractual Issues	Top-level managers	9	48.33	4	4.724	.317
	Mid-level managers	25	40.44			
	First-line managers	9	50.17			
	Non-managerial staff	16	36.44			
	Academicians	21	36.17			
Financial Issues	Top-level managers	9	39.89	4	3.517	.475
	Mid-level managers	25	42.94			
	First-line managers	9	50.17			
	Non-managerial staff	16	35.78			
	Academicians	21	37.31			
Quality Management	Top-level managers	9	32.83	4	3.026	.553
	Mid-level managers	25	41.44			
	First-line managers	9	34.28			
	Non-managerial staff	16	45.47			
	Academicians	21	41.55			
Contemporary Management Practices	Top-level managers	9	35.61	4	3.024	.554
	Mid-level managers	25	39.94			
	First-line managers	9	42.50			
	Non-managerial staff	16	47.50			
	Academicians	21	37.07			
HR and Organizational Behaviour	Top-level managers	9	36.39	4	2.698	.610
	Mid-level managers	25	41.08			
	First-line managers	9	49.72			
	Non-managerial staff	16	36.50			
	Academicians	21	40.67			
Professional Practice and Ethics	Top-level managers	9	39.28	4	1.732	.785
	Mid-level managers	25	43.12			
	First-line managers	9	36.00			
	Non-managerial staff	16	43.94			
	Academicians	21	37.21			
Information Technologies	Top-level managers	9	43.17	4	2.782	.595
	Mid-level managers	25	39.14			
	First-line managers	9	30.83			
	Non-managerial staff	16	41.22			
	Academicians	21	44.57			
Construction Technologies	Top-level managers	9	37.83	4	1.048	.902
	Mid-level managers	25	37.90			
	First-line managers	9	41.28			
	Non-managerial staff	16	44.21			
	Academicians	21	41.50			

manager does. There is a reasonable explanation behind this finding. For a first-line manager, the major concern is coordinating day-to-day operations. However, a top-level manager has a great financial responsibility that is directly associated with delays and cost overruns.

Other than time management subject, there is no significant difference among respondents' perceptions towards the following items: project and construction management ($H(4) = 5.483$, $p = .241$), decision making ($H(4) = 4.838$, $p = .304$), cost management ($H(4) = 7.825$, $p = .098$), risk management ($H(4) = 3.450$, $p = .485$), legal and contractual issues ($H(4) = 4.724$, $p = .317$), financial issues ($H(4) = 3.517$, $p = .475$), quality management ($H(4) = 3.026$, $p = .553$), contemporary management practices ($H(4) = 3.024$, $p = .554$), HR and organizational behavior ($H(4) = 2.698$, $p = .610$), professional practice and ethics ($H(4) = 1.732$, $p = .785$), information technologies ($H(4) = 2.782$, $p = .595$), and construction technologies ($H(4) = 1.048$, $p = .902$). In other words, Table 6 claims that each of the given knowledge areas is equally important for a construction manager regardless of being top-level or first-line.

6. Conclusion

Future of the CM profession immensely relies on how well the programs prepare their students for the ever-changing industry conditions, both in terms of theoretical knowledge and managerial skills. Numerous studies investigating the extent of CM knowledge and skills have shown the need for the CM curriculum to be aligned with industry requirements and expectations. In line with the dynamic nature of the AEC industry, CM programs also need to go through regular self-assessment processes and improve their teaching practices.

The present study was designed to determine the desirable key skills, competencies and core knowledge for well-trained and well-educated construction managers. The results of this study further support that identified skills and competencies are of great importance for a construction manag-

er to work efficiently in the industry. The essential skills and competencies -with complete agreement- are, communication, problem-solving & decision-making, leadership, professional ethics, analysis and research, critical thinking and creativity, construction management practices, and technology use. Although there exists some variability in the courses and curricula, construction management programs should ensure that they provide sufficient training and education on each skill and competency. This study has found that project and construction management, decision-making, and cost management are the most important knowledge areas with time management at the top.

The empirical results reported in this study should be considered in light of two major limitations. First, this study did not intend to develop a rigorous CM curriculum, yet it identified the desired skills, competencies and knowledge for professionals in the CM industry. Thus, the authors did not necessarily look for consensus among study respondents. Still, scholars and industry representatives might scrutinize the quantitative findings to refine the absolute must skills and knowledge of CM professionals. Further research is needed to evaluate the effectiveness of existing CM programs in developing those skills, competencies and knowledge. Second, even though the study adopted purposive sampling to reach out to the most relevant respondents of the subject, the representativeness was limited to the students and graduates of a single CM program. Future studies in this field should consider employing larger and more diverse samples of construction professionals, potentially from different regions, to enhance the generalizability and robustness of the findings. It is noteworthy to underscore that approximately half of the study respondents occupy non-managerial roles or are affiliated with academic institutions while they have attained or presently pursuing a graduate degree in the field of PCM. Nevertheless, their responses are in alignment with those of the remaining respondents and offer valuable insights into the future of the CM profession. The findings obtained in this study can guide CM graduate programs to design or re-structure their curricula to ensure that they equip their graduates with the most required knowledge and highly valued skills. This study is of great importance for individuals who are pursuing career development in the AEC industry as well. The findings support prospective construction managers seeking graduate education in the CM field while choosing a suitable program that provides advanced knowledge and promotes skills valued by the industry. Finally, companies seeking to distinguish themselves in the industry can benefit from the results of this study by recruiting graduates of programs that convey these skills and knowledge.

References

Ahmed, S. M., Yaris, C., Farooqui, R. U., & Saqib, M. (2014). Key attributes and skills for curriculum improvement for undergraduate construction management programs. *International Journal of Construction Education and Research, 10*(4), 240-254.

Akadiri O.P. (2011). *Development of a multi-criteria approach for the selection of sustainable materials for building projects* [Doctoral dissertation, University of Wolverhampton].

Aliu, J., & Aigbavboa, C. (2023). Key generic skills for employability of built environment graduates. *International Journal of Construction Management, 23*(3), 542-552.

American Council for Construction Education. (2021). Standards and criteria for the accreditation of construction education programs (Document 103). https://www.acce-hq.org/file-share/48e86a14-cae9-4775-9334-831c94b714f6

Arditi, D., & Polat, G. (2010). Graduate education in construction management. *Journal of Professional Issues in Engineering Education and Practice, 136*(3), 175-179.

Atalah, A., & Muchemedzi, R. (2006). Improving enrolment in the master of construction management program at Bowling Green State University. *Journal of Professional Issues in Engineering Education and Practice, 132*(4), 312-321.

Back, W. E., Macdonald, R., & Grau,

D. (2012). An organizational approach to leadership development for engineering and construction management project practitioners. *International Journal of Business, Humanities, and Technology, 2*(2), 121–131.

Benhart, B. L., & Shaurette, M. (2014). Establishing new graduate competencies: Purdue University's construction management curriculum restructuring. *International Journal of Construction Education and Research, 10*(1), 19-38.

Bhattacharjee, S., Ghosh, S., Young-Corbett, D. E., & Fiori, C. M. (2013). Comparison of industry expectations and student perceptions of knowledge and skills required for construction career success. *International Journal of Construction Education and Research, 9*(1), 19-38.

Carr, R. I. (1997). Engineering and construction management: Leadership and opportunity. *Journal of Construction Engineering and Management, 123*(3), 292-296.

Chartered Institute of Building. (2019). The education framework for master's degree programs. https://www.ciob.org/learning-providers/education-framework

Edum-Fotwe, F. T., & McCaffer, R. (2000). Developing project management competency: Perspectives from the construction industry. *International Journal of Project Management, 18,* 111-124.

Farooqui, R. U., & Ahmed, S. M. (2009). Key skills for graduating construction management students - A comparative study of industry and academic perspectives. In *Construction Research Congress 2009: Building a Sustainable Future* (pp. 1439-1448).

Harty, C., & Leiringer, R. (2017). The futures of construction management research. *Construction Management and Economics, 35*(7), 392-403.

Hsu, W.-L., Chen, Y.-S., Shiau, Y.-C., Liu, H.-L., & Chern, T.-Y. (2019). Curriculum design in construction engineering departments for colleges in Taiwan. *Education Sciences, 9*(1), 65.

Magano, J., Silva, C., Figueiredo, C., Vitoria, A., Nogueira, T., & Dinis, M. A. P. (2020). Generation Z: Fitting project management soft skills competencies - A mixed-method approach. *Education Sciences, 10*(7), 187.

Mason, J. (2018). *Qualitative researching* (3rd ed.). SAGE Publications.

Odusami, K. T. (2002). Perceptions of construction professionals concerning important skills of effective project leaders. *Journal of Management in Engineering, 18*(2), 61-67.

Pathuri, R. T., Killingsworth, J., & Mehany, M. S. H. M. (2022). Knowledge, skills, and abilities for senior-level construction managers: A US Industry-based Delphi study. *International Journal of Construction Education and Research, 18*(3), 234-250.

Pellicer Armiñana, E., Yepes Piqueras, V., & Ortega Llarena, A. J. (2013). Method for planning graduate programs in construction management. *Journal of Professional Issues in Engineering Education and Practice, 139*(1), 33-41.

Pietroforte, R., & Stefani, T. P. (2004). ASCE Journal of Construction Engineering and Management: Review of the years 1983–2000. *Journal of Construction Engineering and Management, 130*(3), 440-448.

Posillico, J. J., Edwards, D. J., Roberts, C., & Shelbourn, M. (2022). Curriculum development in the higher education literature: A synthesis focusing on construction management programmes. *Industry and Higher Education*, *36*(4), 456-470.

Posillico, J. J., Edwards, D. J., Roberts, C., & Shelbourn, M. (2023). A conceptual construction management curriculum model grounded in scientometric analysis. *Engineering, Construction and Architectural Management, 30*(9), 4143-4170.

Project Management Institute PMI. (2016). *Construction extension to the PMBOK guide.* Project Management Institute, Inc.

Project Management Institute PMI. (2017). *A guide to the project management body of knowledge (PMBOK Guide)* (6th ed.). Project Management Institute, Inc.

QS Top Universities. (2022, June 21). QS World University Rankings methodology: Using rankings to start your university search. QS Top Universities. https://www.topuniversities.com/qs-world-university-rankings/methodology

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology, 11*(1), 25-41.

Russell, J. S., Hanna, A., Bank, L. C., & Shapira, A. (2007). Education in construction engineering and management built on tradition: Blueprint for tomorrow. *Journal of Construction Engineering and Management, 133*(9), 661-668.

Slattery, D. K., & Sumner, M. R. (2011). Leadership characteristics of rising stars in construction project management. *International Journal of Construction Education and Research, 7*(3), 159–174.

Tatum, C. B. (1987). Balancing engineering and management in construction education. *Journal of Construction Engineering and Management, 113*(2), 264-272.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research, 1*(1), 77-100.

Times Higher Education. (2020, August 24). THE World University Rankings 2021: methodology. Times Higher Education. https://www.timeshighereducation.com/world-university-rankings/world-university-rankings-2021-methodology

Vaz-Serra, P., & Mitcheltree, H. (2021). Understanding the key master of construction project management graduate competencies required to meet industry needs in Australia. I*nternational Journal of Construction Education and Research, 17*(3), 222-241.

Wu, P., Feng, Y., Pienaar, J., & Zhong, Y. (2015). Educational attainment and job requirements: Exploring the gaps for construction graduates in Australia from an industry point of view. *Journal of Professional Issues in Engineering Education and Practice, 141*(4), 06015001.

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Effect of COVID-19 pandemic on the productivity of construction projects in Sri Lanka

R.R. GOHUNUWATTA[1], H.A.H.P. PERERA[2]*, B.A.K.S. PERERA[3], P.A.P.V.D.S. DISARATNA[4]
[1] 172630I@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Moratuwa, Sri Lanka
[2] 162662C@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Moratuwa, Sri Lanka
[3] kanchana@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Moratuwa, Sri Lanka
[4] vijithad@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Moratuwa, Sri Lanka

**Corresponding author*
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Abstract
The COVID-19 pandemic significantly impacted the productivity of construction projects in Sri Lanka and other countries. Research initiatives are required to tackle this issue from the perspective of construction, given that this subject is relatively significant and that individuals are still working to come up with strategies to overcome the pandemic consequences. As a result, this study investigates how productivity fluctuations in Sri Lankan construction projects during the COVID-19 era can be managed. The study applied the Delphi method along with a quantitative methodology. Mean Rating and statistical analyses were used to analyse and validate the empirical data collected during the study. Absenteeism and interference were identified as the main factor that affected production. Other notable factors included prioritising safety over productivity, workforce reduction due to social distancing protocols, inspection and permit delays, and cash flow and payment challenges. Further, the study also discovered eight effective mitigation techniques to deal with production challenges in the construction industry during the pandemic. The findings, which highlight the synergy between the construction industry and productivity increase strategies during COVID 19, would be a useful reference for future studies due to the paucity of literature on the effects of the COVID-19 pandemic on the construction industry in Sri Lanka. Overall, this investigation provides valuable insights into the factors affecting construction productivity during the pandemic and offers potential mitigation techniques for overcoming these challenges in Sri Lanka and other developing countries.

Keywords
Construction projects, COVID-19, Delphi technique, Productivity, Quantitative approach.

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1. Introduction

The coronavirus illness (COVID-19) is the biggest challenge faced by humankind in the 21st century (El-Erian, 2020). Sri Lanka is one of the developing nations that has been badly impacted by the Coronavirus, reporting 671,110 cases, resulting in 16,781 deaths by the end of October 2022 (Sri Lankan Health Promotion Bureau, 2022). Many emergency methods were applied to control the situation (Kawmudi et al., 2021), causing significant negative impacts on the social and economic context globally (Bandara et al., 2021). Further, the effects of the pandemic led to a substantial financial crisis due to the prolonged quarantine, travel restrictions, manufacturing closures, and rapid decline of various services (Boone et al., 2020). The International Monetary Fund (IMF) reports that this global economic recession is far worse than the financial crisis in 2008 (Athias et al., 2020).

Along with the economies of other nations, Sri Lanka's economy experienced a severe recession due to the COVID-19 pandemic (Roshana et al., 2020). Further, the construction sector appeared to be panicking due to the business conditions and was forced to halt operations temporarily (Pathirana, 2020). The COVID-19 pandemic was a severe blow to the construction industry, and the comprehensive closure mandated for months forced the industry to enter into a complete shutdown (Pathirana, 2020).

The epidemic's spread directly affected the construction workers' productivity. For example, people distressed by a virus cannot be productive and put their efforts towards increasing productivity (Kramer & Kramer, 2020). The morbidity caused by the infection implies that no work productivity can occur until after recovery because sick leave or time taken off the job to seek medical attention has reduced productivity (Wren-Lewis, 2020). Additionally, site closures and general shutdowns have a significant impact on productivity.

Low construction productivity thus became the most pressing issue in the Sri Lankan economy (Manoharan et al., 2022). Even when construction activity resumed in late 2020, the effects of the economic crisis persisted because of increases in material prices, exchange rates, and shortages (World Bank, 2021). Various factors influenced construction productivity during the COVID-19 pandemic outbreak (Abeysinghe & Jayathilaka, 2022). However, evidence-based mitigation techniques can ensure construction productivity during the pandemic (Raoufi & Fayek, 2020). The COVID-19 pandemic's effects continue to have a significant operational impact on Sri Lanka's construction industry, creating a compelling need to solve productivity issues in the construction industry (Niroshana et al., 2022). And also, it is clear that there is a pressing need to find extensive measures and techniques that are required to address these issues in the Sri Lankan construction industry (de Silva, 2023). However, the problem is that while several research projects have focused on this issue in the Sri Lankan context, their reach has mostly remained relatively confined. Few studies have specifically prioritised increasing construction productivity, but there is a lack of literature offering practical mitigation techniques to deal with the related difficulties. Therefore, this study aims to investigate the effects of the COVID-19 pandemic on construction productivity in Sri Lankan construction projects with the following research questions:

Q1: What is the productivity fluctuation in Sri Lankan construction projects during the COVID-19 period?

Q2: What the factors affecting the productivity fluctuation in Sri Lankan construction projects during the COVID-19 period?

Q3: What are the suitable mitigation techniques used to reduce the effects of the COVID-19 pandemic for each productivity factor?

Q4: What are the most effective mitigation techniques used in Sri Lankan construction projects?

2. Literature review

This section focuses mostly on the body of literature that has been published about the COVID-19 epidemic in both Sri Lankan and worldwide contexts.

The majority of the literature now in circulation examines how the COVID-19 pandemic has affected productivity in the construction industry from both a global and local standpoint. Additionally, this literature emphasises previously recognised productivity-related factors. The theoretical framework and the necessity for performing this research will be discussed in due time. This will serve to emphasise how important the contribution that this research piece made is.

2.1. Effects of COVID-19 on the construction industry

The global economy was severely demobilised due to the COVID-19 pandemic (Chakraborty & Maity, 2020). Investment has been downgraded by international credit rating agencies as a result of the unpredictability of the economy (Faculty of Humanities and Social Sciences, 2020), causing substantial disruptions and suffering across all industries, including construction, dining, retail, and aviation (Alsharef et al., 2021). COVID-19 significantly and negatively impacted the real estate and construction industries, causing projects to stall and their beneficiaries to suffer (Bailey et al., 2020). It is noticeable that the primary elements that had a substantial influence on the construction industry were inflation, the closure of production businesses, shorter and longer workweeks, the economic downturn, decreased demand for sales and projects, and rising material and equipment costs (Chopra, 2020). However, the work had to be carried out in a difficult situation with cautious, restricted movements and accelerated project delivery. They had to commence working under the risk of infection with full scrutiny and awareness (Gamil & Alhagar, 2020). Therefore, construction productivity also significantly declined due to the COVID-19 impacts (Bsisu, 2020).

2.2. Effects of COVID-19 on the Sri Lankan construction industry

The Sri Lankan construction industry employs more than 600,000 people and contributes 7.4% to the nation's GDP (Ranasinghe & Pathirana, 2021). Local supply chain systems became extremely important during the pandemic, taking the brunt of the COVID-19 outbreak and having a significant impact on a wide range of industries (Bandara et al., 2020). As a result, the construction industry was severely hit by the COVID-19 outbreak and the nation's economic slump (Kawmudi et al., 2021). More than 50% of the work was done in the Sri Lankan construction industry, which has a total market value of Rs. 397.77 billion, without the client making any payments to the contractor, and the contractor has not made the majority of suppliers' payments (Pathirana, 2020). According to Chopra (2020), such problems are becoming severe and will cause a serious blow to construction productivity and have adverse effects on the world economy.

2.3. Construction productivity

Productivity is a critical consideration for the construction industry, which contributes between 6 and 7 percent of the GDP and ranks as the fourth-largest sector of the national economy (Karunarathna & Siriwardana, 2019). The current official measures of construction productivity frequently rely on labour productivity; still, it is becoming increasingly evident that such incomplete measures may be deceptive because the output change is frequently caused by changes in all inputs rather than a single input (Navaratna & Jayawardane, 2007). However, the construction industry is currently having trouble maintaining its production due to the COVID-19 pandemic effects (Niroshana et al., 2022). Tools have been developed in practise to gauge the severity of the impact that project-level factors have on the productivity of the construction industry. Such tools can pinpoint the variables that need more attention to boost project productivity (Adi & Kasih, 2019).

2.4. Factors affecting construction productivity

Many researchers have investigated the factors influencing productivity (Ghoddousi & Hosseini, 2012). These

Table 1. *Factors affecting construction productivity.*

Productivity Factors	Romania	Brazil	Egypt	India	Indonesia	Iran	Jordan	Kuwait	Malaysia	Nigeria	Oman	Pakistan	Palestine	Saudi Arabia	Thailand	Trinidad and Tobago	Uganda	Zimbabwe
	A & B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Absenteeism and Interference					•					•					•			
Access Control		•																
Clarity of Technical Specifications								•			•							
Communication and Coordination between Construction Parties							•	•						•		•		
Consumption Reduction	•																	
Delay Drawings				•											•			•
Delay in Material Supply			•	•														
Delay Responses to the Clarifications											•							
Increasing Costs	•																	
Equipment Breakdowns						•												
Equipment Shortages			•		•	•			•	•			•		•			
Errors and Omissions of Designs											•							
Excessive Workload												•						
Financial Incentives							•											
Funding Problems	•																	
Incentive Programmes																		
Labour Disciplines	•																	
Labour Motivation										•			•					
Labour Shortages	•																	
Labour Skills																	•	
Labour Supervision								•			•					•		
Lack of Manpower																	•	
Low Salaries												•						
Material Shortages	•		•	•	•	•			•	•					•			•
Management of Work	•																	
Payment Delays	•		•						•					•		•		•
Political Situation													•					
Poor Construction Methods									•									
Poor Relationships among Labours												•		•				
Project Delays		•																
Revisions of Drawings and Schedules				•		•						•		•				•
Rework					•				•	•								
Site Management													•					
Strikes				•														•
Subcontractor Works								•										
Suitability/Adequacy of Plant and Equipment																	•	
Supervision Delays										•					•		•	
Supervisory Incompetence																•	•	
Supply Chain Problems	•																	
Variations								•			•							
Weather and Site Conditions						•												
Work Experience							•					•	•	•				
Work Suspension for the Long Run		•																
Unrealistic Scheduling and Expectation of Labour Performance																•		

A - Leontie et al., 2022; B - Iqbal et al., 2021; C- Alsamarraie and Ghazali, 2021; D - Gerges et al., 2016; E - Thomas and Sudhakumar, 2014; F - Kaming et al., 1997; G - Zakeri et al., 1996; H - Hiyassat et al., 2016; I - Jarkas and Bitar, 2012; J - Abdul Kadir et al., 2005; K - Olomolaiye et al., 1987; L - Jarkas et al., 2015; M - Tahir et al., 2015; N - Mahamid, 2013; O - Mahamid et al., 2013, P - Makulsawatudom et al., 2004; Q - Hickson and Ellis, 2014; R - Alinaitwe et al., 2007; S - Chigara and Moyo, 2014

productivity-affecting elements vary from project to project, especially from country to country, and even within the same project under various conditions (Jayawardane et al., 1998). Table 1 lists factors that affect construction productivity in different countries as identified by past researchers. The factors were discovered concerning general construction productivity.

Most authors have emphasised that the most important factors affecting construction productivity are payment delays and shortages of materials and equipment. Factors such as communication and coordination between construction parties, revisions of drawings and schedules, work experience, and labour supervision can also be highlighted as important factors affecting construction productivity. In addition, studies have since been performed to determine the mitigation techniques that will enhance the positively impacting factors while lowering the negatively impacting ones.

Table 2. *Mitigation techniques to control construction productivity during the Covid-19 period.*

No.	Mitigation Technique	A	B	C	D	E	F	G
1	Administrative action and policies			●			●	
2	Alternatives for offsite works and virtual					●		
3	Creates opportunities for contractors	●						
4	Daily Attendance Log		●					
5	Emergency Loans		●					
6	Encouraging risk assessment and collaboration					●		
7	Engineering controls			●				
8	Environmental Controls		●		●			
9	EOT Claims	●			●			
10	Fast-track medical transportation					●		
11	Job opportunities for skilled workers					●		
12	Lower Overhead costs				●			
13	Material Planning					●		
14	Monitoring through advanced technology			●				
15	New health guidelines and mandatory vaccination		●		●		●	●
16	Participants limiting/reduction of meetings							●
17	Personal Protective Equipment		●	●	●	●	●	
18	Provide financial aids	●	●			●		
19	Providing on-site accommodation			●	●			
20	Sanitation and hygiene			●	●			
21	Scheduling and planning of work			●	●	●		
22	Site logistics and control			●				
23	Social Distance		●	●				●
24	Splitting in working shifts to reduce contact							●
25	Switching real environment to a virtual one							●
26	Work as groups						●	●

A - King et al., 2021; B - Alsamarraie and Ghazali, 2021; C - Iqbal et al., 2021; D - Hassan, 2020; E - Parameswaran and Ranadewa, 2022; F - Dan-Jumbo, 2021; G - Leontie et al., 2022

2.5. Mitigation techniques used to reduce the pandemic impact on productivity fluctuation in the construction industry

Regardless of the circumstances, technological solutions ensure that contractors function as effectively as possible to tackle the COVID-19 pandemic situation in the construction industry (Alsamarraie & Grazali, 2021). Crisis management frameworks played a vital role, and they have potential impacts on controlling construction productivity during the COVID-19 period (Iqbal et al., 2021). On the other hand, intelligent software can provide mitigation techniques for COVID-19 to planning, ordering, and bidding processes by analysing the data that is now accessible to determine where, when, or how tasks are completed and the expenses involved (Alsamarraie & Grazali, 2021). Table 2 illustrates some mitigation techniques to control construction productivity during the COVID-19 period identified by the previous studies.

Table 2 denotes that new health guidelines, mandatory vaccinations, and personal protective equipment are the most frequent mitigation techniques identified in the previous studies. In addition to that, providing financial aid, rescheduling and planning, and social distancing can be highlighted as some standard techniques to prevent construction productivity during the COVID-19 pandemic.

2.6 The necessity for investigating the effect of COVID-19 on the productivity of construction projects in Sri Lanka

The construction industry is one of the most highlighted industries contributing to socioeconomic growth, especially in developing countries (Cherian, 2020). The Sri Lankan economy also heavily depends on the construction sector (Jayalath & Gunawardhana, 2017). When the island's ethnic strife ended in 2009, revitalising economic activity and leading to a

boom in infrastructure and building construction, significant development initiatives were anticipated in other areas of the country (ICRA, 2011). However, the COVID-19 epidemic, which posed many difficulties for many organisations and businesses functioning globally, including the construction industry, altered the expansion of the construction industry.

The construction industry faced a vast disruption due to the COVID-19 pandemic (Pathirana, 2020). According to Rio-Chanona et al. (2020), six weeks of social isolation caused a 5.6% decline in GDP. The working environment has undergone a radical change, and workers' worries about the economy, their psychological and physical well-being, their loneliness, and the difficulties of working securely and remotely have been voiced (Padimukkala et al., 2021). According to PricewaterhouseCoopers (PwC) Sri Lanka (2020), with this uncertain nature surrounding the crisis, the survival of industries is unprecedented due to the cash pressures, supply chain and workflow disruptions, and long-term consequences of the economy.

Sri Lanka's construction industry was also severely affected by the COVID-19 pandemic. After the Easter Sunday attack, the Central Bank of Sri Lanka anticipated economic growth of 4.5% to 5% but now expects only 2.2% due to the COVID-19 pandemic's effects (Central Bank of Sri Lanka, 2021).

Most academics were seeking answers to address these problems in construction productivity due to the productivity recession in the construction industry. Numerous studies examined what factors impacted construction output before the epidemic (Chigara & Moyo, 2014; Gerges et al., 2016; Thomas & Sudhakumar, 2014). On the other hand, numerous research initiatives have been launched globally to examine construction production during the COVID-19 epidemic period. Nonetheless, the amount of study being done on the COVID-19 pandemic in developing countries is rather modest. Confirming the aforementioned remark, these estimations of the pandemic's effects on the construction sector are incredibly low given the Sri Lankan setting. While some studies have looked at the effects of the COVID-19 pandemic in relation to the Sri Lankan construction industry, the majority of them have skipped looking at mitigation measures in conjunction with productivity-related factors, particularly skipping over the analysis of productivity fluctuation patterns throughout the COVID-19 outbreak. The current study highlights this crucial gap in the literature that exists in this area of inquiry. Therefore, this research is necessary to increase construction production while dealing with the repercussions of the COVID-19 epidemic, especially in the context of Sri Lanka.

On the other hand, the pandemic effects will persist for decades (Bandara et al., 2020). Therefore, Sri Lankan construction companies must select the best tactics to adopt inside their projects to increase construction productivity as the nation transitions to a post-pandemic age (Ranasinghe & Pathirana, 2021). More research initiatives are needed to support and strengthen these operations. Therefore, this research aims to investigate how to manage the productivity fluctuations in Sri Lankan construction projects that occurred during the COVID-19

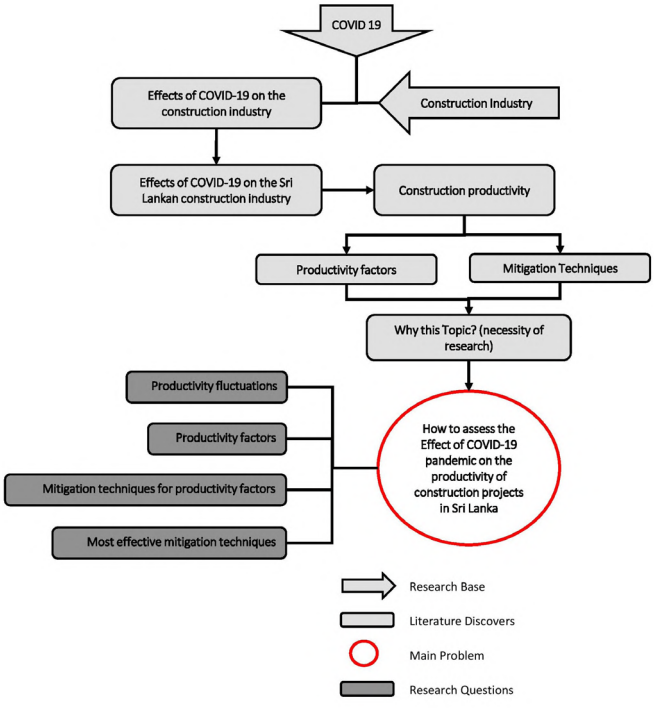


Figure 1. *Theoretical framework of the study.*

Table 3. *Summary of the Delphi Rounds.*

Delphi Round	Phase	Objective	Technique
Delphi Round I	Phase I	Identify the time frame to tank the labour, capital, and material production	Average Acceptance Rate
	Phase II	Validate the factors affecting construction productivity in relation to the pandemic period and identify new factors that had affected construction productivity during the Covid-19 outbreak	Average Acceptance Rate
Delphi Round II	Phase I	Rank the labour, capital, and material production levels relative to predetermined time frames in the pandemic period	Mean Rate
	Phase II	Rank the factors to identify the most significant productivity factors during the Covid-19 pandemic	Mean Rate
	Phase III	Validate the mitigation techniques to reduce the impact of the Covid-19 pandemic and identify new strategies that can enhance or control productivity during the Covid-19 outbreak	Average Acceptance Rate
Delphi Round III	Phase I	Find the most suitable mitigation techniques for each most significant productivity factor	Mean Rate
	Phase II	Rank the mitigation techniques to identify the most effective mitigation techniques to increase productivity during the Covid-19 period	Mean Rate

period, which is a significant need to face future similar challenges as well.

2.7. Theoretical framework

The four initial research questions have been clarified by the theoretical framework presented below, which provides a methodical roadmap for defining the research main problems. The research focuses on the COVID-19 epidemic and the construction industry. Based on that, the literature review discussed the study's backdrop through six subtopics to connect the research's main problem with its four research questions. Please refer to Figure 1 for a visual reference.

3. Methodology

3.1. Quantitative approach

This research looks into questions to make inferences or come to conclusions by carefully gathering data, ranking and analysing it, and discussing the findings. Therefore, this study adopts a quantitative approach as the investigation method. This approach collects data in numerical form and analyses it using mathematical techniques, particularly statistics, to explain an issue or phenomenon (Apuke, 2017). Additionally, it involves various data types that must be gathered to support data analysis. Hence, the quantitative technique is the most suitable approach to collecting more than one type of data to create a better and more comprehensive picture of what is happening in the field (Elkatawneh, 2016). Further, questionnaire surveys can help acquire quantitative data because the study questions require the most important and effective components by ranking them (Bacon-Shone, 2022). When using the Delphi technique, the questionnaire is created similarly to the traditional survey approach, with the researcher selecting a group of qualified experts (Crawford & Wright, 2016).

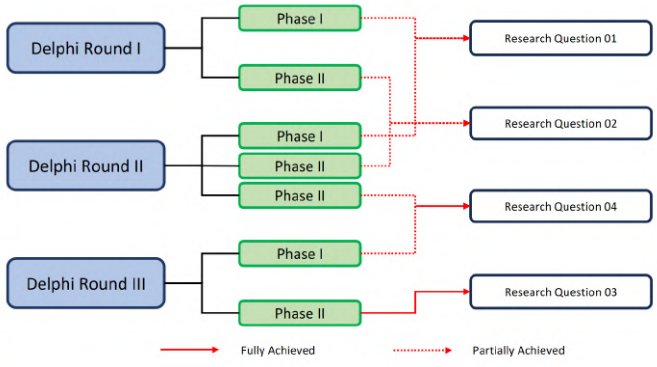


Figure 2. *Research process.*

3.2. Delphi technique

The Delphi approach is functional when group dynamics prevent effective communication and the issue at hand can benefit from collective, subjective evaluations or decisions (Bolger & Wright, 2011). The researcher then creates a second survey based on the results of the first survey and administers it to the same group of respondents. The respondents are asked to examine their initial responses

Table 4. *Respondents' selection criteria.*

Designation	Experience in the Construction Industry	Criteria 1	Criteria 2	Criteria 3	Round I Nos	Round II Nos	Round III Nos
Construction Managers	10 - 20 Years	4	4	4	4	4	4
	More than 20 Years	8	8	8	8	7	7
Contract Administrators	10 - 20 Years	3	3	3	3	3	3
	More than 20 Years	9	9	9	9	9	8
Senior Engineers	10 - 20 Years	7	7	7	7	7	7
	More than 20 Years	4	4	4	4	2	2
Senior Quantity Surveyors	10 - 20 Years	5	5	5	5	5	4
	More than 20 Years	2	2	2	2	2	2
Total					42	39	37

Criteria 1 - Obtained a Bachelor's Degree in Construction Related Subject, Criteria 2 - Obtained a Master's Degree in Construction Related Subject or Obtained Professional Qualification, Criterial 3 - Experience in dealing with construction productivity (More than 5 Years)

and/or provide more information in response to the first survey's respondent suggestions (Amrouche, 2022). Thus, this study used the Delphi technique. Amrouche (2022) stated that the experts remain anonymous to one another while repeating this procedure until reaching a suitable level of agreement. Most research on Delphi in construction engineering and management suggests that consensus occurs in rounds two or three (Ameyaw et al., 2016). Therefore, this study uses three rounds of the Delphi method to derive its conclusions. Table 3 provides a summary of the Delphi Rounds.

Further, based on the methodology previously provided the research procedure for this study can be further defined as follows. It demonstrates how every component of the Delphi round relates to answering the research questions. For more information, please see Figure 2.

3.3. Data analysis technique

3.3.1. Mean rating

The data collected from quantitative approaches can be analysed using statistical methods (Apuke, 2017). Therefore, in this research, the collected data were evaluated using the mean rating (MR), and the elements were ranked based on a 1–5 Likert scale. The MR of each smart city element was calculated using Equation (1), given below.

$$MR = \frac{\sum_{i=1}^{5}(x_i)}{n}$$

Where xi = rate of the responses (Ranging from 1–5) and n = number of responses

3.3.2. Internal consistency

Internal consistency of the responses is one of the major concerns in data collection. Therefore, Cronbach's alpha (Equation 2) value was employed to validate the findings, which is considered a measure of internal consistency (Tavakol & Dennick, 2011). The Cronbach's alpha value should exceed the 0.700 thresholds, and an alpha value closer to one (1) is considered more reliable (Gunduz & Elsherbeny, 2020).

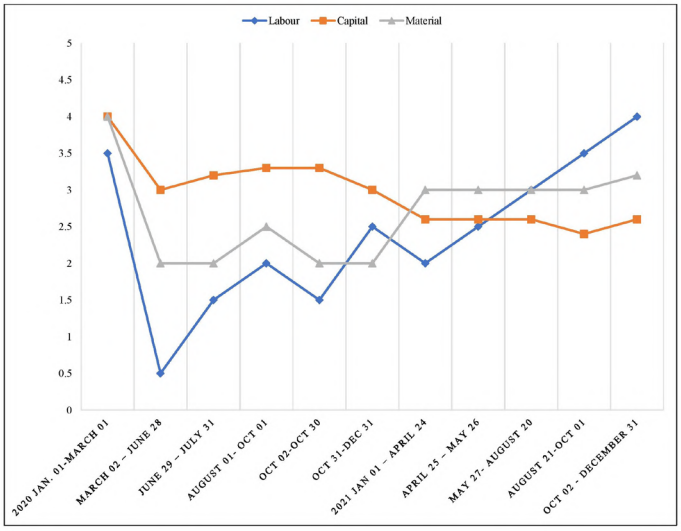
$$\propto = \frac{k}{k-1}\left(1 - \frac{\sum V_i}{V_t}\right)$$

Where k denotes the number of factors, Vi denotes the sum of the risk factor variances, and Vt denotes the variance of the total scores of the Severity Index. The alpha values for the data set were 0.831, 0.845, 0.833, and 0.912, respectively, in phase 1 and phase 2 of rounds two and three. Thus, data sets are considered consistent.

3.4. Expert profiles

Purposive sampling is a technique used by quantitative researchers in which research participants are consciously chosen to test a specific theoretical premise (Agius, 2013). A purposive sample of construction industry professionals with over ten years of expertise was picked for the Delphi rounds, along with three

Figure 3. *Productivity fluctuation during COVID-19 outbreak.*



selection criteria devised to choose the optimal sample for the study. All three requirements must be satisfied to be selected as a respondent for this study. They were contacted via e-mails and phone calls. Similarly, the questionnaires were distributed by hand or e-mail, and the same expert group was considered for all rounds. Table 4 presents the respondent selection criteria. A smaller sample size was used on purpose in this study to maintain the precision and accuracy of the results, adhering to the idea that a well-defined and carefully chosen sample can produce findings with substantial significance despite potential restrictions on statistical generalizability (Lakens, 2022). Furthermore, the senior staff of the construction projects, which includes construction managers, contract administrators, senior engineers, and senior quantity surveyors, is responsible for the management of construction productivity. Therefore, the survey sample size was purposefully limited to a select group of highly experienced senior staff members skilled in coordinating construction production in order to achieve the best productivity results.

4. Findings and analysis

4.1. Fluctuation of productivity during the COVID-19 period (Delphi Round I - Phase I, Delphi Round II - Phase I)

During Phase I of Delphi Round I, the time frame for the rating system was finalised using expert interviews. A 1–5 rating system was used to identify the productivity fluctuations during the COVID-19 period in Phase I of Delphi Round II. Respondents were requested to rank labour productivity, capital productivity, and material productivity. Figure 3 was created using the mean rating for each category to give an idea of the productivity levels and to explain the effect of COVID-19 on construction productivity.

According to the analysis of survey data gathered from respondents, construction project productivity in January 2020 was high, with an average rating of 4 out of 5. However, once the government imposed an island-wide curfew from March 2020 to June 2020, a significant drop in labour productivity (more than 90%) was observed. The output of several initiatives suffered as a result. Although labour produc-

Table 5. *Most significant factors affecting construction productivity during Covid-19 period.*

Rank	Most Significant Factors	Mean Rate	Factor from Literature Review	Research Contributions (identified by Experts)
01	Absenteeism and interference	4.12	•	
02	Safety being prioritised over productivity	4.07		•
03	Workforce reduction due to social distancing protocols	3.98		•
04	Delays in materials supply	3.92	•	
05	Communication and coordination between construction parties	3.78	•	
06	Inspection and permitting delays	3.68		•
07	Cash flow and payment challenges	3.44		•
08	Revisions of Drawings and Schedules	3.25	•	
09	Overwhelming work operation	3.16		•
10	Equipment shortage	3.12	•	

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03	Workforce reduction due to social distancing protocols	3.98		•
04	Delays in materials supply	3.92	•	
05	Communication and coordination between construction parties	3.78	•	
06	Inspection and permitting delays	3.68		•
07	Cash flow and payment challenges	3.44		•
08	Revisions of Drawings and Schedules	3.25	•	
09	Overwhelming work operation	3.16		•
10	Equipment shortage	3.12	•	

tivity slightly increased from June to October and November to December 2020, the second and third waves of the COVID-19 pandemic significantly reduced productivity, with an average rating of 2 out of 5 from October 2020 to April 2021. Furthermore, data analysis showed that public projects in Sri Lanka received the majority of the funds allocated for development projects. The amount of output produced for every dollar spent in capital decreased as a result of delays in funding and allocating funds for new initiatives. Over the whole pandemic period, the productivity decrease that started in the early stages of the outbreak was maintained.

Material productivity data analysis showed a decline from March to October 2020, with an average rating of 2 out of 5. Weather-related material damage and supply chain disruptions were attributed to this reduction. With an average grade of 3 out of 5, material productivity did, however, increase from January to December 2021, showing a stabilisation of the supply chain.

4.2. Most significant factors affecting the productivity fluctuation in Sri Lankan construction projects during the COVID-19 period (Delphi round I - Phase II, Delphi Round II - Phase II)

The literature identified 44 factors, of which 41 had been validated in the second phase of Delphi I. Ten new factors were also added, totalling 51 factors that were carried forward to Delphi round II with the agreement of 75% of respondents (Perera et al., 2023). During Delphi Round II, respondents were asked to rank the factors according to their significance. The elements with a mean rating of over 3.0 were determined to be the most significant in the study after the results were analysed to see how well each component was rated (Hwang et al., 2017; Leontie et al., 2022). As a result, ten factors were identified as significant: five from the literature review and the remaining five from the study findings, which were suggested by respondents and ranked as significant factors. Table 5 highlights the most significant factors that impacted construction productivity during the COVID-19 period in Sri Lanka. Newly identified factors are in italics in Table 5.

The most significant factor impacting the construction industry's productivity during the COVID-19 period has been identified as "absenteeism and interference". The project's progress is significantly obstructed by the construction workers' attendance at the site. However, the pandemic impacts were severely detrimental to worker attendance as a result of workers' reluctance to report to work out of fear of the virus. In addition, factors such as "safety being prioritised over productivity", "workforce reduction due to social distancing protocols", "inspection and permitting delays", "cashflow and payment challenges", and "overwhelming work operations" can be highlighted as new factors derived from the study findings related to the Sri Lankan

Table 6. *Suitable mitigation techniques for each most significant productivity factors.*

No.	Most Significant Productivity Factors	Technique 01	Technique 02	Technique 03	Technique 04
1	Absenteeism and interference	**Work from Home**	Providing on-site accommodation	**Bio Bubble System**	New health guidelines and mandatory vaccination
		MR = 3.27	MR = 3.11	MR = 3.07	MR = 3.03
2	Safety being prioritised over productivity	New health guidelines and mandatory vaccination	Administrative action and policies	Personal Protective Equipment	
		MR = 3.34	MR = 3.01	MR = 3.01	
3	Workforce reduction due to social distancing protocols	New health guidelines and mandatory vaccination	Providing on-site accommodation	**Work from Home**	
		MR = 3.45	MR = 3.23	MR = 3.14	
4	Delays in materials supply	**Use alternative materials**	Material Planning	Monitoring through advanced technology	Monitoring through advanced technology
		MR = 3.78	MR = 3.34	MR = 3.21	MR = 3.14
5	Communication and coordination between construction parties	**Bio Bubble System**	Social Distance	Environmental Controls	
		MR = 3.23	MR = 3.11	MR = 3.07	
6	Inspection and permitting delays	**Use alliterative methods**	Monitoring through advanced technology	Engineering controls	EOT Claims
		MR = 3.15	MR = 3.11	MR = 3.07	R = 3.01
7	Cashflow and payment challenges	Administrative action and policies	EOT Claims		
		MR = 3.41	MR = 3.27		
8	Revisions of Drawings and Schedules	Scheduling and planning of work	Administrative action and policies	Monitoring through advanced technology	
		MR = 3.55	MR = 3.34	MR = 3.21	
9	Overwhelming work operation	Providing on-site accommodation	**Bio Bubble System**	Social Distance	
		MR = 3.21	MR = 3.19	MR = 3.15	
10	Equipment shortage	Engineering controls	Emergency Loans	**Use alliterative methods**	
		MR = 3.19	MR = 3.06	MR = 3.01	

constriction industry. The remaining elements, including "delays in material supply", "communication and coordination between construction parties", "revisions of drawings and schedules", and "equipment shortages", may together have an adverse effect on construction productivity, leading to delays, higher costs, and other problems that adversely affect the construction process. Therefore, effective management of these factors is vital to ensure the smooth and efficient operation of construction projects, which leads to higher productivity.

4.3. Suitable mitigation techniques used to reduce the pandemic impact on productivity fluctuation in the Construction Industry (Delphi Round I – Phase III, Delphi Round III – Phase I)

Phase II of Delphi Round II discovered 33 mitigation techniques (26 from the literature and six new techniques identified by the experts) with a 75% response rate and advanced them to Round III. During Delphi Round III, respondents were asked to identify the mitigation techniques for each most significant productivity factor. The techniques with a mean rating of more than 3.0 were determined to be the most suitable mitigation techniques for each most significant factor. Table 6 shows suitable mitigation techniques for each most significant productivity factor. The table below features some mitigation techniques that are fresh additions from this study

Table 7. *Most effective mitigation techniques of the study.*

Rank	Most Effective Mitigation Techniques	MR Score
1	New health guidelines and mandatory vaccination	4.01
2	Providing on-site accommodation	3.89
3	EOT Claims	3.87
4	**Bio-Bubble System**	3.65
5	**Work from Home Concept**	3.54
6	Monitoring through advanced technology	3.40
7	Administrative action and policies	3.25
8	Social Distance	3.11

and are denoted in bold. The experts recognised these and chose them as appropriate strategies for some of the important aspects.

Out of 33 mitigation techniques, 15 were selected to manage construction productivity during the COVID-19 outbreak in the Sri Lankan context. "New health guidelines and mandatory vaccination", "monitoring through advanced technology", "administrative action and policies", and "the Bio Bubble System" were the most frequently used mitigation techniques presented in the table. Those techniques can mitigate the three or more most significant factors affecting construction productivity. In addition, some techniques can be used to mitigate two other productivity factors. However, techniques such as "emergency loans", "environmental controls", "EOT claims", "material planning and scheduling", and "work planning" can be considered unique techniques in this context because they can only be used to mitigate one productivity factor in the study.

4.4. Most effective mitigation techniques used to reduce the impact of the pandemic on productivity fluctuation in the Sri Lankan Construction Industry (Delphi Round II – Phase III, Delphi Round III – Phase I and II)

After identifying mitigation techniques for each of the most significant factors affecting construction productivity, the selected techniques were further ranked based on their effectiveness to identify the most effective mitigation techniques for the Sri Lankan context. Thus, respondents were asked to rank the mitigating techniques according to their effectiveness in the Sri Lankan context. Techniques with an MR score above three (3) are considered the most effective techniques for this study. Accordingly, as illustrated below, eight techniques were chosen as the most effective mitigation techniques for the Sri Lankan context. Newly discovered mitigating strategies are highlighted in bold.

Based on the table outcomes, "new health guidelines and mandatory vaccination" can be considered the most effective mitigation technique that can enhance productivity during the COVID-19 outbreak. Further, "providing on-site accommodation" and "EOT claims" has a similarly significant impact on increasing construction productivity during the COVID-19 outbreak. Maintaining "social distance" is the last and most important mitigation action used throughout the epidemic, as it significantly slows virus spread. However, maintaining social distance can be difficult when working on a construction site because worker interconnectedness is hard to control. Therefore, social isolation works with bio-bubble systems to improve adaptation and efficiency.

5. Discussion

The study results identified ten factors significantly affecting construction production during the COVID-19 outbreak. It can also be deduced that these particular factors are of the utmost importance based on their perspectives given the scope of the study, which primarily centres on productivity factors examined from the perspective of project productivity governance (involving construction and contract managers, senior engineers, and quantity surveyors). One of these, "absenteeism and interference", has been identified as having the greatest potential impact on the construction industry's productivity. The COVID-19 pandemic significantly disrupted and interfered with the Sri

Lankan construction industry because the bulk of the sites had to close as a result of the disease's rapid spread (Bandara et al., 2020). This factor was also noted during the literature assessment of various countries. Specifically, this factor significantly affected labour productivity in the Nigerian construction sector during the 20th century (Olomolaiye et al., 1987). However, in the contemporary building sector, Asian countries like Thailand have also elevated that as a productivity factor in their studies (Makulsawatudom et al., 2004). Additionally, the two most commonly observed factors throughout the COVID-19 period are "delays in material supply" and "equipment shortages". It's also vital to remember that the majority of material and equipment shortages were brought on by unstable market prices. Due to a lack of supply, those costs were also rising rapidly day by day. For instance, the unit cost of sand (price per 100 cubic feet) climbed by over 8,000 LKR to approximately 22,000 LKR within the past two years (Nilar, 2022). However, before the emergence of the COVID-19 epidemic, these factors had a significant impact on the construction output in several countries, such as Egypt, India, and Zimbabwe (Chigara & Moyo, 2014; Gerges et al., 2016; Thomas & Sudhakumar, 2014). However, since it is essential for planning and procurement throughout all construction activities, it is possible to say that "coordination and communication between parties" is a factor that extends beyond the COVID-19 outbreak. Numerous studies have identified this factor as a productivity indicator for the entire construction industry in different countries during the past two decades (Hiyassat et al., 2016; Jarkas & Bitar, 2012; Mahamid et al., 2013). The study concluded with five additional factors that were previously not identified as influencing productivity during the COVID-19 outbreak in the construction industry.

Over the past few years, numerous studies have developed methods to reduce the COVID-19 epidemic's impact on global construction output. Despite these various investigations, the circumstances in Sri Lanka are quite different. Alsamarraie and Grazali (2021) conducted a study and concluded that there were six mitigating strategies to deal with the effects of COVID-19 in the construction sector. The above study and this research have shown that using social distance, bio-bubble systems, and offering accommodations on the construction site significantly affect construction productivity. These strategies were also derived from this study since the biobubble system and accommodation provision on construction sites were among the techniques most frequently employed by Sri Lankan construction workers during the COVID-19 outbreak. Further, Alsamarraie and Grazali (2021) and this study have further emphasised the need for vaccines. With the introduction of vaccinations, this preventative measure could become an essential requirement for every person in Sri Lanka, resulting in a mandate for all construction sector workers to receive a vaccination prior to beginning work, significantly lessening the impact of the COVID-19 pandemic on the construction industry (Ranasinghe & Pathirana, 2021). Although only a few of these strategies are in line with the results of this study, the majority of them contradict them. King et al. (2021) provided a list of mitigation strategies to deal with construction industry productivity during the pandemic period. Here, methods have been developed in many categories, including legal, financial, production, and environmental. The authors have, however, highlighted the ongoing supply and the avoidance of labour shortages as a mitigation strategy in the production category—in this study, it came from the other components, too. For instance, offering onsite accommodations and bio-bubble systems can help reduce the labour shortage. Additionally, a continuous material supply may be guaranteed by adopting alternative resources. Therefore, the findings of King et al. (2021) align to some extent with this study, which is based on the Sri Lankan context. Iqbal et al. (2021) have stated that mitigation strategies such as physical distancing, a one-worker, one-task policy, monitoring through advanced

technology, scheduling, and site logistics and control can overcome issues in construction productivity during the COVID-19 pandemic. However, the effects of these strategies may differ depending on the Sri Lankan setting. For instance, the Sri Lankan construction industry employs a novel and uncommon approach to monitoring construction activity with advanced technology. The one-worker, one-task concept and the ideas of a bio-bubble and social distancing are identical. Though the overall outcome differs in the study of Iqbal et al. (2021), the two studies are equivalent to a certain extent. However, considering that the general components of project productivity are largely controlled by seasoned and experienced experts within the construction industry, the mitigation measures used in this study are primarily centred around project productivity governance.

Further, the effects of the COVID-19 epidemic have also been closely examined in a variety of international contexts (Şeker, 2022). However, depending on specific regional and demographic characteristics, the consequences of these studies can vary significantly (Khan et al., 2021). As a result, the focus of this study was limited to the Sri Lankan setting due to the fact that developing countries like Sri Lanka have been severely impacted by the COVID-19 pandemic and are currently working to establish effective responses. Also noteworthy is the thorough examination of productivity aspects from the perspective of the entire project, which included project productivity as a whole rather than isolating it into distinct categories like labour or party productivity.

6. Conclusion and recommendations

The COVID-19 effects during the previous two years have severely reduced the contributions of the construction industry to an expanding economy. Due to these combined effects, productivity in the construction industry as a whole has significantly decreased. As a result, one of the crucial challenges in the economic recovery of Sri Lanka is to examine the effect of COVID-19 on the productivity of construction projects.

The present analysis identified ten factors as having an impact on construction productivity during the COVID-19 pandemic period. Absenteeism and interference were the top factors that impacted construction production during the epidemic. Additionally, safety being prioritised over productivity, workforce reduction due to social distance protocols, inspection and permit delays, cashflow and payment challenges, and overwhelming work operations can be highlighted as highly distinctive factors derived from this study related to the Sri Lankan context. The study also identified a set of mitigation techniques to deal with production challenges in the construction industry during an epidemic. Among them, eight techniques were highlighted as the most effective mitigation techniques in the Sri Lankan context. The main priorities were the EOT claims, establishing health guidelines, and providing on-site accommodation.

Ultimately, the study contributes to the industry by finding the factors affecting construction productivity and mitigation techniques to overcome the issues in productivity and thereby enhance the quality of the construction industry. Overall, this study gives important new insights into the difficulties that pandemic construction productivity encounters, as well as workable answers to these difficulties. It will serve as a crucial reference for construction experts and decision-makers in order to navigate and reduce the difficulties of the upcoming pandemic or other disruptions.

On the other hand, it is worth evaluating how the COVID-19 outbreak would affect the construction sector in modern society. Other countries have already conducted numerous research projects connected to this topic, though Sri Lankan research incentives are drastically insufficient to address this issue in the future. Therefore, this study can contribute to the theory by examining the impact of COVID-19 on construction productivity. The ultimate conclusions, however, can vary among nations. Therefore, the final findings apply to countries with a sim-

ilar setting to the Sri Lankan context. This study can also benchmark further research in a different context.

References

Abdul-Kadir, M. R., Lee, W. P., Jaafar, M. S., Sapuan, S. M., & Ali, A. A. (2005). Factors affecting construction labour productivity for Malaysian residential projects. *Structural Survey*, *23*(1), 42–54. http://dx.doi.org/10.1108/02630800510586907

Abeysinghe, N., & Jayathilaka, R. (2022). Factors influencing the timely completion of construction projects in Sri Lanka. *PLoS ONE*, *17*(12). https://doi.org/10.1371/journal.pone.0278318

Adi, T., & Kasih, R. (2019). Construction project productivity assessment model and its implementation in Indonesia construction industry. *Proceedings of MATEC Web of Conferences*, 258. https://doi.org/10.1051/matecconf/201925802026

Agius, S. (2013). Qualitative research: Its value and applicability. *The Psychiatrist*, *37*, 204-206. http://dx.doi.org/10.1192/pb.bp.113.042770

Alinaitwe, H. M., Mwakali, J. A., & Hansson, B. (2007). Factors affecting the productivity of building craftsmen-studies of Uganda. *Journal of Civil Engineering and Management*, *13*(3), 169–176. https://doi.org/10.1080/13923730.2007.9636434

Alsamarraie, M., & Grazali, F. (2021). The impact of COVID-19 and control strategies adoption in the construction sector. *Annals of the Romanian Society for Cell Biology*, *25*(6), 19524-19531. https://www.annalsofrscb.ro/index.php/journal/article/view/9783

Alsharef, A., Banerjee, S., Uddin, S., Albert, A., & Jaselskis, E. (2021). Early impacts of the COVID-19 pandemic on the United States construction industry. *International Journal of Environmental Research and Public Health*, *18*(4), 1-21. https://doi.org/10.3390/ijerph18041559

Ameyaw, E. E., Hu, Y., Shan, M., Chan, A. P. C., & Le, Y. (2016). Application of Delphi method in construction engineering and management research: A quantitative perspective. *Journal of Civil Engineering and Management*, *22*(8), 991–1000. https://doi.org/10.3846/13923730.2014.945953

Amrouche, T. (2022). Delphi technique between the easy theoretic and the difficulty application in scientific research and future studies. *Technium Social Sciences Journal*, *37*(1), 749–759. https://doi.org/10.47577/tssj.v37i1.7603

Apuke, O. (2017). Quantitative research methods: A synopsis approach. *Arabian Journal of Business and Management Review (Kuwait Chapter), 7*, 40-47. Retrieved from http://dx.doi.org/10.12816/0040336

Athias, D., Bubbico, A., Daniels, L., Kidd, S., Peebles-Brown, A., & Tran, A. (2020). *Tackling the COVID-19 economic crisis in Sri Lanka: Providing universal, lifecycle social protection transfers to protect lives and bolster economic recovery*, Colombo: United Nations Sri Lanka.

Bacon-Shone, J. (2022). Introduction to quantitative research methods. https://edshare.gcu.ac.uk/9449/

Bailey, J., Bouchardie, N., & Madalena, I. (2020, April 14). *COVID-19: The current impact on construction and engineering projects.* White & Case LLP 1996- 2024. http://www.whitecase.com/publications/alert/covid-19-current-impact-construction-engineering-projects.

Bandara, K. P. S. K., Jayasooriya, S., & Vithana, N. I. (2020). Impact of Covid -19 Pandemic to Construction Industry in Sri Lanka. International Research Conference 2020 – KDU. Colombo, Sri lanka.

Bolger, F., & Wright, G. (2011). Improving the Delphi process: Lessons from social psychological research. *Technological Forecasting and Social Change*, *78*, 1500–1513. https://doi.org/10.1016/j.techfore.2011.07.007

Boone, L., Haugh, D., Pain, N., & Salins, V. (2020). Tackling the fallout from COVID-19. *In Economics in the Time of COVID-19*, 37-44, London: Centre for Economic Policy Research Press.

Bsisu, K. (2020). The impact of COVID-19 pandemic on Jordanian civil engineers and construction industry. *International Journal of Engineering Research and Technology*, *13*(5), 828-830. http://dx.doi.org/10.37624/IJERT/13.5.2020.828-830

Central Bank of Sri Lanka. (2021).

The financial system stability review – 2020. Colombo: Central Bank of Sri Lanka.

Chakraborty, I., & Maity, P. (2020). COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment*, *728*, https://doi.org/10.1016/j.scitotenv.2020.138882

Cherian, A. (2020). The construction industry in the perspective of an economic boost of the United Arab Emirates (UAE). *International Journal of Engineering and Technology*, *7*, 270-276.

Chigara, B., & Moyo, T. (2014). Factors affecting labor productivity on building projects in Zimbabwe. *International Journal of Architecture, Engineering and Construction*, *3*(1), 57–65. http://dx.doi.org/10.7492/IJAEC.2014.005

Chopra, R. (2020). Battling the coronavirus crisis: A case of India's real estate sector. *UGC CARE Journal*, *1*(4), 1133-1147.

Crawford, M., & Wright, G. (2016). Delphi Method. *Statistics Reference Online*, 1-6. http://dx.doi.org/10.1002/9781118445112.stat07879

Dan-Jumbo, N. (2021). COVID-19 associated risks and mitigation strategies relevant for the UK construction industry. *Academia Letters*, *6*(1), 13-20. https://doi.org/10.20935/AL1485

De Silva, P. H. R. (2023, July 24). *Global economic crisis and implications for Sri Lanka's construction industry*. ft.lk. https://www.ft.lk/columns/Global-economic-crisis-and-implications-for-Sri-Lanka-s-construction-industry/4-750925.

El-Erian, M. (2020, March 17). *The coming coronavirus recession and the uncharted territory beyond*. Foreign Affairs. https://www.foreignaffairs.com/world/coming-coronavirus-recession.

Elkatawneh, H. (2016). Comparing qualitative and quantitative approaches. *SSRN Electronic Journal*. Retrieved from https://dx.doi.org/10.2139/ssrn.2742779

Faculty of Humanities and Social Sciences. (2020). *COVID-19: The socio-economic impact on Sri Lanka-Part-1: The economic impact of the COVID-19 pandemic in Sri Lanka*. Matara: University of Ruhuna.

Gamil, Y., & Alhagar, A. (2020). The impact of pandemic crisis on the survival of construction industry: A case of COVID-19. *Mediterranean Journal of Social Sciences*, *11*(3), 122-128. https://doi.org/10.36941/mjss-2020-0047

Gerges, M., Ahiakwo, O., Aziz, R., Kapogiannis, G., Saidani, M., & Saraireh, D. (2016). Investigating and ranking labour productivity factors in the Egyptian construction industry. *International Journal of Architecture, Engineering and Construction*, *5*(1), 44–52. http://dx.doi.org/10.7492/IJAEC.2016.005

Ghoddousi, P., & Hosseini, M. (2012). A survey of the factors affecting the productivity of construction projects in Iran. *Technology in Society*, *34*(1-2), 99-116. http://dx.doi.org/10.3846/20294913.2012.661203

Grime, M. M., & Wright, G. (2016). Delphi method. *In Wiley StatsRef: Statistics Reference Online*, Glasgow: Wiley. https://doi.org/10.1002/9781118445112.stat07879

Gunduz, M., & Elsherbeny, H. (2021). Critical assessment of contract administration using multidimensional fuzzy logic approach. *Journal of Construction Engineering and Management*, *147*.

Hicksona, B. G., & Elli, L. A. (2014). Factors affecting construction labour productivity in Trinidad and Tobago. *Journal of Association of Professional Engineers, Trinidad and Tobago*, *42*(1), 4–11.

Hiyassat, M. A., Hiyari, M. A., & Sweis, G. J. (2016). Factors affecting construction labour productivity: a case study of Jordan. *International Journal of Construction Management*, *16*(2), 138–149. https://doi.org/10.1080/15623599.2016.1142266

Hwang, Y.S., Bartlett, B., Greben, M., & Hand, K. (2017). A systematic review of mindfulness interventions for in-service teachers: a tool to enhance teacher wellbeing and performance. *Teaching and Teacher Education*, *64*, 26–42. http://dx.doi.org/10.1016/j.tate.2017.01.015

ICRA & IMaCS. (2011), *Industry Report on Sri Lanka: Construction Industry in Sri Lanka*. http://www.icralanka.com

Iqbal, M., Ahmad, N., Waquas, M.

& Abrar, M. (2021). COVID-19 pandemic and construction industry: Impacts, emerging construction safety practices, and proposed crisis management framework. *Brazilian Journal of Operations and Production Management*, *18*(2), 1–17. https://doi.org/10.14488/BJOPM.2021.034

Jarkas, A. M., Al Balushi, R. A., & Raveendranath, P. K. (2015). Determinants of construction labour productivity in Oman. *International Journal of Construction Management*, *15*(4), 332–344. https://doi.org/10.1080/15623599.2015.1094849

Jarkas, A. M., & Bitar, C. G. (2012). Factors affecting construction labour productivity in Kuwait. *Journal of Construction Engineering and Management*, *138*(7), 811–820. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0000501

Jayalath, A., & Gunawardhana, T. (2017). towards sustainable constructions: Trends in Sri Lankan construction ındustry-a review. *International Conference on Real Estate Management and Valuation (ICREMV- 2017)*, Hilton Residences, Colombo-Sri Lanka

Jayawardane, A. K., Harris, F. C. & Olomolaiye, P. O. (1998). *Construction productivity management.* Longman.

Kaming, P. F., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1997). Factors influencing craftsmen's productivity in Indonesia. *International Journal of Project Management*, *15*(1), 21–30. https://doi.org/10.1016/S0263-7863(96)00019-1

Karunarathna, N., & Siriwardana, C. (2019). Productivity and performance threats for local construction companies in Sri Lanka. *International Conference on Structural and Construction Management 2019*, Earl's Regency Hotel Kandy, Sri Lanka

Kawmudi, W. N., Jayasooriya, S. D., Rupasinghe, A. R., & Ariyarathna, K. C. (2021). Identification of the challenges ımposed by COVID-19 pandemic on Sri Lankan construction projects. *General Sir John Kotelawala Defense University*, *1*(1), 1–8. http://ir.kdu.ac.lk/handle/345/3247

Khan, W., Hussain, A., Khan, S. A., Al-Jumailey, M., Nawaz, R., Liatsis, P. (2021). Analysing the impact of global demographic characteristics over the COVID-19 spread using class rule mining and pattern matching. *Royal Society Open Science*. *08*(1), 01-19. https://doi.org/10.1098/rsos.201823.

King, S., Rahman, R., Fauzi, M., & Haron, A. (2021). Mechanisms for addressing the impact of COVID-19 on infrastructure projects. *IOP Conference Series: Earth and Environmental Science*. https://doi.org/10.1088/1755-1315/682/1/012047

Kramer, A., & Kramer, K. (2020). The potential impact of the COVID-19 pandemic on occupational status, work from home, and occupational mobility. *Journal of Vocational Behavior*, *1*(4). https://doi.org/10.1016/j.jvb.2020.103442

Lakens, D (2022). Sample Size Justification. Collabra. *Psychology*, *8*(1): 33267. https://doi.org/10.1525/collabra.33267

Leontie, V., Maha, L., & Stoian, I. (2022). COVID-19 pandemic and ıts effects on the usage of ınformation technologies in the construction ındustry: the case Romania. *Buildings*, *12*(1), 166. https://doi.org/10.3390/buildings12020166

Mahamid, I. (2013). Principal factors impacting labour productivity of public construction projects in Palestine: contractors' perspective. *International Journal of Architecture, Engineering and Construction*, *2*(3), 194–202. http://dx.doi.org/http://dx.doi.org/10.7492/IJAEC.2013.018

Mahamid, I. A., Al-Ghonamy, A., & Aichouni, M. (2013). Major factors influencing employee productivity in the KSA public construction projects. *International Journal of Civil and Environmental Engineering*, *14*(1), 16–20.

Makulsawatudom, A., Emsley, M., & Sinthawanarong, K. (2004). Critical factors influencing construction productivity in Thailand. *Journal of King Mongkut's University of Technology North Bangkok*, *14*(3), 1–6.

Manoharan, K., Dissanayake, P., Pathirana, C., Deegahawature, D., & Silva, R. (2022). Labour-related factors affecting construction productivity in Sri Lankan building projects: perspectives of engineers and managers. *Frontiers in Engineering and Built Environment*, *2*(4), 218-232. https://doi.org/10.1108/FEBE-03-2022-0009

Navaratna, D., & Jayawardane, A. (2007). Total factor productivity in the building construction ındustry in Sri Lanka. *The Engineer: Journal of the Institution of Engineers, Sri Lanka*, *40*, 15-24. http://doi.org/10.4038/engineer.v40i1.7129

Nilar, A., (2022, April 23). *75% of country's construction at a standstill: National Construction Association.* NewsFirstLK. https://www.newsfirst.lk/2022/04/23/75-of-countrys-construction-at-a-standstill-national-construction-association/

Niroshana, N., Siriwardana, C., & Jayasekara, R. (2022). The impact of COVID-19 on the construction industry and lessons learned: a case of Sri Lanka. *International Journal of Construction Management*, *22*(1), 1-11. https://doi.org/10.1080/15623599.2022.2076016

Olomolaiye, P. O., Wahab, K. A., & Price, A. D. F. (1987). Problems influencing craftsmen's productivity in Nigeria. *Building and Environment*, *22*(4), 317–332. https://doi.org/10.1016/0360-1323(87)90024-2

Padimukkala, A., Kermanshachi, S., & Jahan-Nipa, T. (2021). Impacts of COVID-19 on health and safety of workforce in construction ındustry. *Engineering*, *19*, 418-430. https://doi/10.1061/9780784483541.039

Parameswaran, A., & Ranadewa, K. (2022). Construction industry on the brink: The COVID-19 impact. In Y. S. Gunatilake, and K. A. Waidyasekara (Eds.), *Proceedings of the 10th World Construction Symposium*, Sri Lanka: CIOB, 220-235. http://dx.doi.org/10.31705/WCS.2022.19

Pathirana, L. (2020). Effect of COVID-19 and strategic response: A review on Sri Lankan construction industry. SSRG *International Journal of Economics and Management Studies*, *7*(1), 1-10. https://doi.org/10.14445/23939125/IJEMS-V7I6P110

Perera, H.P., Perera, B.A.K.S., & Palihakkara, A.D. (2023). Financial and economic risk management in coastal land reclamation projects. *Construction Innovation*, *23*(4), 878-897. https://doi.org/10.1108/CI-12-2021-0238

PwC Sri Lanka. (2020, May 26). *COVID-19: Real estate and construction. PwC Sri Lanka*. PwC. https://www.pwc.com/lk/en/assets/covid19/How-will-COVID-19-affect-the-Future-of-Real-Estate-10June2020.pdf.

Ranasinghe, S., & Pathirana, S. (2021). Impact of COVID-19 on construction industry in Sri Lanka and recommendations for sustainability during the post-pandemic era. *International Journal of Multidisciplinary Current Research*, *3*, 156-163.

Raoufi, M., & Fayek, A. (2020). Identifying actions to control and mitigate the effects of the COVID-19 pandemic on construction organizations: Preliminary findings. *Public Works Management and Policy*, *26*. https://doi.org/10.1177/1087724X20969164

Rio-Chanona, R., Mealy, P., Ptchler, A., Lafond, F., & Farmer, J. D. (2020). Supply and demand shocks in the COVID-19 pandemic. *Covid Economics*, *63*, 1-38. https://doi.org/10.1093/oxrep/graa033

Roshana, M. R., Kaldeen, M., & Banu, A. (2020). Impact of COVID-19 outbreak on Sri Lankan economy. *Journal of Critical Reviews*, *7*(14), 2124-2133.

Şeker, A. (2022). The Effects of COVID-19 Pandemic on International Trade and Production in the Age of Industry 4.0: New Evidence from European Countries. 125-136. https://doi.org/10.1108/978-1-80117-326-120211009.

Shibani, A., Hassan, D., & Shakir, N. (2020). The effects of pandemic on construction industry in the UK. *Mediterranean Journal of Social Sciences*, *11*(6), 48-60. https://doi.org/10.36941/mjss-2020-0063

Sri Lankan Health Promotion Bureau. (2022, December 13). *COVID-19 Situation Report*. https://www.hpb.health.gov.lk/en.

Tahir, M. A., Hashimhanif, Shahid, Z. A., & Hanif, A. (2015). Factors affecting labor productivity in building projects of Pakistan. *Proceedings of the Seventh IIER International Conference*, January 3, Singapore.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53-55. http://dx.doi.org/10.5116/ijme.4dfb.8dfd

Thomas, A. V., & Sudhakumar, J. (2014). Factors influencing constructi-

on labour productivity: An Indian case study. *Journal of Construction in Developing Countries*, *19*(1), 53–68.

Vithana, N. D., Bandara, K., Jayasooriy, S., & Vithana, N. (2021). Impact of Covid-19 pandemic to construction industry in Sri Lanka. *13th International Research Conference, General Sir John Kotelawala Defence University*, 161-166. http://ir.kdu.ac.lk/handle/345/3267

World Bank. (2021, June 20). *Economic and poverty impact of COVID-19: Sri Lankan development update 2021*. The World Bank Open Knowledge Repository. https://openknowledge.worldbank.org/handle/10986/35833.

Wren-Lewis, S. (2020). The economic effects of a pandemic. In R. B. Mauro (Ed.), *Economics in the Time of COVID-19*, CEPR Press, 109-112.

Zakari, M., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1996). A survey of constraints on Iranian construction operatives' productivity. *Construction Management and Economics, 14*(5), 417–426. https://doi.org/10.1080/014461996373287

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Evaluating emotional response to products: The case of dishwashers

Beyza DOGAN[1*], Hatice Humanur BAGLI[2]
[1] doganbey@itu.edu.tr • Industrial Product Design PhD Program, Graduate School, Istanbul Technical University, Istanbul, Türkiye
[2] hbagli@marmara.edu.tr • Department of Industrial Design, Faculty of Fine Arts, Marmara University, Istanbul, Türkiye

** Corresponding author*
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Abstract
As the online shopping market proliferates, designers are pushed to start designing for pre-use user experience, focusing on how the user experiences the product during online shopping, namely before actual use. The goal of this study is to provide input to design professionals, helping them to design for pre-use user experience, in other words, design for products sold in the online shopping market. This study sheds light on pre-use user experience by proposing a questionnaire-based method investigating the "affect" dimension of UX. Throughout the study, following two pilot studies and an optimization process, 7 dimensions, which can be rated on a 5-point Likert scale, are generated to assess the emotional response to the dishwasher samples. While proposing a self-reported, practical, cost-efficient, quantifiable method to evaluate the "affect" dimension in UX, this study also posits a framework that can be used to adapt the method to other product genres.

Keywords
Affect, Emotional response, Design research, Online shopping, User experience.

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1. Introduction

As the online shopping market is proliferating continuously and e-commerce penetration in Europe is predicted to grow to 67,1% in 2025, well exceeding traditional, in-store brick-and-mortar sales (Statista, 2021). This proliferation brings new challenges to designers who have been designing products that were once mostly sold through in-store shopping. Unlike the in-store shopping experience, the online shopping experience offers little to no room for exploring the actual use of the product, scaling user experience (UX) down to pre-use user experience. Interestingly, while there are many methods and tools to investigate UX during the actual use of the product, only a few of them explores pre-use UX (Oelfin & Schrepp, 2021). As pre-use UX increasingly becoming critical to design successful products due to the proliferation of the online shopping market and the pre-use impression of the user tends to stay mostly the same even after-use, this study focuses on pre-use UX by shedding light on the "affect" dimension of the user experience (Tractinsky et al., 2000). The "affect" dimension is one of the widely accepted key dimensions of UX, which can be defined as the emotional response of the user that is evoked by the interaction with a product (Park et al., 2013) (Park et al., 2018). This paper introduces a method for evaluating emotional response to dishwashers by rating the photographs of the appliance samples, thus focusing solely on pre-use UX.

To investigate emotional response, three Miele dishwasher samples are selected from the existing Miele product portfolio. The selected appliance samples can be seen in Figure 1 with product visuals.

The motivation for developing evaluation methods for the "affect" dimension originates from the fact that the most significant mission of a product designer is seen as stimulating affective responses in the user's mind through the shape of the product (Hsiao & Chen, 2006). So, to support the product design process, several methods in various product genres have been developed. Throughout the literature review, it has been observed that the "affect" dimension has frequently been used interchangeably by various researcher. Similar issue has also been observed by Picard in the context of affective engineering and AI. Picard has observed that the terms "emotional" and "affective" have been used interchangeable in the context of affective (Kansei) engineering and AI. (Picard, 2000) Most of the recent studies that are providing fundamental basis to our study are observed to be using the term "emotion" and its generated phrases like "emotional response" mostly. Therefore, this study makes conscious decision to use "emotion" as an equivalent term for "affect", for the sake of avoiding further confusions in the academic field. The emotion evaluation methods can be

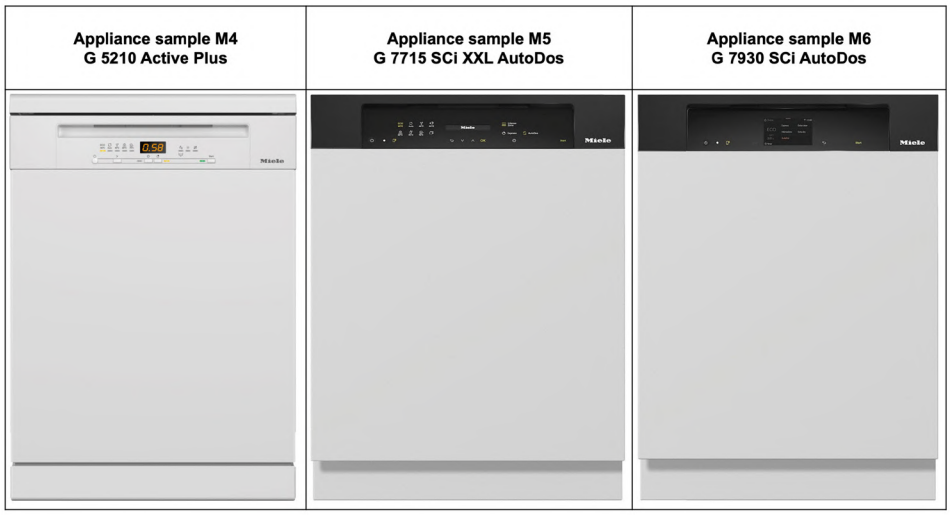

Figure 1. *Appliance samples. Appliance samples from current product portfolio (Miele Gmbh, 2018).*

classified into two main groups: verbal and non-verbal. The non-verbal emotion evaluation tools like Emocards (Desmet et al., 2001), and Self-Assessment Manikin (SAM) (Morris, 1995) (Bradley & Lang, 1994) use visuals or pictograms instead of verbs. Non-verbal methods are largely implemented by many academicians due to the common belief about their high potential to capture unconscious emotional responses (Agarwal & Meyer, 2009). As they, in a way, claim to remove the language barrier between the emotions of the user and the survey. On the other hand, despite their language dependence, verbal methods for evaluation of the emotional dimension in UX are broadly recognized by academicians, as they are relatively easy to implement and adapt. The verbal methods usually use Likert scales and Semantic Differential scales to measure the emotional response (Agarwal & Meyer, 2009). As verbal methods are largely implemented and adapted to home appliances and electronic products, they are identified as the main focus for assessing the emotional dimension of UX in dishwashers. Throughout this study, the verbal emotion assessment method has been optimized to compensate for the language barrier that verbal methods bring due to their nature. On home appliances and electronic products, the evaluation of the emotional dimension in UX is conducted through various methods like Semantic differential scales (Macedo & Silva, 2014), Kansei Engineering (Delin, 2013), and AttrakDiff (Bevan et al., 2016). Some of these methods use standard scales which can be rated on Likert Scales, while others offer custom scales specific to product genre by finding the adjectives describing the products, then using the adjectives to rate the products through Likert scales or semantic differential scales. For example, AttrakDiff offers one standard adjective set to define any product category leaving less room for adaptability (Bevan et al., 2016). On the other hand, the Kansei Engineering method is more flexible to adapt in any product category as the Kansei words need to be derived specifically for each product. Due to its adaptable nature, the Kansei Engineering method is chosen to assess the dimension of emotion for the field research.

The main inspiration for this study, Kansei Engineering has initially been developed as a product development methodology by Mitsuo Nagamachi which analyses the user's feelings, emotional responses to products in order to stimulate intended emotional response through product design (Schütte, 2002). Kansei Engineering has been widely used in the industry to improve and compare products (Schütte, 2002). In the home appliance industry, it has been implemented in many appliances like dishwashers (Delin, 2013), washers (Ishihara et al., 2014), and vacuum cleaners (Skogman, 2002). Kansei engineering uses "Kansei words" to describe the emotional response generated by the product (Delin, 2013). The collection of Kansei words has been performed in various ways. While some researchers like Delin (2013) preferred collecting the Kansei words through questionnaires conducted on users and designers, some researchers use media materials like marketing materials, blogs, catalogs, etc. For example, Yodwangjai and Pimapunsri (2011) collected 130 Kansei words from various sources like magazines and websites, etc. about furniture through keyword analysis (Yodwangjai & Pimapunsri, 2011). Kansei engineering method has been re-interpreted throughout this study to assess and compare the appliance samples. Especially evaluative adjective (Kansei word) collection process is mainly inspired by Kansei engineering method and uses both data sources namely questionnaires to collect keywords from users and media materials to derive keywords.

While the quantity of Kansei words represents the comprehensiveness of the study, it also brings complexity to the process which would require intense filtering or grouping. At this point studies like Hsu et al. (2000) and Hsiao and Chen (2006) apply keyword analysis to reveal which Kansei word or adjective has the higher distribution frequency (Hsiao & Chen, 2006) (Hsu et al., 2000). Hsiao and Chen (2006) have worked on multiple product genres, namely automobile, sofa, and kettle, to reach overarching infor-

mation helping product designers to convey intended emotion through the product. To do this Hsiao and Chen (2006) derived a set of descriptive adjectives which they name "affective adjectives" from representative product visuals by conducting surveys. Hsiao and Chen (2006) collected 719 adjectives for the automobile, 510 adjectives the sofa, and 645 adjectives for the kettle product categories. After the manual elimination of duplicated, irrelevant, confusing adjectives they reached a list of 100 adjectives per product category. Through a series of card sorting, clustering, and ranking sessions, the adjective list is optimized and adjective pairs ("bipolar adjective pairs") are created to generate a semantic differential scale featuring 28 adjective pairs which can be used on all three product categories (Hsiao & Chen, 2006). Afterward, these 28-item adjective pairs are rated on a 7-point Likert Scale to assess the affective responses towards each product category.

Similarly, in this study keyword analysis is also used to collect and prioritize the evaluation adjectives defining emotional response to dishwashers. In addition to the keyword analysis, the sample adjective sets from existing studies in relevant product genres are also reviewed to support prioritization decisions. A series of pilot studies are conducted to optimize and improve the evaluation format. Consequently, to improve the practicality and efficiency of the rating process and the evaluation process, the adjective pairs are converted into nouns which can be rated on 5-point Likert Scale.

2. Method

The study seeks to investigate the "affect" dimension of the user experience and meanwhile proposes a framework that can be used to develop custom evaluation scales to assess the "affect" dimension of the UX in other product genres. The study consists of two main stages which are "Constructing the tool" and "Final Empirical study".

2.1. Stage 1: Constructing the tool

Stage 1 is the "Constructing the tool" phase which prepares and collects necessary background information for tool design and then tests the tool iteratively through a series of pilot studies to improve and finalize. Stage 1 has four steps; the first step is selecting the appliance samples to evaluate. Second step mainly aims to identify evaluation adjectives for the emotional perception of the appliance sample. The third step is conducting pilot studies to test the rating scale with adjective sets and optimize them. The fourth step is "Constructing the evaluation format" which aims to finalize the rating scale and the rating format through the evaluation of pilot studies.

2.1.1. Step 1: Selecting the appliance samples

The appliance samples are selected from the current product portfolio, aiming to include disparate interface technologies, from disparate price classes, thus with disparate forms in the study. Miele dishwasher portfolio is mostly consisted of three main categories: Semi-integrated dishwashers, Fully integrated dishwashers, Freestanding dishwashers. (Miele & Cie, Miele dishwasher range, 2021) A fully integrated dishwasher practically invisible among the kitchen cabinets. A fully integrated dishwasher has a completely hidden control panel and is designed to be flush with the kitchen cabinets. Due to their integrated invisible nature, they are not seen in the scope of this study. Similarly, semi-integrated dishwasher is a dishwasher that is designed to be integrated into the cabinetry of a kitchen, but with the control panel and display visible on the top of the dishwasher door. In the end semi-integrated dishwashers are also invisible to the naked eye except during a loading or unloading process. Due to it visibility, freestanding dishwasher category is chosen to focus on in this study, as Freestanding Dishwashers Category bring the clearest differentiation between the models. The appliance sample selection process in Freestanding Dishwashers Category is carried out with the aim of including wider scope of the line-up and making sure that the differentiation features among the samples are clear enough to support rating process in the empirical

study. In the end G 5210 Active Plus, Miele G 7715 SCi XXL AutoDos, Miele G7930 Sci Autodos are selected and within the study named as M4, M5, M6 respectively. After defining the appliance samples, a review of the appliance sample visuals quickly showed that there are many similarities between the models. As an example, all three appliance samples have an integrated handle. While Appliance sample M4 has a smaller integrated handle, Appliance sample M4 and M5 feature identical integrated handles. With the intention to find differentiation features between the appliance samples detailed user manual review is conducted revealing similarities and disparities between the models clearly. The control panels as well as the control panel technologies are found to be the sharpest differentiation feature between the models. While appliance sample M4 is featuring a control panel, swamped up with physical buttons and LED indicators, appliance sample M5 features a control panel which is awash with printed symbols with text. On the other hand, appliance sample M6 stands out from the rest with its touch based TFT panel, which considerably decreases the need for printed icons and results in a layout with less interaction elements.

Appliance sample M4 (Miele G 5210 Active Plus)

Miele G 5210 Active Plus is called as appliance sample M4 throughout the study. The appliance sample M4 is chosen from the current product portfolio to represent the lower segments of the dishwasher line-up. The price of the dishwasher at the time of this study was documented as 919,00 €, marking the bottom-line of the pricing in dishwasher category. Appliance sample M4 has full white front door, a fairly crowded control panel with an integrated handle. Appliance sample M4 features no touch panel. Instead, the control panel technology is solely based on push buttons which are occupied by LED indicators, satisfying feedback purposes. In terms of the control elements, there are 5 push buttons which are responsible from functions like on/ off, program selection, timer, start and express. On the other hand, the feedback about the system status is given through 11 LED indicators. Besides, the control panel also features a small display which shows only a timer. Feedbacks like information about the active program and the status of the ongoing program are not shown on the display, instead the LED indicators are responsible from delivering such feedbacks. In appliance sample M4, aligned with its price segment and control panel technologies, the number of the available dishwashing programs can be found limited in comparison to rest of the Miele dishwasher category line-up. User is supposed to scroll through these programs by a push button. (Miele & Cie, Operating instructions for dishwashers- G 5210, 2018a)

Appliance sample M5 (Miele G 7715 SCi XXL AutoDos)

Miele G 7715 SCi XXL AutoDos is called as appliance sample M5 throughout the study. The appliance sample M5 is specifically chosen from the dishwasher line-up as the representative of the mid-segment models in the Miele dishwasher product category. At the time of the study the price of the appliance sample M5 is recorded as 2.159,00 €, fitting into mid-segment product class definition of the Miele brand. Appliance sample M5 has a discreetly integrated handle which houses the control panel on its back panel, making the control panel the most prominent form element on the dishwasher face. Unlike the appliance M4, M5 features a touch-based technology along with a context based clear text display. The display can show informative text and time. The available controls are formed through backlit icons with descriptive text which are printed behind the glass. On the control panel there are 19 touch buttons, except on/off button all touch buttons are backlit, indicating status information. Compared to the appliance sample M5, available dishwashing programs and the customization options are considerably broader. Hence, the number of the interface elements seems to be considerably more than

the appliance sample M4. The feedback system of the control panel relies on the clear text slim display screen and the backlit touch buttons performing as status indicators. Unlike the appliance sample M4, user does not need to scroll through the options by pushing the same button multiple times, instead every program had its own dedicated touch button, that provides a direct access. (Miele & Cie, Operating instructions Dishwasher- G 7715, 2018b)

Appliance sample M6 (Miele G7930 Sci Autodos)

Miele G7930 Sci Autodos is called as appliance M6 throughout the study. G7930 Sci Autodos is specifically selected from the dishwasher product category to represent the highest product segment. At the time of the study the price of the appliance sample M6 is recorded as 2.919,00 € marking top price segment of the dishwasher product category. The front door features a discreetly integrated handle which houses the control panel on its own back panel, identical to the appliance sample M5. The discreetly integrated handle makes the control panel center of attention. On the other hand, the number of interface elements is considerably less than the other appliance samples. The touch display is accompanied by 4 backlit printed touch buttons. The appliance M6 features more than 13 predefined programs with the options to create custom programs. (Miele & Cie, Operating instructions Dishwasher- G 7930, 2018c).

2.1.2. Step 2: Identification of evaluation adjectives

Due to the adaptable nature of Kansei Engineering, the method development is inspired by Kansei Engineering rather than AttrakDiff. As AttrakDiff offers a standard word pair set to assess any product genre, adaptability of the scale was found to be limited (AttrakDiff, 2015). On the other hand, in the Kansei Engineering method, the evaluation adjective list is not a standard list that claims to fit in every product genre, instead the evaluation adjectives are defined through keyword analysis of relevant sources. So Kansei Engineering method mostly starts with definition of the input sources which would be analyzed to define scale items through set of research activities like keyword analysis, clustering, grouping, etc. In this study, aligned with the Kansei Engineering method, relevant sources are defined as online dishwasher buying guides, blogs, the official Miele website dishwasher page, and product manuals of the appliance samples. While the official Miele website dishwasher page, and product manuals of the appliance samples brings model specific input, online dishwasher buying guides, blogs brings in data from customer perception, expectation by introducing marketing terms in the keyword analysis process. Vast amount of online blog material in form of buying guides and reviews required the study to focus on recent and most influential materials. At the time of the keyword analysis the most recent articles about dishwashers were found at Cnet, which is the oldest and one of the most influential online platform covering tech news, product reviews, how-to guides, product prices. (Cnet, 2018) The most comprehensive article on the Cnet platform has been picked by the researchers for further analysis. (Gebhart, 2018) On these prementioned source a keyword analysis is conducted to collect the evaluation adjectives defining emotional responses to dishwashers. The scope of the defined data sources inevitably affects the accuracy of rating as complete scale is derived from them. According to keyword analysis, an initial set of adjectives are defined. Figure 2 shows the initial set of adjectives with the result of the keyword analysis through expression count, Frequency, and Source. Top ranking twenty-four evaluative adjectives are picked. By doing so, keywords which are not directly describing the product are ignored.

The collected evaluation adjectives are grouped and organized through a cluster analysis featuring hierarchical organization, binary correlation matrix, and antonym pairs generation to form an initial set of adjectives. Throughout the process, researchers

Evaluation Adjectives	Expression count	Frequency	Source
automatic	2	0.10%	Appliance buying guides, blogs*
efficiency	2	0.10%	Appliance buying guides, blogs*
economical	5	0.50%	Miele Webpage**
integrated	2	0.10%	Appliance buying guides, blogs*
quiet	4	0.10%	Appliance buying guides, blogs*
quick	2	0.10%	Appliance buying guides, blogs*
light	3	0.30%	Miele Webpage**
flexible	2	0%	Product manual G6920 Sci***
bulky	2	0.20%	Miele Webpage**
convenient	2	0.20%	Miele Webpage**
comfortable	2	0%	Product manual G6480***
	2	0%	Product manual G6920 Sci***
versatile	2	0.20%	Miele Webpage**
performance	10	0.30%	Appliance buying guides, blogs*
cleaning power	3	0.10%	Appliance buying guides, blogs*
wide	3	0.10%	Appliance buying guides, blogs*
nice	3	0.10%	Appliance buying guides, blogs*
easy	3	0%	Product manual G6920 Sci***
	2	0%	Product manual G6480***
large	3	0.10%	Appliance buying guides, blogs*
smart	2	0.10%	Appliance buying guides, blogs*
small	2	0.10%	Appliance buying guides, blogs*
fashioned	2	0.10%	Appliance buying guides, blogs*
loud	4	0.10%	Appliance buying guides, blogs*
less space	2	0.10%	Appliance buying guides, blogs*
fit	6	0.20%	Appliance buying guides, blogs*

Figure 2. *Keyword analysis results. Initial evaluation adjectives set (Kansei Words) collected from various sources through Keyword analysis (Cnet, 2018; Miele Gmbh, 2018; Miele & Cie, Miele dishwasher range, 2021).*

omitted certain evaluative adjectives that bring incomprehensibility and irrelevancy to the process like versatile, wide, etc. Besides researchers also decided to test the performance of an additional adjective pair: "cheap X expensive". As a result of cluster analysis, an initial set of adjective pairs (antonyms) is generated, and accordingly, the semantic differential scale is formed.

2.1.3. Step 3: Pilot studies

Two sets of Pilot studies are conducted to implement and optimize the initial set of adjective pairs, transforming them into an optimized scale that can evaluate the emotional response on a 5-point Likert Scale (see Figure 3). The details of each Pilot study through sample size, material, evaluation scale, and task are shown in Figure 4. Pilot study 1 included an additional open-ended option for the "How does it look" question with the aim of collecting new adjectives which might come up during the study. This additional data collection method has been removed for the second round of the Pilot study and Pilot Study 2 is fully focused on testing the scale items.

Throughout this phase, to optimize the evaluation scale, follow-up interviews are conducted and the adjective pairs are compared with adjective pair sets from existing studies from Home Appliances Market. The adjective pairs from existing studies are shown in Figure 5.

2.1.4. Step 4: Constructing the evaluation format

Follow-up interviews are conducted with the participants of Pilot Study 2. Pilot Study 2 showed that the adjective pairs have been still not completely optimized. During the field study, it is observed that

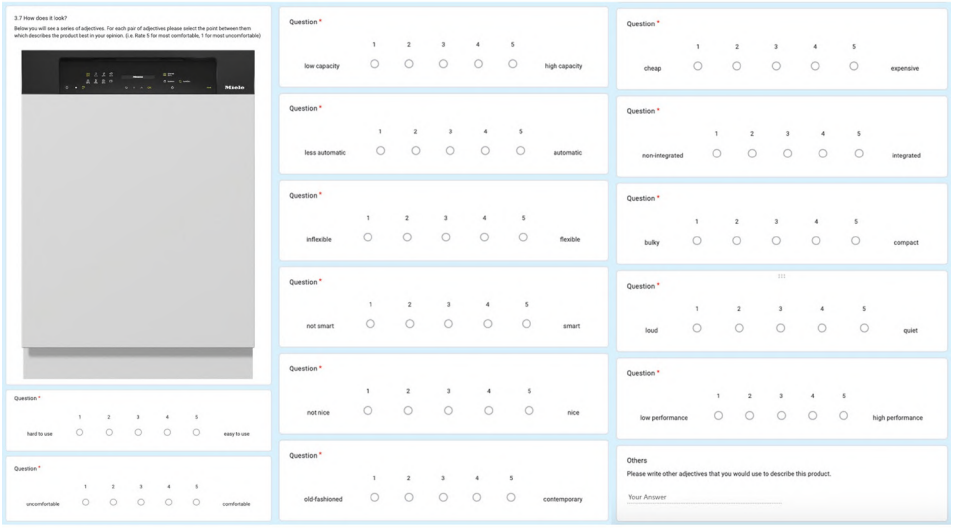

Figure 3. *Question format - pilot study 1. A screenshot from the online questionnaire showing the questionnaire format (Dogan, 2021).*

	Subject	Material	Evaluation Scale	Task
Pilot Study 1	12 users 5 males and 7 females between 18-40 years old with a college degree	Visuals of M4, M5, M6	Each subject is asked to rate the appliances on a 5-point Likert Scale. The rating scale is formed by positioning 5-Point Likert Scale in the middle of the adjective pair. While the adjectives describing negative feelings are positioned on left the adjective describing positive feelings is positioned on right.	The visuals of the appliance samples are shown to the participant one by one with the question of "How does it look?" The participant is expected to rate appliance samples on a 5-point Likert scale.
Pilot Study 2	20 users, between 18-45 years old with college degrees.	Visuals of M4, M5, M6		

Figure 4. *Structure of the pilot studies. Pilot study 1 and pilot study 2 (Dogan, 2021).*

Silva & Macedo (2014)	**Neves (2011)**
cheap, clean (aesthetics), compact, complex, durable, easy, elegant, expensive, fast, flexible, fragile, functional, heavy, intuitive, large, light, noisy, reliable, robust, spacious, useful	pleasant, neat, controllable, dynamic, stimulating, easy to clean, easy to use, honest, strong, multifunctional, organized, surprising
Automatic, Beautiful, comfortable, difficult, ecological, economical, efficient, ergonomic, innovative, smart, clean (cleaning), modern, practical, resistant, secure, silent, simple, technological	

Figure 5. *Adjectives collected by Silva & Macedo (2014) and Neves (2011). Adjective sets from Silva & Macedo (2014) and Neves (2011) (Macedo & Silva, 2014; Neves, 2011).*

participants were inclined to question the scale items, struggling to comprehend, most importantly getting occasionally bored as follow-up interviews have also validated this observation. It can be concluded that the adjective antonym pairs which are mapped on the semantic differential scale are found to be impractical, time-consuming, hard to comprehend, and in the end thickening the language barrier. More concrete input coming from the follow-up interviews showed that to be able to make sense of the scale, participants are required to comprehend, develop an understanding of 2 evaluative adjectives per dimension and then rate it. This inevitably extends the response time and putting extra pressure on the shoulders of the participants. Consequently, to optimize the rating process, the adjective pairs are converted into nouns, forming dimensions that can be rated on 5-point Likert Scale, bringing in practicality and comprehensibility as seen in Figure 6. Figure 7 shows the comparison between initial and final evaluation scale format. The overall evolution of the evaluation scale format for each keyword can be seen in Figure 9. In its optimized version, the participants are required to comprehend one evaluative adjective to rate every dimension. Testimonial collected from the participants of final field study, confirmed that the scales featuring one adjective per dimension were found to be more practical by majority of the participants.

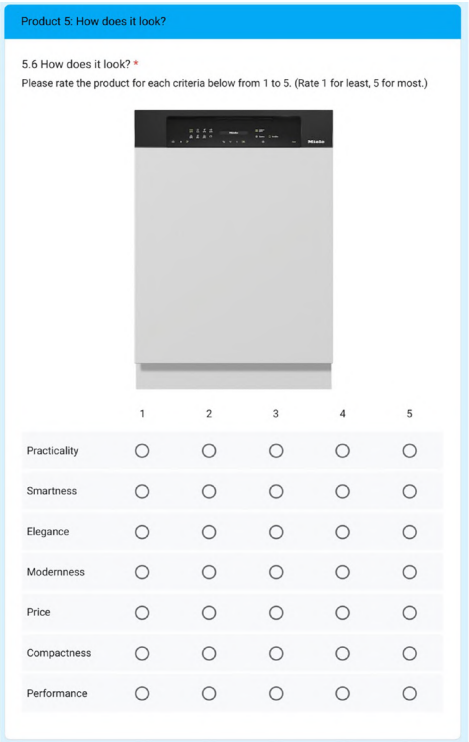

Figure 6. *The final question format. The final question format with derived dimensions of emotional response on a 5-point likert scale (Dogan, 2021).*

2.2. Stage 2: Final empirical study

Stage 2 is the final phase of the study which tests the final online questionnaire-based method to evaluate the emotional dimension of UX in dishwashers. In this phase final rating scale which is formed by one evaluative name instead of two evaluative adjectives is used. In total emotional response to the appliance samples are measured in seven separate dimensions on a 5-point Likert scale, through seven evaluative names defining these dimensions. The dimensions can be listed as, Practicality, Smartness, Elegance, Modernity, Price, Compactness, Performance.

Subjects: 56 users between 18-65 years old with college degrees.

Material: Online questionnaire with six appliance samples selected from Miele Museum and the current product portfolio. Appliance samples are shown in Table 1.

Procedure: Each subject is asked to complete the online questionnaire. The subjects are allowed to proceed at their own pace.

Task: The visuals of the appliance samples are shown to the participant one by one with the question "How does it look?" The participant is expected to rate appliance samples on a 5-point Likert scale. The semantic differential scale which is optimized as a result of Pilot Study 1 and Pilot Study 2 is implemented through the final empirical study.

2.2.1. Results of the field study

As shown in the Figure 8, it appears that the newest appliance sample, M6, received a high emotional response with an average score of 3.9. It received high scores in the dimensions of smartness (4), elegance (3.8), modernity (4), price (4), and performance (4). This suggests that consumers generally view M6 as a smart, modern, and high-performing appliance that is worth the higher price.

The sample M5 received the second highest overall emotional response with an average score of 3.8. It received high scores in the dimensions of practicality (3.9) which is higher than M6, smartness (3.8), elegance (3.6), modernity (4), price (3.8), and performance (3.8). M5 scores higher than M6 in practicality dimension. It suggests that consumers view M5 as being more practical than M6, conceivably because it has smaller display and bigger printed icons, which obviously offers a bigger surface area to navigate.

The oldest appliance sample, M4, received the lowest overall emotional response with an average score of 3.3. It received lower scores in the dimensions of practicality (3.2), smartness (3.4), elegance (3.1), modernity (3.4), compactness (3.2), and performance (3.4). This suggests that consumers view M4 as being less modern, less smart and less elegant than the other two samples. This view would probably stem from multiple reasons. While appliance sample M4 stands out with its considerably lower interaction technology featuring push buttons rather than touch technologies. This also affects the basis CMF which is used in the construction of the appliance. Unlike glass-based appliance samples M5 and M6, the prominent surfaces in appliance sample M4 are based on colored plastic derivatives.

In conclusion, the newer technology and features and CMF which are asso-

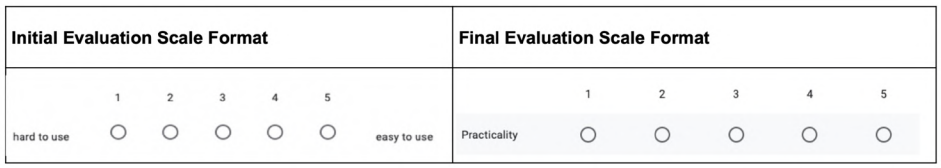

Figure 7. *The evaluation scale format. Initial evaluation scale format vs Final evaluation scale format showing how the scale is optimized (Dogan, 2021).*

Appliance Samples	Practicality	Smartness	Elegance	Modernity	Price	Compactness	Performance	Average
M4	3.2	3.4	3.1	3.4	3.3	3.2	3.4	3.3
M5	3.9	3.8	3.6	4	3.8	3.7	3.8	3.8
M6	3.8	4	3.8	4	4	3.7	4	3.9

Figure 8. *Results of field study. Ratings for emotional response per dimension on a 5-point likert scale.*

ciated with newer technologies such as touch panel technology, and glossy glass surfaces, tend to induce higher emotional response in general with one exception: practicality dimension. Practicality dimension is found to be an exception where the appliance sample M5 scores higher than M6. While both of the appliance samples feature touch technologies, the appliance sample M6 features considerably more advanced technology than appliance sample M5. But featuring more advance technology has not helped the appliance M6 to induce better emotional response in practicality dimension.

3. Results and discussion

The paper introduces a method for evaluating emotional responses to home appliances and presents a framework that would be used to implement the tool in various product genres. The presented method is a calculated combination of existing evaluation methods with the aim of improving practicality and efficiency of the rating process and evaluation process. To do this, the existing methods found in the literature for emotion evaluation have been reviewed. As the target product genre belongs to home appliances, especially the methods performed in home appliances have been explored. In addition to the methods implemented in home appliances, the methods evaluating emotional response to consumer electronics have also been investigated. The comparative review of main existing methods like Semantic differential scales (Macedo & Silva, 2014) assessing washing machines, Kansei Engineering assessing dishwashers (Delin, 2013) , and AttrakDiff assessing range hoods (Bevan et al., 2016) , etc. revealed several criteria to consider to improve practicality and efficiency of the methods. These criteria could be listed as adaptability to diverse product genres, quantifiability of the results, and the practicality of submitting input.

Regarding "adaptability", the literature review of the existing methods showed that the standard scale used by AttrakDiff is being implemented without adaptation into every product genre (Bevan et al., 2016). In this sense, the process of generating the Kansei word for the Kansei Engineering method is found to be bringing in new levels of adaptability along with complexity (Delin, 2013). The adaptable nature of the proposed tool is mainly inspired by Kansei Engineering rather than AttrakDiff, however, the method that has been developed to reach a scale to evaluate the emotional dimension of user experience creates a framework the list of attributes achieved creates a standard that can be used for different product categories as AttrakDiff suggests. The way that researchers arrange the keyword sources ensures the required room for adaptability. While the method is implemented on dishwashers, the framework could easily be implemented in any product genre. Regarding "quantifiability", the verbal methods for evaluating emotional response have been targeted from the beginning due to their easy-to-quantify nature (Agarwal & Meyer, 2009). Regarding the

	Collected Evaluation adjectives	Initial adjective antonyms		Adjective pair set of Pilot Study 1		Adjective pair set of Pilot Study 2		Final Scale
Use	comfortable	uncomfortable	comfortable	uncomfortable	comfortable	practical	impractical	Practicality
	easy	hard to use	easy to use	hard to use	easy to use			
	practical	impractical	practical	impractical	practical			
	versatile	limited	versatile	mono-functional	multifunctional			
	efficiency	less efficient	efficient					
	convenient	inconvenient	convenient					
	automatic	less automatic	automatic	less automatic	automatic	not smart	smart	Smartness
	smart	not smart	smart	not smart	smart			
	flexible	inflexible	flexible	inflexible	flexible			
	less space	low capacity	high capacity					
Aesthetic	elegant	inelegant	elegant	inelegant	elegant	inelegant	elegant	Elegance
	nice	not nice	nice					
	Antique							
	weird							
	fashioned	old -fashioned	~~contemporary~~ modern	old fashioned	modern	old fashioned	modern	Modernity
	old-fashion							
	integrated	~~disintegrated~~ nonintegrated	integrated	complex	clean			
	fit	fitted	not fitted					
	bulky	bulky	compact	bulky	compact	bulky	compact	Compactness
	wide							
	light	heavy	light					
	small	small	large					
	large							
	economical	less economic	economic					Price
	expensive	cheap	expensive	cheap	expensive	cheap	expensive	
Performance	quiet	loud	~~silent~~ quiet	loud	silent			Performance
	loud							
	quick	slow	fast	slow	fast			
	performance	low performance	high performance	low performance	high performance	low performance	high performance	

Figure 9. *The evolution of the scale for evaluating emotional response. The evolution of rating format and scale items for the tool for evaluating the emotional response throughout the study.*

"practicality" of submitting input, the method development has started with a semantic differential scale which is developed with the Kansei method and the semantic differential scale has been through multiple optimization processes throughout multiple pilot studies. The pilot studies are followed up by interviews through which the ratings are discussed with participants. During follow-up interviews, two main problems are enunciated by the participants and observed by the researcher: (a) the excessive number of scale items to rate and (b) the language barrier posed by the adjective pairs. To explain the first problem further, the rating process was mostly found lengthy. So, the scale items are reduced to seven, implementing Miller's Law (Miller, 1956). The second problem, the language barrier, was actually stemming from the nature of the semantic differential scale. To rate only one scale item, the subjects were required to comprehend two adjective pairs, then rate. This requirement extends the response time and requires additional cognitive effort. To fix this problem, the adjective pairs are converted into simple nouns, which would later be called as dimensions. The performance of the final evaluation scale is reviewed through another round of follow up interviews, confirming that converting adjective pairs into simple single nouns simplified the rating process for the participants.

In the end, the study synthesizes the method development processes from Kansei Engineering to bring in more adaptability and scale optimization processes from Semantic Differential Scale methods to bring in the practicality of evaluation and input collection to reach more efficient, quantifiable, and adaptable tools to evaluate emotional response. The evolution of the scale for evaluating emotional response starting from collected evaluation adjectives, generated adjective pairs, and optimized semantic differential scale to the final scale featuring dimensions can be seen in Figure 9.

Consequently, the study presents a framework that could be used by researched who would like to evaluate emotional responses in products. The framework can be implemented in other product genres as well. The simple steps presented in the framework to follow can be listed as:

- Stage 1: Constructing the tool
  - o Step 1: Selecting the appliance samples
  - o Step 2: Identification of evaluation adjectives
  - o Step 3: Conducting Pilot Studies
  - o Step 4: Constructing the evaluation format
- Stage 2: Conducting final empirical study

4. Conclusion

Even if the sample set is focused on a specific product genre, the study aims to propose a method that can be

adapted to other product genres and help designers to test the emotional response to products in the most practical way possible. The method provides advantages compared to the existing methods in the sense of adaptability, quantifiability, and practicality.

Firstly, the adaptable nature of the tool development helps to reach more accurate results by ensuring product genre-specific rating scales.

Secondly, considerably simplified rating format and dimensions help the researchers to easily quantify data for comparison and evaluation of the emotional dimension in user experience, improving quantifiability.

Thirdly, the refined rating scale of the tool which is distilled down to 7 dimensions rated on a 5-point Likert Scale brings practicality and agility to the input submission process and motivates participants.

In the end, the results which this tool provides cannot only shed light on the emotional response but also, can pose solid research questions or hypotheses to explore the link between the emotional response (affect) and various factors like the level of technology, certain interface technologies, focus of the design approach, CMF design, etc. Bringing such perspectives into discussion would further help product management professionals to form more educated design briefs and design practitioners to take informed design decisions.

5. Limitations and further studies

As this tool is developed as a smaller part of an ongoing Ph.D. thesis, the pilot studies, and the final empirical study are performed on appliance samples representing major milestones in the evolution of kitchen technologies. Still, the study details the tool development process with the aim of providing a framework that can be implemented in other product genres and performed on other product models. The choice of appliance samples provided a wide scope of diversity in terms of features and technologies, ensuring a high level of differentiation among the samples. It can be said that the final result of the field study is also affected by this specific appliance sample choice making the comparison-based evaluation of the results sharper. So, it can be concluded that the comparison capacity of the tool needs to be further assessed by implementation in products with similar technologies. Moreover, the final scale, which originated from the adjective pair sets derived from product genre-related data sources, is not designed to be used in other product genres directly. But the framework that shows how adjective sets can be generated and then converted into nouns to reach the final scale can be implemented in other product genres and used to evaluate emotional response. As the final scale generated through the study has been formed through a series of optimization processes direct implementation of the 7-dimension scale in similar product genres can also be considered in further studies to verify the adaptability of the scale. Similarly, while the adaptable nature of the tool development method poses a significant advantage, further research on the adaptation of the tool in other product genres needs to be conducted to improve the adaptability and flexibility of the tool. To verify the improvements that the tool brings, the practicality of the input submission process and quantifiability of the evaluation process should be compared with existing methods like SD scales, Kansei-Engineering based SD scales, and AttrakDiff.

References

Agarwal, A., & Meyer, A. (2009). Beyond usability: evaluating emotional response as an integral part of the user experience. *In CHI'09 Extended Abstracts on Human Factors in Computing Systems*, (pp. 2919-2930).

AttrakDiff. (2015). *Evaluation Report for Product "Demo - B"*. User Interface Design GmbH.

Bevan, N., Liu, Z., Barnes, C., Hassenzahl, M., & Wei, W. (2016, May). Comparison of Kansei Engineering and AttrakDiff to evaluate kitchen products. *Human Factors in Computing Systems In Proceedings of the 2016 CHI Conference Extended Abstracts* ,

(pp. 2999-3005).

Bradley , M. M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. *Journal of behavior therapy and experimental psychiatry*, 25(1), 49-59.

Cnet. (2018, June 21). *Homepage*. Retrieved from Cnet: https://www.cnet.com/

Delin, A. (2013). *Enhancing the perceived quality of a dishwasher through user-centered design.* Master of Science Thesis.

Desmet, P., Overbeeke, K., & Tax, S. (2001). Designing products with added emotional value: Development and application of an approach for research through design. *The design journal, 4*(1), 32-47.

Dogan, B. (2021). *Measuring Cognitive Gap in Evolution of Kitchen Appliances.* Retrieved from Google forms: https://forms.gle/hgWZy8TAhnETj9db9

Gebhart, A. (2018, June 21). *How to buy dishwasher*. Retrieved from Cnet: https://www.cnet.com/home/kitchen-and-household/dishwasher-buying-guide/

Hsiao, K. A., & Chen, L. L. (2006). Fundamental dimensions of affective responses to product shapes. *International Journal of Industrial Ergonomics*, 36(6) 553-564.

Hsu, S. H., Chuang, M. C., & Chang, C. C. (2000). A semantic differential study of designers' and users' product form perception. *International journal of industrial ergonomics, 25*(4), 375-391.

Ishihara, S., Nagamachi, M., & Ishihara, K. (2014, June). Electronic Product Development with Kansei Engineering/Kansei Ergonomics. *In International Conference on Kansei Engineering and emotion research* (Vol. 17, pp. 1385-1395).

Macedo, V., & Silva, C. (2014). Building a Semantic Differential Scale as Tool for Assisting UX Evaluation with Home Appliances. *In International Conference of Design, User Experience, and Usability* (pp. 308-317). Springer, Cham.

In *Design, User Experience, and Usability. Theories, Methods, and Tools for Designing the User Experience: Third International Conference, DUXU 2014, Held as Part of HCI International 2014, Heraklion, Crete, Greece, June 22-27, 2014, Proceedings, Part I 3* (pp. 308-317). Springer International Publishing.

Miele & Cie, K. (2018a, January). *Operating instructions for dishwashers-G 5210*. Retrieved from www.miele.com: https://media.miele.com/downloads/40/fb/00_96106EC61D0B1EEC-B5EA9CEB038040FB.pdf

Miele & Cie, K. (2018b, January). *Operating instructions Dishwasher- G 7715*. Retrieved from www.miele.com: https://media.miele.com/downloads/cd/ce/02_C7F128283F7D1EEEA3D-366E59444CDCE.pdf

Miele & Cie, K. (2018c, January). *Operating instructions Dishwasher-G 7930*. Retrieved from www.miele.com: https://media.miele.com/downloads/4d/d4/03_C7F128288AE61EEE-A3D31CE943934DD4.pdf

Miele & Cie, K. (2021, January). *Miele dishwasher range*. Retrieved from miele.co.uk: https://www.miele.co.uk/e/dishwashers-1015063-c

Miele Gmbh. (2018, June 8). *Willkommen bei Miele- Immer besser*. Retrieved from Miele Shop: https://www.miele.de/haushalt/shop-3996.htm

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological review, 63*(2), 81.

Morris, J. D. (1995). Observations: SAM: the Self-Assessment Manikin; an efficient cross-cultural measurement of emotional response. *Journal of advertising research, 35*(6), 63-68.

Neves, A. (2011). Experiência cronológica do design de Eletrodomésticos. Programa de Pós-graduação em Design UFPR. Master Thesis.

Oelfin, D., & Schrepp, M. (2021). Evaluation of Anticipated User Experience. *Mensch und Computer 2021-Workshopband*.

Park, J., Han, S. H., Kim, H. K., Cho, Y., & Park, W. (2013). Developing elements of user experience for mobile phones and services: survey, interview, and observation approaches. *Human Factors Ergon. Manufact. Service Ind., 23*(4), 279–293.

Park, J., Han, S. H., Park, J., Park, J., & Kwahk, J. (2018). Development of a

web-based user experience evaluation system for home appliances. *International Journal of Industrial Ergonomics*(67), 216-228.

Picard, R. W. (2000). *Affective computing*. MIT press.

Schütte, S. (2002). *Designing feelings into products: Integrating kansei engineering methodology in product development*. (Doctoral dissertation, Linköping University Electronic Press).

Skogman, A. (2002). Measurements of user feelings regarding existing vacuum cleaners with Kansei Engineering: an evaluation of Kansei Engineering and other methods.

Statista. (2021, May 20). *Digital buyer penetration in Europe from 2017 to 2025*. Retrieved from Statista: https://www.statista.com/forecasts/891317/digital-buyer-penetration-in-europe

Tractinsky, N., Katz, A., & Ikar, D. (2000, March 24). What is beautiful is usable. *Interacting with Computers, 2*(13), p. 127±145.

Yodwangjai, S., & Pimapunsri, K. (2011). Application of Semantic Differential Technique and Statistical Approach to Evaluate Designer's and Consumer's Perception in Furniture Design. *Applied Science and Engineering Progress, 4*(1), 23-30.

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Drawing as a site of critical knowledge production in design research

Burçe KARADAĞ[1]
[1] karadag17@itu.edu.tr • Architectural Design PhD Program, Graduate School, Istanbul Technical University, Istanbul, Turkey

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Abstract
The question of critical representation is discussed within architectural design for its potential to provide other ways of exploration and production. This study focuses on drawing within the extensive field of critical representation discussions. There has been a growing interest in this area (which is distinguished from the earlier architectural representation discussions) due to its reference to the scope of criticality. This reference is taken as a starting point since it reveals the transformative relationship between content and methodology. The aim of this article is to discuss drawing as a critical practice within architectural design by focusing on the actions that are involved in the process of drawing. It is argued that through this approach, practice has a potential to become a site of critical knowledge production in design research. The article provides an understanding of how criticality is discussed within architectural design with an emphasis on design research and how these discussions have affected the scope of drawing within architectural representation. The study suggests a connection between the methodology of design research and the discussion on critical drawing through the aspects of proximity, objectivity and reflectivity. These aspects propose a way of discovering the actions of drawing which are explored through two case studies. The focus is therefore shifted to the process of drawing, not merely the final product, and how this process can be considered as a critical practice.

Keywords
Critical practices, Design research, Drawing.

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1. Introduction

The study focuses on the relationship between critical knowledge production in design research with an emphasis on drawing as a critical practice. The term critical refers to, but is not limited by the work of the Frankfurt School of early twentieth century (Geuss, 1981), which is extended and conceptualized by Rendell (2006) as practices that are "self-critical and desirous for social change" (p.3). Critical knowledge in this sense, is considered as a type of knowledge that emerges from practice. Design research on the other hand, according to Fraser (2013) involves the process of research into design thinking. This process consists of research actions (thinking, writing, discussing, performing, etc.) and research methods that work together. Design research differs from other architectural works because it mediates understanding and knowledge production (Fraser, 2013). The term also has a connection to Frayling's (1993) differentiation on the relationship between research and design, which is categorized into three as research for, into and through design. The latter two are related to this approach.

The argument is formed by discussing the relationship between critical knowledge and design research, how critical knowledge is produced through the process of design research and how drawing becomes a site for this type of knowledge production to take place. Critical knowledge production in design research, within this article, is obtained by bringing attention to proximity, objectivity, reflectivity. If the distance between the practitioner and the practice depends on the context and the perspective of the practitioner, acknowledging this distance or proximity becomes significant for self-reflectivity, as well as understanding the scope of objectivity. A self-reflective process results in a transformation that is not projected from outside but generated through practice. In this context, objectivity is discussed as partial and situated. This problematizes the split between theory and action, by offering a situated, embodied and critical practice.

Design research demonstrates processes of researching through practice, whereas this study focuses on researching through drawing with an emphasis on action. The literature review on the relationship between criticality, drawing and representation demonstrates different approaches on how drawing embodies architectural knowledge. Although these examples document a variety, this study specifically indicates drawing as an action. The term action refers to the bodily actions of the drawer, the motion and interaction between different bodies. To further this argument, actions of all agents involved in the process of drawing can be taken into consideration, however this is not included in the limited scope of the article.

The study offers a perspective that aims to unfold the embedded actions within drawing. Through the dictionary review, it is seen that a selection of actions relate to spatiality and disciplinarity. These are demonstrated through examples that approach drawing outside of the established form and open up a site of exploration. Established form of drawing is understood as any type of instrumentalization under the task of representation, specifically representation of something that is separate from the drawing itself. What may be outside of this form is to be discovered. This is where drawing is considered as a site where all of these embedded actions dwell, critical knowledge emerges and creative processes take place.

2. Critical knowledge and design research

Critical theories, as defined by Geuss (1981), are distinguished from theories of natural sciences in terms of the epistemological difference; critical theories are 'reflective' whereas natural sciences are 'objectifying' (p. 2). A scientific theory aims at manipulating the external world by instrumentalization, is objectifying as the theory is separated from the object of that theory and require empirical evidence; whereas a critical theory aims at freeing the agents through making them aware of existing and hidden

power structures, is reflective as the theory is always partly about itself and is acceptable if it can survive evaluation (Geuss, 1981, p. 55). This description, points out that critical theories focus on what already is present, revealing the constraints that are evident in a given context. Through critical theories, another form of knowledge which is outside of the scope and methodology of natural sciences becomes possible.

Criticality has become the subject of architecture due to issues such as knowledge derived from design processes, relevance of this form of knowledge, power relations and values. Design knowledge, according to Jiménez-Narváez (2000), belongs to the socio-critical approach which aims to liberate, focuses on social imbalance, consists of a critical attitude and a theoretical model for social action, purposes to transform through critical analysis and knowledge production by using a transformational methodology. When the design object is reviewed within this category, the socio-critical approach results in a transformer object which may lead to a social transformation and a knowledge production that modifies the attitudes, habits and values through the object of design (Jiménez-Narváez, 2000, p. 48).

Although there is a potential for transformation, the relationship between architectural design and critical approach also holds the risk of becoming a justification of an existing social structure which dislocates architecture from its context (Cunningham, 2007). At this point, interdisciplinary research becomes important, since interdisciplinarity brings the scope, methods and structures of the discipline into question. Architecture is a multidisciplinary field of study as it relates to disciplines such as history, theory, design, technology, but also it is open to interdisciplinary work through questioning disciplinary assumptions (Rendell, 2007a). In this sense, an interdisciplinary practice not only allows for a critical, creative and transformative knowledge production, but also has the ability to affect and change the established disciplinary structures. Rendell (2013) introduces 'critical spatial practices' as a way of interdisciplinary architectural design research that leads to questions about disciplinary definitions. Through properties of self-reflection, desire for social change, transformation, questions about existing power structures, investigation of limits, critical spatial practices are positioned in between theory and practice, art and architecture, public and private (Rendell, 2013, p. 258). Questioning these definitions enables for a critical knowledge production as well as the possibility of a creative practice. In a later study, Rendell (2020) reconsiders 'critical spatial practices' arguing that these practices cannot be separated from ethical concerns and reproduces 'ethical and critical spatial practices' in a transdisciplinary approach.

Similarly, Doucet and Janssens (2011) recommend adopting a transdisciplinary approach and draw attention to the relation between theory and practice, experimentation in production forms (developing methods or thinking differently by questioning existing methods) and the ethical scope and impact of production. Doucet and Janssens (2011) point out that there is a possibility of transforming the disciplinary practice only when taken together with the transdisciplinary approach. In particular, the relationship with ethics emphasizes the importance of the context in which production takes place. Such discussions exemplify an ongoing attempt for positioning criticality in relation to discipline within the scope of design research in architecture.

In relation to transformation through a socio-critical approach, Grillner (2013) offers to question the purpose and direction of this transformation that has been projected onto the critical practice, stating that such approach needs to be "involved on the ground, and perform the research at the same time as it works to transform" (p. 180). This view brings the ground into the discussion, both physically and conceptually, which emphasizes the site, location and place of the research. Through this understanding, it becomes possible to question the existing structure of a design practice, as both raised in the discussions of criticality and disciplinarity. These posi-

tions indicate that if critical knowledge emerges out of design, research and action, then the context of these processes inevitably become a part of the discussion.

3. Critical knowledge production in design research

This section suggests a connection between the methodology of design research and critical practices through questioning the context of practice. Critical knowledge production in design research, within this article, is obtained by bringing attention to the selected aspects of proximity, objectivity and reflectivity.

The distance or the relationship between practitioner and practice appeared in the earlier discussions on criticality. On this subject, Fraser (2013) points out a specific approach as "from critical distance to critical proximity" (p. 12) in design research. Criticality is assumed to require a distance from the object of criticism in order to gain a complete perspective of what that object in question might be. However, this excludes the fact that perspective is partial and variable depending on the context and the position, where the distance results in a detachment between things in question. When the dynamics between practitioner and practice become multidirectional, this relationship might become interchangeable resulting in an interaction rather than a fixed situation. This is where proximity becomes an important aspect in order to understand this interactive relationship.

When Rendell (2007a) refers to criticism as a 'self reflective and embodied' action, there appears to be an emphasis on the separation between design and criticism as the former being "material, subjective and embodied", the latter being "abstract, objective and distanced", as oppositional processes (p. 4). The term embodied holds the notion of the body in itself as well as the interaction of all bodies that are in contact. These bodies include the body of the practitioner as well as the material bodies that take part in practice. If design and practice are performed as an exploration into both the material and the conceptual premises, the separation does not serve the purpose of distancing but rather offers a movement (in proximity) between different positions.

The proximity of practitioner and practice brings position and objectivity into question within the discussions on knowledge production. Donna Haraway's (1988) notion of 'situated knowledges' opens the phenomenon of scientific objectivity for discussion. Through situated knowledges, Haraway calls into question the 'disembodied scientific objectivity'. If the knower and the knowledge cannot be separated completely, it can only be misleading to say that objectivity is not biased. Haraway offers the alternative understanding to avoid binary oppositions such as objective vs. subjective; revealing a partial, situated and critical perspective. In this sense, Haraway's concept of situated knowledges is embodied objectivity through an understanding that objectivity is acquired in a limited location in relation to its context. The partial perspective explains the fragmented view brought about by situatedness, in contrast to the misleading promise of the all-seeing gaze without any location (Haraway, 1988, p. 586), emphasizing the importance of position. The partiality, divisions and multiplicities make inferences about the nature of the variable position and the partial perspective. The embodied, situated and critical knowledge revealed in this discussion challenges the notion of objectivity.

Discussions on objectivity in design research are most apparent in the split between theory and action. Doucet and Frichot (2018) problematize the separation of theory and action in having a positioned perspective while discussing the relationship between architecture and its context. They propose the production of a situated theory through the notion of 'theory as practice'. While expanding on a situated, embodied and critical practice, Doucet and Frichot (2018) include features such as "connectedness, inclusivity, subjectivity and complexity" instead of "abstraction and dualistic thinking" (p. 2). This argument draws attention to current architectural discussions, in which many agents including not only architects and non-architects, but

also humans and non-humans who are involved in or affected by architectural production are left out of the process. This expansion can be achieved through paying attention to the context of practice. Furthermore, this view can be questioned in terms of negotiation with the context of practice since a situated practice requires responding to existing conditions. This bears similarity to the earlier discussions on positioning criticality in relation to discipline where there is a risk of justification instead of transformation.

In order to come to terms with this risk of justification, the reflectivity aspect of practice suggests a transformation process that is not projected from outside but generated through practice. Blythe and van Schaik (2013) state a method of researching through design practice (p. 56) while pointing out a specific way of working with a critical approach. Design research, in this sense, requires the practitioner to be critical about their own work through the work itself, which brings out the importance of its context. Their 'PhD by Project' model, takes into account that projects are publications since they simultaneously question, examine and reflect the past experiences as the designers are practicing on their current work. This model also challenges the separation between research and practice as the processes of "discovery, integration, application and dissemination" (Blythe & van Schaik, 2013, p. 60) happen in both research and practice where a separation becomes ambiguous, or even unnecessary.

The reflective practice model, as stated by Blythe and van Schaik (2013), focuses on the problem of disassociation similar to what is being discussed about the different effects of critical distance and proximity. Their model consists of the following processes: 'reflecting on' an existing work requires telling the back story, recalling aspects and placing them in a new context of design (p. 61); 'reflecting in' the act of designing where the two become simultaneous; 'reflecting for' future moves and potential future designs that are to emerge (p. 62). This model points out the significance of time, not as a constraint to be limited by; but as a notion that relates these different processes that are taking place. This action is a dynamic and perhaps transformative reflection, emphasizing the focus on the context of production.

The quality of reflectivity relates to the discussion on the distance that has been projected onto the notion of objectivity, which splits practitioner and practice in a way that the context of practice becomes neglected or even irrelevant. The proposition of a 'creative ecology of practice' by Hélène Frichot (2017) defines practice as a creative act of resistance which is about being "critical of the context of action" (p.139). This type of resistance refers to an action that can adapt and transform together with its context, as opposed to an immutable situation. Frichot (2017) emphasizes the context in which practice takes place and the habits that shape the process. The characteristics of the practitioner who performs the creative resistance action are one of the factors that determine the context of the practice. Therefore, the criticality of practice becomes related to the constraints and boundaries of the practitioner. This is where reflectivity is crucial in practice. Criticality is a creative process in which the agents involved in the practice carry out as they become aware of their own limits and positions.

4. Drawing as a site of critical knowledge production in design research

4.1. The relationship between criticality and drawing

The relationship between criticality and drawing have been taken into consideration under the common purpose of architectural representation. Recent studies (Pellegri, 2015; Serra et al., 2015; Grover et al., 2020; Sadokierski, 2020; Asar & Dursun Çebi, 2020; Tanrıverdi Çetin & Dülgeroğlu Yücel, 2020; Mortaş & Dursun Çebi, 2023) have shown that drawing is challenged in the field of architectural representation. Critical approaches in architectural design practices require critical positions in ways of making as well as the issues that are being raised. This section will indicate different approaches to critical drawing practices with an emphasis on drawing as a

transformative and reflective action. Through this unfolding, it is aimed to portray a shift in the established understanding of drawing as a tool for representing something other than/ outside of itself.

As a part of the existing discussion on architectural drawing, there has been an emphasis on the differentiation in the medium drawing, whether it has been produced by hand or digitally. Frascari (2007) writes that "even the digital production of architectural drawings ... fulfill the sole purpose of mechanically describing visual appearances that are utterly insignificant from a properly imaginative way of architectural thinking" (p. 2), pointing out the interrelation between imagination and drawing. This statement shows that although there has been a shift in the medium of production, the instrumentalization purpose remains; drawing is only taken as a documentation tool and not as an exploration process. Frascari then suggests that drawings are "important architectural agents, since they carry embodied in them the non-verbal essence of architectural theory" which takes drawing as an agent that embodies the architectural knowledge (p. 5). This agency of drawing causes the efficiency, precision and representation purposes to come into question.

As drawing's agency affects its relationship to knowledge production, the assigned roles do not perform a limit but rather result in another layer of information to work together with. Hamel (2007) discusses "drawing's role to confound and question as opposed to resolve" (p. 201) and points out the purpose or the attained mission of drawing. Drawing might still hold the process of documenting, recording, transmitting, explaining and instructing, however it becomes problematic, as the main issue reviewed in this article, when it is only limited to these processes. The urge to categorize, limit and make clear boundaries becomes distorted because as Hamel (2007) states "the principle of absolutes fears contamination" (p. 201). The process of asking questions through drawing reveals the ambiguities and everything else that can be overlooked for the task of production. When Jennifer Bloomer (1992) contaminated the act of drawing through 'dirty drawings', there has not only been a shift in the materiality but also everything that has been attached to the concept of representation, especially the separation between theory and practice. Bloomer (1992) distinguishes drawings into three; the first two, sketchbook drawings and shop drawings aim to document and inform construction, materiality and form, whereas the third category, dirty drawings, "aim both to exploit the power of the pornographic image and to mark the connection between it and the conventions of architectural representation" (p. 19). Through the dirty drawings, Bloomer questions, challenges and responds to the "sterility, precision, control, gender" (Rendell, 2018) qualities that have been fundamental to and established in architectural representation.

Drawing is a political act in terms of what is included, what is left out and the relationships that influence these decisions. The political quality puts emphasis on the significance of positionality and partial perspective, in this case, both to be aware of and unfold. Supporting this view, Hamel (2007) writes "to define something is to mark its boundaries" (p. 205) and "to abstract is to select, to select is to make a choice, to choose one thing is to disregard others ... (where) ideological positions are revealed" (p. 206). The question is not about how to dissolve this hierarchy, but rather to become aware of this order and what this entails in terms of design. This is possible through revealing the positionality of the drawer, which will be partial, situated and contextual as discussed in the reflective quality of research.

Although there is a great variety of approaches that deal with drawing within the realm of representation and problematize this relationship, it is argued that drawing has been taken into account as a word or a concept and not as an action. If there is an established understanding of what a drawing is - precisely what an architectural drawing is - it is difficult to approach this subject critically when there is an expectation of a similar result. Since "ambiguity is a quality rarely attributed to the criti-

cal" (Hill, 2007, p. 213) this study aims to reveal the possibilities that dwell in drawing rather than producing a description. The discussion on drawing can also be pursued for modeling. Starkey (2007) points out that "architectural theorists use the modes of drawing and writing to theorize their work, but they rarely use the architectural model as a critical or theoretical tool" (p. 231), and discusses models 'of ' something else, models 'for' something else (p. 233) and models that 'generate' design ideas instead (p. 234).

These views on the scope of drawing (what is included and left out) propose a critical approach since they contain discussions on the medium, tools, processes, materiality of drawing as well as its relation to imagination, agency, role to question, select, choose, position and embody architectural knowledge. If critical knowledge is a type of knowledge that emerges from practice, then the context of that specific practice comes into question. Such discussions that examine the context of practice or the context of action imply a possibility of transformation.

4.2. Actions that constitute drawing

In order to approach drawing critically, the embedded actions within drawing that shapes its boundaries are to be revealed. These boundaries, however, are not to be discarded, but to be worked together with. Hill (2013) writes that "the term design comes from the Italian word disegno, meaning drawing" (p. 76) and suggests that "the original meaning of design -the drawing of a line and the drawing forth an idea- remains valuable to architectural practice and research as long as its limitations are acknowledged and challenged" (p. 90). In this sense, challenging the notion of drawing and exposing the embedded actions within, becomes a critical practice in itself. This adds another layer to the relationship between criticality and drawing; which is not only about the subject and context or the tools and medium of drawing, but about what drawing consists of as an action in itself.

In order to unfold drawing, the embedded actions within the notion will be shown through a dictionary review (Online Etymology Dictionary, n.d.; Merriam-Webster, n.d.). When the notion of drawing unfolds, the actions that already dwell within drawing become visible. These embedded actions will be selected according to their reflection in bodily motion and possibility of bringing different concepts in proximity. This relates to spatiality and disciplinarity issues that were raised previously. It is intended to open up the conditions of drawing and its relation to representation. For the latter part of this section, two case studies will be presented, which approach drawing through action and express the potential of the body as an agent in a critical practice. It is argued that these examples provide an embodied approach to drawing.

Draw apart, draw away, draw back, draw from, draw in, draw into, draw off, draw on, draw out, draw up, draw upon and more. This group involves an action embedded in the word which can also be expressed in bodily motion. When drawing is taken as a bodily motion, it starts to lose its tight bound to the realm of two dimensionality and exposes the embedded notion of time and place. Since motion is a spatial action within and depending on a specific time and place, drawing's context comes into question.

Draw a lesson, draw a meaning, draw a parallel between, draw advantage from, draw attention to, draw an audience, draw a breath, draw close, draw conclusion, draw information, draw inspiration, draw reaction, draw a line, draw together and more. This group involves a relationship that is attained through bringing different concepts in proximity. This is clearly related to the multi/inter/trans/cross disciplinarity question that is an ongoing part of the design research discussion.

The relationship between the actions within drawing is not defined by the format of the table as shown (Figure 1), since these relationships are defined by their context. Aarhus Arc study by David Gersten and Arts, Letters & Numbers (2012) investigates the actions of drawing that infiltrates into a border/wall. The co-constructed semicircular wall is positioned inside the architectural studio space as defining a new

boundary. When the border/wall is established, it separates the studio into sections. Along with the live video and images projected onto it, the border/wall begins to accommodate different locations in itself. A different spatiality comes about even though the physical features of the border/wall do not change. Through the interventions by the workshop participants, the form of the border/wall begins to change. Along with the actions of drawing, the drawing tools and drawing bodies used also interfere with the border/wall. Different agents communicate with each other through the constructed boundary. The border/wall becomes a boundary that can be inhabited and turns into a space that is both separating and enabling to establish new connections at the same time.

As this work records, punctures, extends the boundary of the wall and the studio space; documents, frames, separates, gathers the process of working together; draws information from the environment and draws together a critical approach in architectural education (Figure 2), it becomes evident that the actions of drawing can not be reduced to a medium, scale, dimension or common instrumentalized purpose.

Drawing Restraint, an ongoing project since 1987 by Matthew Barney questions the scope of drawing as a bodily action that results in spatial transformation and provides insight into how to expand the discussion on the actions of drawing. Through this example, it also becomes possible to understand the scope of critical practices, as in what constitutes a critical practice. Within Drawing Restraint (Barney, 1987-2005), each 'path' (or study) consists of action, drawing and sculpture categories. These categories remain throughout different paths, however, they vary in medium, size, location or time. The studies are not limited to the established formal qualities of the categories. As stated in the title, limit, boundary, restraint are taken as notions to explore and engage with. For each path, information on drawing tool, medium and an explanatory text is included along with a section scheme of the planned performance (Figure 3).

draw apart,	separate break off cut off insulate	draw a lesson,
draw away,	distract confuse divert	draw a meaning,
draw back,	retract reduce deduct	draw a parallel between,
draw from,	reason figure out infer speculate gather suppose	draw advantage from, draw attention to, draw an audience,
draw in,	absorb accept constrict	draw a breath,
draw off,	crack puncture tap	draw close,
draw on,	use to advantage rely on extract	draw conclusion, draw information,
draw out,	elongate protract drag extend	draw inspiration,
draw up,	document compose frame	draw reaction, draw a line,
draw upon	record recruit	draw together

Figure 1. *Selected acts that constitute "to draw" (Online Etymology Dictionary, n.d.; Merriam-Webster, n.d.) (prepared by the author).*

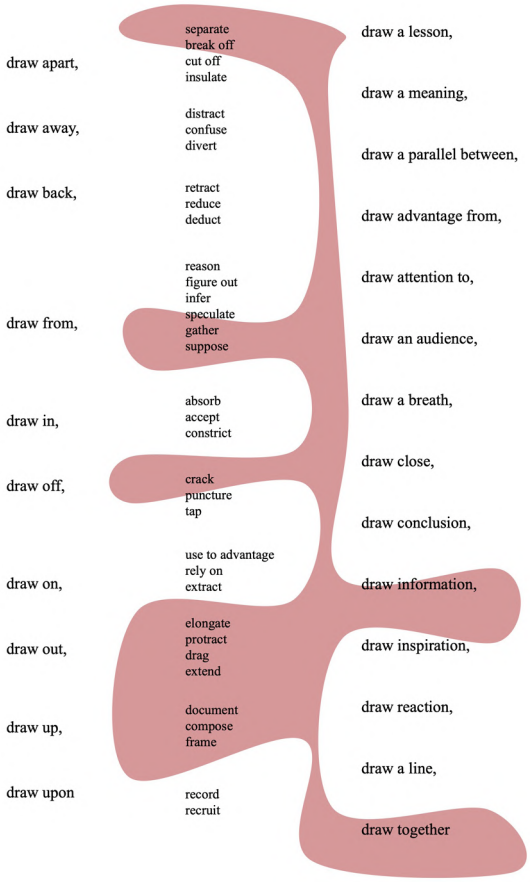

Figure 2. *Selected acts that constitute "to draw" for the particular example (prepared by the author).*

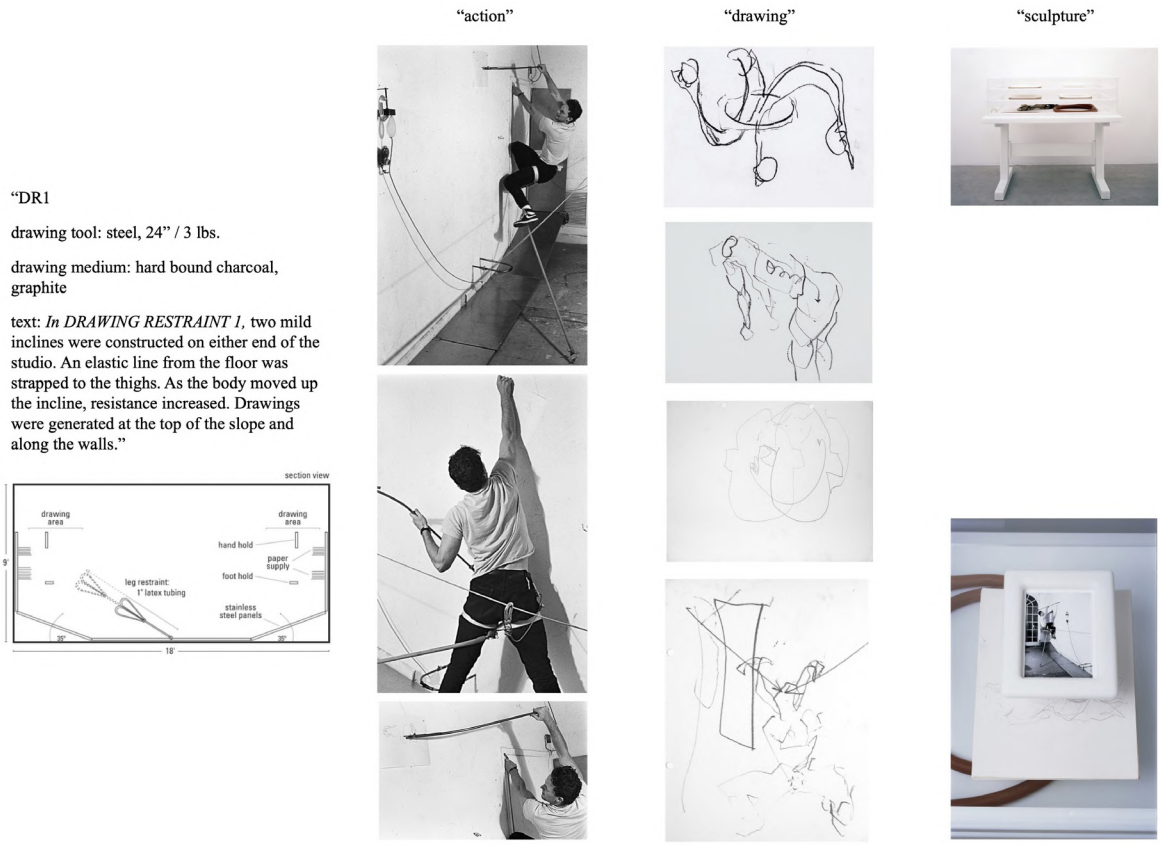

Figure 3. *Matthew Barney, Drawing Restraint 1, 1987. Table showing information on drawing tools, medium, action, drawing and sculpture. Table by the author, photographs and information by Matthew Barney.*

For the scope of this study, 'actions' that are involved on these paths become significant. From Drawing Restraint 1-23, each study requires different actions that are shaped by their context and transform their context in return. As the context of the performance changes (interior, exterior, open, high, closed, unstable and so on), actions differ accordingly. Although the actions can be seen as the bodily action of the performer/artist, it can also be understood that space and production are also fragments of these actions that have been gathered on paths; reach, lean, bend, touch, jump, pull, limit, climb, hold on, leave a mark, push, pull, hold, overturn (Figure 4).

As these actions provide insight into the actions of drawing, it becomes possible to question the term 'embodiment'. Embodiment, in relationship to the body, often comes up as a concept or a physical threshold rather than an agent of research. These studies do not take the body within the boundaries of daily action but physically expand it in relation to space, therefore have the possibility to result in a spatial transformation. In later studies, the performance moves towards a collective path, as the physical restraint of a single body is extended by working together. This example shows that drawing, as an action, can be taken as a research methodology, while still maintaining its earlier properties (such as leaving a mark). In this analysis, it can be argued that Drawing Restraint appears to be closer to the group on 'the relationship between bodily motion and space' whereas Aarhus Arc relates more to 'bringing different concepts in proximity' since it problematizes the boundaries of architectural education through practice. Through these two examples, along with the introduction that unfolds the notion of drawing, it is observed that drawing and the actions associated with drawing generate a site of exploration.

When criticality is considered as an approach that seeks change and transformation which is generated through the practice itself, these examples perform critically as the scope of drawing is questioned. By solely looking at the actions embedded in drawing, it can be

argued that the boundaries of drawing expand or become inhabitable, new relationships emerge or interactions become materialized. Questions regarding drawings relation to the body of the drawer, the space of practice or the agents of this process become evident as the practice unfolds.

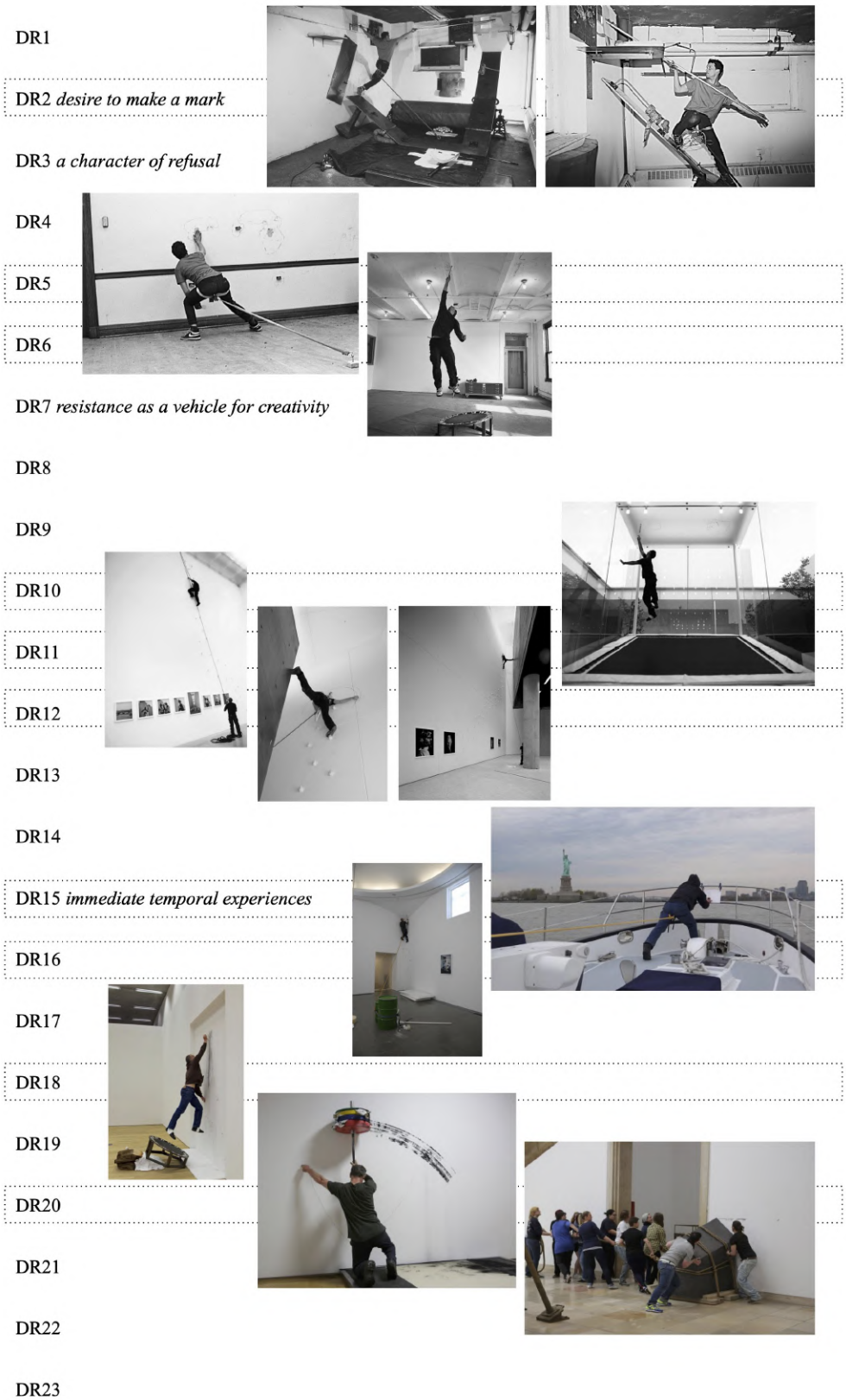

Figure 4. *Matthew Barney, Drawing Restraint 1-23, 1987-2015. Table on different drawing actions. Table by the author, photographs and information by Matthew Barney.*

4.3. Drawing as a site of critical practice

In order to explore how drawing is considered as a site of critical knowledge production, Rendell (2007b) states that "the re-making of a drawing raises questions of its site in terms of cultural context and architectural production and reproduction" (p. 183). Rendell (2007b) further elaborates on drawing that "does not attempt to re-stage history 'as it really was', but rather explore historical knowledge as an ongoing reconstruction in the present, located somewhere between fact and fiction" (p. 187). Both considerations bring out the context of drawing, not as something to be represented through, but something that is already in the process of drawing, allowing the actions to reveal the context that it takes place in and is shaped by. As the time of drawing and the place of drawing comes into discussion, the imaginative aspect of the process begins to be included, which was left out for the purpose of instrumentalization as a tool for representation.

When drawing is considered as a site of critical, embodied and situated knowledge production, its separation from the context of time, place and spatiality becomes a significant quality. In this sense, Aarhus Arc is a site of a critical approach to architectural education, which is not represented, but reproduced in a different context (the border/wall of studio space) through drawing. It becomes evident in the works that have been reviewed, that criticality is still discussed and challenged. In order for these discussions to result in transformation, two issues have become crucial. The disciplinarity aspect is to be taken into account as practicing a discipline while questioning its own methods, structures, hierarchies and relationships. This is where the embodied and self-reflective qualities of the practice come as a defining feature. The criticality aspect, on the other hand, does not only reside in the content and the scope of the practice, but also in the ways of making, taking action, and generating knowledge. Taking drawing as an action or taking action in drawing interferes with both issues that have been recurring in design research on different scales of spatial practice.

In Actions of Architecture, Hill (2003) writes "drawing a building or building a drawing ... great pleasure and creative tension exists where they overlap, one feeding the other" (p. 25), which is not only about a process of translation, but a site of action that has been defined or fixed in place through the established notions of an organizational structure over time.

5. Conclusion

This article lays out a study within design research in architecture that investigates the actions embedded in drawing, which are not limited to what drawing is about, but instead looking into what drawing already is. This study does not intend to re-conceptualize drawing, but only to reveal what it already encompasses, in order to become transformative in design research. Drawing is a site where all of the actions that it embodies take place. This also challenges the relationship between drawing and representation including the aspects materiality, dimensionality, content and disciplinarity. Through this research, it becomes clear that in order for drawing to become a critical practice, its relationship with representation should be challenged. While drawing can still have a representative property, it is not only limited to this classification. The studies included in the third section show that working with the body with a focus on the bodily actions opens up a space where the argument unfolds through practice. This is where the transformative potential of an embodied approach becomes visible. This approach, as shown through examples, challenges the process of design research as it interferes with the established scope and methodologies of the practice.

Although the relationship between drawing and representation was challenged and discussed through this study, the critical, spatial, embodied practice still remains to be explored. In this process however, the intention is not to produce guidelines for a critical drawing practice for design research, but rather propose methods that shape

and are shaped by each context, in a dynamic and responsive nature that leads to self-reflection and a critical, embodied and situated knowledge production.

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References

Arts, Letters & Numbers. (2012). *Aarhus Arc*. Retrieved 28.07.2022 from http://www.artslettersandnumbers.com/archive/2012/aarhus-arc

Asar, H., & Dursun Çebi, P. (2020). Layering in Representation: Rethinking Architectural Representation Through Perry Kulper's Works. *AZ ITU Journal of Faculty of Architecture, 17*(3), 141-153.

Barney, M. (1987). DR1. *Drawing Restraint*, Retrieved 28.07.2022 from http://www.drawingrestraint.net/drawingrestraint/dr1.htm

Barney, M. (1987-2015). DR1-23. *Drawing Restraint,* Retrieved 28.07.2022 from http://www.drawingrestraint.net/path.htm

Bloomer, J. (1992). Abodes of Theory and Flesh: Tabbles of Bower. *Assemblage, 17*, 6-29.

Blythe, R., & van Schaik, L. (2013). What if Design Practice Matters?. In M. Fraser (Ed.), *Design Research in Architecture: An Overview*. Farnham: Ashgate Publishing.

Cunningham, D. (2007). Architecture as Critical Knowledge. In J. Rendell, J. Hill, M. Fraser & M. Dorrian (Eds.), *Critical Architecture*. London: Routledge.

Doucet, I., & Janssens, N. (2011). Transdisciplinarity, the Hybridisation of Knowledge Production and Space Related Research. In I. Doucet & N. Janssens (Eds.), *Transdisciplinary Knowledge Production in Architecture and Urbanism, Towards Hybrid Modes of Inquiry*. Springer.

Doucet, I., & Frichot, H. (2018). Resist, Reclaim, Speculate: Situated Perspectives on Architecture and the City. *Architectural Theory Review, 22*(1), 1-8.

Frascari, M. (2007). Introduction: Models and Drawings, the Invisible Nature of Architecture. In M. Frascari, J. Hale & B. Starkey (Eds.), *From Models to Drawings: On Representation in Architecture*. London: Routledge.

Fraser, M. (2013). Introduction. In M. Fraser (Ed.), *Design Research in Architecture: An Overview*. Farnham: Ashgate Publishing.

Frayling, C. (1993). Research into Art and Design. *Royal College of Art Research Papers, 1*(1), 1-5.

Frichot, H. (2017). A Creative Ecology of Practice for Thinking Architecture. *Ardeth, 1,* 139-149.

Geuss, R. (1981). *The Idea of a Critical Theory: Habermas & the Frankfurt School*. Cambridge: Cambridge University Press.

Grillner, K. (2013). Design Research and Critical Transformations: Situating Thought, Projecting Action. In M. Fraser (Ed.), *Design Research in Architecture: An Overview*. Farnham: Ashgate Publishing

Grover, R., Emmitt, S., & Copping, A. (2020). Critical Learning for Sustainable Architecture: Opportunities for Design Studio Pedagogy. *Sustainable Cities and Society, 53*.

Hamel, C. (2007). Drawing Lines of Confrontation. In M. Frascari, J. Hale & B. Starkey (Eds.), *From Models to Drawings: On Representation in Architecture*. London: Routledge.

Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies, 14*(3), 575-599.

Hill, J. (2003). *Actions of Architecture: Architects and Creative Users*. London: Routledge.

Hill, J. (2007). Weather architecture, weather drawing. In M. Frascari, J. Hale & B. Starkey (Eds.), *From Models to Drawings: On Representation in Architecture*. London: Routledge.

Hill, J. (2013). Design Research: The First 500 Years. In M. Fraser (Ed.), *Design Research in Architecture: An Overview*. Farnham: Ashgate Publishing.

Jiménez-Narváez, L. M. (2000). Design's Own Knowledge. *Design Issues, 16*(1), 36-51.

Merriam-Webster. (n.d.). Draw. In *Merriam-Webster*. Retrieved 19.12.2021, from https://www.merriam-webster.com/thesaurus/draw

Merriam-Webster. (n.d.). Draw. In *Merriam-Webster.* Retrieved 19.12.2021, from https://www.merriam-webster.com/dictionary/draw

Mortaş, M., & Dursun Çebi, P. (2023). From Actualization to Virtuality: Differentiations of Becoming in Bryan Cantley's Critical Architectural Representation. *AZ ITU Journal of Faculty of Architecture, 20*(1), 147-162.

Online Etymology Dictionary. (n.d.) Draw. In *Online Etymology Dictionary.* Retrieved 19.12.2021, from https://www.etymonline.com/word/draw

Pellegri, G. (2015). Survey and Drawing Representation of Architecture and Environment: Different Teaching Approach for Architects and Engineers. *Social and Behavioral Sciences, 174,* 4090-4095.

Rendell, J. (2006). *Critical Spatial Practice.* Retrieved 28.07.2022 from https://janerendell.co.uk/wp-content/uploads/2009/06/critical-spatial-practice.pdf

Rendell, J. (2007a). Introduction: Between Criticism and Design. In J. Rendell, J. Hill, M. Fraser & M. Dorrian (Eds.), *Critical Architecture.* London: Routledge.

Rendell, J. (2007b). Seeing time/writing place. In M. Frascari, J. Hale & B. Starkey (Eds.), *From Models to Drawings: On Representation in Architecture.* London: Routledge.

Rendell, J. (2013). A Way With Words: Feminists Writing Architectural Design Research. In M. Fraser (Ed.), *Design Research in Architecture: An Overview.* Farnham: Ashgate Publishing.

Rendell, J. (2018). Only resist: a feminist approach to critical spatial practice. *Women in Architecture, The Architectural Review, 1449.*

Rendell, J. (2020). Hotspots and Touchstones: From Critical to Ethical Spatial Practice. *Architecture and Culture, 8*(3-4), 407-419.

Sadokierski, Z. (2020). Developing Critical Documentation Practices for Design Researchers. *Design Studies, 69.*

Serra, J., Torres, A., Llopis, J., Giménez, M., & García, A. (2015). Forget What You Have Learned: Spontaneous Drawing For The Genesis Of Architecture. *Social and Behavioral Sciences, 191,* 1128-1134.

Starkey, B. (2007). Material, Intellectual, Spiritual Modes. In M. Frascari, J. Hale & B. Starkey (Eds.), *From Models to Drawings: On Representation in Architecture.* London: Routledge.

Tanrıverdi Çetin, Ç., & Dülgeroğlu Yücel, Y. (2020). Tracing the Hidden Dimension of Line in Architectural Representation. *AZ ITU Journal of Faculty of Architecture, 17*(1), 115-128.

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An investigation related to practice of stakeholder management in Turkish construction industry

M.TÜRESOY[1]*, H.M. GÜNAYDIN[2], G. TOPÇU ORAZ[3]
[1] turesoy18@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Türkiye
[2] gunaydinh@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Türkiye
[3] oraz@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Türkiye

**Corresponding author*
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Abstract
Stakeholders and their attitudes toward a project strongly affect the overall project success. The construction projects involve numerous internal and external stakeholders that have distinct characteristics, interests, and impacts besides the conflicts and probable competition among them throughout the whole project life cycle. Project success depends on not only achieving targeted time, cost, and quality but also providing all stakeholders' satisfaction by managing effectively. This study aims to reveal the importance and necessity of stakeholder management and issues related to its implementation in current practice through experts' opinions and experiences in the Turkish construction industry. This study grounds the literature review in the context of stakeholder management issues such as stakeholder analysis, stakeholder engagement, critical success factors, and stakeholder management strategies. Researchers collected the data by using semi-structured questionnaires with in-depth interviews. The research findings indicate that effective stakeholder management can increase the probability of project success. This most relates to the impact of stakeholders and their adequate participation in the project by using a suitable stakeholder management model and plan via stakeholder management organization. The financial problems and uncertainty, lack of stakeholder engagement, change in project objectives and decisions along the project lifetime, and insufficiency of staff in the organization are the primary issues in stakeholder management. Findings underline that effective communication, stakeholder analysis, and monitoring are the significant activities of the stakehoder management process.

Keywords
Critical success factors (CSFs), Project success, Stakeholders, Stakeholder management (SM), Turkish construction projects.

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1. Introduction

Many scholars emphasized that "ignored and inadequate stakeholder management " is one of the essential causes of the failure of construction projects (Aaltonen, 2010; Bourne & Walker, 2006; El- Gohary et al., 2006; Jepsen & Eskerod, 2009; Olander, 2007; Yang et al., 2011; Zolin et al., 2012). Andersen (2008) states that overall project success is the combination of both effective project management process and the completed project as a final product. Beringer et al. (2013) consider the issue from the stakeholders' perspective, emphasizing the stakeholders' behaviors and management of them effectively as a significant factor for project success. Muliisa and Kariuki (2017) further claim that the stakeholders' interests, requirements, concerns, and apprehensions towards the project, that are not taken into account by projects' managers affect overall project success negatively. Beringer et al. (2012) state that SM should concern not only individual stakeholders but also interrelationships among them, that Yang (2014) considers as a cause of project complexity. Therefore, the complexity needs systematic and adequate project management policies and abilities considering stakeholders for achieving projects (Mok et al., 2015). Project managers who undertake the essential responsibility to ensure the meeting of needs and satisfaction of all stakeholders are also defined as significant entities for project success (Eyiah-Botwe et al., 2016). De Wit (1988) emphasizes overall project success depends on both the achievement of stakeholders and its technical performance. Eskerod and Jepsen (2013) claim that it is difficult to achieve construction projects unless focused on stakeholders and managed adequately.

This study aims to search the SM practice and circumstances in the context of the construction industry in Türkiye insomuch as a crucial aspect in overall project success. The issues of research are mainly classified as follows:

- Understanding the current practice related to SM in Turkish construction projects through expert opinions and experiences.
- Analyzing the problems related to the SM process and offering possible solutions.
- Defining the Critical Success Factors (CSFs) in SM.

The findings of this study can enhance the structure of the previous studies that contribute the theory and practice of managing stakeholders. The questionnaire survey consisting of the aforementioned main aspects aims to get information from experts who have long experiences in the construction sector. The results of this research can shed light on new perspectives for effective SM processes and assist in improving the advanced models and guidelines.

2. Stakeholder management

SM is a process of identifying, engaging, discussing with stakeholders, and growing relationships among them to get under control the debates, project's threats, and troubles. The stakeholders are a core element in construction project success via effective SM (Jayasuriya et al., 2017). SM can be discussed basically in the following five concepts.

2.1. Stakeholder theory and definitions

The concept of stakeholder evolved through Freeman's "Strategic Management: A Stakeholder Approach" that is well-known hypothetic base for the sequential developments similar to Rajablu et al. (2015) state, and various theories have been developed in stakeholder agency theory (Hill & Jones, 1992), theory of stakeholder influences (Rowley, 1997), theory of network governance (Jones et al., 1997), and stakeholder salience theory (Mitchell et al., 1997). Many scholars provided different definitions for the term stakeholder. Freeman (1984) defines it as any person or organization that has ability to affect the project success, or be affected by its consequences. Cleland (1986) describes stakeholders as individuals or organizations either under or out of the project manager's control and directly or indirectly impacted in terms of project outcomes and possess

a stake, a claim, or an interest in the project.

Many different perspectives have been improved in SM such as three aspects of classifying stakeholder theory in descriptive, instrumental, and normative (Jones ,1995), stakeholders' salience and typology (Mitchell et al., 1997), stakeholder influence strategies (Aaltonen et al., 2008; Frooman, 1999; Hendry, 2005), stakeholder response strategy (Aaltonen & Sivonen, 2009; De Schepper et al., 2014; Savage et al., 1991), stakeholder engagement (Greenwood, 2007; Strand & Freeman, 2015), the stakeholder dynamics (Aaltonen et al., 2015).

The literature demonstrates that some main concerns related to SM grouped as (1) stakeholder analysis, (2) stakeholder influence strategies, (3) stakeholder management strategies, and (4) stakeholder engagement (Nguyen et al., 2018).

2.2. Stakeholder analysis

Stakeholder analysis relates to stakeholder identification, categorization, and evaluation (Mok et al., 2015). Scholars classify stakeholders in different ways. (1) involvement and features of the relationship towards the project, (2) their claims or positions, and (3) their roles in the project.

The stakeholders are also classified according to "involvement and features of the relationship" towards the project as follows:

- *Internal stakeholders* present the formal participants via official or contractual connections with the project (Winch, 2004), those who are closely involved in the project life-cycle (Olander & Landin, 2005). They are also called primary stakeholders by Cleland (1998) and business actors by Cova and Salle (2005). Additionally, internal stakeholders are defined as owners, clients, designers, contractors, subcontractors, project managers, suppliers, process and service providers, consultants, employees, shareholders, and financiers (Newcombe, 2003; Smith & Love, 2004).
- *External stakeholders* refer to members under the effect of the project even though they do not join directly into the project, Winch (2004) also further breaks down into public and private actors. Cleland (1998) identifies them as secondary stakeholders, Cova and Salle (2005) define non-business actors. Ward and Chapman (2008) identify them as local government, regulators, local communities, environmental groups, potential users, and the media. According to Bourne and Walker (2005), Newcombe (2003), they are government establishments, the general public, legal authorities, community representatives and regional development agencies, non-governmental organizations such as activist groups, trade unions, consumer advocacy groups, etc.

The stakeholders are also classified according to "claims and positions " towards the project by different parties as follows:

- Winch (2004) defines internal stakeholders who support and contribute to the project as promoter stakeholders,and those who are against the project as opponent stakeholders.
- McElroy and Mills (2007) suggest five different kinds of stakeholder positions towards the project (1) active opposition, (2) passive opposition, (3) non-committal, (4) passive support, and (5) active support.
- PMI (2017) defines the stakeholders' positions as (1) supporter, (2) leading, (3) neutral, (4) resistant, and (5) unaware.

The stakeholders are classified according to their roles, in other word functional positions in the project, considering the actors of business, community, and government (Tikkanen & Lindblom, 1998), upstream and downstream stakeholders, external stakeholders, invisible stakeholders (Rowlinson & Cheung, 2008).

The stakeholders are also analyzed and assessed through their characteristics like *power, interest, position, and attitudes*. Yang et al. (2014) state that stakeholder attitude and behavior are critical factors affecting decision-making in SM strategies and managerial processes.

The Stakeholder Salience Model, presented by Mitchell et al. (1997),

categorizes stakeholders in terms of possession *power* to impact, *legitimacy* compared with other stakeholders, and *urgent* demands on project managers' attention. This model introduced seven types of stakeholders as follows:

- Power only, *latent*; they may not profess any abuse on the project.
- Legitimacy only means *discretionary*; if they associate with other stakeholders, they possess power in the project.
- Urgency only, *demanding*; they require managerial attention for their troubles.
- Power and legitimacy mean *powerful*; they have a crucial status in project managers' attention.
- Power and urgency are *hazardous*; they may become opponent to the project.
- Urgency and legitimacy mean *dependent*; they depend on other stakeholders to realize their requirements.
- Power, legitimacy, and urgency mean *decisive*; they are strong and highly salient in the decision-making process.

Park and Lee (2015) suggest that *power* is a tool to reach for resources that consist of human, economic, and social capital to affect the issue dynamics. Mitchell et al. (1997) define *legitimacy* as the general conjecture that the activities of existence are acceptable and relevant according to social norms, values, beliefs, and definitions. *Urgency* means the claims of stakeholders referring to time precision, risks, and priorities of the demands (Mitchell et al., 1997). It specifies the dynamics of stakeholder salience and relations among the stakeholders.

Many scholars have developed different matrices based on various characteristics of stakeholders like power/interest, influence/interest, and power/urgency to present the effects on each other.

Power and interest are widely used for the identification and assessment of stakeholders (Johnson et al., 2005; Newcombe, 2003; Olander & Landin, 2005; Yang, 2014). Besides, Newcombe (2003) indicates power/predictability matrix; Mendelow (1981) power/dynamism matrix; Aaltonen et al. (2015) salience/position matrix; Bourne and Walker, (2005) vested interest-impact index; Olander (2007) the external stakeholder impact index improve as well-known tools for stakeholder analysis.

Bourne and Walker (2005) introduce the *Stakeholder Circle* to map their power and impact so that the key project stakeholders are identified and prioritized by project managers. In addition, *Social Network Analysis* has provided to describe the relationships among stakeholders within the network pattern (Wasserman and Galaskiewicz, 1994). It causes to understand stakeholders' structural interrelationships and interdependency rather than only determining their characteristics. Each stakeholder is examined in terms of network level, actor level, and tie level through the social network perspective. Network level refers to communication flow and performance and indicates the collaboration and involvement of stakeholders. Actor level refers to the location and distance of stakeholder to other members in terms of centrality. Finally, the tie level indicates weak and strong relational ties among the stakeholders. Hence, the social network approach enables the project managers to analyze and comprehend the stakeholder interrelations with the environment. Since specific stakeholder characteristics cause many struggles to be dealt with by project managers, they should apply appropriate strategies for effective stakeholder management (Nguyen et al., 2018).

2.3. Stakeholder influence strategies

Stakeholder Influence refers to the policies to realize the stakeholders' needs and to force project managers to take consideration in the decision-making process (Nguyen et al., 2018). Aaltonen et al. (2008) describe diverse approaches including:

- *Direct restriction*: Stakeholders may constrain projects to attain significant resources under control, to maximize their sense of authority.
- *Indirect restriction*: Stakeholders may prevent to reach the resources even though they do not directly control them.

- *Resource building:* Stakeholders obtain and collect the crucial resources to raise their assumed power.
- *Alliance building:* Stakeholders form unions with different projects' participants to enhance their assumed authority and validity.
- *Conflict growth:* Stakeholders try to create some conflicts and escalate them in different purposes so that the project transforms into a battle area. It might produce a scene in which stakeholders' demands are considered more legitimate.
- *Reliability creating:* Stakeholders enhance their sense of legality through obtaining reliable and efficient means, for instance, prominent persons with good reputation and connections.
- *Communication:* Stakeholders utilize certain kinds of media to connect and enhance the sense of legality and urgency of their demands.
- *Direct action strategy:* Stakeholders arrange remonstrations, road blockades, or other protests to raise the perceived urgency of their demands.

Abovementioned approaches can support the stakeholders to increase their power and provide the validity of demands. Stakeholders generally take advantage of coalition building and communication to influence the decision-makers.

2.4. Stakeholder management strategies

SM Strategies are determined and used by the project management organizations as approaches and policies that might alter the level of stakeholders salience or those of positions and attitudes towards the projects (Aaltonen et al., 2015). Managers might diversify the strategies by considering the stakeholders positions and conditions of the project (Olander & Landin, 2005). Pacagnella Junior et. al (2015) suggest four strategies as follows:

- *Collaboration strategy* contributes stakeholders to avoid possible risks and increase the motivation for the project.
- *Involvement strategy* encourages stakeholders for active engagement by revealing the advantages and benefits of the project.
- *Monitor strategy* observes and controls stakeholders carefully during all project stages, approves their change constantly.
- *Defense strategy* lessens or removes negative impacts originated by participants.

Furthermore, these strategies, exchange the knowledge, and ignorance for managing stakeholders are also concerned as *stakeholder response strategies*. The other approaches project managers can use in response to stakeholders' impact are as follows (Aaltonen & Sivonen, 2009).

- *Adaptation strategy;* complying with claims and orders
- *Compromising strategy;* the discussion, taking notice and agreement
- *Avoidance strategy;* slacken ties among the participants, removing the responsibility
- *Dismissal strategy;* overlooking, ignorance and not paying attention
- *Influence strategy;* forming the values by taking action, sharing information, and building relationships

2.5. Stakeholder engagement

Chinyio and Akintoye (2008) and Greenwood (2007) state that "stakeholder engagement" relates to communication, involvement, and improvement of interactions among the stakeholders and considering their thoughts in the decision-making process during the whole project lifecycle, similarly Cascetta et al. (2015) also indicate. The purposes of stakeholder engagement are (1) to prevent and reduce possible stakeholder conflicts according to Deegan and Parkin (2011) and Aaltonen (2011); (2) to implement an open and clear decision-making process via stakeholders' feedback and contributions as Cascetta et al. (2015) state; (3) to give the chance to voice stakeholder views (Turner & Zolin, 2012).

The two essential concerns of stakeholder engagement are *involvement* and *participation* (Nguyen et al., 2018). It leads and encourages the stakeholders both informing and consulting towards the project. The five stages of

involvement proposed by Luyet et al. (2012) are as follows:

- *Information*; collecting and sharing information and knowledge related to the project with stakeholders.
- *Consultation*; presenting the project's issues to stakeholders, collecting suggestions and information to conclude by regarding or disregarding the participants' characteristics.
- *Co-decision*; cooperation with participants to solve the problems.
- *Empowerment*; gaining credit over the circumstances and outcomes, letting the stakeholders make a decision.
- *Collaboration*; creating an atmosphere to meet common goals by sharing information and knowledge, building trust and mutual respect among the stakeholders.

Stakeholder participation provides a higher level of engagement to avoid possible problems among stakeholders and remove the resistance towards the project.

3. Research methodology

This study adopts qualitative and quantitative research approaches and develops in three stages. First is the literature review providing main issues such as stakeholder identification and analysis, SM strategies, and CSFs in effective SM. Many scholars suggest numerous CSFs through different studies. They signify that the external factors and characteristics of project, stakeholder identification and analysis, stakeholder classification and assessment, stakeholder dynamism, stakeholder engagement and empowerment, appropriate SM strategies, monitoring and control of the process, continuous support and effective communication are the essential activity groups in effective SM. Therefore, the experts comment the CSFs list with 31 items that presents abovementioned groups in this study.

Secondly, researchers direct the semi-structured questionnaire survey that consists of three sections and face-to-face in-depth interviews with ten experts based on a 5- point Likert Scale with the total duration of interviews taking approximately 30 hrs in two months in 2021. The evaluation

Table 1. *The evaluation of research questions.*

Research Questions Section B- Section C	unimportant / important	disagree / agree	negative/ positive
importance of stakeholder and stakeholder's type, impact level of main activities in SM, change of stakeholders' positions	X		
impact of SM on project success criteria, stakeholder participation, issues and activities to improve SM, characteristics of SM model		X	
interaction of procurement route and SM			X
CSFs in SM (project characteristics, stakeholder analysis / dynamics / engagement and empowerment		X	

due to the research questions' logic as in Table 1, and scores from 1 to 5 vary as follows:

1: extremely disagree, *2*: disagree, *3*: neutral, *4*: agree, *5*: extremely agree

1: extremely negatively, *2*: negatively, *3*: neutral, *4*: positively, *5*: extremely positively

1: unimportant, *2*: somewhat important, *3*: quite important, *4*: very important, *5*: extremely important

The Relative Importance Index (RII) for each finding/item from the survey is calculated and ranked accordingly. Finally, the discussion and conclusion take place after assessing the results.

3.1. Survey concept

The questionnaire survey consists of three sections. Section A contains experts' professional characteristics. Section B aims to understand the current practice in SM and its importance in construction project success, problems and possible solutions. Section C inquires about CSFs in the stakeholder management process. The experts evaluate the aspects within each section according to their experiences through the 5-point Likert Scale mentioned above.

3.2. Questionnaire administration

The questionnaire has been purposely directed to selected experts by considering their competence level and positions in construction projects to provide the required data. The interviews take approximately 30 hrs with ten experts who are actively associated with project management in more than 25 years of experience. Survey also acquires the experts' views and comments through some open-

Table 2. *Experts' profile.*

		Field of employment					Professional title						Sector of employment			
Experts	Years in experience	Design / Project	Construction / Building	Quantity surveying / Cost	Consultancy	Business development	Project director	Project / Construction mng.	Contract manager	Construction chief	Designer	Consultant	Public	Private	Public+Private Partnership	Consortium
1	+25	x	x	x	x	x					x	x		x	x	x
2	+25		x					x						x		
3	+25	x	x								x			x		
4	+25		x		x							x		x		
5	+25	x	x	x	x		x				x		x	x		
6	+25		x					x						x		
7	+25	x	x				x		x		x			x		
8	+25			x			x						x	x		
9	+25		x	x			x	x					x	x		
10	+25	x	x					x						x		

ended questions. A limited number of experts participate in in-depth interviews, but their specialty areas and qualifications vary in professional status as information in Section A.

3.3 Ranking approach

Relative Importance Index (RII) given by formula below is to evaluate and rank each response based on the experts' scores obtained from the survey (Zarewa, 2019).

$$RII = \frac{\Sigma W}{A * N}$$

W = weight to each attribute from the experts (Likert scale 1 to 5).

A = the highest weight (it is 5)

N = total number of experts (In this survey it is 10)

RII Value ranges between 0 and 1. The higher RII value shows its impact level and ranking is high in effective SM.

4. Findings and analysis

The findings of this study explained are as follows.

4.1. Experts' profile

Table 2 shows the experts' profiles based on years of experience, professional titles and sector of employment. All of them have professional experiences more than 25 years. They have experience in different areas and professional calling in construction projects. They have been mostly in the private sector of employment.

The breakdown of the experts based on the type of projects involved are as follows:

(1) Housing %19, (2) Shopping mall %16, (3) Trade building %13, (4) Office building %10, (5) Industry, factory %9, (6) Educational building %6, (7) Transportation %6, (8) Mixed building (house+ trade) %6, (9) Hotel, recreation building %6, (10) Health centres %3, (11) Logistic, warehouse %3, (12) Sport facilities %3

The experts have been involved with various project types and sizes. The size of projects diversifies from 20.000 m^2 -30.000 m^2 to more than 200.000 m^2. The projects in remarkable sizes from 100.000 m^2 to 200.000 m^2 are logistic warehouses, housing, shopping malls, office buildings, house + trade projects, and educational buildings. The project size of more than 200.000 m^2 contains housing, shopping mall, house + trade mixed projects, sports facilities, trade buildings, transportation, and health centres.

4.2. Research questions

The following research questions are investigated based on experts' remarks and professional experiences in *Section B*.

- Different types of stakeholders' impact levels in SM
- The impact of effective SM on project success criteria
- The importance of stakeholders SM in the project's success
- The level of stakeholders' participation and its effect on projects' overall success
- The implemented activities in the context of SM in construction projects
- The impact level of the main activities in SM
- Current practice of the experts in the context of SM
- The characteristics of the SM model to apply in construction projects and probable issues related to its implementation
- The requirement of an organizational unit or staff for SM
- The factors affecting the positions of stakeholders as interest, attitudes, and proximity toward a project
- The issues which occur in SM

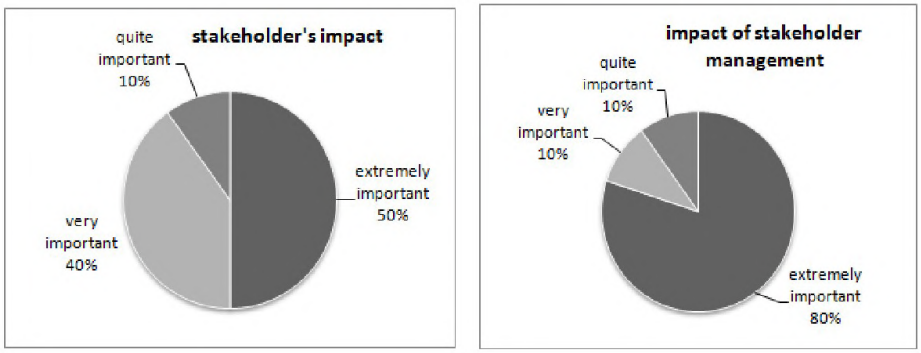

Figure 1. *The impact of stakeholders and SM on project success.*

- The activities to improve the SM
- The characteristics related to procurement route and effects on SM

In *Section C*, the research questions related to critical success factors (CSFs) in SM mentioned in four main groups (1) project characteristics, (2) stakeholder analysis, (3) stakeholder dynamics, and (4) stakeholder engagement and empowerment.

4.3. Survey findings

Experts indicate how the impact levels of stakeholders is respectively. According to RII values in the first five ranks, internal stakeholders are such as; (1) owner, client, investor, (2) project management team, (3) contractor, (4) design team, and (5) staff/employees. External stakeholders are (1) local government, (2) shareholders, (3) sponsors, (4) public services, and (5) central government.

Some findings supposed to affect the construction project through following hypotheses from H1 to H8 related to the impact of stakeholders, and the impact of effective SM on project success criteria (time, quality, cost, stakeholder satisfaction,and project benefit) are in Figure 1, besides the level of stakeholders' participation, requirement of SM organization and a proper SM model or plan. The framework of these relationships shown in Figure 2.

H1: Comprehension of stakeholders' views, requirements, and expectations is vital to analysis properly for effective SM.

H2: A stakeholder manager and team is necessary for the implementation of effective SM.

H3: Effective SM is crucial for overall project success.

H4: The stakeholders' participation is an inevitable concern for project success.

H5: An adequate level of stakeholder participation provides the efficient SM.

H6: A suitable SM model/plan enables the project success.

H7: An applicable and comprehensible model is necessary for effective SM.

H8: Proper project managers and SM organizations enhance project success.

Experts evaluate some expressions about the relationship between stakeholders' participation and project success that an *inadequate level of stakeholders' participation affects project success negatively* with a high RII of 0.98. They also agree that an *adequate level of stakeholders' participation affect project success* with an RII of 0.92. Thus, they approve neither inadequate nor excessive participation of stakeholders. Findings underline the necessity of an applicable SM model and the existence of an organization unit and or/and staff

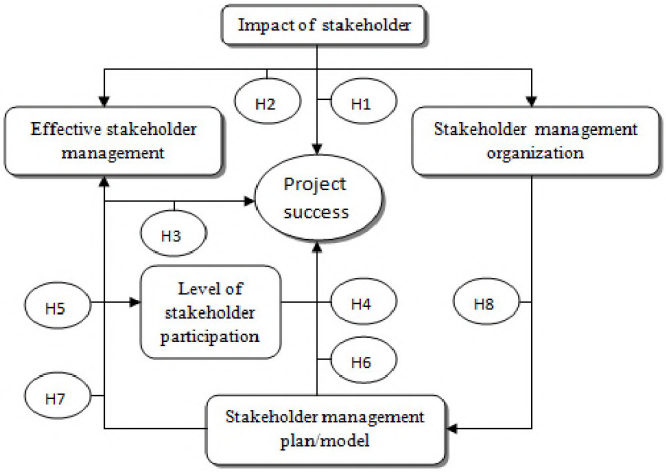

Figure 2. *The framework of relationships between SM components and overall project success.*

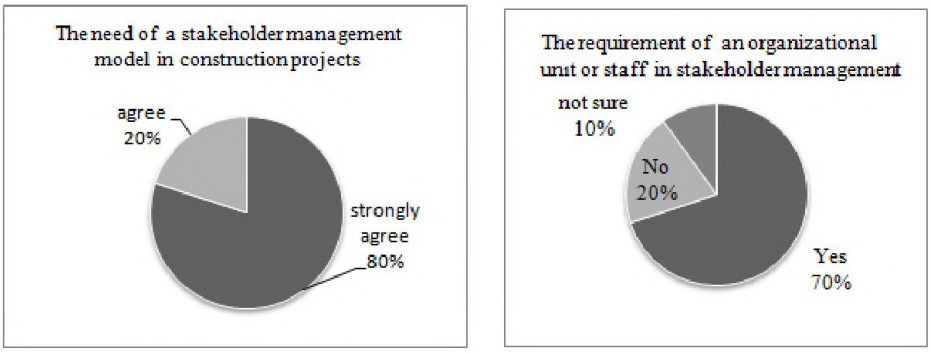

Figure 3. *The experts views in the requirement of an applicable model and organizational unit or staff in stakeholder management.*

for effective SM, as in Figure 3. The expected characteristics of an applicable model in SM are ranked below.

The experts define some expected characteristics of an SM model. Firstly "being clear and comprehensible (RII of 0.92)", secondly "proper logical structure and practical/ applicable way of use (RII of 0.90)", then "inclusive all different stakeholder groups and enhancing the stakeholder engagement and motivation (RII of 0.88)", finally "resolving conflicts between stakeholders (RII of 0.86)". Although most experts submit the necessity of an SM model, some possible problems and barriers in application are described through open-ended questions by experts' experiences in real-life practice as follows:

- Intensity of work and lack of consideration using the model adequately.
- Shortage of experience and difficulties in adaptation during the early period.
- The resistance to innovation and rejection of different management tools.
- Inadequate attitudes and mindset of stakeholders, also lack of motivation to apply the model.
- The conflicts and competitions between the stakeholders.
- The requirement of managerial procedures and guidelines for model application if necessary sanctions are applied.
- The need for responsible personnel /staff to observe the model's application process.
- Different kinds of stakeholders with educational and socio-cultural backgrounds gather in construction projects.

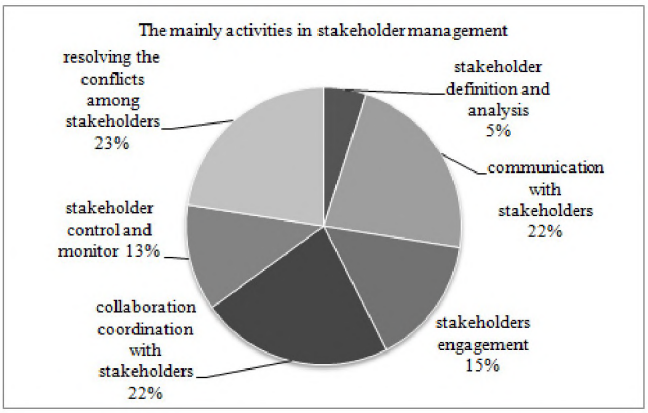

Figure 4. *The main activities of experts' current SM practice.*

The frequency of basic activities implemented by experts in current practice is shown in Figure 4. Resolving the conflicts among stakeholders, communication with stakeholders, collaboration, and coordination with stakeholders are mainly executed aspects. However, the experts also underline the essential activities in SM as (1) effective communication (RII of 0.94), (2) stakeholder analysis (RII of 0.88), (3) stakeholder monitoring RII of 0.88), (4) stakeholder engagement (RII of 0.86), (5) adequate strategies for SM (RII of 0.84). In addition, 70% of experts emphasize following their method and manner, whereas only 40% of them indicate applying the structured procedures in SM practice.

According to respondents, the factors that affect the position of stakeholders, namely, interest, attitudes, and proximity towards the project are defined in Table 3. Changes in the project's aim and objectives, lack of stakeholders' engagement, and inadequacy in sharing information are remarkable

factors that cause changes in stakeholders' positions.

The experts identify the stakeholders' nature in large-scale construction projects firstly as being numerous stakeholders (RII of 0.94), difficulty both private and public stakeholders' satisfaction (RII of 0.92), complexity and interrelationships among the stakeholders (RII of 0.86), change of stakeholders' nature in long project duration (RII of 0.86), the stakeholders from various socio-cultural backgrounds (RII of 0.84), stakeholders with conflicting interests (RII of 0.80), dynamic and unpredictable stakeholders (RII of 0.78).

The research findings show the remarkable issues related to SM in Table 4. Firstly, financial problems and uncertainty are the most significant issues, secondly, the lack of stakeholder engagement, the change of project objectives and decisions along the project lifetime, insufficient capacity in personnel /staff, lastly, ineffective conflict management, clash of responsibilities between various private and public organizations, difficulty and misevaluation for stakeholders' expectations.

The influential activities to improve SM defined are as follows. (1) trustworthiness of the SM team and the existence of SM organization (RII of 0.94), (2) ability to resolve conflicts among stakeholders (RII of 0.92), (3) effective communication (RII of 0.88), (4) balancing opponent ideas among stakeholders (RII of 0.84), (5) improving the conditions for stakeholders' collaboration (RII of 0.82).

Table 5 shows the findings of characteristics related to the procurement route and its effects on SM. The remarkable aspects are (1) collaborations among internal stakeholders, (2) open and efficient communication and monitoring, (3) defining the responsibilities clearly, (4) implementation of stakeholder analysis appropriately, and (5) avoiding conflicts and finding solutions.

Many scholars determine various CSFs to facilitate effective SM (Eyiah-Botwe et al., 2016; Hammad, 2013; Li et al., 2011; Molwus, 2014; Tsiga, 2016; Yang et al., 2009; Yang et al., 2014; Zarewa, 2019). Eyiah-Botwe et al.

Table 3. *The factors affecting the positions of stakeholders towards the project.*

The factors affect the position of stakeholders towards project	RII	rank
The change in project's aims and objectives	0.80	1
Lack of stakeholders' engagement	0.80	1
Inadequancy of share information	0.80	1
Lapse project duration	0.76	4
Lack of communication	0.72	5
Weakness of stakeholders' responsibility / empowerment	0.72	5
Lost of trust and belief against project team	0.70	7
Reduction of proximity and involvement towards project	0.68	8

Table 4. *The issues occurring in SM.*

The issues occur in stakeholder management	RII	rank
▪ Financial problems and uncertainty	0.94	1
▪ Lack of stakeholder engagement	0.84	2
▪ The change of project objectives and decisions along the project life-time	0.84	2
▪ Insufficient capacity in personel /staff	0.84	2
▪ Ineffective conflict management among the stakeholders	0.80	5
▪ Clash of responsibility between various private and public organizations	0.80	5
▪ Difficulty and misevaluation for stakeholders' expectations	0.80	5
▪ Political uncertanity in project decision and lack of engagement of public party	0.74	8
▪ Absence of project management organizations	0.74	8
▪ Lapse of project duration and vagueness for project delivery date	0.72	10
▪ Shortage of pay attention in stakeholders' performance monitoring in long term	0.72	10
▪ Lack of taking account in public welfare	0.64	12
▪ Lack of public relations and sharing information with local community	0.58	13

Table 5. *The characteristics related to procurement route and its effects on SM.*

The characteristics related to procurement route and effects on stakeholder management	RII	rank
▪ The collaborations among internal stakeholders	0.94	1
▪ Open and clear communication and monitoring	0.92	2
▪ Defining the responsibilities clearly	0.92	2
▪ Implementation of stakeholder analysis easily and properly	0.92	2
▪ Avoiding conflicts and finding solutions	0.88	5
▪ To be organized stakeholder management	0.88	5
▪ Separating the role of design and construction	0.82	7
▪ Definition of external stakeholders and engagement	0.82	7
▪ The providing suitable conditions for change management	0.78	9
▪ Integration of design and construction roles	0.76	10
▪ Participation of owner/client as from inception phase	0.64	11
▪ Participation of contractor into design phase	0.62	12
▪ Gathering all responsibility at single authority	0.56	13

Table 6. *CSFs according to RII values from survey results.*

CSFs related to project characteristics		RII	rank
1	Clearly defining project mission, goals and objectives	0.96	1
2	Good leadership and management skills	0.94	2
3	Top management support	0.94	2
4	Determining project external conditions such as political, economical, legal, ethical, cultural	0.90	4
5	Choosing appropriate procurement methods for material, finance, employment etc.	0.84	5
6	Taking account of economical, legal, environmental/ecological, ethical concerns via Corporate Social Responsibility(CSR)	0.80	6
7	Flexible project organization	0.80	6
CSFs related to stakeholder analysis			
1	Determining the stakeholders' priority and importance	0.94	1
2	Recording the commitments of stakeholders	0.94	1
3	Determining the stakeholders' tasks and responsibilities	0.92	3
4	Predicting stakeholders' potential influence on each other	0.86	4
5	Predicting and mapping stakeholders' behaviour and attitudes (supportive, opponent, neutral etc.)	0.84	5
6	Properly classifying the stakeholders according to their characteristics (power, legitimacy, urgency, proximity, interest)	0.82	6
7	Determining and assessing; Stakeholders' power (the influence capacity on other stakeholders' actions)	0.82	6
8	Stakeholders' legitimacy (legal validity of stakeholders' claims)	0.80	8
9	Stakeholders' proximity (level of closeness and involvement with project)	0.80	8
10	Stakeholders' urgency (degree of immediate attention and importance to which requires other stakeholders' claims and demands)	0.76	10
CSFs related to stakeholders' dynamism			
1	Resolving the conflicts among the stakeholders effectively	0.98	1
2	Managing effects of project decisions on stakeholders	0.92	2
3	Predicting and analysing the potential conflicts and coalitions among stakeholders	0.90	3
4	Managing the change of stakeholders' interests	0.84	4
5	Managing the change of stakeholders' influence and attributes	0.84	4
6	Predicting possible reactions of stakeholders for implementation project decisions.	0.82	6
7	Managing the change of relationship among stakeholders	0.78	7
CSFs related to stakeholder engagement and empowerment			
1	Providing effective, open and frequently communication throughout project life cycle	0.98	1
2	Sharing information with stakeholders	0.94	2
3	Establishing an appropriate way of communication with stakeholders in order to institute feedback and control mechanism	0.90	3
4	Formulating relevant strategies to manage and engage different kind of stakeholders	0.90	3
5	Improving collaboration and empowerment among stakeholders	0.84	5
6	Promoting and improving positive relations among stakeholders	0.80	6
7	Incorporate the stakeholders into decision making process	0.78	7

(2016) emphasize that the remarkable CSFs are as respectively;(1) on time and accurately identification for whole stakeholders, (2) managing stakeholders by focusing on external factors of political and cultural atmosphere, (3) open and constant communication, (4) project managers' competence, experience, leadership style and technical ability, and (5) a formal and structured SM process. According to findings of research by Molwus (2014), CSFs are ranked as (1) involving adequate project stakeholders at the inception stage and if necessary refining the project mission, (2) determining stakeholders' interest in the project, (3) communication properly and frequently, (4) understanding how project decisions affect stakeholders, and (5) resolving conflicts among stakeholders.

On the other hand, Yang et al. (2009) define the highly prioritized CSFs as (1) managing stakeholders through social responsibilities (legal, economic, environmental and ethical), (2) defining the stakeholders' requirements and constraints to the project, (3) communicating with and engaging stakeholders properly and frequently, (4) comprehending the area of stakeholders' interests, and (5) identifying stakeholders appropriately.

In this study, *Section C* inquiries the impact of CSFs through experts' opinions regarding lists in four categories and 31 items with RII values shown in Table 6.

The findings of this study significantly overlap with the mentioned studies from the literature; they indicate the most significant CSFs as (1) resolving the conflicts among the stakeholders effectively, (2) providing effective, open, and constant communication throughout the project lifetime, (3) clearly defining project mission, goals, and objectives, (4) determining the stakeholders' priority and importance, (5) good leadership and management

skills, (6) top management support, (7) recording the commitments of stakeholders, and (8) sharing information with the stakeholders.

The findings obtained from both the literature and this study underline that the remarkable CSFs in effective SM are effective communication, identifying and understanding the stakeholders by analyzing properly, and competency in management skills. However, the experts assess some CSFs with lower RII scores as stakeholders' urgency, incorporating the stakeholders into the decision-making process, and managing the change of relationships among the stakeholders. Above all, CSFs requires efficiency in organizational and managerial skills.

5. Discussion and conclusion

The literature review clarifies that both the construction industry and the academic world pay attention to effective SM. Overall project success depends upon not only targeted time, cost, and quality criteria called the "iron triangle" but also stakeholders' satisfaction, benefit, and technical performance of the project. This study justifies that the experts admit the significance of the subject matter in the Turkish construction industry, as well. The findings of the research show the remarkable factors for project success as (1) impact of stakeholders, (2) adequate level of stakeholders' participation, (3) accurate and continual SM, (4) requirement of management team/ organization, and (5) an appropriate stakeholder management model/plan. Although these results conform to previous studies, most experts apply their methods and approaches using learned lessons in current SM practice. It might lead the scholars to produce managerial guidelines and a structured formal model/plan to facilitate the SM process.

The human factor is the decisive element in the effective SM. Unless a competent management team, responsible and involved individuals, and stakeholders exist, it is difficult to achieve an effective SM.

The experts confirm that the most significant activities are efficient communication, stakeholder analysis, stakeholder monitoring and control, stakeholder engagement, and proper strategies for stakeholder management for an ideal SM scene. However, they state that the most applied activities in their current SM practice are resolving conflicts among stakeholders (23%), communication (22%), and collaborating with stakeholders (22%) with respect to application percentage. On the other hand, stakeholder monitoring and control (13%) and stakeholder analysis (5%) are applied more infrequently. These activities can be facilitated by suggesting more applicable methods in future studies. The findings further shed light on problems regarding current SM practice as (1) financial problems and uncertainty,(2) lack of stakeholder engagement, (3) the change of project objectives and decisions along the project lifetime, (4) insufficient capacity in personnel /staff, (5) ineffective conflict management, (6) clash of responsibility between various private and public organizations, and (7) difficulty and misevaluation stakeholders' expectations. All of these problems underline the organizational problems.

According to research findings, influential activities to improve SM have been suggested as follows. (1) the trustworthiness of the SM team and the existence of the SM organization, (2) the ability to resolve conflicts among stakeholders, (3) effective communication, (4) balancing opponent ideas among stakeholders, and (5) improving the conditions for stakeholders' collaboration. The ideal model for SM can use these criteria for developing an effective process and policies.

The characteristics related to the project procurement route and its effects on SM are (1) collaborations among internal stakeholders, (2) open and efficient communication and monitoring, (3) defining the responsibilities clearly, (4) implementation of stakeholder analysis appropriately, and (5) avoiding conflicts and finding solutions. Many scholars suggest several CSFs considering the overall project domain and the characteristics of the project and stakeholders for a successful SM process. In this study, the essential CSFs are as follows. (1)providing

effective, open, and frequent communication throughout the project life cycle, (2) resolving the conflicts among the stakeholders effectively, (3) clearly defining the project mission, goals, and objectives, and (4) determining the stakeholders' tasks and responsibilities.

As a result, recognizing the current conditions and potentials of the SM process helps researchers introduce new perspectives and approaches to the subject. The study becomes better to understand the probable restraints, risks, and obstacles besides requirements and suggestions with numerous participants. The research findings are tested through different construction projects as well. Future studies might suggest efficient SM models and managerial procedures, organizations, and guidelines considering the research gaps and incoherency.

References

Aaltonen, K., Kujala, J., Havela, L., & Savage, G. (2015). Stakeholder dynamics during the project front-end: The case of nuclear waste repository projects. *Project Management Journal, 46(6),* 15-41.

Aaltonen, K. (2011). Project stakeholder analysis as an environmental interpretation process. *International Journal of Project Management, 29(2),* 165-183.

Aaltonen, K. (2010). *Stakeholder Management in International Projects.* (Phd. Dissertation). Aalto University, School of Science and Technology, Espoo, Finland.

Aaltonen, K., Jaakko, K., & Tuomas, O. (2008). Stakeholder salience in global projects. *International Journal of Project Management, 26(5),* 509-516.

Aaltonen, K., & Sivonen, R. (2009). Response strategies to stakeholder pressures in global projects. *International Journal of Project Management, 27(2),*131-142.

Andersen, E.S. (2008). *Rethinking project management: An organizational perspective*. FT Prentice Hall: Pearson Education.

Beringer, C., Jonas, D., & Gemunden, H.G. (2012). Establishing project portfolio management: An exploratory analysis of the influence of internal stakeholders' interactions. *Project Management Journal 43(6),* 16-32.

Beringer, C., Jonas, D., & Kock, A. (2013). Behavior of internal stakeholders in project portfolio management and its impact on success. *International Journal of Project Management, 31(6),* 830-846.

Bourne, L., & Walker, D.H.T. (2005). Visualizing and mapping stakeholder influence. *Management Decision, 43(5),* 649-660.

Bourne, L., & Walker, D.H.T. (2006). Using a visualizing tool to study stakeholder influence-two Australian examples. *The Project Management Journal*, *37(1),* 5-21.

Cascetta, E., Carteni, A., Pagliara, F., & Montanino, M. (2015). A new look at planning and designing transportation systems: A decision-making model based on cognitive rationality, stakeholder engagement and quantitative methods. *Transport Policy, 38,* 27-39.

Chinyio, E., & Akintoye, A. (2008). Practical approaches for engaging stakeholders: findings from the UK. *Construction Management and Economics, 26(6),* 591-599.

Cleland, D.I. (1998). Stakeholder management. In: Pinto J., (Ed.), Project Management Handbook, San Francisco, Jossy -Bass, Project Management Institute, 55-72.

Cleland, D.I. (1986). Project stakeholder management. *Project Management Journal,17(4),* 36-44.

Cova, B., & Salle, R. (2005). Six key points to merge project marketing into project management. *International Journal of Project Management, 23(5),* 354-359.

De Schepper, S., Dooms, M., & Haezendonck, E. (2014). Stakeholder dynamics and responsibilities in public-private partnerships: A mixed experience. *International Journal of Project Management, 32(7),* 1210-1222.

De Wit, A. (1988). Measurement of project success. *International Journal of Project Management, 6(3),* 164-170.

Deegan, B., & Parkin, J. (2011). Planning cycling networks: Human factors and design processes. *Proceeding of the ICE-Engineering Sustainability, 164(1),* 85-93.

El-Gohary, N.M., Osman H., & El-Diraby, T.E. (2006). Stakeholder management for public-private part-

nerships. *International Journal of Project Management, 24(7),* 595-604.

Eskerod, P., & Jepsen, A.L. (2013). *Project Stakeholder Management (fundamentals of project management).* Farnham, Surrey, England: Gower.

Eyiah- Botwe, E., Aigbavboa, C.O., & Thawala, W.D. (2016). Critical success factors for enhanced stakeholder management in Ghana. *The Scientific Journal for Theory and Practice of Socio-economic Development, 5(10),* 153-170.

Freeman, R.E. (1984). *Strategic Management: A Stakeholder Approach.* Pitman Publishing Inc. Mansfield, MA

Frooman, J. (1999). Stakeholder influence strategies. *Academy of Management Review, 24 (2),* 191-205.

Greenwood, M**.** (2007). Stakeholder engagement: Beyond the myth of corporate responsibility. *Journal of Business Ethics, 74(4),* 315-327.

Hammad, S. (2013). *Investigating the stakeholder management in construction projects in the Giza strip.* (MSc thesis). The Islamic University of Gaza.

Hendry, J.R. (2005). Stakeholder influence strategies: An empirical exploration. *Journal of Business Ethics, 61(1),* 79-99.

Hill, C. W., & Jones, T.M.(1992). Stakeholder agency theory. *Journal of Management Studies, 29(2),* 131-154.

Jayasuriya, S., Zhang, G., & Yang, R.J. (2017). *Structural Equation Model of strategies for successful stakeholder management.* AUBEA Australian Universities Building Education Association Conference, EPIC Series in Education Science, (1), 341-350.

Jepsen, A.L., & Eskerod, P. (2009). Stakeholder analysis in projects: Challenges in using current guidelines in the real world. *International Journal of Project Management, 27(4),* 335-343.

Jones, T.M. (1995). Instrumental stakeholder theory : A synthesis of ethics and economics. *Academy of Management Review, 20(2),* 404-437.

Jones, C., Hesterley, W.S., & Borgatti, S.P. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of Management Review,* 22(4), 911-945.

Johnson, G., Scholes, K., & Whittington, R**.** (2005). *Exploring Corporate Strategy: Text and Causes,* 7th edn. London: Prentice Hall.

Li, Y., Lu, Y., & Peng, Y. (2011). Hierarchical structuring success factors of project stakeholder management in construction organizations. *African Journal of Business Management, 5(22),* 9705- 9713.

Luyet, V., Schlaepfer, R., Parlange, M.B., & Butler, A. (2012). A framework to implement stakeholder participation in environmental projects. *International Journal of Environmental Management, 111,* 213-219.

McElroy, B., & Mills, C. (2007). Managing stakeholders , in Turner, J.R.(ed). *Gower Handbook of Project Management, 4th edition,* Gower Publishing, Aldershot, 757-77.

Mendelow, A.L. (1981). *Environmental Scanning-the Impact of the stakeholder* Concept. Proceedings of the International Conference on Information Systems, Cambridge

Mitchell, R.K., Agle, B.R., & Wood, D.J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review, 22(4),* 853-886.

Molwus, J.J. (2014). *Stakeholder Management in Construction Management*. (Doctoral dissertation). Heriot Watt University, Edinburgh.

Mok, K.Y., Shen, G.Q., & Yang, J. (2015) Stakeholder management studies in mega construction projects: A review and future directions. *International Journal of Project Management,3(2),* 446-457.

Muliisa, R., & Kariuki, P. (2017). Role of stakeholder management on project sustainability; A case of compassion International supported projects in Huye District of Rwanda. *International Journal of Science and Research, 6 (11),* 61-68.

Newcombe, R. (2003). From client to project stakeholders: A stakeholder mapping approach. *Construction Management and Economics, 21(8),* 841-848.

Nguyen, T.S., Mohamed, S., & Panuwatwanich, K. (2018). Stakeholder management in complex projects: Review of contemporary literature. *Journal of Engineering, Project and Production Management, 8(2),* 75-89.

Olander, S. (2007). Stakeholder impact analysis in construction project management. *Construction Management and Economics,25(3),* 277-287.

Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. *International Journal of Project Management, 23(4),* 321-328.

PMI. (2017). *A guide to the project management body of knowledge (PMBoK ® guide) (Vol. 6th; sixth edition)* Newtown Square, PA: Project Management Institute, Inc.

Pacagnella Junior, A.C., Porto, G.S., Pacifiso, O., & Salgado Junior, A.P. (2015). Project stakeholder management: A case study of a Brazilian science park. *Journal of Technology Management and Innovation, 10(2*), 39-49.

Park, H.S., & Lee, Y.H. (2015). Exploring a process model for stakeholder management. *Public Relations Journal, 9(4),* 1-17.

Rajablu, M., Marthandan, G., & Yusoff, W.F.W. (2015). Managing for stakeholders: The role of stakeholder-based management in project success. *Asian Social Science, 11(3),* 111-125.

Rowley, T.J. (1997). Moving beyond dyadic ties: A network theory of stakeholder influences. *Academy of Management Review, 22(4),* 887-910.

Rowlinson, S., & Cheung, Y.K.F. (2008). Stakeholder management through empowerment: modeling project success. *Construction Management and Economics, 26,* 611-623.

Savage, G.T., Nix, T.W., Whitehead, C.J., & Blair, J.D. (1991). Strategies for assessing and managing organizational stakeholders. *The Executive, 5(2),* 61-75.

Smith, J., & Love, P.E.D. (2004). Stakeholder management during project inception: Strategic needs analysis. *ASCE Journal of Architectural Engineering, 10(1),* 22-33.

Strand, R., & Freeman, R.E. (2015). Scandinavian cooperative advantage: The theory and practice of stakeholder management in Scandinavia. *Journal of Business Ethics, 127(1),* 65-85.

Tikkanen, H., & Lindblom, J. (1998). A network approach to international project marketing. A case study of a technology transfer project to the PRC, Working Paper No. 11, University of Oulu, Oulu.

Tsiga, Z., Emes, M., & Smith, A. (2016). Critical success factors for the construction industry. *PM World Journal, 5(8),* 1-12.

Turner, R., & Zolin, R.(2012). Forecasting success on large projects: Developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal, 43(5),* 87-99.

Ward, S., & Chapman, C. (2008). Stakeholders and uncertainty management in projects. *Construction Management and Economics, 26(6),* 563-577.

Wasserman, S., & Galaskiewicz, J. (1994). *Advances in social network analysis: Research in the social and behavioral sciences.* Thousand Oaks, California: Sage Publications.

Winch, G.M. (2004). *Managing project stakeholders.* In: Morris P. W. G. and Pinto J.K. (Eds.), The Wiley Guide to Managing Projects, John Wiley & Sons Inc., Wiley, New Jersey.

Yang, R.J., Shen, G.Q., Ho. M., Drew, D.S., & Chan, A.P. (2009). Exploring of critical factors for stakeholder management in construction projects. *Journal of Civil Engineering and Management, 15(4),* 337-3348.

Yang, R. J., Wang, Y., & Jin, X-H. (2014). Stakeholders' attributes, behaviors, and decision-making strategies in construction projects: Importance and correlation in practice. *Project Management Journal, 45 (3),* 74- 90.

Yang, R.J., Shen, G.Q., Ho, M., Drew, D.S. & Xue, X. (2011). Stakeholder management in construction: An empirical study to address research gaps in previous studies. *International Journal of Project Management*, *29(7),* 900-910.

Yang, R.J. (2014). An investigation of stakeholder analysis in urban development projects: Empirical or rationalistic perspectives . *International Journal of Project Management, 32(5),* 838-849.

Zolin, R., Cheung, Y.K.F., & Turner, R. (2012). Project managers' understanding of stakeholders' satisfaction. *Project Perspectives, 34,* 10-15.

Zarewa, G. A. (2019). Barriers to

effective stakeholder management in the delivery of multifarious infrastructure projects (MIPs). *Journal of Engineering Project and Production Management, 9(2),* 85-96.

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Overlapping of the semiotics in the fields of linguistics and architecture: A relational analysis approach

Mehdi KHAKZAND[1], Alaleh SAMIR[2*]
[1] mkhakzand@iust.ac.ir • Department of Landscape Architecture, School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran
[2] a.samir@iau.ac.ir • Department of Architecture, Faculty of Architecture, Islamic Azad University of Pardis Branch, Tehran, Iran

** Corresponding author*
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Abstract
Semiotics is a way of finding meanings by examining the relationships between signified, signifier, and text. Semiotics can be used intentionally in architecture to convey meanings through form, which is perceived differently by the user's experience. Since influencing the user's experience is the way to enhance the mutual connection between architecture and users, semiotics is significant in architecture. Given this importance, no comparison has been studied between the linkage of these two fields. Therefore, this research is required. The purpose is to discover the differentiation of the existing relationships between these two fields based on this question: "What relationship can be affirmed from the texts that have been written in the field of linguistics and architecture with the similar keyword (semiotics/semiology)?" To achieve this, the relational analysis method is needed which is a subcategory of qualitative content analysis. In this regard, 53 articles from 2005 to 2020 within the "Science Direct" source website are used as the population interest of this research. Afterward, 16 samples are selected by the snowball sampling method for depicting cognitive mappings. Thus, after finding the concepts by snowball sampling, the relationships between them are defined as codes. Results showed that six types of relationships exist among the concepts. These codes are used as a reagent indicator of the relationship types and are depicted in the suggested cognitive mapping.

Keywords
Architecture, Qualitative content analysis, Relational analysis, Semiotics, Semiotics in architecture.

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1. Introduction

Semiotics studies the process of meaning-making through signs and has a wide range of definitions. In this regard, one of the widest influential definitions in this field is mentioned by Umberto Eco (1979), whose description of semiotics is included in everything that can be perceived as a sign. At first, it only encompassed language and the debates related to linguistics, but it was developed through many fields. Indeed, Semiotics was established by Ferdinand de Saussure and Charles Sanders Peirce, whose viewpoints are considered in the most influential and related debates. Ferdinand de Saussure (2019), the founder of modern linguists, believed in placing linguistic signs in a more general-based theory, so he suggested semiology instead of semiotics. In fact, semiotics is a split in semiology. The principles that semiotics detects are those that can be used in linguistics, and therefore linguistics is specified to a particular place in the field of mankind's knowledge (ibid). Charles Sanders Peirce (2012) employed the word semiotics instead of the semiology of Saussure and thought that it was necessary to consider the interpretant as well as the sign and signifier (Peirce & Buchler, 2012). Thus, he proposed a three-dimensional system. It was from this view that biosemiotics and eco-semiotics were derived.

Saussure's theory neglected the debates about meaning and reality (Hodge, 2017), while Peirce's theory expands semiotics boundaries to various fields of meaning-making such as social, cultural, and cognitive debates (ibid). In the end, semiotics developed through many sciences like architecture, urbanism, sociology, psychology, criticism, media, and so forth, as well as becoming an approach to research methodology (Wang, 2020; Pietropaolo, 2020; Hodge, 2017). For example, the approach of semiology in the field of architecture contains an architectural mechanism, and the social-cultural background of the area with its three-dimensional perspective such as syntactic, semantic, and pragmatism (Rapoport, 1990). The architecture consists of two main categories architects and users, which are known as knowledge and instruments that can be improved over time (Prieto, 1975) with responsive functions. For all these parts, a detailed analysis of the semiotics'-based theories enables the readers to utilize semiotics as a knowledge instrument in architecture and come to an understanding of morphological aspects of architectural structures generally. This would involve examining how meaning is conveyed through architectural elements in both formic such as shape, materials, rhythm, and cognition, perception, design reasoning in content. Because architecture can intentionally convey meanings through semiotics, resulting in varied user perceptions and a significant impact on user experiences. By merging insights from semiotics in linguistics with architecture theories, can explain the origins, bases, and conduction of signs and the way of their meanings within a cultural-social context in architectural speech. In this way, architecture as a medium can create a reality, and according to Barthes (1993), reality has different modalities. So, if reality comes into existence through an architectural medium such as a built environment it conveys different meanings. As Chandler (2017), declared every medium can produce a variety of genres or styles representing parts of reality that have multiple meanings for individuals, so it is dynamic and context-dependent. It means the reality created by architecture (built environment) would be a representation of the value system of reality that is diverse, specific in style, and responsive to the social culture of society according to its time. Likewise, semiotics is a methodology itself (Wang, 2020; Pietropaolo, 2020; Hodge, 2017) that can be used in architectural procedures. Understanding the association between semiotics and architecture requires further research on signs in architectural speech and practice. However, there has been a lack of comparison between these two fields. Consequently, it is critical to conduct further research to reach a more comprehensive understanding of the relationship between semiotics and architecture can be achieved.

This research is being undertaken

to clarify the process of the influential developments of the semiotically multi-dimensional systems of Saussure and Peirce in the field of architecture through its history. To achieve this purpose, it is necessary to understand and analyze the kinds of relationships that exist across semiotics in the fields of linguistics and architecture, such as connections, coherences, subcategories, originations, and correlations. So relational analysis is needed. Furthermore, Onwuegbuzie and Leech (2007), declared that "the term "encoding" is used to make mention of the "constant comparison analysis" method, which was expressed by "the fathers of grounded theory, Anselm Strauss and Barney Glaser in 1967" (p. 565). Obviously, in this approach "meaning" can be achieved by the relationships between concepts (Carley, 1997). To represent the overall meaning of the texts, the cognitive mapping approach is used for creating a model. Consequently, the basis of this research is a qualitative content analysis method of research that according to Carley (1993), focuses on the repetitions of words or concepts within or across the texts. To study these relationships, various articles were chosen from 2005 to 2020 within the source of the Science Direct website as the population interest of this research seeks to answer the question: "What relationship can be affirmed from the texts that have been written in the field of linguistics and architecture with the similar keyword (semiotics/semiology)?" The broadly relatable importance of studying "the relationships between texts that have the similar keyword (semiotics/semiology) in the field of linguistics and architecture is the evidence of different originations of cognition and concepts that can be concluded as the frame of the suggested cognitive mapping.

2. Theoretical framework: selective related articles in the field of architecture and linguistics

The theoretical framework of this paper is based on a qualitative content analysis of texts which was obtained from the Science Direct source website within the years 2005-2020 to arrive at the concepts through the texts for drawing mental models. To do this, 53 Articles were found using a search for the keywords "Semiology/ Semiotics" from 2005 to 2020 on the Science Direct source website. Subcategories of "semiotics debates as theoretical foundations" or "semiotics as the research method" were studied in selected articles. After making sure that articles were relevant to the topic issue of this research, a table of the contents of selected articles was prepared as shown below in Table 1. This table has two main groups which are architecture and linguistics, respectively indexed with the letters "A" and "B" and comprises the population of interest in this research.

3. Method (The population of interest and sampling)

According to the purpose of this paper, the chosen research method is based on relational analysis which is a subcategory of the qualitative content analysis method of research. This method "shares many of the unique attributes associated with all qualitative research methods" (Roller, 2019, p.1). One of the approaches of this method is "relational analysis" which focuses on relationships between concepts. According to Palmquist et al. (2020), a "concept" is an ideational kernel, a single idea, and a "relationship" links two concepts that are named "statement". In cognitive networks, concepts are devoid of meaning except as they relate to other concepts (ibid). Thus, at first, the core concepts from the texts were specified as shown in Figure 1, and then the relationship between them was determined according to the next selected article and its contents from the viewpoint of the authors. In other words, the relationships between cores define the whole meaning that was obtained from the 53 articles.

As Kracauer (1952) admitted: "Only in approaching these perfect individuals with all one's being will the analyst be able to find and determine their meaning or one of their meanings, thereby assisting them in their realization" (Kracauer, 1952, p. 642-3). In the end for representing how the cores are connected and in which means, mental models are used. Carley (1990)

described mental models as an indication of connected concepts. This means mental models can visualize the perceptual realization of the conscious or subconscious by the use of representations (ibid). The population of interest for this research covers 29 articles in the architecture field and 24 articles in the linguistics field, which was shown previously in Table 1 and the method used for sampling was the snowball sampling method. Goodman (1961) describes this method as a way of achieving a randomized sample of individuals from a certain population. In this way, the first paper was selected with the consideration of general comprehensive information to achieve core concepts, and then with the snowball sampling method, the papers related to these cores were chosen.

Hence, after selecting the first paper for content analysis core concepts or "main codes" were identified. To complete data for the main codes, it was needed to discover the interactions, discussions, and categories of more pieces of information. So, later information which was defined as "subcodes" was gained with use of the snowball sampling from studying other papers' content analysis. By this means every code specified the further step of data that connects information or subsequent subcode which was directed by the snowball sampling method.

Then In this stage, articles A.1, A.2, A.3, A.4, A.7, A.11, A.12, A.14, A.15, A.17, A.20 from the architecture group and B.2, B.3, B.4, B.7, B.21 from the linguistics group were chosen as sample groups for studying.

To present gathered data in a tangible way that can be readable and make a whole knowledge and related together, cognitive mapping was used. As cognitive mappings shape relations and concepts, First, the connections among codes were discovered and then classified to make a whole meaning from all concepts. Second, the relation types were perceived and represented. As Table 2 shows six types were specified.

In both fields, all these types were found except number 4, which was only detected in the field of architecture. The core concepts were obtained through samples B.2, B.3, and B.21 which showed that language as a multifaceted human faculty can be read as several views of semiotics. In this manner, six different definitions of language describe the multi-faceted nature of language that can be studied through

Table 1. *The texts of the population interest of this research.*

Semiology						
		Authors	Year	Methodology	Case study	Location
Architecture	A.1	Brandt	2005	Critical	A painting by Matisse	Denmark
	A.2	Pellegrino	2006	Analytic	-	Switzerland
	A.3	Luck & McDonnell	2006	Empirical study	Pre-briefing conversations	UK
	A.4	Pellegrino	2006	Analytic	-	Switzerland
	A.5	Casakin	2006	Empirical study	Students of design	Israel
	A.6	Taib & Rasdi	2009	Survey, Semiotic	The perception of users towards sacredness or sanctity space in mosque	Malaysia
	A.7	Pierroux & Skjulstad	2011	Text analysis	Tate Modern Museum in London, and the National Museum of 21st Century Arts in Rome	Norway
	A.8	Wang & Heath	2011	Review	-	UK
	A.9	Kuznetsova	2011	Semiotic	Greimas semiotic theory for analyzing architectural works	Lithuania
	A.10	Mashayekhi et al	2012	Survey, comparative	The behavior of the different residents of Ekbatan residential complex	Iran
	A.11	Shafik Ramzy	2013	Semiotic	Funerary Complex of Sultan Qaitbay in Cairo, Egypt	Egypt
	A.12	Gulliver et al	2013	Organizational semiotics	The worth of particular systems in the care environment	UK
	A.13	Masatlıoğlu	2014	Interpretation of criticisms	-	Istanbul
	A.14	Baharudin & Ismail	2014	Interpretative, comparative	Prominent communal mosque found in Muslim and non-Muslim countries	Malaysia
	A.15	Mohidin & Ismail	2014	Interpretive paradigm and semiotics	Perdana Putra and Parliament Malaysia	Malaysia
	A.16	Mahdavi Nejad et al	2014	Descriptive	-	Iran
	A.17	Parsaee et al	2015	Comparative, descriptive	The residential architecture of Bushehr, Iran	Iran
	A.18	Yan	2015	Descriptive,	Design semiotics	China
	A.19	Brasher	2016	Review	-	UK
	A.20	Lazutina et al	2016	Analytic	Architecture symbols	Russia
	A.21	Anti et al	2017	Survey	Gorontalo vernacular architecture	Indonesia
	A.22	Marotta et al	2017	Comparative experiment	De Fusco, Luisa Scalvini, Luigi Brusasco, Tosoni, Borghini	Italy
	A.23	Shojaee & Saremi	2018	Semiotic	Architectural codes theory of Umberto Eco	Iran
	A.24	El-Torky	2018	Hermeneutics	Mohammad Ali's Mosque	Egypt
	A.25	Goubran	2019	Semiotic	Deductive and abductive reasoning of sustainable design	Canada
	A.26	Ferrara & Russo	2019	Hermeneutics	Italian Material Design	Italy
	A.27	Lyu	2019	Survey	-	China
	A.28	Pane et al	2020	Descriptive	Tjong A Fie's House	Indonesia
	A.29	Simanjuntak et al	2020	Semiotic	Contemporary Architecture of Batak Toba	Indonesia
Linguistics	B.1	Manning	2006	Historical, descriptive	Wealth & value	Canada
	B.2	Danesi	2006	Analytical	-	Canada
	B.3	Nuessel	2006 a	Semiotic	-	USA
	B.4	Nuessel	2006 b	Historical, cognitive	Figurative language	USA
	B.5	Anderson	2006	Semiotic	-	USA
	B.6	Perron	2006	Semiotic	Propp's model	Canada
	B.7	Bernard	2006	Analytical	The fundamental units of sign systems and process	Austria
	B.8	Wodak & De Cillia	2006	Historical, critical discourse	The Waldheim affair	UK
	B.9	Kravchenko	2007	Bio-cognitive	The code models of language used in traditional linguistics	Russia
	B.10	Mutis & Issa	2008	Semiotic	Use of symbols as signs	USA
	B.11	Cooren	2008	Analytical	-	Canada
	B.12	Moya Guijarro & Pinar Sanz	2008	Textual analysis	Kress and van Leeuwen's social semiotic analysis and Hallidayan linguistics in a picture book	Spain
	B.13	Bax	2009	Historical, diachronic, analogical	The context of medieval rhetorical practice	Netherlands
	B.14	Foote & Azaryahu	2009	Analytical	-	Israel
	B.15	Hunter	2009	Historical	The post-Kantian metaphysics of Husserl and Heidegger	Australia
	B.16	Pinnow	2011	Semiotics	English Language Learner of a Second Language classroom in the United States	USA
	B.17	Adler	2011	Semiotics	Argumentative silences that illustrated by Diaz Canales and Guarnido (2005).	Israel
	B.18	Perrin	2011	Review	Marks and marking behavior	USA
	B.19	Batu	2012	screen model	-	Turkey
	B.20	Tang	2013	Semiotics	4 series of middle school students' acts of meaning-making in nanoscience lessons	Singapore
	B.21	Yakin & Totu	2014	Comparative, content analysis	Theory of Peirce and Saussure	Malaysia
	B.22	Mazzola et al	2016	Review	-	Switzerland
	B.23	Pablé	2018	Comparative	Benedetto Croce's expression and Roy Harris' sign	Hong Kong
	B.24	Akimoto	2019	Analogical	Genette's narratological terms	Japan

Table 2. *The relationship codes of cognitive mapping that used in figures 2 to 8.*

	Relation Type	Definition
1		Branch-Subset
2		Equiponderant
3		Orientation-Eventuation
4		Gap
5		Group
6		Category

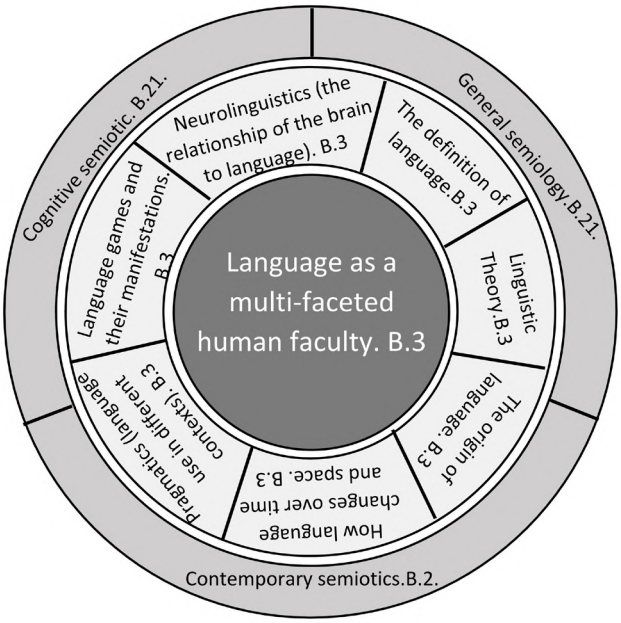

Figure 1. *Language as a multi-faceted human faculty can be read through several views of semiotics.*

various approaches of semiotics, but as core concepts, general semiotics, cognitive semiotics, and contemporary semiotics were obtained as shown in Figure 1.

4. General semiology

In Peirce's thought, anything that stands for something else can be included in semiotic studies (Peirce & Buchler, 2012) whilst Chandler (2017) expressed that semiotically, "signs can be enrolled in different states such as words, images, sounds, gestures, and objects" (p. 11). In addition to these declarations, Saussure (2019) stated that since signs exist within social life, thus, they can be studied in social or general psychology.

The most famous view of his theory is the two-dimensional system which is summarized to sign and the signifier. This relationship holds in the sign systems and the arbitrary system (Saussure, 2019). In dichotomy or duality, in the theory of Saussure, signs consist of two focal components, known as signifier and signified (ibid). The signifier is considered as the sound pattern, whilst signified or the concept is the interpretation of the signifier (ibid). Likewise, the signifier can be considered physical, form, langue, and synchronic and syntagmatic features (Yakin & Totu, 2014). Meanwhile, the signified is considered abstract, content, parole, with diachronic, paradigmatic, and associative characteristics (ibid). To this, there are two distinct pages in human minds of the special form, the notion, and sound, so that spokesmen optionally plan slight portions to link them together (Bernard, 2006).

The notion of the text is the most essential data on which a considerable amount of research on sign systems is based (Colilli, 2006). Bakhtin considers the notion of text as the main origin of all sciences of humans because there is no subject of investigation in the inexistence of text (Todorov quotes from Bakhtin, 1984). Shepherd (2012) Inferences a real-live interactive form of language from Bakhtin's texts, which is according to Bernard (2006) opposite to the Saussure theory from the sign and ideology closeness point of view. This idea is the base of the socio-semiotics and cultural-semiotics, which create different principles for dialogue, means of communication, reality, senders, and percipients (ibid). The cultural semiotics is adopted as the point for the interactionist pioneers including Robert Lafont and Ferruccio Rossi-Landi. Rossi-Landi introduces (1992) the signs in accordance with themselves naturally and apart from any communication or commentary process that relates to the social-historical connections. Alongside his works on distinguishing the signs and nonesigns, he tried to accomplish some fundamental mechanisms of production and reproduction of the signs (ibid). Rossi-Landi (2019) describes the diversity of language can lead to differentiation issues that relate to a variety of social or other human fields.

As mentioned before, the dichotomy theory of Saussure is the base for multimodal theories afterward such as linguistic structuralism, socio-se-

miotic structuralism, and post-structuralism which are the main and fundamental core for other branches of later theories and studies themselves. For instance, various schools of semiotics like Prague School, Paris School, Moscow-Tartu School, and Stuttgart School in the field of Linguistic structuralism can be referred to (Bernard, 2006), which have had many lucrative endeavors to enhance the distinguishing of the characterizing of semiotics and its progress. Through the development of Saussure's explanation of semiology by Louis Hjelmslev (1969), he achieved the totality of all sign systems in his Danish School of Glossematics. That is to say, he employed "expression-form (EF)" and "content-form (CF)" to replace the signified/signifier dyad (Hjelmslev, 1969).

In the 1960s, revolutionary innovations called poststructuralism were formed in the theoretical framework of the structuralist paradigm (Howarth, 2013). The poststructuralism theory developed invariant categories. In this regard, it can be mentioned the critical existentialism of Heidegger (2013) from transcendental phenomenology, the deconstruction of texts of Derrida (Derrida et al, 2016), the deconstruction of social contexts of Foucault (2005), the psychoanalysis of Lacan (2019), the radical human subjectivity of Zizek (2014), and so forth.

Derrida (2016) defined the word "différance" as differentiation and a delay in meanings between signifiers and signifieds. For revealing the message of a text, all signifiers' meanings relate together and decode in relation to each other (ibid). The meaning can be interpreted differently by interpretants or over time. The process of reading a text is called deconstructing (ibid). Deconstructing later became prominent in architecture in the 80s (Tallak, 1996). To deconstruct a built environment, it should be considered as a text that needs to be interpreted by referring to all the representamens, objects, and interpretants in a system of signs (Derrida, 2016). The first layer of text interprets to reach the second layer of the text, and it continues to the underlays, thus different endless meanings can be achieved simultaneously or over time (ibid).

In the 1970s, Algirdas Julien Greimas (1984) a developer of the Paris School studied Saussure theories and used the Hjelmslev legacy and also utilized the School of Glossematics tenets. In this sense, the semiotics intention is to counterfeit the tools, especially for the characterization of the verbal as nonverbal communications to inspect the articulation of the semantics in micro-universes (Greimas, 1984). According to him, the metalanguages hierarchy a descriptive level exists in this part (ibid). This is where the analyzed language through communication clarifies the semiotic theory (ibid). The analyzed instruments intricate at this procedural level, consist of concepts, procedures, and models (ibid). Eventually, the last level is epistemological, wherein the validation of analytical homogeneity coherence tools happens (ibid). The second level in the hierarchy consists of communication and the core part of the semiotics (ibid). Max Bense (1975), defined Peirce's triadic relationship of the signs with cardinal numbers in a formula. In which, the singular medium is used with the duality relationship of the object, and the triadic interpretant relation (Walther, 2016). Bense (1981), detached this triadic relationship of the signs from the Peircean triangle. The medium in the Bensean triangle is the interpretation part, which acts as a background, is perceptible, and instantly connects to the two other parts (Bense, 1981). Kristeva & Beardsworth (2020), separated the symbolic and semiotics. They borrowed the "speaking being" notion of semiotics from psychoanalysis (ibid). Thus, in her multi-influenced theory, semiotics develops in broader lines by means of sem-analysis, intertextuality, and dialogism (ibid). They developed the treatment art of the mentality in psychoanalysis which created a new vision through the verbalized faculty of thought (ibid). In general, it can be said that her exquisite theory rearranges the cultural trajectories in societies (ibid).

Baudrillard (2016), in his theory of sign, defined simulacra. He explained in post-modern societies there is a common socio-political simulation that possesses every reality with their

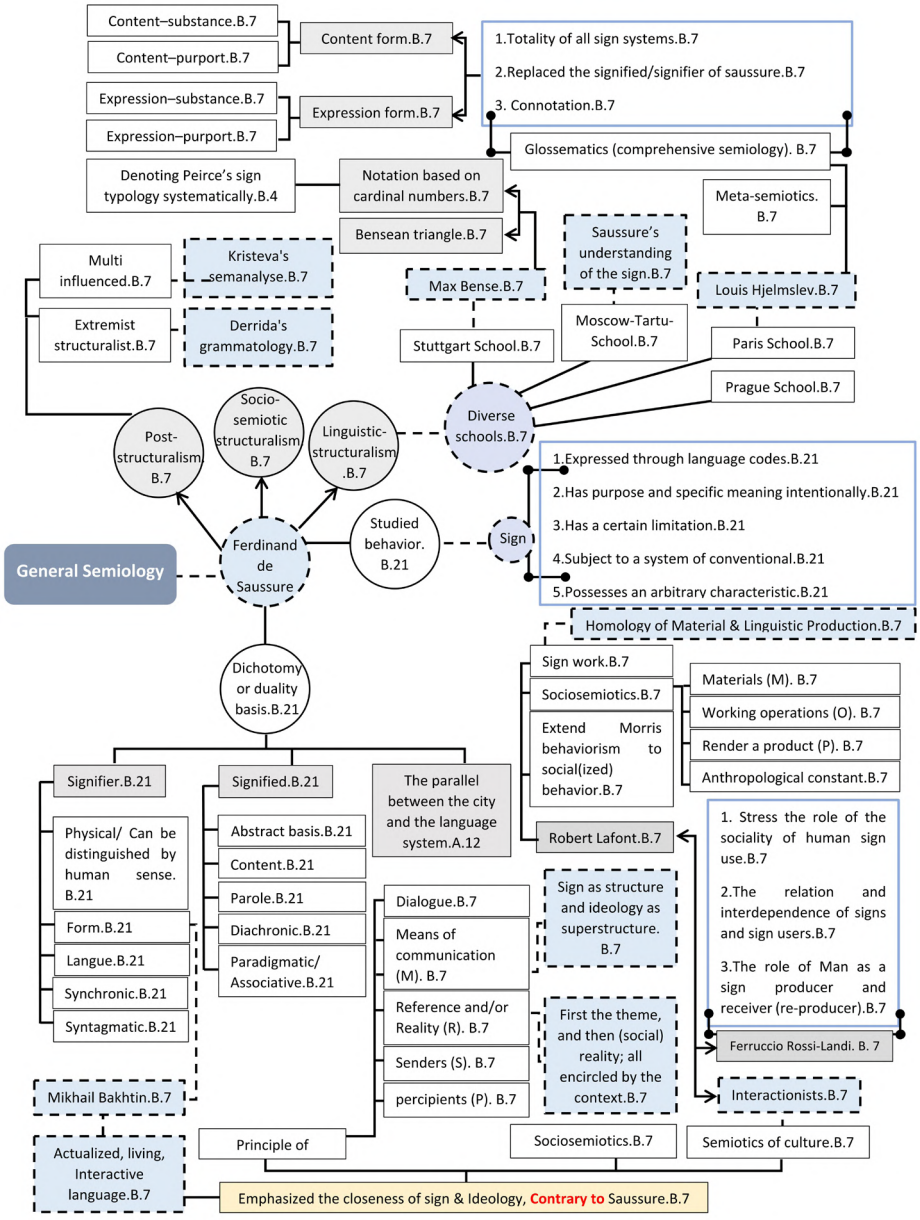

Figure 2. *General semiology and its development.*

desires, and so the "hyperreality" will come into existence instead of the true experience of humans (ibid). In this system, the value of signs is based on consumption values or value exchanges (Baudrillard, 2020). Accordingly, the politics behind the economy produce signs in product designs ideologically, and when they are decoded into notions these notions reproduce and simulate themselves repetitively (ibid). This shows how the semiotics or the system of signs is powerful in daily life.

Figure 2 shows the mental model of a dichotomy basis, its development, and the relationship between the Saussure theory of sign and structuralism. The term "semiology" is used due to the relation of this part with Saussure.

5. Cognitive semiotics

In Peirce's thought, generally logic is another name for semiotics (Peirce, 1931-58). Triadic sign models include a heterogeneous set of semiotic theories that distinguish three relationships of the signs, sign means, sense, and reference (ibid). Sometimes, dyadic and triadic models are not distinctive from each other (Nöth, 2014). The

development of studies of structuralist semioticians in fields of combined sign systems and nonverbal signs clarified the limitations of sign theory. Thus, some motivational works from theorists of this field came to arise with the use of typology terms of Peirce's theory of signs, for instance, icon and index (Bernard, 2006). This theory divides the group of signs based on the relationships that exist among objects such as contiguity and arbitrariness (ibid). In this regard, the contiguities relations categorize the sign's types into Icons and indexes. This is while diagrams, images, and metaphors are ramified from the category of icons (ibid). Symbolic signs are the most common ones, while iconic signs are conventionality significant, and indexical signs can draw attention blindly to themselves (Peirce, 1931–58). Peirce's theory of semiotics is an act of thought that explains language, culture, and contemplation as historical elements (Hoopes,2014). Eco (1979), appended the element of culture, which is laid underneath human communications to the triadic theory. In other words, the semiotics interpretations depend on the communications that are concatenated with culture (ibid). In addition to this, Leeds-Hurwitz (2012) declared the particular relationship between semiotics and nonverbal language that is generated by the culture. Lorusso (2015) defined, cultural systems are made by cultural units and continue with redundancy and steady differentiations that lead to homogeneity and distinction relationships. Jacob (2021) mentions, that every society possesses its own culture that arises from the national contextuality of a community, which is based on a particular system of signs to make and convey meanings through communications. Codes and structures are referred to by different systems to make the meanings (ibid).

Morris (1938) introduced a triadic model of signs, consisting of designatum, sign vehicle, and interpretant, applicable to both humans and animals, considering the existence of behavior and biology, known as animal signs or proto-semiosis. Proto-semiosis further classified into three categories: syntactic, semantic, and pragmatic, borrowing from the philosophy of rationalism (ibid). This theory provides a comprehensive framework for understanding the processes of communication and meaning-making in both human and animal contexts.

Sebeok, who raised the issue of global semiotics due to the social world of humans (Sebeok, 2001), believed that semiotics is a science that not only studies communication in culture but also studies communicative behavior from a biosemiotics perspective (Sebeok & Danesi, 2012). He suggested the biosemiotics interpretation of the concept of language as a syntactic modeling device (ibid). Biosemiotics is the fundamental level that links biology to the humanities in a different manner from sociobiology, and evolutionary psychology (Brier, 2006). This different manner according to Kull (2001), is "communicational structures". As biosemiotics is adopted by Peirce's triadic theory, its causality consists of model fit, differences, and codes as the data part in the dyadic proto-semiotic materials (Nöth, 2001). This is the necessity for the last part of the causality, signification, and interpretation of semiotics (ibid). Uexküll (1982), considered three components in his biosemiotics theory. According to him, every live organism is assumed as a subject, that is a meaning utilizer (ibid). According to him, the meaning vehicle is considered an object, while between these two the umwelt is laid down (ibid). In this sense, the internal parts of an organism in semiotic procedures call "endo-semiotic", the organism and its umwelt call "exo-semiotic", and the signification part is called umwelt (Sebeok & Danesai, 2012). These parts interfere with each other by means of social communication, the cultural signification is created (Brier, 2006). Different theories are derived from biosemiotics such as the theory of systems, the biology of theory, and the theory of self-organized systems (Brier, 1998). Figure 3 shows the trichotomy system of Peirce in cognitive semiotics, and its development through the studies of Sebeok and Uexkull.

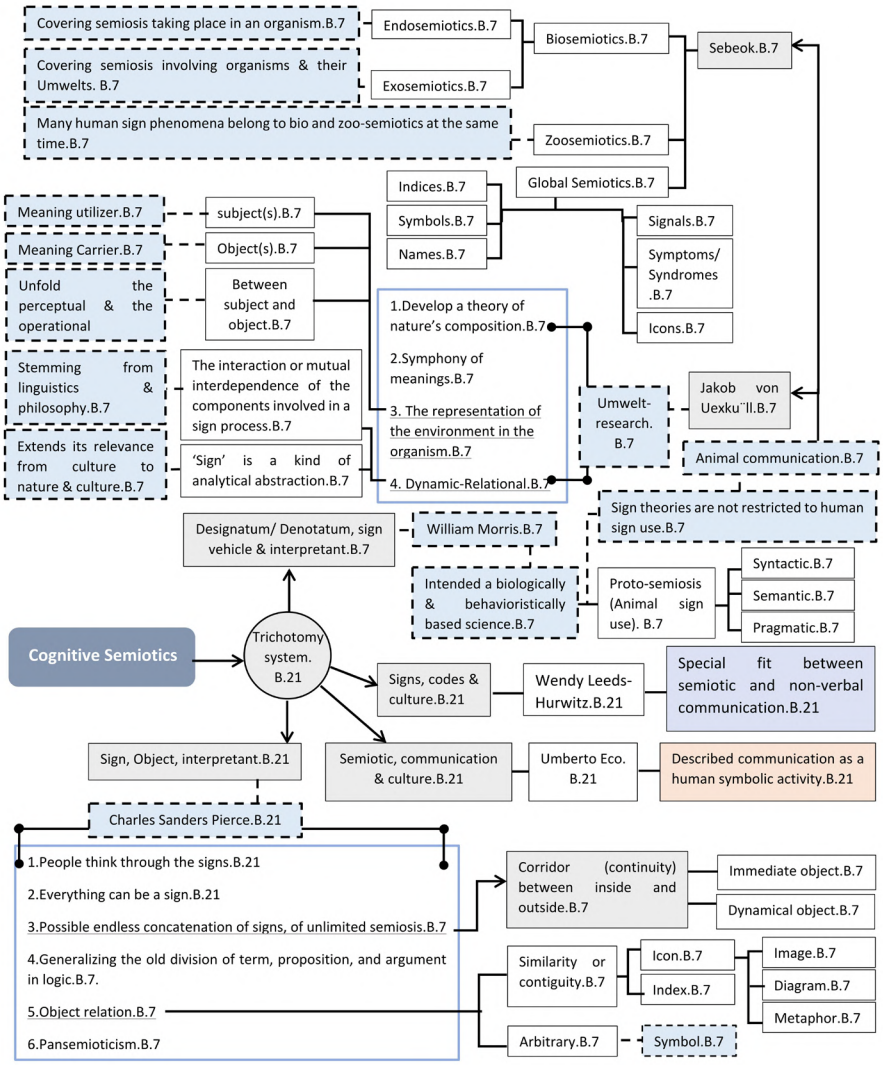

Figure 3. *The trichotomy system of Peirce in cognitive semiotics.*

6. Contemporary semiotics

According to various studies, contemporary semiotics identifies different types of signs such as visual, aural, and so forth. visual signs will be studied in this paper due to their important relevance to architecture. Meanwhile, traditional scholars made dichotomous between figurative language and verbal language (Nuessel, 2006a), in which classifications are metaphor, simile, personification, onomatopoeia, oxymoron, hyperbole, allusion, and idiom. As in architecture "metaphor" is more useable in the design process of forms and in environmental experiences after creating the form, this research studies it briefly.

For the first time, Pollio et al (1977) declared the metaphor's role in conceptual abstraction forms and mentioned that a metaphor is not as much exclusively to a discourse, while discourse is the main structure for it. After this declaration in the 1970s and the 1980s, two fundamental categories arose (Sebeok & Danesai, 2012). The first one is the theory of conceptual metaphors which Lakoff is its pioneer in his book titled "Metaphors we lived by" (Lakoff & Johnson, 2017), and the second is cognitive linguistics which is related to Langacker's book under the name of "Cognitive Grammar" (Langacker, 2008). But today's meaning of the term "metaphor" is equivalent to figurative language, which points out the exis-

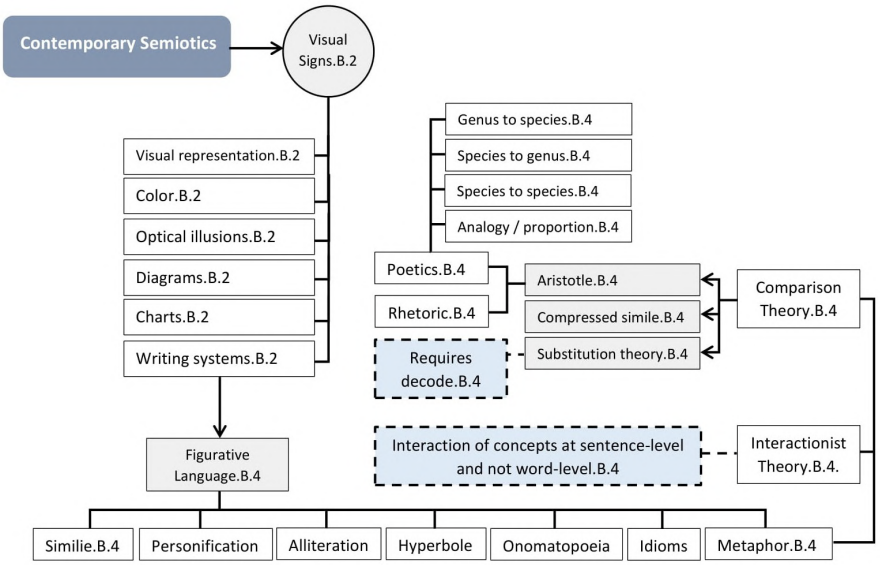

Figure 4. *Visual signs in contemporary semiotics.*

tence of physical abstractions. Sebeok and Danesai (2012), mention as these intentional abstractions are encoded within the simulation process of awareness inferences of humans, they need to be decoded.

The division of metaphor theories into substitution and comparison is made clear in Nuessel's (2006a&b) writings. According to him, in substitution theory, an improper figurative term exists in place of a literal term (ibid). In the comparison theory, the interplays of concepts do not exist at the word level but sentence level (ibid). This means the association of concepts creates a metaphor together with a new meaning (ibid). This view relates to Aristotle whereby means "A is B" or "A implies B" in a metaphoric sense and "A is like B" in a simile sense" (Aristotle & Kennedy, 2007). Aristotle describes the metaphor as the application of an alien name by transference in 3 forms or by analogy, that is, proportion (Aristotle, 2019). Figure 4 shows the place of visual signs in contemporary semiotics.

7. Semiotics in architecture, the ambiguity, and contradiction in form and figure

Using the word semiotics in architecture can be traced back to the definition of architecture, which is related to architects and includes, amongst other things, the clients, and users of buildings. Vitruvius (2019), one of the ancient architects, declared that architecture is a science that is understood by practice and theory, which respectively means, that architecture contains the design performances, in accordance with the significant subject of architecture, which is, the creation of proper form with the appliance of the proportions. The proposed items related to the measurements given to the different parts of the planned building (ibid). Thus, according to Vitruvius (2019), theory in architecture can be considered a semiotic theory, and generally, the significant things in sciences are the signified and the signifier. The optional description of components of the graphic sign creates a linkage between metalanguage and connotation (ibid). Thus, there will be a connotative intonation in expressions and context in the expression plan of architecture (Pellegrino, 2006a). In opposition and ambiguity of the level of the forms, architecture pushes back the conventions, the duplication of utilization norms, and the emulation of common styles (ibid). Designing through measurements and proportions creates a monumental expression, in which the mechanism of communication appears within the form and content (ibid). This is proof for architecture which is arising a form from the intention of its architect. So

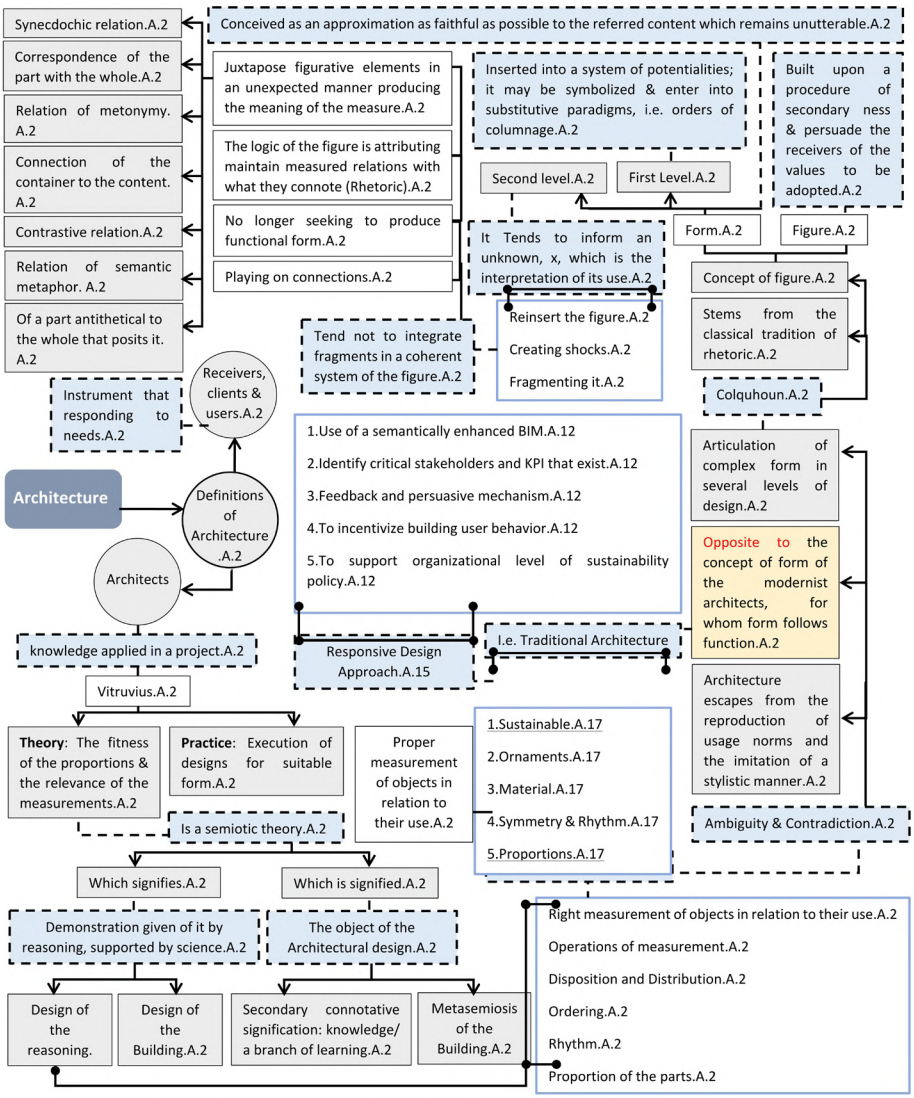

Figure 5. *Semiotics in the architecture, of ambiguity and contradiction in form and figure.*

in this shape of communication, the form is a container of the architect's intentions and expresses itself through measurable proportions forms (ibid). However, this articulation is in opposition to the doctrine of Sullivan where "form follows function" (Sullivan, 1896, p.408). Modern architects describe the complex form devised in multiple levels of design (Thornberg & Carulla, 2011). Alan Colquhoun in 1985, mentions the concept of the figure upon the second level of meaning, which according to Fontanier and Genette (2009), originated from the tradition of classical rhetoric.

In Colquhoun's theory, the figure is the second external layer of meaning, while the form is signified by the content of the concept in the internal layer of meaning (Colquhoun, 1985). The first level of the form is based on the potentialities, and it can be symbolized through the substitutive paradigms (ibid). This is while the second level of the form is inclined to inform its use interpretation, and it happens through re-entering the figure to create shocks and then disintegrate it (Pellegrino, 2006a). Nevertheless, disintegrating is not happening in the syndetic system of the figure (ibid). The connotation and denotation rules in syntax make an indicated principle with the use of composition, continuity, and discontinuity of combined elements (Pellegrino, 2006b). This indicated principle

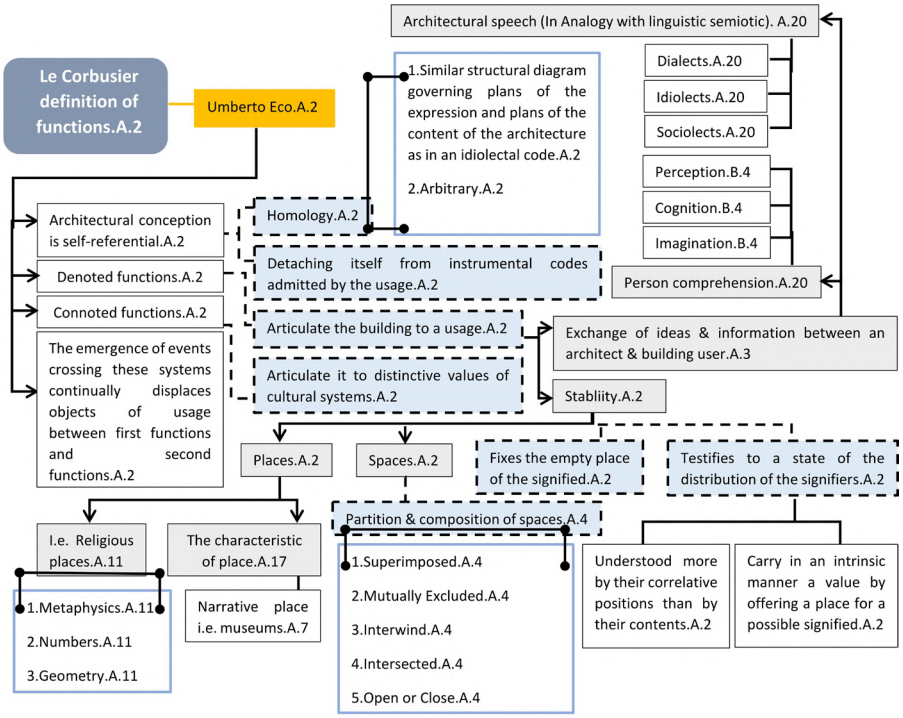

Figure 6. *Le Corbusier's definition of functions.*

offers feasible positions in the substitution arrangement that contains an origin, and a destination together with the well-formed whole (ibid). Thus, in this manner, the figurative parts colligate in abrupt order to produce the new meaning of the measure (Pellegrino, 2006a). Whereby, the rhetoric here is the idea that joins the measured relationships to their connotations (Perelman, 2012). They don't attempt to produce functional forms, but they do play with linkages (Colquhoun, 1985), investigate the concordance of pieces to the whole, indicate the metonymy and synecdoche relations, conjoin the container to the content that creates the opposite relations, semantic metaphor from the polar parts to the whole (Pellegrino, 2006a). Figure 5 shows semiotics in architecture according to its definition and the ambiguity and contradiction of form and figure.

7.1. Le Corbusier's definition of functions

Le Corbusier's definition of a function, based on "a house is a machine for residing" (Le Corbusier, 2007, p.14), has led to a new implication of the function for modern architects. Umberto Eco (2016) differentiates them into two steps. First are denoted functions, that connect the building to its usage (ibid). Second, are connoted functions that connect the building to specific values of cultural systems (ibid). The arrival of events in these systems constantly shifts the place of objects of usage between the first functions and the second functions (Pellegrino, 2006a). Architectural codes are formed with attention to the usage, without direct connection to the functions of firsts or seconds levels (ibid). In this sense, the cultural independence of architecture exists so that the architectural perception is self-referential (ibid), and draws in relationships of homology (ibid). Umberto Eco in 1979, described architectural signs as signifiers of feasible functions in two groups of created objects and confined spaces. He also distinguished between the incitement procedure, and the signification procedure (ibid). Thereby, he mentioned that categories of feasible functions, make the content an expression of architecture (ibid). Figure 6 shows the Le Corbusier definition of functions.

7.2. Architectural speech in analogy with linguistics

A semiotic system of architecture can be compared with a system of language. In the pursuit of analogy, the syntactic, morphological, pragmatic, and sign structure is developed and the debates continue over dialects, idiolects, and even architectural speech sociolects (Lazutina et al., 2016). In accordance with the triadic model of Peirce, the materialistic or physical objects are interpreted to the concepts or notions of the signs, that are created in the organism's mind (Peirce & Buchler, 2012). In this regard, the interpretations of perception that occur in the mind, create the cognitive part of the interpretant content or subject awareness. Brier (2006), mentions this subject awareness as a "consciousness" of human beings and as an "experience" in animals. So that the awareness process in biosemiotics initiates the signification within the living systems or living organisms and by means of the perceptual process eventually leads to the cognition or awareness of the subject (Brier, 2006; Thibault, 2006; Sebeok & Danesi, 2012; Feng, 2020). In this sense, this debate in variant scholar's fields of works such as neurology, cognitive sciences, psychology of environment, architecture, and so forth has come to the conclusion that the subject awareness comes from the sensory systems and psychoanalysis part of the interpretants. As this paper seeks to find the overlapping of the semiotics field with architecture, it is necessary to study the perceptual process of the places. In this regard, the most important related debates of environmental psychology are experiencing the places, the quality of the atmosphere of the places, and the sense of the places. It is significant to notice that all these debates happen after the perceptual process is raised and led to schemas or mental maps and eventually behavior or actions. Sebeok and Danesai (2012), explain that schemas are created by the reduction of the interchanged information of sensory systems into the "mental models", so that awareness of the subject, or cognition, happens after the perceptual process. Thus, the participation of the organism in the environment or other behavioral actions occurs in conclusion to the sensory information due to interactions of the self with own or self with other-selves (Thibault, 2006). These actions and reactions happen during the perceptual process between self or " endo-semiotic" and object in the out or " exo-semiotic " (Sebeok & Danesai, 2012), which came along in Peirce's theory as "firstness" and "secondness" (Peirce & Buchler, 2012), as mentioned above.

Obviously, information on sensory systems is gained from the five human senses, such as vision, auditory, olfactory, and tactile sensation. Since in environmental sciences and architecture, the most influential sense is the vision, it was discussed before under the visual signs' debates in contemporary semiotics. As the importance of the influence of architectural work on user behavior developed, the behavioral model of architectural semiotics was proposed. Figure 7 shows architectural speech in analogy with linguistic semiotics.

8. Discussion and conclusion

In this paper, after defining the concepts by snowball sampling, six types of relationships that existed between them have been identified and used for creating the cognitive mappings. According to generated cognitive mappings, as shown in Figures 2 to 8, contemporary semiotics is a correlation of general semiology and cognitive semiotics. That is, on the one hand, contemporary semiotics classifies visual signs and writing systems that include verbal and nonverbal signs, in which connotation matters. In this sense, comprehensive semiology was derived from replacing the Saussure theory and led to the definition of connotation.

In this duality theory of signs, structuralists from diverse schools of meta-semiosis studied the content form and expression form in both substance and purport.

On the other hand, is the multiplicity and plurality of meaning of post-structuralism, which is an adaption of the index, icon, and motivated sign from the cognitive semiotics of Peirce.

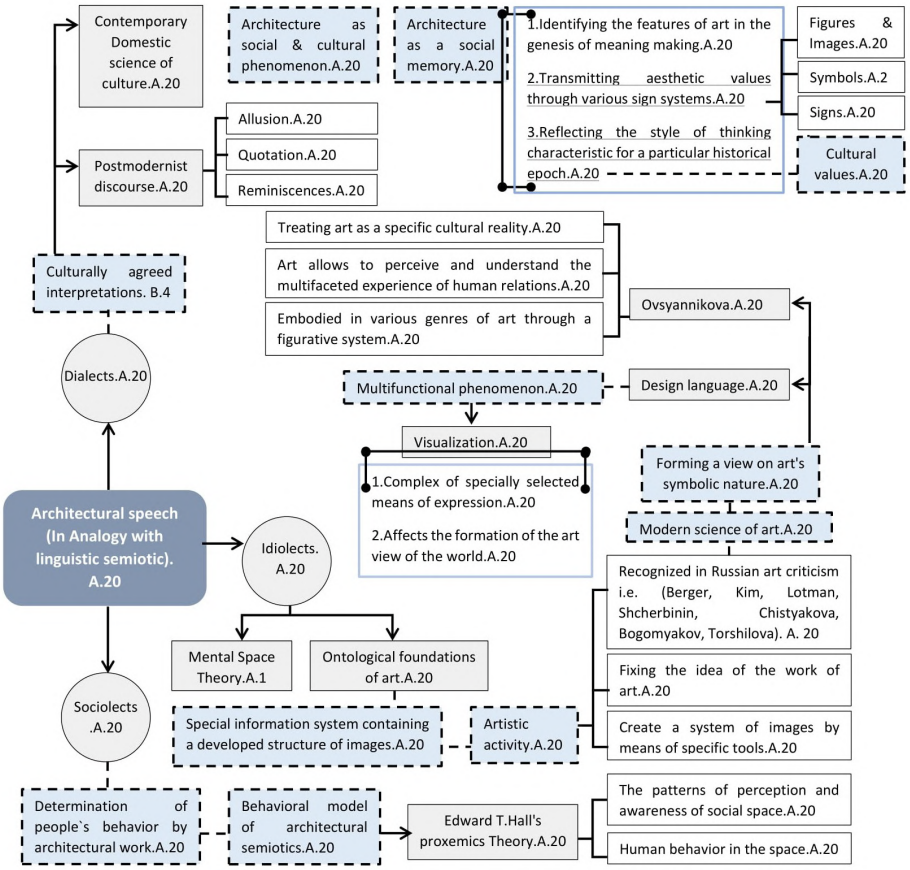

Figure 7. *Architectural speech in analogy with linguistic semiotics.*

Later the cognitive semiotics based on the trichotomy system developed by the idea of Morris appended behavior to categorize semiotics called proto-semiosis into three main groups syntactic, semantic, and pragmatic. Along with this Umwelt's research proved the dynamic relational and symphony of meanings features of the sign which turned a sign into an analytical abstraction that relates to nature and cultural relevance.

Meanwhile, global semiotics comprises a more extensive world including animals and biology. The combination of these two, as contemporary semiotics, leads to the utilization of signs as shown in Figure 8, Part A.

Semiology is a means of studying meaning-making which was initiated in linguistics and then developed through the different sciences such as architecture. Since architecture is a way of giving expression to content, it is therefore related to semiotics and can be used consciously to convey meanings through the architectural form. Thus, the importance of form and content within a text has been highlighted which is attributed to the triadic theory of Peirce. In this sense, the signifier is considered as a form, structure, and model while the signified is considered as content, notions, and codes. The relation between these two is upon the vehicle of meaning or media, which here is exemplified as architecture.

To use a semiotic system in architecture or any other media practically the notion or idea becomes significant. Baudrillard introduced the simulacra in post-modern societies that dominated the socio-political aspects of reality to form a desired ideology instead of the actual reality. This means signs are in service of specific socio-political ideas that convey particular meanings while reproducing themselves.

This system is conducted within the text. Text can take various debates

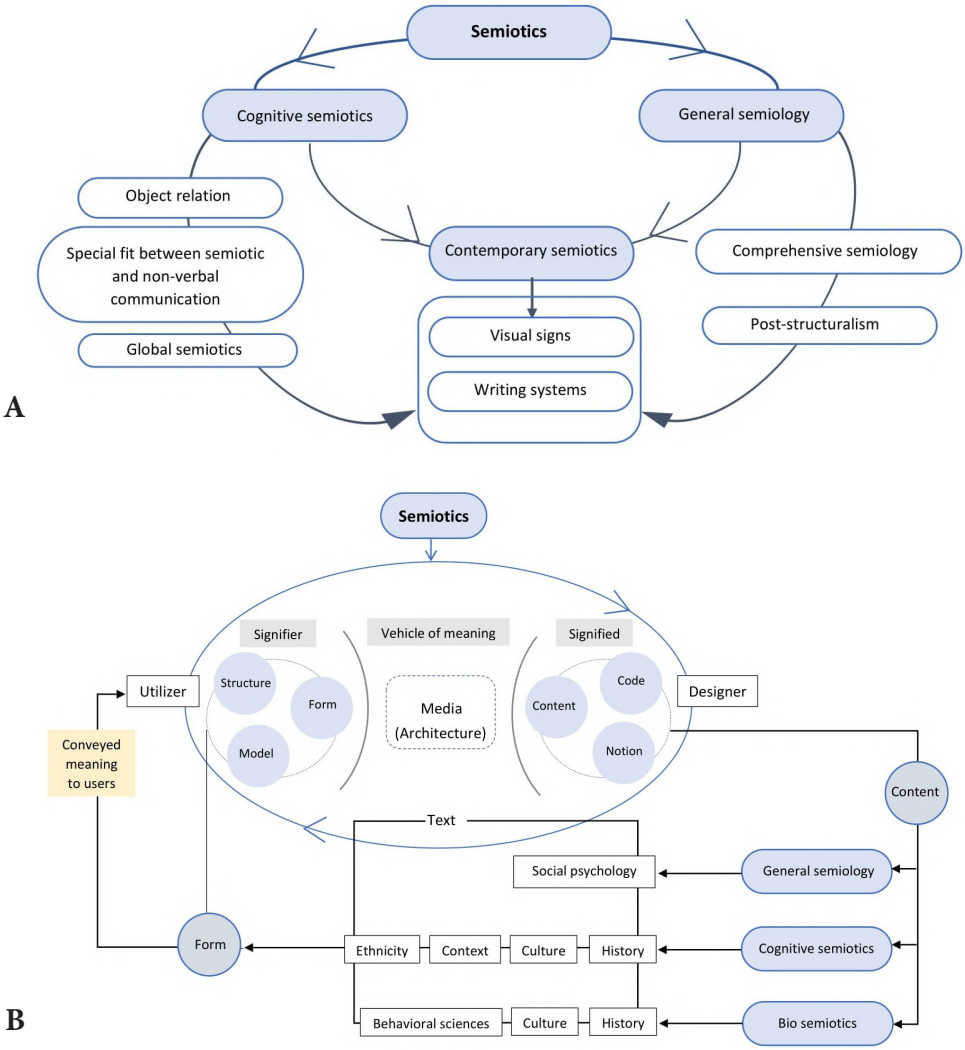

Figure 8. *The relationship between semiotics theories. (B) The relationship between semiotics theory and architecture.*

among different categories of semiotics theories. For instance, according to cognitive semiotics, content creates form through culture, history, ethnicity, and context, while in biosemiotics, the combination of behavioral sciences with history and culture can make the form. Consequently, the architectural style of these two categories likewise will be different. As for the cognitive semiotics according to historical considerations in the design process can lead to vernacular architecture, indigenous architecture, neoclassic architecture, or postmodern architecture. This is while the appliance of the biosemiotics theory to the design procedure considers environmental psychology and behavioral sciences that can create parametric architecture, complementary architecture, biomorphic architecture, zoomorphic architecture, and responsive architecture. In both categories, the different types of signs mentioned before as symbols, indexes, and icons are used. In this regard, in the phase of design, architectural diagrams of the architects can be named which are icons themselves, or the form, that is also assumed as a metaphor for the architect's idea is also an icon, as shown in Figure 8, part B. After creating a form, in the phase of utilizing, and according to the endo-semiotics the users of an architectural place can experience the place through their sensory systems, which leads to individual meaning for them.

This is according to Derrida's theory of deconstruction which assumes a built

environment as a text that has to be interpreted. A text is written by an author's notion that over time, different users come to various meanings conforming to their cultural, behavioral, and social experiences. Thus, a built environment can't have a single meaning and it depends on various aspects of comprehension situations of the utilizer.

References

Adler, S. (2011). Silence in the graphic novel. *Journal of Pragmatics*, *43*(9), 2278–2285. https://doi.org/10.1016/j.pragma.2010.11.012

Akimoto, T. (2019). Narrative structure in the mind: Translating Genette's narrative discourse theory into a cognitive system. *Cognitive Systems Research*, *58*, 342–350. https://doi.org/10.1016/j.cogsys.2019.08.007

Anderson, M. (2006). Nonverbal Communication. *Encyclopedia of Language & Linguistics*, 690-692. https://doi.org/10.1016/B0-08-044854-2/01432-2

Anti, H., & Faqih, M. & Rachmawati, M. (2017). Meaning Interpretation of Gorontalo Vernacular Architecture with Semiotic Method. *The International Journal of Engineering and Science (IJES)*, *6*(8), 39-51.

Aristotle. (2019). *The poetics of Aristotle*. United States: Creative Media Partners, LLC.

Aristoteles, & Kennedy, G. A. (2007). *On rhetoric: A theory of civic discourse*. Oxford University Press.

Baharudin, N. A., & Ismail, A. S. (2014). Communal mosques: Design functionality towards the development of sustainability for community. *Procedia - Social and Behavioral Sciences*, *153*, 106–120. https://doi.org/10.1016/j.sbspro.2014.10.046

Barthes, R. (1993). *Mythologies*. United Kingdom: Vintage.

Batu, B. (2012). An overview of the field of semiotics. *Procedia - Social and Behavioral Sciences*, *51*, 464–469. https://doi.org/10.1016/j.sbspro.2012.08.190

Baudrillard, J. (2020). *The System of Objects*. United Kingdom: Verso Books.

Baudrillard, J. (2016). *Symbolic Exchange and Death*. United Kingdom: SAGE Publications.

Bax, M. (2009). Generic evolution: Ritual, rhetoric, and the rise of discursive rationality. *Journal of Pragmatics*, *41*(4), 780-805.

Bense, M. (1975). Semiotische Prozesse und Systeme in Wissenschaftstheorie und Design, *Ästhetik und Mathematik*. Agis-Verl.

Bense, M. (1981). *Axiomatik und semiotik*. Agis-Verlag.

Bernard, J. (2006). Sign theories. *Encyclopedia of Language & Linguistics*, 365–374. https://doi.org/10.1016/b0-08-044854-2/01453-x

Brandt, P. A. (2005). Mental spaces and cognitive semantics: A critical comment. *Journal of Pragmatics*, *37*(10), 1578–1594. https://doi.org/10.1016/j.pragma.2004.10.019

Brasher, J. P. (2017). Narrating space/spatializing narrative: Where narrative theory and geography meet. *The AAG Review of Books*, *5*(3), 180–182. https://doi.org/10.1080/2325548x.2017.1315251

Brier, S. (1998). The cyber semiotic explanation of the emergence of cognition: The explanation of cognition signification and communication in a non-cartesian cognitive biology. *Evolution and Cognition*, *4*(1), 90-105.

Brier, S. (2006). Biosemiotics. Encyclopedia of Language & Linguistics, 31-40. https://doi.org/10.1016/B0-08-044854-2/01396-1.

Carley, K. (1990). Content analysis. In R.E. Asher (Ed.), *The Encyclopedia of Language and Linguistics*, *2*, 725-730.

Carley, K. (1993). Coding choices for textual analysis: A comparison of content analysis and map analysis. *Sociological Methodology*, *23*(75). https://doi.org/10.2307/271007

Carley, K. (1997). Extracting team mental models through textual analysis. *Journal of Organizational Behavior*, *18*, 533-558. Retrieved from http://www.jstor.org/stable/3100264

Casakin, H. P. (2006). Metaphors as an unconventional reflective approach in architectural design. *The Design Journal*, *9*(1), 37–50. https://doi.org/10.2752/146069206789372118

Chandler, D. (2017). Semiotics: The basics. United Kingdom: Routledge.

Colilli, P. (2006). Texts: Semiotic theory. *Encyclopedia of Language*

& Linguistics, 630–642. https://doi.org/10.1016/b0-08-044854-2/01460-7

Colquhoun, A. (1985). *Recueil d'essais critiques: Architecture moderne et changement historique*. Brussels: Mardaga.

Cooren, F. (2008). Between semiotics and pragmatics: Opening language studies to textual agency. *Journal of Pragmatics*, *40*(1), 1–16. https://doi.org/10.1016/j.pragma.2006.11.018

Danesi, M. (2006). Visual semiotics. *Encyclopedia of Language & Linguistics*, 441-448. https://doi.org/10.1016/B0-08-044854-2/01461-9

Derrida, J., Spivak, G. C., & Butler, J. P. (2016). *Of grammatology*. The Johns Hopkins University Press.

Eco, U. (1979). *A theory of semiotics*. Indiana University Press.

Eco, U. (2016). *La struttura assente: La ricerca semiotica e il metodo strutturale*. La nave di Teseo.

El-Torky, A. A. (2018). Political symbolism in Mohammad Ali's Mosque: Embodying political ideology in architecture. *Alexandria Engineering Journal*, *57*(4), 3873–3880. https://doi.org/10.1016/j.aej.2018.11.002

Feng, H. (2020). *Form, meaning and function in collocation: A corpus study on commercial Chinese-to-English translation*. Routledge, Taylor & Francis Group.

Ferrara, M., & Russo, A. C. (2019). The Italian design approach to materials between tangible and intangible meanings. *Cuadernos Del Centro De Estudios De Diseño y Comunicación*, 70. https://doi.org/10.18682/cdc.vi70.1138

Fontanier, P., & Genette, G. (2009). *Les figures du discours*. Flammarion.

Foote, K.E. & Azaryahu, M. (2009). Semiotics. *International Encyclopedia of Human Geography*, 89-95. https://doi.org/10.1016/B978-008044910-4.00741-0

Foucault, M. (2005). The order of things. https://doi.org/10.4324/9780203996645

Goodman, L. A. (1961). Snowball sampling. *The Annals of Mathematical Statistics*, *32*(1), 148–170. http://www.jstor.org/stable/2237615

Goubran, S. (2019). Sustainability in architectural design projects: A semiotic understanding. *Social Semiotics*, *31*(4), 625–651. https://doi.org/10.1080/10350330.2019.1681062

Greimas, A. J. (1984). *Structural semantics: An attempt at a method*. University of Nebraska Press.

Gulliver, S., Grzybek, H., Radosavljevic, M., & Wiafe, I. (2013). Changing building user attitude and organisational policy towards sustainable resource use in healthcare. *Health Policy and Technology*, *2*(2), 75–84. https://doi.org/10.1016/j.hlpt.2013.03.006

Heidegger, M. (2013). *Being and time*. Stellar Books.

Hjelmslev, L. (1969). *Prolegomena to a theory of language: Louis Hjelmslev*. University of Wisconsin Press.

Hodge, B. (2017). *Social semiotics for a complex world: Analyzing language and social meaning*. Polity press.

Hoopes, J. (2014). *Peirce on signs writings on semiotic by Charles Sanders Peirce*. The University of North Carolina Press.

Howarth, D. R. (2013). *Poststructuralism and after structure, subjectivity, and power*. Palgrave Macmillan.

Hunter, I. (2009). Spirituality and philosophy in post-structuralist theory. *History of European Ideas*, *35*(2), 265–275. https://doi.org/10.1016/j.histeuroideas.2008.11.002

Jacob, F. (2021). *War and semiotics: Signs, communication systems, and the preparation, legitimization, and commemoration of collective mass violence*. Routledge.

Kracauer, S. (1952). The challenge of qualitative content analysis. *Public Opinion Quarterly, Special Issue on International Communications Research*, *16*(4), 631. https://doi.org/10.1086/266427

Kravchenko, A. V. (2007). Essential properties of language, or, why language is not a code. *Language Sciences*, *29*(5), 650–671. https://doi.org/10.1016/j.langsci.2007.01.004

Kristeva, J., & Beardsworth, S. (2020). *The philosophy of Julia Kristeva*. Open Court.

Kull, k. (2001). A paradigm for biology and semiotics. *Semiotica*, *134*(1/4), 1-60.

Kuznetsova, K.J. (2011). Architectural space and Greimassian semiotics. *Societal Studies*, *3*(4), 1269–1280.

Lacan, J. (2019). *Four fundamental concepts of psycho-analysis*. Routledge.

Lakoff, G., & Johnson, M. (2017). *Metaphors we live by*. University of Chicago Press.

Langacker, R. W. (2008). *Cognitive grammar a basic introduction*. Oxford University Press.

Lazutina, T.V., Pupysheva, I.N., Shcherbinin, M.N., Baksheev, V.N., & Patrakova, G.V. (2016). Semiotics of art: language of architecture as a complex system of signs. *International Journal of Environmental & Science education*, *17*, 9991-9998.

Le Corbusier. A. (2007). *Toward an Architecture*. Getty Research Institute.

Leeds-Hurwitz, W. (2012). *Semiotics and communication: Signs, codes, cultures*. Routledge.

Lorusso, A. M. (2015). *Cultural semiotics: For a cultural perspective in semiotics*. United Kingdom: Palgrave Macmillan.

Luck, R., & McDonnell, J. (2006). Architect and user interaction: The spoken representation of form and functional meaning in early design conversations. *Design Studies*, *27*(2), 141–166. https://doi.org/10.1016/j.destud.2005.09.001

Lyu, F. (2019). Architecture as spatial storytelling: Mediating human knowledge of the world, humans and architecture. *Frontiers of Architectural Research*, *8*(3), 275–283. https://doi.org/10.1016/j.foar.2019.05.002

Mahdavinejad, M., Bahtooei, R., Hosseinikia, S. M., Bagheri, M., Motlagh, A. A., & Farhat, F. (2014). Aesthetics and architectural education and learning process. *Procedia - Social and Behavioral Sciences*, *116*, 4443–4448. https://doi.org/10.1016/j.sbspro.2014.01.963

Manning, P. (2006). Words and things, goods and services: Problems of translation between language and political economy. *Language & Communication*, *26*(3-4), 270–284. https://doi.org/10.1016/j.langcom.2006.02.010

Marotta, A., Spallone, R., Turco, M. L., Zich, U., Vitali, M., Marchis, E., & Pavignano, M. (2017). Visual images and language in architecture: Signifier semiotics and meaning semiotics. *Proceedings*, *1*(9), 964. https://doi.org/10.3390/proceedings1090964

Masatlıoğlu, E. S. (2014). *Morphogenesis of space a reading of semiotics in architecture*. Paper presented at the 4. International Archtheo Conference, Istanbul.

Mashayekhi, M., Mahdavinejad, M.J., & N. Shishavan, S. (2012). Designing family friendly architecture environments. *Procedia - Social and Behavioral Sciences*, *51*, 449-453.

Mazzola, G., Mannone, M., Pang, Y., O'Brien, M., & Torunsky, N. (2016). De Saussure and Peirce: The semiotic architecture. *Computational Music Science*, 63–66. https://doi.org/10.1007/978-3-319-47334-5_7

Mohidin, H. H., & Ismail, A. S. (2014). Responsive design approach in modern Malaysian administrative building. *Procedia - Social and Behavioral Sciences*, *153*, 330–340. https://doi.org/10.1016/j.sbspro.2014.10.066

Morris, C. W. (1938). *Foundations of the Theory of Signs*. United States: University of Chicago Press.

M. Thornberg, J., & S. Carulla, M. (2011). Bakhtin, architectonics and architecture. International Workshop COAC Barcelona. Retrieved from https://pa.upc.edu/ca/Varis/altres/arqs/congresos/international-workshop-coac-barcelona-2013-jornadas-cientificas-coac-barcelona-2013/articulos-articles/2.-bakthin-architectonics-and-architecture.

Moya Guijarro, J., & Pinar Sanz, M.J. (2008). Compositional, interpersonal and representational meanings in a children's narrative: a multimodal discourse analysis. *Journal of Pragmatics*, *40*(9), 1601-1619.

Mutis, I., & Issa, R.R.A. (2008). Semiotic proposition for understanding semantics within construction documents. *Tsinghua Science & Technology*, *13*(S1), 192-198.

Nöth, W. (2001). Protosemiotics and physicosemiotics. *Sign Systems Studies*, *29*(1), 13–26. https://doi.org/10.12697/sss.2001.29.1.02

Nöth, W. (2014). *Handbook of semiotics*. Indiana University Press.

Nöth, W. (2016). *Semiotics of the media: State of the art, projects, and perspectives*. De Gruyter Mouton.

Nuessel, F. (2006a). Figurative language: Semiotics. *Encyclopedia of Language & Linguistics*, 446–459. https://doi.org/10.1016/b0-08-044854-2/01409-7

Nuessel, F. (2006b). Language: Semiotics. *Encyclopedia of Language & Linguistics*, 665-679. https://doi.org/10.1016/B0-08-044854-2/01422-X

Onwuegbuzie, A. J., & Leech, N. L. (2007). Sampling designs in qualitative research: making the sampling process more public. *The Qualitative Report*, *12*(2), 238-254. Retrieved from https://nsuworks.nova.edu/tqr/vol12/iss2/7

Pablé, A. (2018). Radical indeterminacy, idealism, realism: Benedetto Croce vs. Roy Harris. *Language & Communication*, *61*, Pages 46-57.

Palmquist, M. E., Carley, K. M., & Dale, T. A. (2020). Applications of computer-aided text analysis: Analyzing literary and nonliterary texts. *Text Analysis for the Social Sciences*, 171–190. https://doi.org/10.4324/9781003064060-12

Pane, I. F., Fachrudin, H. T., Fibriasari, H., & Lubis, A. S. (2020). *Architecture as Communication System with Semiotic Theory (Case Study: Tjong A Fie's House)*. IOP Conference Series, *452*(1), 012013. https://doi.org/10.1088/1755-1315/452/1/012013

Parsaee, M., Parva, M., & Karimi, B. (2015). Space and place concepts analysis based on semiology approach in residential architecture: The case study of traditional city of Bushehr, Iran. *HBRC Journal*, *11*(3), 368-383.

Peirce, C.S. (1931-1958). *Collected Papers* (8 vols: vol. 1, Principles of Philosophy, ed. Charles Hartshorne and Paul Weiss, 1931; vol. 2, Elements of Logic, ed. Charles Hartshorne and Paul Weiss, 1932; vol. 3, Exact Logic (Published Papers), ed. Charles Hartshorne and Paul Weiss, 1933; vol. 4, The Simplest Mathematics; ed. Charles Hartshorne and Paul Weiss, 1933; vol. 5, Pragmatism and Pragmaticism, ed. Charles Hartshorne and Paul Weiss, 1934; vol. 6, Scientific Metaphysics ed. Charles Hartshorne and Paul Weiss, 1935; vol. 7, Science and Philosophy, ed. William A. Burks, 1958; vol. 8, Reviews, Correspondence and Bibliography, ed. William A. Burks, 1958). Cambridge, MA: Harvard University Press.

Peirce, C. S., & Buchler, J. (2012). *Philosophical writings of Peirce*. United States: Dover Publications.

Pellegrino, P. (2006a). Semiotics of architecture. *Encyclopedia of Language & Linguistics*, 212-216. https://doi.org/10.1016/B0-08-044854-2/01393-6

Pellegrino, P. (2006b). Space: Semiotics. *Encyclopedia of Language & Linguistics*, 599-601. https://doi.org/10.1016/B0-08-044854-2/01456-5

Perelman, C. (2012). Rhetoriques. Belgium: Université de Bruxelles.

Perrin, O. T. (2011). Marks: A distinct subcategory within writing as integrationally defined. *Language Sciences*, *33*(4), 623–633. https://doi.org/10.1016/j.langsci.2011.04.025

Perron, P. (2006). Actantial theory. *Encyclopedia of Language & Linguistics*, 26-37. https://doi.org/10.1016/B0-08-044854-2/01431-0

Pierroux, P., & Skjulstad, S. (2011). Composing a public image online: Art museums and narratives of architecture in web mediation, *Computers and Composition*, *28*(3), 205-214.

Pietropaolo, D. (2020). *Semiotics of the Christian imagination: Signs of the Fall and Redemption.* United Kingdom: Bloomsbury Publishing.

Pinnow, R.J. (2011). "I've got an idea": A social semiotic perspective on agency in the second language classroom. *Linguistics and Education*, *22*(4), 383-392.

Pollio, H. R., Barlow, J. M., Fine, H., & Pollio, M. R. (1977). *Psychology and the poetics of growth: Figurative language in psychology, psychotherapy, and education*. Lawrence Erlbaum Associates.

Prieto, L. J. (1975). *Pertinence et pratique: essai de sémiologie*. In Éditions de Minuit eBooks. https://ci.nii.ac.jp/ncid/BA09884393

Rapoport, A. (1990). *The meaning of the built environment: A nonverbal communication approach*. United Kingdom: University of Arizona Press.

Roller, M. R. (2019). A quality approach to qualitative content analysis: Similarities and differences compared to other qualitative methods. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *20*(3). https://doi.org/10.17169/fqs-20.3.3385.

Rossi-Landi, F. (1992). *Between signs and non-signs*. Netherlands: John Benjamins Publishing Company.

Rossi-Landi, F. (2019). *Ideologies of linguistic relativity*. Germany: De

Gruyter.

Saussure, F. d. (2019). *Course in general linguistics*. United Kingdom: Forgotten Books.

Sebeok, T. A. (2001). *Global semiotics*. Bloomington: Indiana University Press.

Sebeok, T. A., Danesi, M. (2012). *The forms of meaning: Modeling systems theory and semiotic analysis*. Germany: De Gruyter.

Shafik Ramzy, N. (2013). Visual language in Mamluk architecture: A semiotic analysis of the Funerary Complex of Sultan Qaitbay in Cairo. *Frontiers of Architectural Research*, *2*(3), 338-353.

Shepherd, D. (2012). *The contexts of Bakhtin: Philosophy, authorship, aesthetics*. Netherlands: Taylor & Francis.

Shojaee, S.M., & Saremi, S.A.A. (2018). Explaining the methods of architecture representation using semiotic analysis (Umberto Eco's theory of architecture codes). *International Journal of Architecture and Urban Development*, *8*(3), 33-48.

Simanjuntak, H., Loebis, M., & Lindarto, D. (2020). *Meaning of ornament in architecture (case study: contemporary architecture Batak Toba)*. IOP Conference Series: Earth and Environmental Science. 452. 012010. 10.1088/1755-1315/452/1/012010.

Sullivan, L. (1896). The tall office building artistically considered. *Lippincott's Magazine*, *339*, 403-409.

Taib, M.ZM., & Rasdi, M. (2012). Islamic architecture evolution: Perception and behaviour. *Procedia - Social and Behavioral Sciences*, *49*, 293-303.

Tallack, D. (1996). Architecture and Deconstruction: a survey. *Paragraph*, *19*(1), 68-79.

Tang, K.S. (2013). Instantiation of multimodal semiotic systems in science classroom discourse. *Language Sciences*, *37*, Pages 22-35.

Thibault, P. J. (2006). *Brain, mind and the signifying body: An ecosocial semiotic theory*. Continuum.

Todorov, T. (1984). *Mikhail Bakhtin: The dialogical principle.* United Kingdom: Manchester University Press.

Vitruvius, M. (2019). *Vitruvius, the ten books on architecture*. Translated By Morris Hicky Morgan. India: Lector House.

Von Uexxküll, J. (1982). The theory of meaning. *Semotica*, *42*(1), 25-79. https://doi.org/10.1515/semi.1982.42.1.25

Walther, E. (2016). *Max Bense: Ausgewählte schriften in vier bänden. Band 2: Philosophie der mathematik, naturwissenschaft und technik*. Germany: J.B. Metzler.

Wang, Q., & Heath, T. (2011). Towards a universal language of the built environment. *Social Semiotics*, *21*(3), 399–416. https://doi.org/10.1080/10350330.2011.564389

Wang, M. (2020). *Linguistic semiotics*. Germany: Springer Singapore.

Wodak, R., & De Cillia, R. (2006). Politics and language: Overview. *Encyclopedia of Language & Linguistics*, 707-719. https://doi.org/10.1016/B0-08-044854-2/04665-4

Yakin, H.S., & Totu, A. (2014). The semiotic perspectives of Peirce and Saussure: A brief comparative study. *Procedia- Social and Behavioral Sciences*, *155*, 4-8. 10.1016/j.sbspro.2014.10.247.

Yan, P.H. (2015). *The Study of design semiotics and architectural space semantics*. International Conference on Material Science and Application. 10.2991/icmsa-15.2015.83.

Zizek, S. (2014). *Event: A philosophical journey through a concept*. United Kingdom: Melville House.

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A critique on private ownership and protection of architectural heritage: Case study of Arpaz Tower

Huriye Armağan DOĞAN
huriye.dogan@ktu.lt • Institute of Architecture and Construction, Kaunas University of Technology, Kaunas, Lithuania

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Abstract
Appropriate conservation and management practices for architectural heritage are crucial for national and local governments to develop since they are not only valuable individually as monuments, but they also impact the environment they are located in. However, this process can become complex when the property has a private owner. The aim of this research is to discuss the issue of private ownership in the conservation and restoration of architectural heritage and to provide an overview of its positive and negative aspects. To analyse these aspects, Arpaz Tower, which is located in the Western region of Anatolia and owned by the same family until recently (since it was built in the 19th century) was selected as a pilot study. The analysis of the performed research suggests that it might not always be possible to manage and protect an architectural heritage only with the efforts of private owners or governmental organisations. Therefore, a concrete strategy that can inform the owners before and during the protection process and adequate collaboration is required.

Keywords
Architectural heritage, Arpaz Tower, Ownership, Private, Collaboration.

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1. Introduction

One of the evaluation criteria used for assessing an architectural structure as a cultural heritage has been the age value offered by Riegl (Riegl, 1903). Nowadays, the architectural structures of the 20th century have started to get into the heritage lists with acceleration since it has been more than a hundred years from the date they were built, and they began to satisfy the criterion of age value. When the heritage of the last century is analysed, it can be expected that private ownership is likely to become more common in the future of heritage topics since most of the structures of 20th century architecture are residential buildings and neighbourhoods which have private owners (Doğan, 2020). Currently, heritage conservation and restoration are performed by either governmental entities or nongovernmental organisations most of the time (Yung & Chan, 2012). However, in the future, due to having more residential buildings as heritage, the restorations might be performed more by private owners, which can create new dynamics in the heritage field. In that regard, it is crucial to understand the various aspects of private ownership and the issues related to that in the protection of architectural heritage.

Hodder (2010) argues that cultural heritage should not be discussed by ownership or decent, but it should be more considered due to terms of both benefit from and participation in cultural heritage. Furthermore, Jokilehto (2012) states that the usage of cultural heritage is not merely the right of the owners, but it should be viewed as a human right. In that regard, the management of these structures can become crucial since it is directly related to the general public interests, and this might outweigh the private gain.

In the matter of the protection of architectural heritage, having a private owner can have both positive and negative consequences from time to time. As De Clippele and Lambrecht (2015) state, while the traditional way of property rights is focused on the absolute enjoyment of the owners regarding their possessions when the property is a heritage, it might interfere with these rights from lower levels to higher ones. Owning a architectural heritage property differs from owning any property and brings a different responsibility. However, this may restrict the actions that can be implemented and demand charges on the owners depending on the classification measures and conservation strategies. Furthermore, the cost of conserving and restoring can also impose a significant financial burden on their owners. While these impositions might create an uncomfortable environment for the owners, it should be noted that it is for the well-being and sustainability of not only the physical characteristics of the heritage but also for their intangible values. However, it should also be noted that expropriation should not be the only solution, and new strategies are required.

This research discusses the issue of private ownership in the conservation and restoration of architectural heritage and provides an overview of its positive and negative aspects. While the topic of private ownership is expected to be an issue related to 20th century heritage in the near future, these structures have other complications regarding not being appreciated by society when they become a cultural heritage. Therefore, to entirely focus on the ownership issues, the paper analyses Arpaz Tower as a pilot study of broader research. The basis for the selection of Arpaz Tower is related to two main reasons. The first reason is that even though the building complex is highly appreciated by the locals, and it is frequently mentioned in symposiums by academics, no preventative interventions occurred for this building complex, and it requires a strategy for its protection. The second reason is the fact that, until recently, the complex was owned by the same private owner since it was built in the 19th century. However, the status changed last year, and it was expropriated. Therefore, studying this building is found beneficial for the discussion of positive and negative aspects of private ownership of cultural heritage properties with multiple layers.

The paper starts by giving brief information regarding the property rights of architectural heritage and private ownership in heritage conserva-

tion. Following that, it focuses on private ownership and attempts to analyse its positive and negative aspects. In the third section, the paper examines the approaches and legislation towards the protection of privately owned heritage. It discusses different approaches which are implemented and focuses specifically on the Turkish conservation legislation and its relationship with property rights. In the fourth section, the paper focuses on the case study of Arpaz Tower. In this section, the paper provides information about the history of the tower to explain the context and assesses the issues that occurred related to its ownership and the consequences of it in the current situation of the structure. In conclusion, the research assesses the impacts and the possible strategies which can be followed for the improvement of the situation.

2. Property rights of heritage objects and private ownership in heritage conservation

Due to the intangible values they carry, cultural heritage - including architectural heritage- have a special status in law, which focuses on their protection, both for the culture and, at the same time, for the sustainability of the identity. As stated by Campfens (2020), this special status has been preserved in international laws since the first days. However, the issue of architectural heritage can be complicated from time to time due to ownership. In United Nations Educational, Scientific and Cultural Organization (UNESCO)'s Draft Medium-Term Plan 1990–1995, cultural heritage was defined as "*the entire corpus of material signs - either artistic or symbolic - handed on by the past to each culture and, therefore, to the whole of humankind*." In this definition, one of the emphases is that heritage belongs to the whole of humankind, and it requires to be assessed in a holistic way (UNESCO, 1989). Appropriate conservation and management practices for architectural heritage are crucial for national and local governments to develop since they are not only valuable individually as monuments, but they also impact the environment they are located in. When the approaches towards heritage conservation and protection are analysed in various countries, it is possible to see different strategies which involve regulations prepared and controlled by different institutions from different levels, such as national, federal and local.

For example, in Austria, if any change is intended to be performed on an architectural heritage, an application is required for permission from the municipality. After this application, the city takes over the responsibility and decision-making process by following the comprehensive laws (Stubbs, 2011). This approach can be regarded as similar in most European Union countries. On the other hand, in the UK, no single comprehensive law can be implemented nationwide. The approach followed in the UK is to have multiple pieces of legislation and regulations overseen by different organisations (Zaleckis et al., 2022). Therefore, there are a series of standards and strategies which are recommended to be applied in the process of rehabilitation and conservation, and there are various aspects and layers of them.

Property rights can be regarded as one of the under-emphasised aspects of heritage maintenance, with a few exceptions researched by Lai and Ho (2016) and Benhamou (2020). According to Cheung (1987), property rights of cultural objects are not clearly defined and effectively enforced, especially when the topic involves rights related to privately owned objects (movable and immovable) listed nationally or internationally. However, especially regarding movable tangible heritage, international laws on property rights exist, and most of the time, they are in favour of cultural heritage rather than private property rights (i.e. UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, 1970). As stated by Baysan (2007), even in 1877, in France, a legal regulation was introduced that limited the rights of the private owners of heritage properties in the name of protection of cultural assets. However, some scholars, such as Shelby (2007), Matthes (2018) and

Aykan (2018), state that ownership is valued more over heritage rights due to its close connection with human rights. Furthermore, due to inheritance being the core notion of the concept of cultural heritage. Because if nobody finds a heritage object culturally valuable, it will not have any importance. Therefore, the owner might be more influential in the equation. In the case of immovable heritage, the convention of the Council of Europe on Offences relating to Cultural Property was adopted in 2017 as well, which clearly stated that the destruction or damage of cultural property, when committed intentionally, is a criminal act. Therefore, there is legislation for the protection of cultural property; however, private ownership might be adding another layer to the protection process, and from time to time, it might create a clash between fundamental property rights and the protection of heritage. In this matter, private ownership and private property rights, their limits, and implementation of them in the protection of heritage become essential to discuss.

2.1. Private ownership of heritage properties

The definition of property objects and the content of ownership claims has been transforming in recent decades due to the growth of global capitalism (Aykan, 2018). While priorly, property was limited to tangible objects, nowadays, even information can be a subject of property rights. To own a property or to have a possession is one of the rights of human beings, which is stated in Article 17 of the Universal Human Rights Declaration. However, owning a cultural heritage property might have a different dimension than any other property (United Nations, 1948). As Blake (2011) states, cultural heritage and the rights of the owners are important issues in themselves, as well as the identities of individuals and societies and their development since these processes are directly related. Furthermore, Rowlands (2004) states that cultural heritage can be significant in the identity construction process for people, and it is directly related to personal and collective right to exist. Therefore, the owner of a cultural property is responsible towards the other people as well, who recognise the reflection of their identity in these objects. However, as Logan (2014) states, this causes the conflict between individual and collective rights and creates the debate on which one is more dominant (Jakubowski, 2016). As stated by Macmillan (2013), there is a need to reach an agreement between governmental bodies and private owners depending upon some choices as to which rights should prevail and how. Especially when an architectural heritage has private owners, interventions towards the property might primarily focus on the interests or wishes of the owners (Wu and Hou, 2021). In that regard, it can be stated that private property owners have a paucity on considering the heritage values of their properties, which might create the perception that public ownership is more beneficial for the sustainability of the object. However, even though private ownership can contain negative aspects, it can also offer certain assets which would be to the advantage of these architectural heritage.

2.2. Positive and negative aspects of private ownership of heritage

Historical Monuments Act of France, which was signed in 1913, introduced a public easement that did not allow the private owners of historical monuments to make any changes to their artefacts without supervision or permission from the Ministry of Culture, which might alter the physical integrity of the property. Therefore, the negative aspects of private ownership have been a topic for a long while. However, private ownership can be a crucial positive asset for protection.

First of all, especially if the owner of the architectural heritage inherited the structure, it is possible that the object will have a sentimental value for the owner. As stated by Thurley (2005), valuing is one of the essential elements of heritage protection. When people attach a value to the heritage, it is more likely that they will spend an effort to care about it. In that regard, it is more likely that the private owners will attach a memento value to that heritage,

which can motivate them to protect and preserve the structure. Therefore, this can ensure the long-term survival of the structure.

Secondly, private owners might have the financial means to invest in the preservation and conservation of the buildings, which can shorten the process of searching for an investor or funding. Therefore, it can reduce the financial and economic burden on public funding. Furthermore, the interest in their own property can create philanthropic efforts, which can result in supporting conservation projects, educational programs, and community outreach initiatives for other heritage as well (Starr, 2010). In that regard, the private owners will not only help their own properties, but it can benefit the heritage community.

On the other hand, owners may not have the required resources, or even they might not have an interest in preserving the property. Prioritising the economic considerations rather than the meaning of the building can lead to making the objects vulnerable to not only to deterioration but also to their destruction. Therefore, this can be considered as one of the negative aspects of private ownership. According to Pickard (2009), in the countries in transition in central and eastern Europe, land and property restitution to the private owners can still be an issue, and it is even possible to notice a reluctance towards it. This can be due to the fear that the private owners might not accept the responsibility for safeguarding the heritage assets. Private owners of heritage objects have the tendency not to consider the value of the object for the general public and just act as if these structures are only their property. Essentially, this can cause accessibility issues for the structures, such as limiting the public from entering the building or restricting access in general. This can affect both academicians and professionals who want to document the structure but, at the same time, the citizens for their cultural experiences. As Lai and Ho (2016) state, in most cases, the regulations followed and the application in practice cannot provide a solution to the problem of open access to heritage buildings which have private ownership. However, approaches such as expropriations should be implemented as a last resource. It is believed that situations regarding accessibility can be solved by the initiatives of private-public partnerships and heritage communities.

3. Assistance for the protection of privately owned heritage and legislation

Even though the conservation and restoration of architectural heritage can be funded by the government or other entities, the inevitable increase in the number of listed buildings implies increasing costs (Benhamou, 2015). Furthermore, even though there are some funding options, the continuity of these projects cannot be provided from time to time. Therefore, management regarding the conservation and restoration of some of these buildings can be left to their owners, and this will emerge the need of assistance for protection. As Bademli (2006) states, private properties cannot be expected to be protected by their owners purely because, in that case, private benefits and interests will be at the forefront when it is compared to the public good. Therefore, a long-term strategy for preserving the structures is required for the heritage belonging to private owners. Especially communicating the knowledge on the confirmation of whether or not any approvals are required for changes can be necessary for the private owners. Furthermore, information on how to achieve an outcome both for protecting the structure as well as personal gains can get the attention of the owners and assist them to be more involved in the process.

Cases regarding supporting the owners and providing information with technical sheets can be detected in various countries. For instance, in the example of Fremantle, which is a city in Western Australia, the Heritage Council of the City provides information on different topics, such as an introduction to good conservation practices, a checklist for inspections, how to look after limestone walls, make limestone mortars and repoint lime mortar joints and how to deal with dampness in old

walls (Heritage Council of the City of Fremantle, 2015). On the other hand, the city of Warsaw in Poland provides information regarding legal works for their citizens who privately own heritage and technical drawings of good practice ideas for the interventions which can be implemented in the area of Żoliborz (Domagalska et al., 2017). Even though tailored technical information is particularly crucial for assisting private owners and private initiatives, provided general information can support in general terms as well. However, every heritage in different locations will require a particular approach and traditional methods, which will merely be supported by the help of the experts.

3.1. Different approaches regarding the management of heritage

Without the advice of the experts, the protection of privately owned structures can be complicated, not only due to not having enough knowledge about the physical repairments but also due to the subjective approach towards its management. Therefore, different approaches are required for the protection and management of heritage.

To facilitate an easier living standard for the owners, façadism was used as an adaptive reuse strategy for various architectural heritage structures in the past, even though it does not comply with the Venice Charter. According to the definition of Richards (1994), façadism is the retention of the front or exterior of a building, even though the interior is completely gutted and replaced. Therefore, this approach only protects the façade but not the essence of the building; furthermore, it establishes a theatre décor rather than a historical environment. While this approach preserves the historical façades, it allows the unrestricted alteration of the interiors (Benhamou, 2015). Loyer (2001) states that, in the 17th and 18th centuries, façadism was employed to beautify cities. It was used in the post-war period to preserve the historical material that remained during the rebuilding efforts. In contemporary usage, it is more about keeping the façade for economic reasons and is seen as a compromise between divergent interests, especially in the US. However, perceiving the façade as a separate element segregates the building from its own design and the environment, which might result in different outcomes. Furthermore, it might be possible to state that this method can establish more negative results rather than positive ones for the heritage, and it cannot even be regarded as maintenance or restoration.

Another approach can be regarded as expropriation, which is followed by the preservation of the architectural heritage that have private ownership. For the first time, the possibility of expropriation was included in the Granada Convention of the Council of Europe to protect architectural heritage. Article Four, sections C and D in the Granada Convention (1985) states that each Party shall prevent the disfigurement, dilapidation, or demolition of protected properties, and they should introduce legislation which "permits public authorities to require the owner of a protected property to carry out work or to carry out such work itself if the owner fails to do so" and "allows compulsory purchase of a protected property". Every country has their own practices of expropriation for fair compensation of the property rights of the private owners.

Other than expropriation, governments can have other direct interventions for achieving the conservation goals of the privately owned heritage property. Using regulatory policy instruments such as zoning, land acquisition, and development control are the traditional approaches which can be implemented (Hou et al., 2020). However, Shahab et al. (2018) state that the efficacy of these approaches to deal with privately owned built heritage is questionable since they have low effectiveness. Therefore, new approaches are required continuously. Partnerships and the transfer of development rights are some of the most common programs since they meet the demand. At the same time, they have the ability to balance the conflicts between public and private interests with minimal use of public funds (Hou et al., 2020). Furthermore, they assist the public partic-

ipation while lowering the transaction costs. However, every country has different approaches and legislation.

3.2. Turkish conservation legislation and its relationship with property rights

According to the Protection of Cultural and Natural Heritage Law (No. 2863, Article 6), in Turkey, the structures which are built in 1899 and before are identified as immovable cultural assets that require to be preserved without the need for any other action. However, immovable properties constructed after the year 1900 can be only a subject of protection if they are recognised by the Ministry of Culture (Özel, 2018). Immovable cultural heritage, such as architectural heritage which is under the scope of this law, can have both governmental and private ownership. While the structures which are owned by the government are under the responsibility of the government for their protection, the private owners are obliged to fulfil the maintenance and repair of these assets (Protection of Cultural and Natural Heritage Law No. 2863, Article 11). Furthermore, private owners can only use the powers provided to them by their property rights over these assets only to the extent that they do not conflict with the provisions of the law. For the restoration projects or the physical restoration of the privately owned heritage, the owners can apply to the Ministry of Culture and the General Directorate of Cultural Assets and Museums for assistance (Official Gazette of the Republic of Turkey, 2009).

From time to time, related to the inheritance issues, the architectural heritage might not only have one private owner but multiple private owners. This can happen regularly in the context of Turkey. In this situation, the private ownership becomes more complicated because a deed of consent will be required from the other owners. Furthermore, it might also affect the decision-making process since there would be more than one person who is responsible for the safeguarding of the objects. In circumstances like this, the government can frequently follow the expropriation route.

In Turkey, the expropriation of cultural assets is supported by the fees which are collected as a part of the real estate taxes. According to the regulations on the contribution for the protection of immovable cultural assets, there is an imposed rate of 10% of the real estate tax, which is used for the implementation of the projects and expropriation (Regulations on the contribution for the protection of immovable cultural assets, 2009). In order to implement the expropriation and the other steps, such as the preservation and evaluation of immovable cultural heritage property, the government bodies prepare a series of documents. Most of the time, the expropriation procedure is implemented depending on the urgency of the conditions of the heritage property (Albu & Leşan, 2021). However, the expropriation of heritage properties which has private owners should be used as the last action to protect the structures or in the situation when the private owner is not taking care of the building intentionally.

Some of the architectural heritage in Turkey can encounter deterioration, not only due to belonging to private owners but also due to being owned by institutions such as the General Directorate of Foundations. According to Akar (2011), the General Directorate of Foundations is one of the oldest institutions since it is the continuation of the foundation institution from the Seljuk and Ottoman eras. However, this institution is not only responsible for the still-existing foundations and their properties but also structures with an appointed trustee registered in the name of the state treasury (Doğan, 2023). Therefore, from time to time, the preventive measures for these structures can result in conflicting situations, especially regarding political decisions. However, models such as private-public partnerships, which work with the intention of restoring and managing the process and subsequently transferring the property rights of the heritage or sponsorship agreements which can assist in the restoration and maintenance of the properties, are commonly used in Turkish

legislation.

In the end, the poor state of repair of the architectural heritage in the environment can generate no socio-economic benefits to anyone (Greffe, 2004). With the management of the restoration and maintenance of the heritage property, the decay could be much more rapid. One of the examples of this is Arpaz Tower, which is located in the Western Anatolian region of Turkey. The structure is not being restored, and in its current state, the appreciation towards the building is decreasing day by day. In that regard, it is found to be a beneficial example for understanding the positive and negative aspects of private ownership and how it is dealt with.

4. Case study: Arpaz Tower

4.1. History

Arpaz Tower is a unique architectural heritage in its surroundings due to its physical characteristics, but at the same time, due to the historical period it represents. (Figure 1.). It is one of the few structures left in the Western Anatolian region, which was built as a defence tower.

The tower is located in Arpaz (Esenköy) village, near Nazilli. The tower is part of a complex, which is one of the examples of Ayan Architecture in the Ottoman Empire. According to the Encyclopaedia of the Ottoman Empire (Agoston, 2008), the word Ayan represents the local noble class or dynasts in the 16th to the early 19th century in the Ottoman Empire who held different degrees of authority in provincial towns. They used to supervise the interaction between the government and the public, such as helping the government to collect and supervise the distribution of tax (Ergenç, 1981). However, especially in the late 18th century, the system started to get corrupted, and the head of the noble classes became more of a feudal lord with bigger lands and environmental authority than the government itself (Öksüz, 2005). In these lands, they gave the opportunity to the local public to work and stay, and in return, provided them protection. The Arpaz family was one of those noble families who had lands in the area, which is located near the Meandros River. The family owned significant lands on this plain, which included a mansion, a tower and outbuildings located all around the farm (Figure 2.). Furthermore, ruins of a castle in the same plot were found in 1986 (Arel, 1986).

Figure 1. *Façade of the Arpaz Tower (The photo is taken by the author).*

Figure 2. *The complex with the tower and the mansion (The photo is taken by the author).*

After the 1829 uprising in Aydın

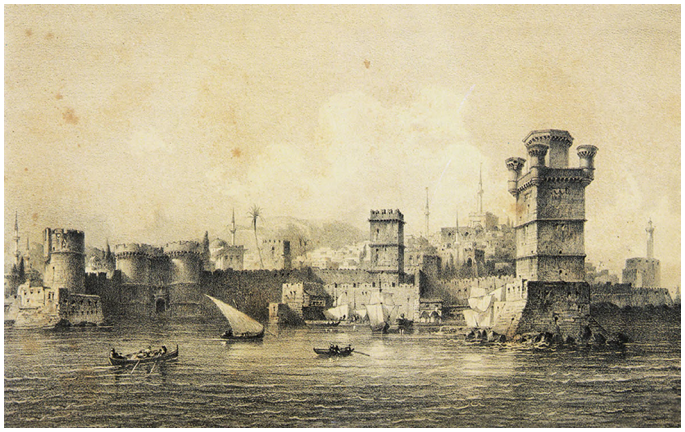

Figure 3. *Engraving of the fortifications of the harbour of Rhodes as seen in 1862 (N. Kasseris, 1997).*

surrounding, the head of the family, Arpaz Hacı Hasan Bey, was exiled to Rhodes by Sultan Mahmud II due to being unable to control the uprising. However, a few years later, he was forgiven by the Sultan, and he returned to his family lands (Hürol, 2011). As stated by Hürol (2011), when he returned from Rhodes, he brought approximately 30 Greek mason workers with him, whom he used to repair his farm and fortify the existing tower. According to Arel (1992), in this repair process, the workers from Rhodes made the tower look similar to the Naillac Tower of Saint John Knights (Figure 3.).

4.2. Issues caused the current situation of the building complex

While various reasons caused the issues regarding the current situation of the Arpaz Tower, one of the most dominant ones can be identified as the neglect towards the structure. However, this might be the result of different layers of problems.

One of the problems can be regarded as the ownership status of the building with two different aspects. First of all, the structure was still owned by the same family who built the structure in the 19th century until 2022. Therefore, it had private ownership, which established the expectation to be protected and maintained by its owners. However, this could not be achieved successfully.

According to the interviews with the family, which took place in 2011 as a part of a master's thesis research at Yildiz Technical University, Istanbul, by Şahizer Meltem Hürol, it is revealed that one of the problems regarding the building was not the ownership issue due to the private owners but the number of owners at present. Therefore, there was the existence of multiple private owners (Seven family members) who were required to give each other the deed of consent in anything that needed to be done. According to Hürol (2011), until the beginning of the 20th century, there was no problem with the maintenance and the use of the buildings since the owner of the complex was the eldest son of the family, and he was taking care of the structures. However, after he passed away, inheritance was divided between the relatives, which provided some rights to the buildings for many people. As a result, since there was not one person in charge of the restoration or the maintenance of the structure, it started to be neglected. Therefore, over the years, the building got damaged, both due to the disregard by the owners and, at the same time, the disregard by the heritage institutions. Furthermore, the climate conditions started to affect the complex more, which accelerated the decay.

The tower and the whole complex were registered as an architectural heritage in 1988 by the Ministry of Culture of Turkey (Yaşar & Tarhan, 2022). According to Hürol (2011), one of the owners at the time claimed that he applied many times to the Ministry of Culture to receive financial and technical support for the conservation and maintenance of the complex. However, he was not able to get the required funding. Furthermore, according to the statement of the family to author Meltem Hürol, in the same period, the family also stated that they donated the heritage objects to the General Directorate of Foundations on the condition that they would be repaired within seven years; however, no repairs were conducted, and the property was given back to the responsibility of the family again (Hürol, 2011). After this date, the building complex and its deterioration process continued.

Another reason which can be regarded as one of the causes of the damage to the complex can also be the fact that the tower and the mansion have

been empty for a long time. Since nobody lives in this complex, the issues about the complex cannot be detected regularly, and it limits the interventions which can be done on time. However, there is the necessity of preventive repair from the deterioration of the complex. Due to the immense amount of cultural heritage in Turkey, the approval periods of the projects might be lengthy and slow. However, if the property owned is listed, it does not mean that the owners cannot make any changes to the structure, and as long as the proposed changes are conducted legally, these maintenance and repair work are regarded as development in most cases. Therefore, even though these broader maintenance and preventative repairs were required for the integrity of this complex by the consultation with the experts, these measures were not taken.

In 2022, the municipality of Nazilli expropriated the complex by having an agreement with all seven owners who had the inheritance rights on the property (Yaşar & Tarhan, 2022). Furthermore, the municipality received authorization from the municipal council for the employment of 20 personnel for the restoration of the structure. Even though it was announced that the complex was included in the 2023 investment program by the Ministry of Culture for its restoration, no changes are still taking place (Beginning of 2024), and no work has started. Unfortunately, at present, the survival of the structure is only possible with comprehensive restoration work to be done (Figure 4.). However, despite the expropriation, there is no concrete strategy for the structure and the financial consequences of the restoration projects still remain a burden to the municipality, as it was a burden to the private owners of the structure. Apart from the problems arising from economic reasons, other factors that threaten the existence of the complex are external factors such as theft, fire and treasure hunting.

Figure 4. *Deterioration at the terrace floor (The photo is taken by the author).*

5. Conclusion

When an architectural heritage has private ownership, it might be possible to state that from time to time, it can be harder to protect the property , or it can be more complicated if it is compared with a governmentally owned structure since it is accompanied by various consequences. These consequences can be both negative and positive, and they can directly affect the conservation and protection process. Especially in the case of residential buildings, if a heritage has a private owner, it should be remembered that before being a heritage, the structure is a house for the people who inhabit them. Therefore, it is crucial to establish the balance between the rights of the owner and the general public and, furthermore, adjust the negative and positive aspects. If it would not be possible to establish the proper equilibrium, it can create potential concerns about the continuity of the heritage.

One of the negative aspects of private ownership can be the limited public access to heritage. However, a solution to this can be arranged by the initiatives of private-public partnerships and collaboration with heritage communities. Furthermore, another negative

aspect can be conflicting interests with the profit motive towards the heritage, which can result in the potential risk of neglect or commercial exploitation. On the other hand, inheriting a heritage can also have a positive outcome, which is adding sentimental and memento value for the owners. Therefore, this can motivate the owners to protect and look after the structure. Furthermore, if the private owners have the required finances, it can make the process faster, rather than waiting for sponsorship and funding.

Many countries have laws and regulations regarding the protection of heritage regardless of ownership issues of them. Especially governments and heritage organisations have a crucial role in developing strategies so the heritage can continue its life. These strategies can involve legal protection, such as establishing restrictions on alterations, demolitions, or changes to the façades; financial incentives, such as tax credits or grants, to private owners who invest in the preservation and restoration of architectural heritage. Furthermore, strategies can involve providing expertise and helping to engage the local communities in the process. Creating technical expertise sheets which are tailored for each individual building can be beneficial. Therefore, it can provide the required knowledge both before and during the protection process.

In the case of Arpaz Tower, even though there are many approaches which can be followed by the governmental institutions, unfortunately, the governmental organisations are taking a slow pace for the protection of the building. The government can implement a strategy that can encourage the creation of public-private partnerships and foster joint efforts to conserve and protect the building. Furthermore, it can acquire the financial responsibilities for the restoration of the complex to benefit from it for tourism. In that regard, the model of "restore, manage, transfer" can also efficiently work for this complex. Partnerships and the transfer of development rights are some of the most common programs since they meet the demand. At the same time, they have the ability to balance the conflicts between public and private interests with minimal use of public funds.

It is possible to state that balancing private ownership rights with the need for heritage protection is an ongoing challenge. However, finding a sustainable approach that encourages private investment while safeguarding architectural heritage is also achievable. Therefore, Arpaz Tower is still lacking a concrete strategy even though it is crucial to ensure that this valuable landmark can continue to enrich the understanding of heritage for future generations. In that regard, it should be noted that it might not be possible to manage a heritage, such as the Arpaz Tower, with the efforts of only private owners or governmental organisations. As a result, collaboration is immediately required; however, the government also needs to act as soon as possible before the complex totally vanishes. The balance between ownership rights and heritage rights is a complex and, most of the time, a context-specific matter that is subject to negotiation, debate, and evolving societal norms and values. However, the relative importance of these rights is a matter of ongoing discussion and may change over time as societies evolve.

References

Agoston, G. (2008). *Encyclopedia of the Ottoman Empire*. New York: Gabor Agoston and Bruce Masters.

Albu, S., & Leşan, A. (2021). Expropriation as a way for protecting the architectural heritage. *Current Urban Studies*, *9*, 299-314. https://doi.org/10.4236/cus.2021.92019

Akar, T. (2011). Vakıflar Genel Müdürlüğü ve Vakıf Kültür Varlıklarının Korunması. *Erdem* , *59*, 1–36 .

Arel, A. (1986). *Ege bölgesi ayanlık dönemi mimarisi hakkında bir ön araştırma*. Paper Presented at the 4. Araştırma sonuçları toplantısı, Turkey.

Arel, A. (1992). Ege bölgesi ayanlık dönemi mimarisi: 1986-1991. Paper Presented at the 10. Araştırma sonuçları toplantısı, Turkey.

Aykan, B. (2018). Saving Hasankeyf: Limits and Possibilities. *International Journal of Cultural Property*, *25*, 11–34. https://doi.org/10.1017/S0940739118000036

Bademli, R. R. (2006). *Doğal, tarihi ve kültürel değerlerin korunması*. Ankara: ODTÜ Mimarlık Fakültesi Yayınları.

Blake J. (2011). Taking a human rights approach to cultural heritage protection. *Heritage & Society*,*4* (2), 199–238.

Baysan, N. (2007). Tarihsel çevre koruma mevzuatının değişim süreci: Izmir Mithat Paşa Caddesi örneği. (Unpublished Master's thesis). Institute of Science, Dokuz Eylül University, İzmir.

Benhamou, F. (2015). Who owns cultural goods? The case of built heritage. In V.A. Ginsburgh (Ed.) *Economics of art and culture: invited papers at the 12th international conference of the association of cultural economics international* (pp. 187-202). Bingley: Emerald Group Publishing Limited.

Benhamou, F. (2020). *Heritage: Handbook of cultural economics*. New York: Elgar Publishing.

Campfens, E. (2020). Whose cultural objects? Introducing heritage title for cross-border cultural property claims. *Netherlands International Law Review*, *67*, 257–295. https://doi.org/10.1007/s40802-020-00174-3123.

Cheung, S. (1987). Common property rights. In J. Eatwell, M. Milgate and P. Newman P (Eds) *New Palgrave: A dictionary of economics* (pp.504–505). London: Macmillan.

Council of Europe Treaty Series - No. 221 Council of Europe Convention on Offences relating to Cultural Property Nicosia (2017) [pdf]. Retrieved from https://rm.coe.int/council-of-europe-convention-on-offences-relating-to-cultural-property/1680a5dafb.

De Clippele, M.S. & Lambrecht, L. (2015). Art law & Balances-Increased protection of cultural heritage law vs. private ownership: Towards clash or balance? *International Journal of Cultural Property*, *22*(2-3), 259–278. https://doi.org/10.1017/s0940739115000119.

Doğan, H.A. (2020). Perception of the modern movement in architecture as cultural heritage. Journal of Art History & Criticism, *16* (1), 65–78. https://doi.org/10.2478/mik-2020-0004.

Doğan, H.A. (2023). The reasons of deterioration on historical buildings and the significance of memory in the adaptive reuse process of architectural heritage. *Journal of Heritage Conservation*, *73*, 24–33. https://doi.org/10.48234/WK73INSTANBUL.

Domagalska, K., Kowalski, Ł. & Lewandowski, M. (2017). Guide to good architectural practices of Żoliborz. Warsaw: Stowarzyszenie Żolibor

Ergenç, Ö. (1981). *Osmanlı şehirlerindeki yönetim kurumlarının niteliği üzerinde bazı düşünceler*. Paper presented at the VIII. Türk Tarih Kongresi, Turkey.

Greffe, X. (2004). Is heritage an asset or a liability? *Journal of Cultural Heritage*, *5* (3), 301–309. https://doi.org/10.1016/j.culher.2004.05.001.

Heritage Council of the City of Fremantle (2015) [pdf]. Retrieved from https://www.fremantle.wa.gov.au/conservation-privately-owned-heritage-buildings.

Historical Monuments Act of France (1913), Ministry of Culture of France [Txt]. Retrieved from https://www.culture.gouv.fr/en/Thematic/Monuments-Sites/Monuments-historiques-sites-patrimoniaux/A-little-history/Centenary-of-the-law of1913#:~:text=The%20Historical%20Monuments%20Act%20was,to%20everyone%20.

Hodder, I. (2010). Cultural heritage rights: from ownership and descent to justice and well-being. *Anthropological Quarterly*, *83*(4), 861–882.

Hou, J., Gu, D., Shahab, S. & Cha, E. (2020). Implementation analysis of transfer of development

rights for conserving privately owned built heritage in Hong Kong: A transactions costs perspective. *Growth and Change*, *51*, 530–550.

Hürol, Ş., M. (2011). Nazilli arpaz köyü (esenköy) arpaz beyler konaği koruma sorunlari ve restorasyon önerisi. (Unpublished Master's thesis). Institute of Science and Technology, Yıldız Technical University, Istanbul.

Jakubowski, A. (2016). *Cultural Rights as Collective Rights: An International Law Perspective*.

Leiden: Brill Publication.

Jokilehto, J. (2012). Human rights and cultural heritage. observations on the recognition of human rights in the international doctrine. *Internation-*

al Journal of Heritage Studies,*18* (3), 226–230.

Kasseris,N. (1997). *Rhodes, Nymph of Helios*. Rhodes: Rhodes Image.

Lai, L., & Ho, D. (2016). Farms are not zoo: a post-colonial study on enclosure and conservation of military heritage buildings in Hong Kong. *Urban Studies*, *53*(5), 851–866.

Logan, W. S. (2014). Heritage rights: Avoidance and reinforcement. *Heritage and Society*, *7* (2), 156–69. https://doi.org/10.1179/2159032X14Z.00000000032

Loyer, F. (2001). *Façadisme et identité urbaine*. Paris: Monum Press.

Macmillan, F. (2013). The protection of cultural heritage: common heritage of humankind, national cultural 'patrimony' or private property? *Northern Ireland Legal Quarterly*, *64*(3), 351–364. https://doi.org/10.53386/nilq.v64i3.355.

Matthes, E.H. (2018). The Ethics of Cultural Heritage. In *Stanford Encyclopedia of Philosophy.* Stanford: University Press.

Official Gazette. (1983). *Law on the Conservation of Cultural and Natural Property, Law Number: 2863*. https://kvmgm.ktb.gov.tr/TR-43249/law-on-the-conservation-of-cultural-and-natural-property-2863.html#:~:text=The%20State%20shall%20have%20the,museums%2C%20is%20conserved%20and%20evaluated

Official Gazette. (2009). *Regulation on the contribution fee for the conservation of immovable cultural property 2009-5835/1*, https://kvmgm.ktb.gov.tr/TR-43249/law-on-the-conservation-of-cultural-and-natural-property-2863.html.

Öksüz, M. (2005). XVIII. yüzyilin ikinci yarisinda tranzon'da âyân, eşkiya ve göç sorunlari, *Journal of Social Sciences Institute of Atatürk University*, *5*(1), 169–186.

Özel, S. (2018). Türk hukukunda kültür varlıklarının mülkiyeti / the ownership of cultural property in Turkish laws, *Marmara Üniversitesi Hukuk Fakültesi Hukuk Araştırmaları Dergisi* , *24* (1), 215–238.

Pickard, R. (2009). *Funding the architectural heritage: a guide to policies and examples: A Guide to Policies and Examples*. Strasbourg: Council of Europe Publishing.

Richards, J. (1994). *Façadism*. Oxford: Routledge Press.

Riegl, A. (1903). *The modern cult of monuments: Its essence and its development.* Braumüller: K. K. Zentral-Kommission für Kunst- und Historische Denkmale.

Rowlands, M. (2004). Cultural rights and wrongs: Uses of the concept of property. K. Verdery and C. Humphrey (Eds.) In *Property in question: Value transformation in the global economy*, (pp.207–226) Oxford: Berg Publishing.

Shelby, T. (2007). We who are dark: The philosophical foundations of black solidarity. Cambridge, MA: Harvard University Press.

Shahab, S., Clinch, J. P. & O'Neill, E. (2018). Timing and distributional aspects of transaction costs in transferable development rights programs. *Habitat International*, *75*, 131–138.

Starr, F. (2010). The business of heritage and the private sector. In S. Labadi and C. Long (Eds.) *Heritage and globalisation*. London: Routledge.

Stubbs, J.H. & Makas, E. G. (2011). Architectural conservation in Europe and the Americas-National experiences and practices. New Jersey: John Wiley & Sons, Inc.

Thurley, S. (2005). Into the future: Our strategy for 2005-2010. *Conservation Bulletin [English Heritage]*, *49*, 26–27.

United Nations Educational, Scientific and Cultural Organization. (1970). *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*. https://en.unesco.org/about-us/legal-affairs/convention-means-prohibiting-and-preventing-illicit-import-export-and

United Nations Educational, Scientific and Cultural Organization. (1989). *Draft Medium Term Plan 1990-1995*. https://unesdoc.unesco.org/ark:/48223/pf0000084697.

United Nations. (1948). *Universal Declaration of Human Rights, UN Doc. A/810*. https://www.un.org/en/about-us/universal-declaration-of-human-rights

Wu, H. & Hou, C. (2021). *An investigation of private-owner-led heritage property adaptive reuse*. Paper presented at the 27th Annual Pacific Rim Real

Estate Society Conference, Australia.

Yaşar, A., & Tarhan, Ç.M. (2022). Nazilli'deki arpaz kulesi mevcut korunma durumu ve koruma önerileri. S.Akkurnaz,T.E. Sepetcioğlu & A. Özver (Eds.) In *Kurtuluşunun 100. Yılında Geçmişten Geleceğe Nazilli.* (pp.147–158) Ankara: Akademisyen Press.

Yung, E., H., K. & Chan, E., H., W. (2012) Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, *36*, 352–361. https://doi.org/10.1016/j.habitatint.2011.11.001.

Zaleckis, K., Doğan, H. A. & Lopez Arce, N. (2022). Evaluation of the interventions to built heritage: analysis of selected façades of Kaunas by space syntax and sociological methods. *Sustainability*, *14* (8), Art.No. 4784, 1–18. https://doi.org/10.3390/su14084784.

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High street resilience during the COVID-19 pandemic: Shopkeepers' strategies of Istiklal Avenue, Istanbul

Elif KIRPIK[1*], Asuman TÜRKÜN[2]
[1] ekirpik@yildiz.edu.tr • Department of City and Regional Planning, Faculty of Architecture, Yildiz Technical University, Istanbul, Türkiye
[2] aturkun@yildiz.edu.tr • Department of City and Regional Planning, Faculty of Architecture, Yildiz Technical University, Istanbul, Türkiye

** Corresponding author*
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Abstract
This study investigates the impacts of the COVID-19 pandemic on high streets, focusing on Istiklal Avenue, a historical shopping street in Istanbul, Türkiye. It seeks to uncover the relationship between the resilience of the high street and the response strategies of shopkeepers by examining how they coped with the challenges of the pandemic, adapted to changing conditions, and adopted immediate, temporary, or permanent strategies. To this end, 71 businesses' shopkeepers, managers, and employees were interviewed in-depth to gain a subjective and profound understanding of their micro-resilience. The findings reveal that businesses in and around Istiklal Avenue responded to the COVID-19 crisis through preventive measures to contain the spread of the pandemic, operational and financial strategies, space adaptations, and alternative interventions, as well as a widespread preference for inaction. These strategies are closely linked to the policies implemented by central and local governments during the pandemic, government support and incentives, and the ability of businesses to take advantage of these policies. Additionally, the response to the crisis is significantly influenced by business characteristics, including sector, activity, size and crisis experience. Significantly, the study highlights a mutually reinforcing relationship between the resilience of high street businesses and the overall resilience of the high street itself. The historical continuity of the high street, its previous crisis experiences, its ability to adapt quickly to the changing conditions of each period, and therefore the resilience of the high street becomes a guiding factor in the decision-making mechanisms of the shopkeepers and increases their resilience.

Keywords
COVID-19, Crisis response strategies, High street, Istiklal Avenue, Resilience.

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1. Introduction

Starting from late 2019 and spreading globally over the next two years, the COVID-19 pandemic, considered more than a health crisis in terms of its scale, causes, and effects, has led to various vulnerabilities and inequalities at different levels (United Nations, 2021). High streets have become one of the most vulnerable places during the COVID-19 crisis, as it has strained their capacities, disrupted daily activities, caused damages, posed threats, and exposed their vulnerabilities, highlighting the visible inequality.

High streets, referred to as commercial urban corridors in cities, are not only economic hubs, but also complex socio-spatial environments where socialization and culture are produced, sometimes even surpassing mere economic significance. Distinguished from other urban components, they serve a high level of public space function and are characterized by inclusivity, diversity, vibrancy, crowds, uniqueness, and place attachment, while also maintaining connections to global geographies, often holding symbolic meanings for cities. Even before the COVID-19 crisis, these unique characteristics of high streets have made them vulnerable to a variety of risks, in addition to the more common risks faced by cities. These risks stem from a multitude of environmental, socio-economic and political factors, including natural disasters, climate change, economic crises, terrorist attacks, social movements, urban policies, sectoral dynamics, technological advancement and epidemics. While other changes, shocks, crises in the past and the COVID-19 pandemic have severely damaged the everyday functioning of some high streets and caused them to lose their vitality and viability in the future, some high streets have either been minimally affected by such crises or have continued to maintain their identity and function by adapting and, if necessary, transforming. In the face of future crises, there is a fundamental need to discuss what ensures the resilience of high streets, especially in historic town centres where traditional retailing still dominates and the shopping function has been maintained through many crises and changes over many years. The COVID-19 crisis provides a unique opportunity to conduct such a debate.

Correspondingly, this research aims to explore the impact of the COVID-19 pandemic on historical high streets, exploring the concept of resilience to uncover how businesses in the area were affected, how shopkeepers, managers and employees coped with the pandemic's impacts, and what strategies they used to survive and adapt in the new normality, taking Istiklal Avenue as a case study. Based on the concept of panarchy (Gunderson & Holling, 2002), which refers to the interconnected levels in social-ecological systems and the multi-level interactions between these levels, the research considers the high streets as a focal system and the businesses located on the high streets as a micro-level system. Therefore, this study is based on the assumption that high street resilience and business micro-resilience are related, and this relationship is examined rather than all the components of high street resilience.

The paper is structured as follows: Firstly, the theoretical background of high street resilience is presented, along with a review of the literature expanded by COVID-19 crisis-related studies. The subsequent section offers an overview of Istiklal Avenue, a historic city center in Istanbul, Türkiye, outlining the COVID-19 pandemic's course. The fourth part encompasses case specifics, involving in-depth interviews with 71 shopkeepers, managers, and employees, along with the analysis of findings related to shopkeepers' crisis response strategies. The final section discusses high street resilience and shopkeepers' crisis response strategies, concluding the study.

2. High street resilience

High streets, encompassing not only an economic system but also social, physical, environmental, political, and administrative systems, are regarded as complex and dynamic urban ecosystems (Griffiths et al., 2008; Zukin et al., 2015), with their resilience acknowledged as a facet necessitating enhancement in the face of ongoing

uncertainties, shifts, and manifold crises. In its broadest sense, based on social-ecological system resilience, the resilience of high streets encompasses the ability to sustain their functioning and maintain their identity in the face of sudden or gradual changes, crises and uncertainties, while at the same time being capable of adapting to new conditions, seizing new opportunities and effectively benefiting from new potential (Fernandes & Chamusca, 2014; Hudson, 2010; Meerow et al., 2016; Salgueiro, 2011). The absorptive, adaptive and transformative capacities of good resilience (Béné et al., 2012) recognised in socio-ecological systems also apply to high street resilience, and all components and actors of the high street are considered in building resilience.

The concept of resilience to high streets was initially developed from economic geography literature and utilized with a focus on urban retail (Dolega & Celinska-Janowicz, 2015; Wrigley & Dolega, 2011). Following the financial crisis of 2007-2008, Wrigley and Dolega's (2011) "Resilience, Fragility, and Adaptation: New Evidence on the Performance and Policy Implications of UK High Streets during the Global Economic Crisis" was a pioneering study exploring the resilience of high streets. In the years to come, initial comprehensive research primarily took place under the REPLACIS project, a collaborative effort involving scholars from Portugal, France, Sweden, and Türkiye, focused on urban retail and urban resilience (Balsas, 2014; Barata-Salgueiro & Erkip, 2014; Cachinho, 2014; Erkip et al., 2014; Fernandes & Chamusca, 2014; Kärrholm et al., 2014; Ozuduru et al., 2014; Yalciner Ercoskun & Ozuduru, 2014). These studies reveal that city centers and high streets in countries such as Portugal and Türkiye have distinct issues compared to those in English, American, and certain European cities. The debate on the resilience of the retail sector in emerging markets has centred on the impact of the global economic crisis as well as structural and spatial changes in urban retail. While British and American cities underwent retail decentralisation in the second half of the 20th century due to the impact of out-of-town shopping centres, and traditional high streets faced death in the face of modern retail, this retail transformation in developing countries has only emerged as a threat to high streets since the 2000s. For instance, the structural transformation of retail, defined as small, capital-weak, independent, family-run businesses (Tokatli & Ozcan, 1998) in large cities such as Ankara and Istanbul in Türkiye, towards modern retail only became visible with the opening of shopping malls in both city centres and peripheries in the 2010s (Erkip et al., 2014; Erkip & Ozuduru, 2015; Ozuduru et al., 2014; Yalciner Ercoskun & Ozuduru, 2014), i.e. while the resilience agenda of developed countries is shaped around the renewal of city centres and high streets and the global crisis. Nevertheless, regardless of the underlying rationale, high streets have been jeopardized by modern retailing, leading to increased vacancy rates, vulnerability to economic conditions, shifting customer preferences due to the rise of online shopping, and the loss of their former vibrancy and viability. Consequently, the phenomenon of death of high streets has been frequently declared, particularly in English and American cities, prompting discussions on the causes of this decline, methods for restoring their vitality and viability, and strategies to enhance their resilience (Hall, 2011; Hubbard, 2017; Hughes & Jackson, 2015; Millington & Ntounis, 2017; Parker et al., 2017; Singleton et al., 2016; Talen & Jeong, 2019; Wrigley & Lambiri, 2015). These research efforts have contributed not only academically, but also through reports published by various institutions or researchers, addressing the specific needs of high street management organizations. Research encompassing the broader context of urban policies supporting high streets has been crucial for both identifying the problems faced by high streets and offering action-oriented strategies in areas such as cloning, digitalization, and walkability etc. (Brett & Alakeson, 2019; Genecon LLP and Partners, 2011; Good Growth by Design, 2019; Grimsey et al., 2020; High Streets Task Force, 2020a, 2020b; New Economics

Foundation, 2010; Portas, 2011).

The COVID-19 pandemic has marked a new turning point in the discourse on high streets and their resilience. The widespread implementation of lockdowns, quarantines, mandatory government measures, near cessation of economic activity and gradual changes in human behavior have highlighted the need to reconsider and discuss the resilience of high streets.

While there were significant concerns about the resilience of high streets at the beginning of the pandemic, the academic literature has since broadened its focus to include the impacts of the pandemic on high streets, the factors influencing their resilience, the crisis response strategies of businesses on high streets, and the high street's future role. Carmona (2022) argues that the rise of online shopping has created an existential crisis for high streets, emphasizing the need for them to offer options beyond retail and to be reimagined as experiential places where social interactions are enhanced. Lashgari and Shahab (2022) support Carmona's perspective through a literature review, showing that the rise of online shopping during COVID-19 has led to changes in customer preferences, resulting in declining footfall in city centers and posing a long-term risk to the vitality of high streets. In contrast, Popławska (2021), using the case of Poland, highlights that high streets experienced a revival during the pandemic compared to shopping malls, representing an opportunity for their future, thus offering a more optimistic outlook for high streets.

Some studies of the pandemic have focused on the characteristics of high streets that contribute to their resilience. For example, in a study of footfall in six UK city centers, Enoch et al. (2022) found that smaller centers are likely to be more resilient than larger centers due to utilitarian shopping and proximity, highlighting that footfall is not only criteria for vibrancy but also for resilience. Hill and Cheshire (2023) found that in the UK, high streets with more basic service retailers, and therefore more shops open during compulsory closures, were more resilient, while streets with pre-pandemic instability, high vacancy rates and high tenant turnover were less resilient.

Studies have also focused on the response strategies of high street businesses during the crisis. For example, Appel and Hardaker (2021) identified the factors influencing the resilience of textile retailers in Würzburg, Germany, including local government management style, financial situation, infection rates, self-assessment, innovation willingness of business owners, pre-crisis business status, and property ownership/leasing. In a related study, they examined e-commerce strategies and analyzed subjective and objective components of businesses' resilience (Hardaker et al., 2022). Additionally, Nanda et al. (2021) focused on e-commerce and digitalization, discussing future retail scenarios on high streets and the strategies physical stores should adopt. It should be emphasized that while there are studies in the business resilience literature that explore businesses' response strategies to the COVID-19 crisis (Bressan et al., 2021; Chang et al., 2022; Hossain et al., 2022; Katare et al., 2021; Klöckner et al., 2023; Klyver & Nielsen, 2021; Miklian & Hoelscher, 2022; Morgan et al., 2020; Sharma et al., 2020; Wenzel et al., 2020), there is a notable lack of research specifically focusing on the response strategies of high streets' businesses.

The effects of the pandemic are beginning to fade away, researches have also addressed the characteristics that future high streets should embody, including policy considerations for their resilience (Sparks, 2021) and the need for a comprehensive framework that evaluates sustainability, livability, vitality, adaptability and resilience approaches for high streets (Ntounis et al., 2023). More broadly, the future of high streets involves their transformation into multifunctional centers supported by cultural and entertainment opportunities, encompassing tourism, sport and residential areas, and serving as social and experiential spaces (Carmona, 2022; Grimsey et al., 2020; Local Government Association, 2021a, 2021b, 2022; Ministry of Housing, Communities & Local Government, 2021; Ntounis et al., 2023; Sparks,

2021).

Upon reviewing the literature, various studies have assessed the resilience of high streets in terms of the diversity of functions and retail mix, the characteristics of the physical environment, location and accessibility, the presence of supporting institutional structures and their funding, the role of government, the presence, profile and preferences of users. However, what businesses, which play a crucial role in contributing to the vitality and viability of high streets, providing essential shopping and entertainment functions and shaping their distinctive identities, do during and after the crisis and their impact on street resilience has not been adequately addressed. It becomes evident that understanding the effects of a multi-faceted crisis like COVID-19 on a high street with the history, continuity, and super-diverse character already suggested for future high streets is essential to exploring high street resilience. Furthermore, we believe that the resilience of high streets lies in the ability of businesses to survive, adapt, explore new opportunities, take radical decisions if necessary, and ultimately gain experience to prepare for future crises.

This research aims to fill an existing gap in the literature by examining the crisis response strategies of businesses located on high streets during the COVID-19 crisis, thereby enriching the understanding of high street resilience. Conducted within a high street, Istiklal Avenue, characterized by historical continuity, super diverse, and substantial crisis experience, the study's in-depth interviews with shopkeepers, managers, and employees are anticipated to provide valuable insights into the subjective facets of micro level resilience. It is believed that these interviews will offer profound insights into the unique practical experiences of each business, facilitating a deeper comprehension of their distinctive operational strategies.

3. Istiklal Avenue and COVID-19 pandemic

Istiklal Avenue in the historic center of Istanbul, Beyoğlu district, was one of the high streets that faced various challenges during the COVID-19 crisis due to its long history as an active shopping street for over 150 years. Spanning 1.4 km, this pedestrianized street boasts Türkiye's highest footfall (Cushman & Wakefield, 2022a), stands 30th globally in priciest high streets (Cushman & Wakefield, 2022b) serves as Istanbul's inaugural Western-style shopping destination, harbors diverse commercial and societal roles across sectors beyond retail. Unlike traditional high streets, Istiklal Avenue is not only characterized by its pedestrian section in terms of function and perception. It is intimately connected with the ground and upper floors of the buildings lining the street and all the surrounding streets, as well as the numerous passages, hans and shopping centers. Therefore, the high street is not just limited to the definition of a retail hub, but rather represents a super-diverse high street that includes different urban and public functions, such as shopping, manufacturing, culture, arts, sports, tourism, dining, entertainment, offices, administration, education, healthcare and religious activities, which approximately 4000 commercial units (Türkün et al., 2021).

Due to its own historical background, location, ideological, symbolic and economic value, Istiklal Avenue has experienced multiple economic crises, terrorist incidents, social movements, neoliberal urban policies, and various sectoral decisions and legal processes at different times. A study by Türkün et al. (2021) revealed that the avenue has gone through cycles of decline and revival, experiencing multiple downturns but consistently recovering and adapting to the conditions of each period. Therefore, the shopkeepers, managers and employees, both on the Avenue and in the surroundings streets, have acquired considerable experience in dealing with slow changes and crises. However, they testified that the COVID-19 pandemic presented a uniquely challenging situation.

In the context of Istiklal Avenue, the COVID-19 trajectory in Türkiye commenced with the identification of the first case on March 11, 2020. Swiftly thereafter, the government initiated multifaceted strategies to mitigate the

pandemic's dissemination. Measures encompassed border closures, flight cancellations, compulsory quarantine for travellers, social distancing enforcement, remote work adoption, online education implementation, curfews, and urban transit restrictions. These measures had a substantial initial impact on high street businesses. Notably, on March 15, 2020, coinciding with the first COVID-19-related fatality in Türkiye, businesses started to be gradually shut down depending on their sectors and activities like cinemas, cafes, gyms. Subsequently, barbershops, beauty centres, and dining businesses joined the temporary closure. Then, the dining sector transitioned to takeaway and delivery services, while essential stores adjusted their schedules and patron capacity. This first comprehensive lockdown lasted until 1 June 2020 and included harsh conditions for Istiklal Avenue shopkeepers, unprecedented in their experience on the Avenue. This was followed by a secondary lockdown from 18 November 2020 to 28 February 2021, and then from 29 April to 17 May 2021. From 17 May 2021, the gradual normalisation was completed on 1 June 2022, with the lifting of the still partial mask requirement and the COVID-19 PCR/antigen testing requirement.

From the beginning of the pandemic, mandatory lockdowns, aimed at preventing the spread of the pandemic, have been reinforced by the government through several hygiene practices as well as economic support packages and incentives. For instance, the Ministry of Health released the "COVID-19 Pandemic Management and Workplace Guide" on 25 June 2020, which details vital protocols that need to be implemented across different sectors and activities in order to maintain hygiene practices. To alleviate the economic difficulties caused by the pandemic, the first support announced on 18 March 2020 was the Economic Stability Shield Measure Package, which included support such as suspension of social security premiums and VAT deductions/payments, the postponement of income tax payments, the interest-free postponement of loan payments, and short-time work allowances for employees. In addition, during the following period, support packages were announced, such as the Tradesmen's Support Package, the Basic Needs Support Package, the Cash Wage Support, the Direct Income Support and the Turnover Loss Support. While some of these instruments were organised for the pandemic, others were created by adapting a number of existing instruments. It is important to note, however, that there is no direct support or incentive for high streets or town centres as part of this process.

Despite the considerable lockdowns and rigorous government-mandated hygiene measures, which presented significant obstacles, Istiklal Avenue was able to sustain an appreciably higher footfall than other high streets in Istanbul, even during periods of severe restrictions and business closures (Cushman & Wakefield, 2022a). Moreover, following the gradual easing of restrictions, the high street regained its former vibrancy with great enthusiasm and witnessed even denser crowds than before. Therefore, it is crucial to investigate how businesses on Istiklal Avenue responded during the pandemic crisis, in order to comprehend the reasons, decisions, and time frames for these responses, evaluate the factors that impacted the responses, and debate the ways in which these resilience efforts on a micro level contributed to the overall viability, vitality, and consequently, resilience of the Avenue.

4. Case study

4.1. Methodology

The research adopted a firm-level approach to examine how shopkeepers, managers, and employees navigated the COVID-19 crisis and devised survival and recovery strategies. Utilizing semi-structured in-depth interviews, the study aimed to comprehend contextual nuances and evaluate their experiences. The interviews, comprising 45-60 tailored questions, followed a general structure, beginning with an introduction to gather business and participant information, progressing to a comprehensive analysis of the pandemic's evolution, and concluding with discussions on experiences, the present situation, and expectations for

Istiklal Avenue.

Quota, snowball, and purposive sampling methods were utilised to construct the sample. The study's targeted objectives were enhanced through the use of quota sampling, which ensured comprehensive representation across sectors and localities, snowball sampling, which leveraged pre-existing participant relationships, and purposive sampling, which effectively addressed sample gaps. Sample size was achieved through data and thematic saturation, often used in qualitative studies (Hennink & Kaiser, 2022). The selection was consistently revised until all crucial matters and perceptions were addressed. Even though a thematic saturation was achieved due to the semi-structured interviews, the complexity of the topic and the diversity of sectors, activities, business characteristics and locations were factors in achieving a meaningful saturation of the data.

Between 1 June 2022, when the gradual normalisation ended in Türkiye, and 6 October 2022, 71 interviews were conducted with shopkeepers, managers or employees in Istiklal Avenue and its neighbouring areas. The interviews were conducted in Turkish, recorded with the participants' consent, and later transcribed for analysis. In addition, it is considered that the involvement of the researchers in a research project covering a wider area over three years, including the onset of the pandemic and the pre-pandemic period, coupled with field observations during all phases of the pandemic, has contributed to the study.

4.2. Prefatory remarks

The data collected from 71 interviewees, comprising 10 females and 61 males, including 29 shopkeepers, 18 managers, and 24 employees, provides a diverse perspective on the sectors, activities, and business characteristics represented by the interviewees in the Istiklal Avenue and surrounding area. The distribution of interviews by sector is as follows: 32% in the food & beverage sector, which includes restaurants, cafes, patisseries, bars, and taverns; 30% in the retail sector, mainly includes clothing, cosmetics, book, jewellery, and gift shops; 14% in the services sector, such as beauty salons, dry cleaners, tailors, and funeral services; 11% in the culture, arts, entertainment, and sports sector, which involves cinemas, sports halls, and museums; 9% in the office sector, incorporating publishing, real estate, and tourism agencies; and 4% in the tourism sector, mainly hotels.

The businesses interviewed comprised of 51% micro, 21% small, 7% medium, and 21% large-sized businesses. Of these, 7 were foreign franchises, and 8 were domestic franchises. It is important to note that employees interviewed in these chains were often not directly involved in the decision-making process, or it was difficult to find former employees in these businesses with sufficient knowledge of the pandemic process. There were also 10 local chain establishments and 45 independent businesses, making a total of 63 local brands. Regardless of their location on or around Istiklal Avenue, 86% of the businesses were tenant businesses and ownership was very low, regardless of their size, origin, or type.

4.3. Crisis response strategies of shopkeepers in Istiklal Avenue

In the case of the businesses interviewed, different strategies were implemented at different stages of the crisis. While some of these interventions were mandated by the government and ranged from immediate to temporary or permanent measures, others were initiated at the discretion of shopkeepers, managers or employees. The responses of the businesses were broadly categorized into interventions aimed at preventing the spread of the pandemic, operational interventions, financial interventions, space adaptations, and alternative interventions independent of the existing business. In addition to active interventions, it was also noted that many businesses remained passive, and the reasons for and consequences of this passive waiting warrant further discussion.

4.3.1. Measures to prevent the spread of the pandemic

Businesses' initial response to COVID-19 focused on preventing the spread of the pandemic, and a significant portion of these measures were mandated by governments worldwide, leaving limited room for individual preferences. In Istiklal Avenue, the first action taken by all businesses from mid-March 2020 was mandatory closure. For essential businesses that were allowed to remain open without a complete closure, regulations were introduced regarding working hours and the number of customers allowed inside.

During the different phases of the pandemic, the closure decisions and working hours imposed by the government varied according to the sector and the activity, resulting in considerable disparities between the businesses on Istiklal Avenue, which were keenly felt and recognized by shopkeepers. While many shops remained completely closed for 2 months, specific activities such as bars, clubs and internet cafes were forced to remain closed for as long as 16 months. The prolonged closures, restricted working hours and even the continued ban on music after full reopening of entertainment businesses such as tavern or pubs, which are generally dependent on the nighttime economy, were strongly criticized by interviewees. In addition, the local authority's practice of granting licenses for the same function under different names in different years has led to unfair implementation of closure decisions. For example, the manager of a corporate coffee shop chain with two branches on the Avenue, Interviewee 61, mentioned that while the first branch they opened was not affected by the closure decisions, the newer one remained closed for months. The reason for this discrepancy was the different categorization of the licenses, with one being a 'café' and the other a 'cafeteria'. On the other hand, it was observed that some food and beverage businesses, despite being allowed to operate through takeaway or home delivery services during mandatory closures, chose to keep their shops closed for a period of time as they struggled to adapt to these new service options. The closure measures by the government prevented businesses from actively adopting coping strategies.

Hygiene measures are another set of measures taken by the government to prevent the spread of the COVID-19 pandemic. As mentioned earlier, the Ministry of Health published documents with specific guidelines and measures for businesses to follow, making an "Intra-Enterprise Pandemic Measures Plan" mandatory for businesses (2020). These measures covered a number of aspects of workplace operations, including opening and closing hours, use of open and closed areas, surveillance, compliance with social distancing rules, maintenance of cleanliness in common areas, display of informative posters and signage, compliance with air conditioning and ventilation regulations, and waste management protocols. In addition, measures to protect employees and customers included social distancing, wearing masks, face shields, gloves, appropriate clothing, temperature checks and vigilance about space utilization. The interviewees have highly embraced hygiene practices, and even though they are no longer mandatory due to the changing course of the pandemic, they have become integrated as permanent practices.

4.3.2. Operational interventions

The crisis responses of businesses to the COVID-19 crisis are predominantly evident in operational interventions. These interventions encompass various adjustments related to employees, working hours, diversification and modifications in sales/service channels, as well as changes in marketing and management strategies. Businesses have gone beyond mere prevention and have implemented coping strategies, adaptations, and permanent changes to navigate the challenges of the pandemic.

The pandemic has led businesses to reduce their workforce as a cost-cutting measure due to the decreased customer capacity. The government's support tool known as the Short-Term Work Allowance for employees has been extensively utilized, with businesses

applying for the allowance for their employees when their operations came to a complete halt or decreased by at least one-third, providing payment for non-working days. Additionally, some employees chose to take unpaid leave or utilize their annual/paid leave. As an additional strategy, businesses adopted shift work and remote working to reduce the number of employees. Some of the employees interviewed also used short-term individual strategies, such as returning to their hometowns to reduce rent expenses, engaging in trading activities, or working as couriers for the same business. Despite not being explicitly addressed in the interviews, it is worth noting the presence of a considerable number of uninsured workers in the vicinity who could not avail themselves of these supports. Moreover, despite shopkeepers expressing sensitivity towards layoffs, it is noticeable that certain highly skilled workers, who had long been part of their sectors, are no longer employed on the Avenue.

Operational responses to the pandemic included adjustments in working hours, where government regulations-imposed restrictions on businesses' opening and closing times based on risk levels and activities. Businesses generally complied with these restrictions, and some voluntarily modified their working hours to ensure a safer environment. However, some businesses were still not allowed to operate at all during this period.

The third operational intervention involved businesses diversifying their sales and service channels, including online sales, home services, takeaway and home delivery, and developing alternative services/products. Online sales have been the most prominent coping and adaptation strategy in the retail sector. For example, many second-hand book sellers in Sahaflar Pasaji survived by solely relying on online sales, while some closed their shops and continued their operations with only warehouse expenses. The food and beverage sector also witnessed the implementation of delivery services as a reflection of this strategy. However, transitioning to these digital platforms posed challenges for micro and small businesses due to registration requirements, commission fees, inadequate technological skills, and the nature of their products or services not aligning with online strategies. Some entrepreneurs, like Interviewee 47, faced difficulties in meeting the platform requirements and reverted to in-person services once restrictions were lifted, indicating that the shift to online was a necessity and not a long-term strategy. Other shopkeepers on Istiklal Avenue have similarly asserted that they did not perceive the necessity for an alternative sales channel, attributing it to the bustling pedestrian traffic the avenue typically experiences both before and after the pandemic-induced disruptions. On the other hand, corporate and large businesses, such as an international chain coffee shop managed by Interviewee 61, successfully adapted to online sales by collaborating with major digital platforms, changing packaging, and expanding their product offerings. Similarly, Interviewee 71, a senior employee at a museum with a library, utilized closure periods to digitize resources and organize online events during the pandemic. Therefore, the success of using online sales/service strategies was influenced by the business's characteristics, specialized workforce, availability of financial resources for innovation, and motivation for embracing innovation.

One of the key strategies for diversifying sales and service channels is the implementation of take-away services. Following the relaxation of full closure measures, food and beverage establishments were allowed to offer only take-away and home delivery services to prevent the spread of the pandemic. While this encouraged businesses, the positive impact was not as significant as that of take-away services. The decline in local customers on the Avenue and the ban on tourists entering the country resulted in a considerable reduction in footfall and, consequently, in the use of take-away services. For instance, Interviewee 64, the manager of a frozen yogurt shop, mentioned attempting to compensate for the closure's effects by introducing a product change and offering fruit juice as a take-away option, but due to the limited foot traffic, they

were not successful and temporarily closed the business until full reopening.

Although not directly implemented in interviews, some professionals discussed home-based services. For instance, Interviewee 68, a tattoo artist, mentioned considering providing tattoos at clients' homes if closures prolonged. Another strategy used was to develop alternative products. Interviewee 26, who owns a restaurant serving local cuisine, mentioned the development of alternative products and expressed his intention to start selling organic products, although it should be noted that such examples were limited.

Regarding the fourth operational intervention is making changes in marketing and management strategies. Only the manager of an international chain sports retail store, Interviewee 65, mentioned making changes in their marketing strategy by reopening physical stores with discounts and adapting to the process by implementing open stock management due to more active online sales. This strategy is closely related to the size of the business and its financial capabilities, and micro and small businesses were already struggling to cope with existing challenges and were not in a position to make such moves.

4.3.3. Financial interventions

As consistently reported by interviewees, the pandemic's toughest challenge for businesses was the ongoing operating costs, including significant fixed expenses like rent, utilities, and taxes during closures. As a result, businesses frequently resorted to financial interventions, including cost-cutting measures, using personal savings, using family resources, borrowing funds, taking out loans, benefiting from government support and incentives, and transferring business ownership.

Businesses utilized cost reduction strategies by optimizing their expenses, particularly at the household level, due to the complete closure of businesses. At the business level, cost reduction measures were perceived as workforce reduction, though not explicitly mentioned by interviewees, and limiting the use of mechanical equipment to reduce bill payments. Emphasizing the financial lesson from the pandemic, businesses stressed saving and cost reduction as a coping strategy, with a common preparation for future crises being an emphasis on individual savings. This is because it was observed that individual savings were the most effective financial strategy, especially for micro and small businesses that could not benefit from government support and incentives. During the interviews, the participants repeatedly emphasized feeling alone and believed that they could only overcome crises through individual savings. In addition to savings, some businesses tried to mitigate the impact of the crisis by selling personal assets, albeit on an individual basis. In some cases, the capacity of individual savings was slightly exceeded, and in family businesses, it was a common strategy to utilize family resources, with businesses benefiting from profits generated by other family ventures.

It was observed that businesses without sufficient individual savings resorted to taking loans or borrowing as alternative financial strategies. In Türkiye, the government's major incentive was aimed at facilitating businesses' access to credit. As part of the Economic Stability Shield Package, agreements were made with banks to prevent legal actions against companies facing payment difficulties, providing flexibility and deferment options for loan payments to maintain financial stability and credit credibility. Additionally, credit support was offered to businesses with the condition of not reducing their workforce. However, the positive impact of these measures on Istiklal Avenue was rarely seen. Some businesses reported relying on credit to cover their expenses, and even though they had taken loans, they still faced ongoing financial challenges. Some interviewees mentioned borrowing personally to pay employee salaries rather than for the business itself. On the other hand, micro and small businesses were found to initially utilize individual savings before considering

borrowing when they preferred not to take loans.

As highlighted earlier, various government agencies and chambers of commerce in Türkiye offered support and incentive packages to businesses, ranging from tax and premium payment deferrals to grants, rental assistance and loss of turnover support. These initiatives were aimed at facilitating businesses' access to finance and easing their financial burden. Despite these efforts, feedback from interviewees revealed several concerns and criticisms regarding the effectiveness and adequacy of these supports. Criticisms were raised about the insufficiency of tax and withholding deferrals, the lack of systematic criteria for determining eligible businesses, inconsistent practices between businesses operating and not operating, inadequate funding allocations, the absence of regulations concerning tenants, and the difficulties faced by employees who received short-term work allowances when claiming unemployment benefits and insurances later on. Particularly, the regulation related to tenancy received the most criticism as rent payments were the most burdensome expense for tenant businesses during the pandemic. The provided rent support from the government was a maximum of 79 € per month, which was insufficient considering the average rent level of €1,175 m2/year (Cushman & Wakefield, 2022b) on Istiklal Avenue. Moreover, most businesses on the field could not meet the criteria to receive rent aid. Apart from this inadequate rent support, there were no specific regulations made by the government regarding tenant businesses, and only individual cases were found where landlords showed solidarity by postponing or not collecting rent for a certain period. Unfortunately, the government's support fell short for businesses on Istiklal Avenue.

The final financial intervention is the transfer of ownership, and three transferred businesses were interviewed in this study. A clothes shop was transferred to survive the pandemic, a café due to insufficient individual savings at the time of closure and a dry-cleaning service due to demands for rent increases. In the last case, the shopkeeper's consideration of retirement made the transfer a successful and timely financial decision, highlighting the importance of the shopkeeper's experience and foresight.

4.3.4. Space adaptations

Businesses on Istiklal Avenue made space reconfigurations during the pandemic, such as changing the functionality of their spaces, rearranging and enlarging interiors, carrying out renovations, maintenance and decoration changes. Some of these interventions were mandatory measures to prevent the spread of the pandemic and included rules on the use of indoor and outdoor spaces. Food and beverage outlets, for example, had to reduce their seating capacity by half, resulting in inadequate service to an already dwindling customer base. In addition to these mandatory adjustments, some businesses have voluntarily changed their internal layouts, reducing customer areas to create more workspace for office staff, or using temporary solutions to convert one of the floors normally used by customers into a storage area or staff lounge. In addition, food and beverage businesses forced to offer a takeaway service developed strategies to remain visible and facilitate sales on the avenue. They relocated their food stalls to the street front and reorganized their interiors to adapt to the new circumstances.

During the period of closure, businesses also undertook more lasting and simple renovations, such as repainting, renewing furniture, comprehensive cleaning, and equipment maintenance. However, it is worth noting that despite expressing the need for such renovations, a surprisingly large number of interviewees stated that they could not afford even the smallest changes under economic conditions. Rather, two financially stronger businesses implemented more radical changes. In a multi-functional passage, a cinema hall was permanently closed and transformed into a multi-purpose venue to host concerts and events. Another shisha cafe expanded its premises by purchasing the neighboring space af-

ter its closure due to high rent. These examples demonstrate how financial strength enables businesses to seize opportunities and innovate to thrive amidst challenges.

4.3.5. Interventions apart from businesses

During the interviews, it was found that some shopkeepers diversified their investments by exploring alternative business areas, alongside their existing ventures, to capitalize on opportunities. Despite the widespread impact of the crisis on businesses across sectors, certain interviewees highlighted the importance of sectoral diversification, drawing from their past crisis experiences and observations during the pandemic. For example, Interviewee 34, who operated in the cinema industry, sustained their business during the pandemic by having cafeteria permits within the cinema premises, which facilitated continuous operations, leading them to invest in the accommodation sector based on this experience. On the contrary, Interviewee 54, a restaurant owner who had recently invested in opening a beauty salon on Istiklal Avenue before the pandemic, shared that despite completing renovations and continuing to pay rent, they were unable to actively open the new business during the crisis, leading them to abandon this investment.

4.3.6. Nonaction

During the pandemic, a prevalent coping response among businesses was passive waiting, with a significant number of them adopting a "wait and see" approach. There are several reasons for this reluctance to take proactive measures. In the first place, the pandemic was unlike any previous crisis, and its unprecedented nature brought about uncertainties regarding its duration and the most effective strategies to navigate through it. Some shopkeepers did not fully understand the gravity of the situation and adopted a nonchalant attitude, while others adopted a fatalistic approach, feeling overwhelmed and helpless in the face of a global health crisis that seemed beyond their control.

Although some interviewees recognized the importance of being nimble and agile to identify opportunities and create value in the midst of a crisis, the lack of cash flow during the pandemic led them to prioritize preserving their existing resources. For the micro-enterprises on Istiklal Avenue in particular, the risks associated with taking bold and innovative steps felt overwhelming, leaving them with a sense of vulnerability and isolation in the face of uncertainty. Feeling financially constrained and unsure of the future, they were hesitant to take any action that might further jeopardize their already fragile financial situation.

Furthermore, and most profoundly, a key factor contributing to the inaction of Istiklal Avenue businesses was their unwavering confidence in the avenue's resilience. Having weathered numerous crises in the past, these businesses had developed the belief that "nothing can happen to Istiklal Avenue". They considered crises as routine occurrences and were confident that despite any temporary setbacks, the avenue would inevitably return to its vibrant state or another new state. This deep-rooted faith in the avenue's enduring appeal and commercial viability led some businesses to choose a passive approach, hoping for a natural recovery without taking additional risks or making drastic changes to their operations.

4.4. Results

This study reveals that the businesses in and around Istiklal Avenue responded to the COVID-19 crisis through pandemic prevention measures, operational and financial strategies, adaptations of their physical spaces, and alternative interventions independent of the existing business. The findings demonstrate that these businesses developed various immediate, temporary, or permanent responses, whether mandated by the government or voluntarily adopted, to cope with the crisis, adapt to new conditions, and seize opportunities for further development (Table 1). Furthermore, unexpectedly, many businesses have adopted a "wait and see" approach, hesitating to take proactive measures

Table 1. *Istiklal Avenue shopkeepers' strategies during the COVID-19 pandemic.*

		DURATION			PREFERENCE		PURPOSE		
	STRATEGIES	**Immediate**	**Temporary**	**Permanent**	**Obligatory**	**Voluntarily**	**Cope**	**Adapt**	**Innovation**
Measures to prevent the spread of the pandemic	Full closure	+	+		+	+	+		
	Restriction on working hours		+		+		+		
	Hygiene measures	+	+	+	+	+	+	+	+
Operational interventions	Employee related adjustments								
	Reducing the number of employees		+			+	+		
	Use of Short-Term Work Allowance		+		+		+		
	Annual leave - Unpaid leave		+			+	+		
	Switching to shift work		+			+	+		
	Remote working		+	+	+	+	+	+	
	Working in different role		+			+	+		
	Adjustment in working hours		+		+	+	+	+	
	Diversification in sales/service channels								
	Online sales		+	+		+	+	+	+
	Home delivery		+		+	+	+	+	
	Take-away		+		+	+	+	+	
	Online services		+	+		+	+	+	
	Home-based services		+			+	+	+	
	Alternative service/product development								
	Changes in marketing and management								
	Discounts	+	+			+	+		
	Open stock management			+		+		+	+
Financial intervetions	Cost reduction	+	+	+		+	+		
	Using personal savings	+	+			+	+		
	Using family resources		+			+	+		
	Borrowing		+			+	+		
	Taking out loans		+			+	+		
	Government support and incentives				+	+			
	Transferring business ownership					+	+		
Space adaptations	Changing the functionality of spaces		+			+	+	+	
	Permanent function changes			+		+		+	+
	Renovations and decoration changes			+		+		+	+
Interventions apart from businesses	Investing in alternative businesses			+		+			+
Nonaction	Passive waiting	+	+			+	+		

due to uncertainties and their strong belief in Istiklal Avenue's resilience.

In light of businesses' experiences and their responses, it is evident that one of the most significant factors affecting businesses is the policies implemented by central and local governments during the crisis. Particularly, the duration of closures and the regulation of working hours, varying based on sectors, activities, and even the years of obtaining local permits, have emerged as practices that inflict more harm than the crisis itself, leading to profound inequality among businesses. The restrictive decisions of the government, which either completely halted or severely limited economic activity, have incentivized the deferral of existing debts and the use of credit as a means to compensate for the effects. Unfortunately, this mechanism has not proven sufficient for Istiklal Avenue's businesses. Moreover, the absence of any regulations or guidance, specifically concerning high expenses like rent, in the context of the Avenue where businesses largely function as tenants, and the unquestioning adherence to specific rules for the Avenue without any support from local authorities, have exacerbated the impact of the crisis even further.

Taking all the interviews into account, although the characteristics of the businesses were not determinant in all cases, the sectors and activities, size, number of branches, type, age of business, institutional structure, tenancy status of the businesses and experience of business contributed to their responses to the crises. The sector and activity of the business were the most important distinguishing characteristics due to government-mandated closures, with entertainment and service businesses on Istiklal Avenue facing greater challenges than others. The size of the business has been influential both in terms of benefiting from government support and incentives, and in determining the capacity to take risks. Micro and small businesses have opted for temporary strategies, trying to cope without taking significant risks or simply waiting for a return to pre-crisis conditions. On the other hand, medium-sized businesses with stronger financial capabilities have been more successful in implementing long-term strategies and seizing crisis opportunities. Although detailed re-

search into the strategies of the branches of large-scale businesses remains limited, it has been found that their adherence to workers' rights, fostered by institutionalization, has contributed to their success. In addition, these types of businesses and their employees do not show a strong place attachment to the Avenue, which allows them to make quick exit decisions based on the course of the crisis.

In addition, the years of establishment of the businesses, the working years of the shopkeepers and managers, and their crisis experiences on Istiklal Avenue have emerged as highly influential factors in making critical decisions. Although these experiences enabled them to observe the opportunities arising from the crisis, they were unable to take action due to insufficient subsidies. Furthermore, the prevalence of high rents and limited property ownership in the Avenue was identified as a critical factor in overcoming financial difficulties. Finally, although not explored in detail in this study, as well as business characteristics, the resilience of shopkeepers and managers and the individual strategies adopted by employees are other factors that enrich the crisis response strategies of businesses in high streets.

Most importantly, the research findings indicate that the resilience of Istiklal Avenue directly influences the resilience of businesses and their responses to the crisis. It is concluded that the action or inaction of businesses is closely linked to the high level of confidence shopkeepers have in the resilience of the Avenue. The avenue's long history and its past experience with crises, in which it experienced setbacks on several occasions but eventually adapted to new customer profiles and conditions, was achieved through the ability of businesses to adapt. The avenue's ability to withstand this transformation has become a guiding factor in the decision-making mechanisms of the businesses, leading to the development of a strong sense of attachment to the avenue and raising the threshold for abandonment.

5. Conclusion

This research aims to examine the response strategies of businesses located in historic high streets that have continued their shopping function, focusing on the example of Istiklal Avenue, and discuss their relationship with the resilience of high streets during the COVID-19 crisis. The study has shown that the ways in which businesses on Istiklal Avenue responded to the crisis varied according to their characteristics, the quarantine measures implemented by central and local government, the support and incentives provided, and their ability to take advantage of these measures. Furthermore, the belief of these businesses in the resilience of the high street they operate on has strengthened their ability to withstand the crisis.

The key finding of this research highlights the interrelationship between the micro-resilience of businesses located on a resilient historic high street and the way they respond to crisis. Business resilience and high street resilience suggest two mutually reinforcing, not always linear, but highly correlated scales of resilience. The higher the resilience of the high street, the higher the resilience of the businesses, and often vice versa. In some cases, businesses may fail and be forced to close for internal reasons, but this may not be reflective of the resilience of the high street as the business will be replaced very quickly by another business.

The study findings affirm the prevailing notion that Türkiye's high streets are resilient compared to similar counterparts (Erkip & Kızılgün, 2011; Ozuduru, 2019), showcasing their capacity to survive and adapt to arduous circumstances without significant consequences. Nonetheless, it cannot be asserted that either Türkiye or universally, COVID-19 yields similar outcomes for high streets or that they will respond to future crises with the same resilience. The research further underscores that resilience is context-specific, dynamic, and multifaceted in nature (Meerow & Newell, 2016). Like the resilience of the high street itself, the strategies adopted by businesses on the high street might vary and be constrained in context-specific ways, sometimes fostering resilience

and at other times leading to vulnerability. A fundamental indication of this is the adoption of inaction as a strategy by businesses on such historically multifunctional high streets, even though inaction is inherently inconsistent with the principles of resilience. It is the adoption of this passivity and, of course, the resilience of the high street that has allowed businesses to survive. However, it should be remembered that resilience is achieved through the complementarity of coping, adaptive and transformative capacities, rather than through the use of coping capacities alone, and that it aims at creating new opportunities and moving forward, rather than simply returning to the old status quo. In the case of Istiklal Avenue, it can be seen that traditional, micro and small local businesses in particular have been unable to do this due to a lack of context-specific policies and support, and have instead sought to return to their previous state.

The future of high streets necessitates the widespread adoption of resilience thinking by all relevant stakeholders. Effectively addressing this imperative will require a multifaceted approach that includes reimagining the central role of high streets, preserving the historic elements that underpin their significance, carefully identifying the unique characteristics and needs of each high street, and actively engaging the different actors within the street ecosystem - commercial and non-commercial businesses, institutions, shopkeepers, employees, residents and tourists - in the formulation of responsive policies. Concurrently, it is crucial to safeguard local identity and heritage, conscientiously account for the ecological footprint, and adeptly embrace contemporary innovations such as digitalization, thus fostering a dynamic and adaptive high street milieu capable of withstanding the challenges of the future. Above all, it is essential to recognize that resilience is a place-specific phenomenon and to establish it as a long-term guiding principle. Once this principle is embraced, resilience-specific characteristics such as diversity, heterogeneity, redundancy, robustness, resourcefulness, speed, negotiation, adaptability and recovery capacity will ensure the resilience of high streets.

References

Appel, A., & Hardaker, S. (2021). Strategies in times of pandemic crisis—Retailers and regional resilience in Würzburg, Germany. *Sustainability*, *13*(5), Article 5. https://doi.org/10.3390/su13052643

Balsas, C. J. L. (2014). Downtown resilience: A review of recent (re)developments in Tempe, Arizona. *Cities*, *36*, 158–169. https://doi.org/10.1016/j.cities.2012.10.002

Barata-Salgueiro, T., & Erkip, F. (2014). Retail planning and urban resilience – An introduction to the special issue. *Cities*, *36*, 107–111. https://doi.org/10.1016/j.cities.2013.01.007

Béné, C., Wood, R. G., Newsham, A., & Davies, M. (2012). Resilience: New utopia or new tyranny? Reflection about the potentials and limits of the concept of resilience in relation to vulnerability reduction programmes. *IDS Working Papers, 2012*(405), 1–61. https://doi.org/10.1111/j.2040-0209.2012.00405.x

Bressan, A., Duarte Alonso, A., & Kok, S. K. (2021). Confronting the unprecedented: Micro and small businesses in the age of COVID-19. *International Journal of Entrepreneurial Behavior & Research*, *27*(3), 799–820. https://doi.org/10.1108/IJEBR-09-2020-0602

Brett, W., & Alakeson, V. (2019). *Take back the high street: Putting communities in charge of their own town centres* (p. 40). Power to Change. https://www.powertochange.org.uk/our-work/campaigns/take-back-the-high-street/

Cachinho, H. (2014). Consumerscapes and the resilience assessment of urban retail systems. *Cities*, *36*, 131–144. https://doi.org/10.1016/j.cities.2012.10.005

Carmona, M. (2022). The existential crisis of traditional shopping streets: The sun model and the place attraction paradigm. *Journal of Urban Design*, *27*(1), 1–35. https://doi.org/10.1080/13574809.2021.1951605

Chang, S. E., Brown, C., Handmer, J., Helgeson, J., Kajitani, Y., Keating, A., Noy, I., Watson, M., Derakhshan, S., Kim, J., & Roa-Henriquez, A. (2022).

Business recovery from disasters: Lessons from natural hazards and the COVID-19 pandemic. *International Journal of Disaster Risk Reduction*, *80*, 103191. https://doi.org/10.1016/j.ijdrr.2022.103191

Cushman & Wakefield. (2022a). *İstanbul ana caddeleri 2022* (8. Publication; İstanbul alışveriş caddeleri, p. 20). Cushman & Wakefield.

Cushman & Wakefield. (2022b). *Main streets across the world 2022* (Main streets across the world, p. 27). Cushman & Wakefield.

Dolega, L., & Celinska-Janowicz, D. (2015). *Retail resilience: A theoretical framework for understanding town centre dynamics* (MPRA Paper 72319). University Library of Munich, Germany.

Enoch, M., Monsuur, F., Palaiologou, G., Quddus, M. A., Ellis-Chadwick, F., Morton, C., & Rayner, R. (2022). When COVID-19 came to town: Measuring the impact of the coronavirus pandemic on footfall on six high streets in England. *Environment and Planning B: Urban Analytics and City Science*, *49*(3), 1091–1111. https://doi.org/10.1177/23998083211048497

Erkip, F., & Kızılgün, Ö. (2011). *Kentlerin sürdürebilirliği için perakende sektörünün planlanması* (TÜBİTAK 1001 - The Scientific and Technological Research Projects Funding Program, Project No: 108K614; p. 138). TÜBİTAK.

Erkip, F., Kızılgün, Ö., & Akinci, G. M. (2014). Retailers' resilience strategies and their impacts on urban spaces in Turkey. *Cities*, *36*, 112–120. https://doi.org/10.1016/j.cities.2012.12.003

Erkip, F., & Ozuduru, B. H. (2015). Retail development in Turkey: An account after two decades of shopping malls in the urban scene. *Progress in Planning, 102*, 1–33. https://doi.org/10.1016/j.progress.2014.07.001

Fernandes, J. R., & Chamusca, P. (2014). Urban policies, planning and retail resilience. *Cities*, *36*, 170–177. https://doi.org/10.1016/j.cities.2012.11.006

Genecon LLP and Partners. (2011). *Understanding high street performance* (URN 11/1402; p. 147). Department for Business, Innovation and Skills, UK.

Good Growth by Design. (2019). *High streets & town centers adaptive strategies* (p. 248). Mayor of London. https://www.london.gov.uk/what-we-do/regeneration/high-streets/our-research-and-guidance#acc-i-60213

Griffiths, S., Vaughan, L., Haklay, M., & Jones, C. E. (2008). The sustainable suburban high street: A review of themes and approaches. *Geography Compass*, *2*(4), Article 4.

Grimsey, B., Perrior, K., Trevalyan, R., Hood, N., Sadek, J., Schneider, N., Baker, M., Shellard, C., & Cassidy, K. (2020). *Build back better* (Covid-19 supplement for town centres, p. 70).

Gunderson, L. H., & Holling, C. S. (Eds.). (2002). *Panarchy: Understanding transformations in human and natural Systems* (2nd ed.). Washington: Island Press.

Hall, S. M. (2011). High street adaptations: Ethnicity, independent retail practices, and localism in London's urban margins. *Environment and Planning A: Economy and Space*, *43*(11), 2571–2588. https://doi.org/10.1068/a4494

Hardaker, S., Appel, A., & Rauch, S. (2022). Reconsidering retailers' resilience and the city: A mixed method case study. *Cities*, *128*, 103796. https://doi.org/10.1016/j.cities.2022.103796

Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine, 292,* 114523. https://doi.org/10.1016/j.socscimed.2021.114523

High Streets Task Force. (2020a). *Improving the vitality and viability of your high street* (p. 102). High Streets Task Force.

High Streets Task Force. (2020b, September 24). *Adaptability—25 "vital and viable" priorities*. High Streets Task Force.

Hill, A., & Cheshire, J. (2023). An investigation of the impact and resilience of British high streets following the COVID-19 lockdown restrictions. *Applied Spatial Analysis and Policy*, *16*(2), 537–559. https://doi.org/10.1007/s12061-022-09494-8

Hossain, M. R., Akhter, F., & Sultana, M. M. (2022). SMEs in Covid-19 crisis

and combating strategies: A systematic literature review (SLR) and a case from emerging economy. *Operations Research Perspectives*, *9*, 100222. https://doi.org/10.1016/j.orp.2022.100222

Hubbard, P. (2017). *The battle for the high street: retail gentrification, class and disgust*. London: Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-52153-8

Hudson, R. (2010). Resilient regions in an uncertain world: Wishful thinking or a practical reality? *Cambridge Journal of Regions, Economy and Society*, *3*(1), 11–25. https://doi.org/10.1093/cjres/rsp026

Hughes, C., & Jackson, C. (2015). Death of the high street: Identification, prevention, reinvention. *Regional Studies, Regional Science*, *2*(1), 237–256. https://doi.org/10.1080/21681376.2015.1016098

Kärrholm, M., Nylund, K., & Prieto de la Fuente, P. (2014). Spatial resilience and urban planning: Addressing the interdependence of urban retail areas. *Cities*, *36*, 121–130. https://doi.org/10.1016/j.cities.2012.10.012

Katare, B., Marshall, M. I., & Valdivia, C. B. (2021). Bend or break? Small business survival and strategies during the COVID-19 shock. *International Journal of Disaster Risk Reduction*, *61*, 102332. https://doi.org/10.1016/j.ijdrr.2021.102332

Klöckner, M., Schmidt, C. G., Wagner, S. M., & Swink, M. (2023). Firms' responses to the COVID-19 pandemic. *Journal of Business Research*, *158*, 113664. https://doi.org/10.1016/j.jbusres.2023.113664

Klyver, K., & Nielsen, S. L. (2021). Which crisis strategies are (expectedly) effective among SMEs during COVID-19? *Journal of Business Venturing Insights*, *16*, e00273. https://doi.org/10.1016/j.jbvi.2021.e00273

Lashgari, Y. S., & Shahab, S. (2022). The impact of the COVID-19 pandemic on retail in city centres. *Sustainability*, *14*(18), Article 18. https://doi.org/10.3390/su141811463

Local Government Association. (2021a). *Resilient high streets* (p. 77). Local Government Association. https://www.local.gov.uk/publications/creating-resilient-and-revitalised-high-streets-new-normal

Local Government Association. (2021b). *The future of high streets and town centres: Trends analysis* (p. 47). Local Government Association. https://www.local.gov.uk/publications/creating-resilient-and-revitalised-high-streets-new-normal#pestle

Local Government Association. (2022). *Creating resilient and revitalised high streets in the 'new normal.'* Local Government Association (LGA). https://www.local.gov.uk/publications/creating-resilient-and-revitalised-high-streets-new-normal

Meerow, S., & Newell, J. P. (2016). Urban resilience for whom, what, when, where, and why? *Urban Geography*, *40*(3), 309–329. https://doi.org/10.1080/02723638.2016.1206395

Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, *147*, 38–49. https://doi.org/10.1016/j.landurbplan.2015.11.011

Miklian, J., & Hoelscher, K. (2022). SMEs and exogenous shocks: A conceptual literature review and forward research agenda. *International Small Business Journal*, *40*(2), 178–204. https://doi.org/10.1177/02662426211050796

Millington, S., & Ntounis, N. (2017). Repositioning the high street: Evidence and reflection from the UK. *Journal of Place Management and Development*, *10*(4), 364–379. https://doi.org/10.1108/JPMD-08-2017-0077

Ministry of Housing, Communities & Local Government. (2021). *Build back better high streets* (p. 37). Ministry of Housing, Communities & Local Government. https://www.gov.uk/government/publications/build-back-better-high-streets

Morgan, T., Anokhin, S., Ofstein, L., & Friske, W. (2020). SME response to major exogenous shocks: The bright and dark sides of business model pivoting. *International Small Business Journal*, *38*(5), 369–379. https://doi.org/10.1177/0266242620936590

Nanda, A., Xu, Y., & Zhang, F. (2021). How would the COVID-19 pandemic reshape retail real estate and high streets through acceleration of E-commerce and digitalization? *Journal of Urban Management*, *10*(2),

110–124. https://doi.org/10.1016/j.jum.2021.04.001

New Economics Foundation. (2010). *Re-imagining the high street* (The 2010 Clone town report, p. 48). New Economics Foundation. https://neweconomics.org/2010/09/reimagining-high-street

Ntounis, N., Saga, R. S., Warnaby, G., Loroño-Leturiondo, M., & Parker, C. (2023). Reframing high street viability: A review and synthesis in the English context. *Cities*, *134*, 104182. https://doi.org/10.1016/j.cities.2022.104182

Ozuduru, B. H. (2019). An analysis of the framework of urban public policy for effective city centre development: The planning issues and challenges for Turkish city centres. In Ö. B. Özdemir Sarı, S. S. Özdemir, & N. Uzun (Eds.), *Urban and regional planning in Turkey* (pp. 63–82). Springer International Publishing. https://doi.org/10.1007/978-3-030-05773-2_4

Ozuduru, B. H., Varol, C., & Yalciner Ercoskun, O. (2014). Do shopping centers abate the resilience of shopping streets? The co-existence of both shopping venues in Ankara, Turkey. *Cities*, *36*, 145–157. https://doi.org/10.1016/j.cities.2012.10.003

Parker, C., Ntounis, N., Millington, S., Quin, S., & Castillo-Villar, F. R. (2017). Improving the vitality and viability of the UK High Street by 2020: Identifying priorities and a framework for action. *Journal of Place Management and Development*, *10*(4), 310–348. https://doi.org/10.1108/JPMD-03-2017-0032

Popławska, J. Z. (2021). The resilience of urban retail system in the face of the COVID-19 pandemic. The case study of Poland. *Sustainability*, *13*(24), Article 24. https://doi.org/10.3390/su132413737

Portas, M. (2011). *The Portas Review: An independent review into the future of our high streets* (p. 55). https://www.gov.uk/government/publications/the-portas-review-the-future-of-our-high-streets

Salgueiro, T. B. (2011). The resilience of urban retail areas. In T. B. Salgueiro & H. Cachinho (Eds.), *Retail Planning for the Resilient City: Consumption and Urban Regeneration* (pp. 19–44). Centro de Estudos Geográficos, Universidade de Lisboa.

Sharma, P., Leung, T. Y., Kingshott, R. P. J., Davcik, N. S., & Cardinali, S. (2020). Managing uncertainty during a global pandemic: An international business perspective. *Journal of Business Research*, *116*, 188–192. https://doi.org/10.1016/j.jbusres.2020.05.026

Singleton, A. D., Dolega, L., Riddlesden, D., & Longley, P. A. (2016). Measuring the spatial vulnerability of retail centres to online consumption through a framework of e-resilience. *Geoforum*, *69*, 5–18. https://doi.org/10.1016/j.geoforum.2015.11.013

Sparks, L. (2021). Towns, high streets and resilience in Scotland: A Question for Policy? *Sustainability*, *13*(10), Article 10. https://doi.org/10.3390/su13105631

Talen, E., & Jeong, H. (2019). What is the value of 'main street'? Framing and testing the arguments. *Cities*, *92*, 208–218. https://doi.org/10.1016/j.cities.2019.03.023

The Ministry of Health of Türkiye. (2020). *COVID-19 salgın yönetimi ve çalışma rehberi* (p. 378). The Ministry of Health of Türkiye. https://covid19.saglik.gov.tr/TR-66393/covid-19-salgin-yonetimi-ve-calisma-rehberi.html

Tokatli, N., & Ozcan, G. B. (1998). The State and the Corporate Private Sector in the Recent Restructuring of Turkish Retailing. *New Perspectives on Turkey, 18,* 79–111. https://doi.org/10.1017/S0896634600002892

Türkün, A., Sarıoğlu, A., & Çarıkçı, Ç. (2021). *Tarihi Kent Merkezlerinin Yeniden Yapılanmasında Belirleyici Faktörler ve Olası Senaryolar: İstanbul Beyoğlu Örneği* (TÜBİTAK 1001 - The Scientific and Technological Research Projects Funding Program, Project No: 113K317; p. 1179). TÜBİTAK.

United Nations. (2021*). United Nations Comphrensive Response to COVID-19* (Saving Lives, Protecting Societies, Recovering Better, p. 42). United Nations. https://www.un.org/en/coronavirus/UN-response

Wenzel, M., Stanske, S., & Lieberman, M. B. (2020). Strategic responses to crisis. *Strategic Management Journal*, *42*(2), O16–O27. https://doi.org/10.1002/smj.3161

Wrigley, N., & Dolega, L. (2011). Resilience, fragility, and adaptation: New

evidence on the performance of UK high streets during global economic crisis and its policy implications. *Environment and Planning A*. https://doi.org/10.1068/a44270

Wrigley, N., & Lambiri, D. (2015). *British high streets: From crisis to recovery? A comprehensive review of the evidence*. Southampton: University of Southampton.

Yalciner Ercoskun, O., & Ozuduru, B. H. (2014). Urban resilience and main streets in Ankara. *International Development Planning Review*, *36*(3), 313–337. https://doi.org/10.3828/idpr.2014.18

Zukin, S., Kasinitz, P., Chen, X., Kasinitz, P., & Chen, X. (2015). *Global cities, local streets: everyday diversity from New York to Shanghai*. New York: Routledge. https://doi.org/10.4324/9781315776194

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Factors determining the gulet hull form and a look into the morphological development of the first touristic Bodrum Gulet "Botaş"

Mehmet Turgut ÇIRPANLI[1]*, Gülname TURAN[2]
[1] cirpanlim@itu.edu.tr • Industrial Design PhD Program, Graduate School, Istanbul Technical University, İstanbul, Türkiye
[2] gulname.turan@itu.edu.tr • Department of Industrial Design, Faculty of Architecture, Istanbul Technical University, İstanbul,Türkiye

*Corresponding author
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Abstract
This article aims to complete the missing lines in the writing of the history of the evolution of Touristic Bodrum Gulets. Since the early 1960's, sailing and motor boats destined for touristic purposes have been found in Bodrum region. The article defines the origins of gulets and analyses their morphology. It describes the discovery the very first one specifically designed and built for tourism, introduced in 1967. Signs of government planning and financial support schemes for the development of this archetypial model have also been encountered.
Contrary to the story told - that gulets have been in the making since hundreds of years, it has been found that the hull form of gulets is relatively new and consists of rather modern lines, compared to other more traditional, classical boats such as tirhandils. The article relates gulets' hull lines with larger ships according to "the wave-line theory", a theoretical ship design approach put forward by naval engineer John-Scott Russell and influenced ship design globally, beginning in second half of the 19th century and continued to be influential for many decades.

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Keywords
Bodrum Gulet, Morphological analysis, Wave-line theory, Wooden boat building, Yacht design.

1. Introduction

Shipbuilding along the Anatolian coast, in the sense known today, was initiated by the Phoenicians about 3500 years ago (Binder, 2012) . It has been an important economic activity that has continued with cultures who settled along the Anatolian coasts, throughout history. Ship frescoes dating back to the 16th century BC, found on the island of Santorini in the Aegean Sea, indicate that shipbuilding played an active role in the Eastern Mediterranean in the early periods (Köküöz and Örs, 1995). Ship depictions can be seen in the Karatepe (Azativattaya) North Gate reliefs, located within the boundaries of the Kadirli district, dating back to the Late Hittite Kingdom between the 12th and 7th centuries BC. Shipbuilding in Istanbul, which has been a center of trade throughout history, began in the Yenikapı shores during the Byzantine City-State period in the 6th century BC. It continued on different shores of the Golden Horn during the Eastern Roman Empire and Ottoman Empire periods. In recent times, by the end of the 20th century, due to the rapid growth of the city's population in the city center, boatbuilding has moved to Tuzla (Müller-Wiener, 1998), (Can,2013). It is seen that boatbuilding for military and commercial purposes started in very early periods in centers such as İzmir, Bodrum, Alanya on the Aegean and Mediterranean coasts, and in shipyards such as Tekkeönü, Bartın, Sinop, Trabzon on the Black Sea coast (Kademoğlu, 2000).

Wooden boat building is a construction practice still being carried out in most of the centers mentioned above today. This practice is carried out with the extension of traditional methods and knowledge (Kademoğlu 2000). Following the Industrial Revolution, the use of steel and later petrochemical raw materials became widespread in shipbuilding and workboat manufacturing. In industrialized countries, commercial wooden boats and shipbuilding had almost come to an end after World War II. In contrast, during the same period in Turkey's closed economy, the boat and shipbuilding activities based on materials such as steel could not progress due to the limited economic power of the private sector. In this context, wood was the material of choice in commercial boat and shipbuilding until the 1970s, without interruption (Binder 2012; Nutku and Küçük 1963; Kademoğlu 2000).

The early 70's were a period in which many traditional wooden boat builders transitioned from commercial boat production to tourist boat production. This transformation was shaped under the influence of government policies focusing on tourism, which began in the early 1960s and gained momentum from the 1980s onwards. Wooden boat builders were able to create a new and profitable business area by rapidly turning to the construction of sailing boats called "gulet," which became increasingly popular for marine tourism. Thus, a new era began with significant economic and cultural effects on wooden boat building. This period coincides with the changes in the economic, political, and cultural life of the society in the 1980s. Moreover, with the process of joining the European Economic Community, the appropriate environment was created for both quantitative growth and qualitative improvements in design and production practices in wooden boat building. In accordance with these, government incentives for supporting the private sector and regulatory changes in import and export policies have lead the design profession to become an integral part of the competitive toolset for boat manufacturers.

The study primarily focuses on the continuous relationship between the maritime tourism concept called "blue voyage" (Mavi Yolculuk) and the evolution of Bodrum's wooden sailing boat production. It examines BOTAŞ, which was identified as the very first sailing Gulet designed and built for tourism purposes in Bodrum. Based on the data obtained, Botaş has been found to have the characteristics of a typical "blue voyage" gulet and being the actual prototype for thousands of boats produced in the region. Using documents such as hull line drawings, semi-structured oral history studies based on face-to-face interviews, and data collected from construction sites and boatyards, the historical development of the Bodrum Gulet boat type,

and its relationship with Mediterranean gulet boats in general are analyzed. While the horizontal axis of the study focuses on the historical process of traditional wooden boat production, in the vertical axis, a causal relationship is established with the facts in the fields of tourism, design, economics, and government policies.

2. Gulet definition

In academic literature and popular publications, three distinctly different approaches are encountered in defining the Gulet:

- i) a general description of boat typology
- ii) a definition based on sail equipment
- iii) a definition based on a specific hull form

The first approach, which is a general description of boat typology, is used functionally in the tourism industry's popular publications and promotions. Tour operators, with simplicity in their communication with customers, define all types and sizes of wooden sailboats used for charter trips as "gulet". The second approach, which is adopted by boat designers and historians, defines gulets based on sail equipment. According to the second approach, a gulet term indicates a type of boat with two or more masts, parallel sails to the keel, and a mainsail located at the rear mast, with either a gaff (four-sided) or Bermuda (triangular) sail. Finally, the last approach adopted by boat builders defines the term "gulet" as a specific hull form, mostly built in wood but also made of steel, aluminum, and composite materials (Binder, 2015; Ağan, 2015; Köyağasıoğlu, 2014). In this study, the term "gulet" is discussed based on i) the etymological roots of the word, ii) the definition based on sail equipment, and iii) the definition based on hull form.

2.1. General description of the boat typology

The term "Gulet" is believed to have originated from the Dutch trading vessel "Galliot," which means a two-masted ship. Some sources associate the name with a small shark called Galéos or a seabird called Goéland. In Turkish, "Gulet" is synonymous with the French "Goélette," the Spanish "Goleta," and the Italian "Goletta," which are all defined as "Schooner" in English. The first Gulet in the Ottoman Empire built by the American engineer Henry Eckford in 1832 (Güleryüz & Langensiepen, 2007) was initially called "Uskuna" in Turkish, a derivative of the word "Schooner" which refers to the specific schooner rig type and not any of the then constructed hull forms. It is unclear when the term "Gulet" replaced "Uskuna" in Turkish, as the use of the word "Uskuna" decreased with time. According to Google Trends data from 2004-2021, "Gulet" and "Gulet Kiralama" (Gulet rental) are more frequently searched than "Uskuna" in Turkish, indicating that "Gulet" is the more popular. Based on this, it can be seen that in current usage in Turkish, the word "Gulet" is more commonly used than the word "Uskuna".

It is also observed that the combination of "Gulet" and "Gulet Kiralama" are frequently searched, indicating the importance and popularity of gulets for tourism purposes. Therefore, it can be understood that "Gulet" is more widely known as a type of boat used for blue voyage tourism, while there is no clear conceptual relationship between the term "Uskuna" and blue voyage tourism.

Today the word "Gulet" is frequently used and has become the prevailing term to describe wooden sailing boats, especially in the context of blue cruise tourism, in Turkey and worldwide.

2.2. According to the classification based on rigging: The definition of Gulet/Uskuna

Sailing vessels are usually described based on their sail rigging, which generates the mail propelling force of the vessel, such as "Barque", "Barquentine", "Cutter", "Brig", "Brigantine", "Ketch", "Yawl", which all define a specific setup of mast and sail arrangement. Hull form is not always taken into consideration as a defining factor. When researching the Turkish terms "gulet" and its synonym "uskuna", it has been seen that among nautical historians these terms are used to describe a specific rigging with two

or more masts, where the aft mast is either longer or the same length as the others, and the fore and main masts are equipped with Gaff or Bermuda sails. Some gulets also have small "main topsail" sails above the mainsail or are equipped with a square sail called "fore topsail" on the foremast.

In the historical context of shipbuilding, gulet nomenclature is first encountered as the definition of sailing ships of a typical sail equipment, whose examples have a rig with sails that are set along the keel -as opposed to square sails that are set at a right angle to the keel- and are known as "fore-and-aft sails." Gulets/Schooners are large, sailing, fast, highly maneuverable, and fishable boats that can be managed by a small crew and emerged in the early 1800s in the Nova Scotia region of North America (Köyağasıoğlu, 2015).

Between 1825 and 1935, the hull design lines of 137 different boats built in North America were compiled in the book "American Fishing Schooners" written by renowned Nautical Architect Howard I. Chapelle (1973). In this study, it is seen that these boats, called schooners, are generally broader and, have low freeboards, and often have a moveable centerboard for increased stability.

The variety of hull forms designed for American fishing schooners were shaped for navigation to Gloucester Harbor, a fishing trade center with shallow waters in those years, as well as sailing in open seas and in tidal waterways where the depths change frequently due to tides. Each of these hull forms were quite different from gulets that operate in Mediterranean waters where significant oceanic tidal events are not observed and ports and peers have stable depths, which allow deeper hulls. All the boats featured in this reference book refer to double-masted sailing vessels with a large sail area at the back and a smaller one at the front, in accordance with their sail equipment. Not one American Fishing Schooner of the period is seen with a ketch rig, which have the fore mast longer than the aft mast. The nomenclature is strictly rig-based. Accordingly, as it has been found in several dictionaries, the definitions of "Gulet" and "Uskuna" do not specifically refer to a particular hull shape, but rather to the sail equipment, as explained above.

2.3. Definition of gulet according to hull form

Ata Nutku (1963), following Chapelle's work, has performed mathematical calculations on gulets in Turkey. He evaluates that gulets are defined according to their hull form and uses the term "Gulet" to express a distinctive hull form with evident characteristics rather than for a specific sail equipment. He also states that this form is a downsized example of the Mediterranean "Bark" and explains that gulets have a full form due to the restriction of their length, with distinct shoulder widths at both ends joining a long parallel hull (Figure 1).

"Gulet: In fact, the Gulet, which is a Mediterranean structure, is a distorted copy of the "Barco" passed down to

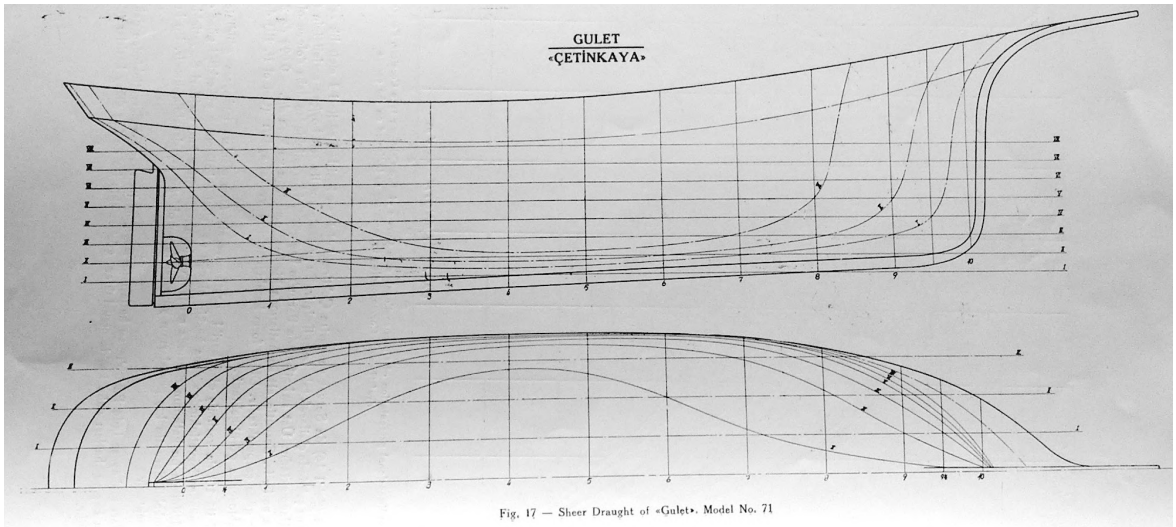

Figure 1. *Hull lines of Gulet "Çetinkaya" (Nutku and Küçük, 1963).*

us by Greek manufacturers, which the French called "Goulette." Its length has been restricted, resulting in a very full form, and both ends have joined a relatively long parallel hull with obvious shoulder widths. As can be seen from the cross-sections in Figure 19 and the hydrostatic curves in Figure 20, the stern is fuller than the bow. The waterlines consist of obvious inward-sloping curves. The bow sections have vertical sides and converge into a sharp corner curve with an increasing deck slope towards the bow. The stern sections resemble a V shape, and their union with the keel occurs with large curved curves.

The Gulet has a spoon-shaped stern. The full waterlines also represent a blunt form with steep buttocks. In both model experiments and sea experiences, the discontinuity of the flow here and the large resistance were observed, so the model's stern was extended with a "Cruiser stern" form, and the front lines were extended so as not to exceed the spoon. The great gain brought about by this can be clearly seen from the diagrams of the experimental results."

"In Turkey, coastal transportation is mostly carried out with wooden barges named after their hull forms, such as <Çektirme>, <Bumbarta>, <Gagalı>, <Gulet>, <Taka>, and <Mavna>."

Similarly, in his research focusing on 19th century mediterranean wooden shipbuilding, A. Delis states that some ships built on the island of Syros were described based on their hull and some on their rigging types. According to Delis (2016), small single-masted boats are generally defined by their hulls, while high-tonnage two or three-masted ships are defined by their rig.

The island of Syros, located approximately 100 nautical miles west of Bodrum, was one of the most important shipbuilding centers in the Mediterranean in the 19th century. More than 1,000 multi-masted gulets and barks were built on this Greek island until the 1850s, which was the birthplace of the low freeboard gulet that could be called the Mediterranean Gulet. As boatbuilding activities based on engineering began to spread in the Aegean, boats with a distinctive hull form, known as "Goletta" or "Goélette" regardless of their rigging, began to be called so. These were mainly used in the Mediterranean and characterized by a clipper-bow and a cruiser or "scoop" stern, beginning from mid-to-late the 19th century and throughout the 20th century.

The fishing gulets produced in Bodrum since 1957, which are the focus of this study, should be considered as derivatives of the Mediterranean Gulets (Figure 8). Although the first boats produced had masts for cargo transportation, they lost their sail rigging entirely with the widespread use of diesel engines. With this development, their hull forms were seen as a differentiating factor in line with the small boat-building practices of their craftsmen, and although produced without sails, they were still referred to as "Gulet".

2.4. Gulet hull design and construction

Wooden Gulets are sailing ships with a skeletal frame system, constructed either with the "Plank-on-Frame" or "Wood-epoxy" construction techniques. "Plank-on-Frame" and "wood-epoxy" are labour-intensive construction techniques that make it possible to construct a ship with limited human resources and primitive tools, providing effective, long lasting, durable results. While "Plank-on-frame" technique can be traced back to the 11th century A.D, the "Wood-epoxy" is only practised since early 1970's, as it relies on the chemical epoxy compound.

A gulet built with the "Plank-on-frame" technique is comprised of a keel, literally the backbone of the ship, a vertical stem which forms the bow, a sternpost forming the aft and a series of parallel transverse frame elements that define the hull form. This construction technique has become widespread over time and is still used in the construction of many types of ships and boats worldwide.

In this technique, design and construction processes can be separately planned ahead or can be carried out simultaneously by skilled craftsmen. As is usually the case, after the main dimensions have been determined based on a defined outline, the remaining dimensions are completed on the

workbench using traditional methods passed down from master to apprentice (Özkeskin, 2016). In the "Plank-on-Frame" technique, after the keel and the middle posts are bolted together, the sheer line and hull shape are determined using thin battens, or slats (Figure 2).

The fitting of the supports for the deck planking follows. The keel, frames, and supports form a strong, durable structure. The next step is to cover the structure with a hull. The inclined surfaces of the hull and deck are covered with solid wood strips (Köküöz and Örs, 1995). This used to be the most commonly used construction technique for tourist wooden boats such as gulets and tırhandils, until late 1990's. "Wood-epoxy" technique has been seen replacing the "plank-on-frame" technique in the last two decades. Due to its efficiency and effectiveness, this new technique is also preferred in new boats designed according to modern engineering principles.

2.4.1. An invalidated but partly effective concept in determining the hull form of gulets: "Wave-Line" theory

"Wave-Line" theory is a ship design methodology developed by British mathematician and shipbuilding engineer John-Scott Russell in the early 19th century, influenced by Isaac Newton's earlier writings (Ferreiro and Pollara, 2016). In late 18th century, Newton showed that the resistance, cross-sectional area, and speed of a three-dimensional shape can be calculated as a function. Taking this into account, Russell began his search for the "least resistant hull form" and began conducting his first pool tests in the first quarter of the 19th century to obtain empirical data on this subject. John Scott Russell tried to shape the hull form that shows the least resistance by formulating a theory called "wave-line theory", explaining the wave model caused by floating objects moving on the water surface.

Russell discovered that when a floating object, such as a ship, moves in water, it creates a complex wave system due to changing pressures underneath the surface of the water around it (Figure 3). Following these observations, he developed a wave formation and pattern theory that was highly influential in naval architecture and shipbuilding from the mid-19th century until the beginning of the 20th century. Although this theory is no longer supported by contemporary shipbuilding engineers, it provided a sound basis for builders of the time (Ferreiro and Pollara, 2016).

According to this theory, the waterline of the ship should follow a sinusoidal curve over a length that corresponds to 53% of the boat's length at the bow. It should flatten in a short section just behind the midship (the keel line) and then take a cycloidal shape at the stern over the remaining length that corresponds to 35% of the boat's length (Figure 3). The same hull design approach and similar properties has also been observed in Gulet hulls.

It was later proven by Froude that resistance is a variable that is proportional to the speed of the hull, and different ships performing different tasks should have different operational speeds, therefore, a single hull type cannot be proposed for all ships. Nevertheless, John Scott Russell's theory remained in the forefront as the only theory that produced partially correct results in the context of designing high-speed, lower-tonnage sailing ships until the 1860s. Other formulas such as the "Admiralty Coefficient" of the British Royal Navy, which were based on the principle of comparing the resistance of ships with other ships, required having a high amount of data. This method adopted by the Navy and major shipbuilders was a method that smaller shipbuilders knew but could not adopt due to the lack of implementation opportunities. The Wave-Line theory, on

Figure 2. *"Plank-on-Frame" technique (Kızılağaç, Bodrum, 2018).*

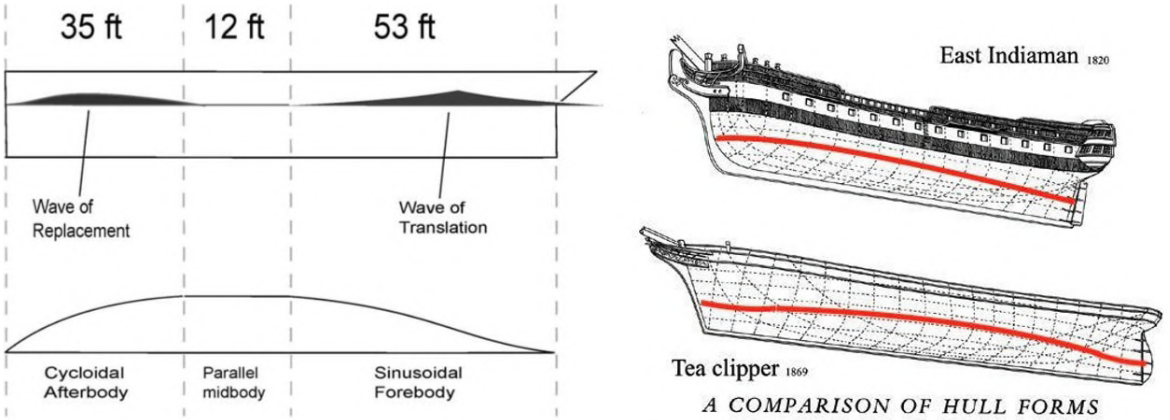

Figure 3. *The wave generation of a hull, shaped according to the Wave-Line Theory (left top) and a half-top view of the waterline (left bottom) An East Indiaman Company Ship (right top), a Tea Clipper (right bottom). (Ferreiro and Pollara, 2016).*

the other hand, has been accepted as a theory that yields "good enough" results, easy to apply by shipbuilders with some knowledge of geometry (Ferreiro and Pollara, 2016).

As seen in Figure 3 (right bottom), Tea Clippers have a bow shape that cuts through the water at a narrower angle and has a sharper entry angle. The shape widens along the waterline for a period, remains parallel for a time, then narrows again toward the stern in order to produce the least possible turbulence in the water. The East Indiaman type of ships, Figure 3 (right top), belong to a period when scientific methods for researching hydrodynamic resistance in shipbuilding had not yet been developed. The designs for these types of ships were produced by imitating the body structures of fast-swimming marine creatures in a technique called biomimicry. This approach, which claimed that the best hydrodynamic performance would be achieved by forms that resembled swimming fish, resulted in forms with the widest part forward of the waterline and a long, slender tail: (Cod's head - Mackerel tail). It was understood from the beginning of the 19th century that this form, which meets the water at a very wide angle, was not in accordance with hydrodynamic principles. This general approach was abandoned starting from the 1830s. (Ferreiro and Pollara, 2016)

The aesthetic quality of hull shapes produced according to the Wave-line theory principles also had a significant impact on popular culture. These enormous sailing vessels, famous for their speed, became the subjects of stories, novels, and films for many years, and during the golden age of seafaring, they became a global phenomenon. Using the scaling method, examples of clipper-type hull shapes developed using the Wave-line theory were produced in different sizes. With this simple parametric formula, it was possible to design fast and resistant boat hulls of the required size and capacity within certain limits. As a result, although the theory lost its name, it continued to be valid.

Through the analysis of hull lines data, it is observed that the masters' methods used to determine the forms of Bodrum gulets overlap with the "wave-line" theory and have influenced the Bodrum-made tourist wooden gulets that follow the Botaş boat. The production methods based on the master-apprentice relationship, which allowed the development of hull forms without complex calculations, have a distinctive position in terms of production techniques. Although the construction technique is the same, gulets differ from tirhandils, another traditional wooden boat type, in terms of the hydrodynamic properties of the advanced hull forms. They should be considered rather newer examples in the evolution of wooden sailing ships.

2.4.2. Early gulet production in Turkey

Due to their functions and needs, wooden gulet tradition has emerged on both the Mediterranean and Black Sea coasts of Turkey. Although

there is no specific boat defined as "Mediterranean or Black Sea Gulet" or "Mediterranean or Black Sea Schooner" in literature, it can be seen that the multi-masted boats such as Brigantino, Bark, and Barkantin, which are frequently encountered on the West and North African coasts, are built in a similar form to each other due to the similarities in their size and functions. Today, it is observed that the tourist types built on the Mediterranean coasts of Turkey are shaped in a similar hull line to them and their superstructures are similar to them.

Wooden gulets began to become widespread in the Mediterranean region after the second half of the 1800s. They are seen as a type of sailing ship that is fast and requires few crew members, usually between 20 and 30 meters in hull length (Delis, 2016). The hull forms of Mediterranean gulets show a great similarity to the fast hull lines of the "Clipper" and "Barque" sailing ships developed in the 19th century with the use of engineering mathematics and the first pool experiments. The hull structures of gulets should be considered as a scaled adaptation of the hull structures of North American 'Clipper' boats. Examples called "Brigantino Goletta" in Italy, "Skuna" and "Goleta" in Greece, and "Pailebot" in Spain have similar lines to gulets.

Clipper ships are trading vessels with a "V" profiled hull, pointed bow, and inclined head slabs that carry less cargo but can go very fast compared to 17th and 18th century galleons. Starting from the 19th century, these ships, which entered the Ottoman Navy and were widely used in trade fleets in the Aegean and Mediterranean, continued their activities with functions such as fishing and cargo transportation in many Mediterranean countries until the mid-20th century. At the same time in Turkey, gulet construction continued on both the Black Sea and Mediterranean coasts during the same period. It is known that gulets for cargo transportation were built in Bartın, İnebolu, Samsun, and Trabzon provinces on the Black Sea coast of Anatolia during the 20th century (Kademoğlu 2000).

The weakness of the Black Sea region's land transportation infrastructure and its unsuitability for cargo transportation required a large proportion of goods and freight to be transported by sea. The fact that the Black Sea coasts are exposed to strong winds from the north and the high waves of the Black Sea has determined the hull structure of the ships operating in this region. In this regard, especially since the beginning of the 20th century, high-tonnage and high-bordered gulets have been built in the Black Sea, unlike those on the Mediterranean coasts. Black Sea gulets are heavy ships with high freeboard and a straighter sheer line, built specifically for cargo transportation. They differ from Mediterranean sponge and fishing gulets in terms of draft, tonnage, bulwark height, and sheer line slope. Mediterranean gulets, with their steeper sheer line, lower structure, and size, are suitable for Trawl fishing in the Aegean Sea.

A photo of a Black Sea gulet taken in Bodrum Harbor in 1959 with the newly constructed "Ege Gülü" trawler on the left, clearly shows the functional and dimensional differences between the two types (Figure 4).

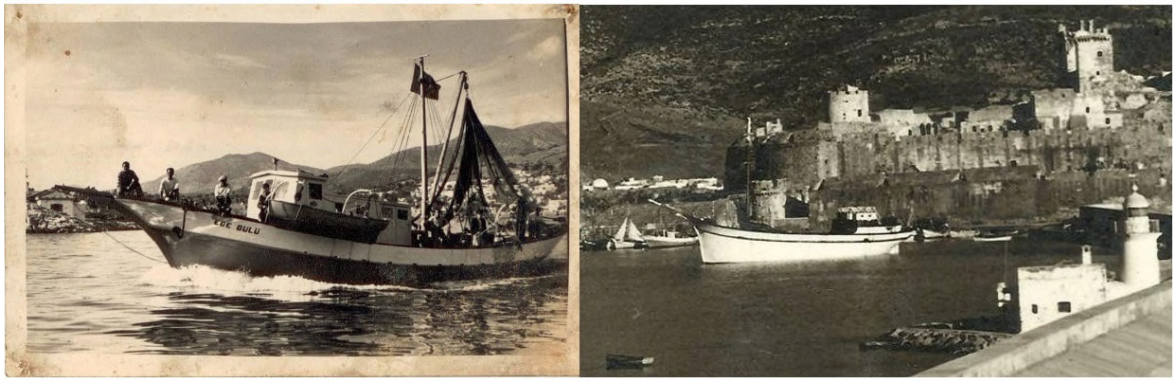

Figure 4. *Ege Gülü (left) and a Black Sea Gulet (right) in Bodrum Harbor, 1959 (Şengün,2017).*

2.4.3. Bodrum's first fisherman gulets "Ege Gülü" and "Mustafa"

1957 is the year when two small wooden boat builders in Bodrum have started to build large motorized gulets for offshore fishing (Binder, 2012). Prior to this, the earliest identifiable motorized fisherman gulet "Zehra", was made in Italy in the 1940s (Kükner et al., 2009). This Italian boat model, which drew the attention of fishermen in western Turkey with its marine features, can be considered as a regional example. It is also known that a research report submitted by prominent nautical arcihtect Howard I. Chapelle to the Turkish Government included wooden fisherman boat designs that could be produced using traditional methods. This report was the result of the research and project development work conducted in Turkey under the FAO (Food and Agriculture Organization of the United Nations) (Popular Boating, May 1959). The well documented research includes plans of a fishing gulet of similar size and lines to the Bodrum ones, built by Durmuş Ali Torlak in Istanbul, in 1955.

In 1957-1958, two craftsmen who were both immigrants from Crete and knew each other well, Güllük's Nami Uyav and Bodrum's Ziya Güvendiren, built a fisherman Gulet each. These boats were launched in Güllük and Bodrum. The first Gulet built by Nami Uyav was called "Ege Gülü", and the first Gulet built by Ziya Güvendiren. was called "Mustafa". (Binder, 2017). In the following period, there was a constant increase in the number of Bodrum's fisherman gulets. These boats, mainly used in trawling, use bottom-scraping net systems in deep waters. Since this fishing technique also includes situations where a large and heavy net must be collected perpendicular to the wave direction from the back of the boat, gulets with a high stern structure, such as a high balcony, are particularly preferred in this fishing technique as they better withstand the incoming wave from the back (Ağan, 2019).

3. The course of yacht tourism and gulet production in Bodrum

The impact of yacht tourism can be examined both from a socio-economic perspective as well as from a socio-cultural perspective. Yacht tourism activities have reached an economic size of around 250 million Euros annually (Deniz Turizmi, 2019). This tourism activity, also known as "Blue Voyage," is currently carried out from the main ports of Muğla province such as Bodrum, Marmaris, and Fethiye. According to the DTO data, as of 2019, more than 3,500 boats, including 1,571 "Yacht-Gulet, etc." and 2,155 "Day Trip Boats," were registered in ports as Maritime Tourism Vehicles in 2018 (Deniz Turizmi, 2019).

Wooden boat production in Bodrum, where more than 1,000 wooden boats have been produced since the 1970s, has started in the region called the Ottoman Shipyard, located downtown. In the late 1970s boat construction activities have moved outside the city center. The first shipyard in İçmeler was established by Erol Ağan with limited facilities. There were no roads or infrastructure. An economic cluster was quickly formed, which provided knowledge transfer, competition, and synergy. Today, Bodrum continues to maintain its effectiveness as one of the leading centers of wooden boat production.

When evaluated in terms of employment, it can be concluded that more than 10,000 sailors work on these 3,500 touristic boats that operate for a 6-month long tourism season between April and October. In addition to this employment, it can be seen that Yacht Tourism has become an industry that serves tens of thousands of people when considering the workers who work in wooden production in shipyards and those who provide services related to cleaning, maintenance, and logistics when the boats dock at the port.

Bodrum, a coastal town with a small population of 10,000, turned into a center of attraction with the popularization of the Blue Voyage concept. The constantly increasing demand for tour boats initially led to the quick conversion of existing fishing and sponge boats into tour boats. This was followed by the idea of developing boats specifically designed for tourism.

3.1. Morphological changes: From fisherman's boat to touristic yacht

Due to emerging developments, gulets which were designed and built for fishing purposes were subject of interest of tourists. The process of gulets being transformed into touristic boats started in Bodrum in the mid-1960s. However, during archivial research, an older visual evidence of a large gulet, albeit italian, transformed into a touristic gulet has been found. In a series of photographs from 1957 a three-masted gulet is seen anchored in front of Bodrum Castle (Figure 5). Sebahattin Efe's archive, who provided the pictures, included no information about the yacht.

The outcomes of an online visual search conducted with the English keywords "triple masted schooner" and Italian keywords "goletta tre alberi", due to the three-masted rigging, indicated that the boat seen in the picture above was the Italian yacht "Francesco Petrarca". The 49 meter vessel, then named "Taitu", was built in 1941 at the Benetti shipyards in Viareggio, Italy and was converted from a cargo ship to a private yacht, using an approach similar to the transformation observed in the evolution of Bodrum Gulets.

In this photo, the aforementioned sailboat is seen anchored right in front of the carpentry shop of master Ziya Güvendiren, adjacent to the castle wall by the seaside. It could be speculated that Ziya Güvendiren, living and working in the same neighborhood (Binder, 2015, Özkeskin 2015), and "Taitu," which was moored right in front of Ziya Güvendiren's workshop in Bodrum for a while, very likely had a direct interaction relationship. Similarly, it is understood that luxury sailing boats of this size and similar structures were coming to Bodrum for tourism activities in those years. Therefore, it is possible to say that this photo series in Sebahattin Efe's archive is an important source and document about the possibility of inspirational interactions.

In the following years, the transformation of fishing boats for tourism purposes has begun. It is known that a gulet (Figure 6) owned by Naci Bey in Kuşadası and approximately 19 meters long, which was used for fishing, was converted into a tourist gulet by adding a cabin and started to be used in long blue voyages in 1961 (Cevat Çapan, 2020). With this Gulet called "Macera", (Adventure in Turkish), Azra Erhat, Sebahattin Eyüboğlu, and Cevat Şakir Kabaağaçlı organized blue voyages with their group of friends (Sözer, 2020).

"Macera" is known to be the first known tourist boat converted from a gulet hull. The deck arrangement and cabin are in a different layout from the archetype Botaş. The captain's cabin is in the middle and high, and there is a closed cabin behind it. The toilets are outside. It does not have the ability to cruise with a sail. Apart from the bow and round stern structure that defines the hull shape, there is almost no visual similarity with today's gulets. It cannot be considered as a typical gulet.

3.2. Critical moment: The adaptation of "davlumbaz" onto the cabin

The primary visual element that defines the tourist gulet archetype is the open-towards-aft pilot house, or "davlumbaz". This is comfort attachment added onto the top of passenger cabins, providing protection from wind gusts, water spray and sun rays. During the evolution of wooden tourist gulets, economic and social factors, as well as technological advancements, have

Figure 5. *Triple-mast schooner "Taitu" (on the left), 1957 (Sebahattin Efe Archive, 2017).*

Figure 6. *Reconstructed image of the "Macera" boat in 1961 (Cevat Çapan Archive).*

played a significant role. Although it is a just simple roof structure, the emergence of the davlumbaz (Figure 7) on sailing boats has been possible as a result of technological advancements brought about by the Industrial Revolution. This is due to the fact that, thanks to the easy adaptation of the diesel engine on boats, the importance of sail equipment in commercial shipping has rapidly declined.

In boats equipped with engines and propellers, masts are shortened and components belonging to sail system are removed because there is no longer a need for sail equipment. With no sail equipment that needs to be constantly monitored, the need for the helmsman to steer the boat in the open air has vanished. Thus, the weatherproof pilothouse that can be used by the helmsman and the crew on deck has emerged. This new element which was first seen in motorboats such as "autoboot" in the 1920s was later adopted in motor-driven sailboats after World War II and evolved into a new type of boat called "motorsailer", such as Design 0924 by John G. Alden from 1954, with the typical example of early "pilothouse motorsailer" yachts. The pilothouse, clipper bow and fine sheer line of this yacht are also seen constituting the characteristic design elements on the touristic gulet type that will be examined in the next section.

Figure 7. *Two tirhandils, one open deck and one with cabin and pilot house (Şengün, 2017).*

Figure 8. *BOTAŞ. Life Magazine, May 22, 1970.*

3.3. The birth of the Bodrum Gulet: Haşim Birkan and the 'BOTAŞ'.

The sailboat seen in Figure 8 is the first purpose built tourist gulet in turkish maritime history that the authors were able to identify.

The emergence of the first example of the Touristic Bodrum Gulet, which continues to evolve today, and its transformation into a typology dates back to 1966-1967. Various factors from different fields were effective in shaping the archetype. Botaş, the first boat that could be called the Bodrum Gulet and built from scratch, was launched in 1967.

BOTAŞ was built by Bodrum wooden boat master builder Ziya Güvendiren for Haşim Birkan, an Istanbul-based tourism entrepreneur and owner of a tourism company of the same name as the boat. BOTAŞ is understood to be launched in 1967, thanks to the pictures taken by Prof. Dr. Ömer Yağız in 1967. Despite various visual documents related to BOTAŞ being found in different sources during the research, no written text or any official port record was found about this Gulet.

The name of the boat is also invisible in the current pictures (Figure 9, Figure 10). This article is the first study to examine the BOTAŞ case, which has not been previously reported in the literature, and is based on face-to-face interviews conducted as part of field research carried out between 2015 and 2019 (Binder, 2015, 2017, 2018; E. Ağan, 2017; İ.Ağan, 2017; Demiröz, 2017; Onur, 2017).

Thanks to this research, the history of gulets specially built for Blue Cruise in Turkey can now be dated back to 1965-1967. It is understood that in 1967, the first tourist sailing gulet named BOTAŞ, which has a gulet hull and a gaff sail ketch rig, was launched from the shipyard on the east

side of Kale, where Ziya Güvendiren's shipyard is located in Bodrum. Since the construction of these boats takes an average of 14-18 months, it can be predicted that BOTAŞ was laid down in 1965 or 1966 (Özkeskin, 2017). BOTAŞ bears similarities with Alden's pilothouse motorsailer design no 0924, which is a type of boat with both sail and motor drive. Both have a protected, enclosed pilothouse (davlumbaz) above the deck level.

In various sources, it is seen that classic hull forms such as Tirhandil were combined with a pilot house and high cabin structures in some pre-1967 constructions, such as "Bebek" tirhandil. However, BOTAŞ emerged as the first example in Turkey where the gulet hull form and open pilot house on cabin combination are used together. By combining a relatively modern hull form developed in the late 19th century with a hood, cabin, and several sails, the Gulet, which is the most well-known example of yacht tourism in Turkey, was created.

BOTAŞ was discovered thanks to two photos (Figure 9) uploaded to the "Eski Bodrum" messaging group on Facebook in 2016. These photos, which are in color and dated by the photographer himself were provided by Prof. Dr. Ömer Yağız and belong to a photo series he had taken during a trip to Bodrum in the summer of 1967.

In these two photos, a few newly built boats in front of the "electric generator building" can be seen on the Girit Neighborhood on the east side of the castle. The boats seen in this area where Ziya Güvendiren and Erol Ağan's workshops are located can be examined from the profile and top view. In the top view photo taken from the castle, the date of the photos can be verified thanks to the Aya Yorgi church, known to have been demolished in 1968 (Binder, 2017).

Initially, no clues were available about the names of the boats in Figure 9. However, it was revealed in a series of interviews conducted by the author that the dark boat with a gulet hull form was called "BOTAŞ". For these interviews, the above pictures were printed and shown to interviewees, which were conducted by voice records and later decoded. Master carpenter Hasan Demiröz, who worked with Erol Ağan for many years, Erol Ağan's brother İbrahim Ağan, and Erol Ağan himself were recorded identifying the boat (E. Ağan, 2017; İ.Ağan, 2017; Demiröz, 2017).

In another voice recorded interview, the same photos were shown to Captain Özcan Onur, an early tourism entrepreneur who invested in the "Heyamola" gulet, built by Erol Ağan in 1972. Having started in the tourism sector in the late 60's, Captain Özcan Onur confirms the information given by Erol Ağan and verifies that the boat belonged to Haşim Birkan's BOTAŞ. He states that Haşim Birkan established Bodrum's first tourism enterprise in Bardakçı Bay under the name BOTAŞ Camping, and had other small boats built, all of which had names such as BOTAŞ-1, BOTAŞ-2, etc. He also states that the Gulet in the picture was named BOTAŞ-6. Of particular interest, Onur also expressed that Birkan had them built with the tourism incentive loan received during the time of the first Minister of Tourism, Nihat Kürşad (Onur, 2017).

Several cross-checks have also been made: In a newspaper article from June 1967, famous singer Zeki Müren, who came to Bodrum, states that he took a tour with a boat and its captain, allocated by Haşim Birkan after his arrival to the town. Existing information about Haşim Birkan, who commissioned Turkey's first known purpose-built tourism gulet does not refer to the boat he had built, but rather to his Botaş Camping, established in Bardakçı Bay in 1965 (Gür 2002; Mansur Coşar, 2015).

As the result of subsequent research on Haşim Birkan, a search conducted on the website www.nadirkitap.com on January 23, 2018, revealed that there was an article about his house in Bodrum in the "Ev Dekorasyon" magazine. Upon obtaining and analyzing the 19th issue of the magazine published in March 1978, the same photo of BOTAŞ has been found in the article. The photo (Figure 8) was published in Life magazine in 1971 and was clearly visible in one of the photos in a showcase in the interior (Çetin & Atilla, 1979).

Figure 9. *"A look from Bodrum Castle to the Greek Neighbourhood" (Ömer Yağız, 1967).*

Figure 10. *First gulets built in Bodrum, following BOTAŞ. Left to right: "Balık", 1971, "Heyamola", 1972, "Elpenor", mid 1980's.*

With the first Gulet identified, it has been possible to observe that in the 56-year period from 1967 to the present day, the characteristic features, plan, and aesthetics of BOTAŞ built by Ziya Güvendiren were rapidly embraced by the craftsmen and customers of Bodrum. BOTAŞ should be considered as the archetype of all "Gulet" built in Turkey until today. Some examples such as Erol Ağan's gulets: Balık launched in 1971 and Heyamola built in 1972 after BOTAŞ, and Elpenor built in the 80s, which have a classic gulet hull form, can still be seen in Bodrum harbor (Figure 10).

4. Conclusion

In this article only a specific type of Gulet based on "hull form definition" and its adaptation for tourism are examined. The two other type of boat hulls that are classified as wooden sailboats and called "Gulet" in popular culture are omitted.

The touristic gulets designed under the influence of the technological possibilities and socio-economic developments of the period in Bodrum are not purebred sailboats like their ancestors used for fishing, sponge diving, and transportation, but rather derivatives with cabins and pilot house extensions added on top of their cargo spaces. With this aspect, gulets can be considered closer to the motor-sailor typology. The hull shape of tourism gulets has been continuously optimized for their new functions that require low load, fuel economy, high cruising speed, and comfort.

When the development of wooden tourist gulets is examined, four basic characteristics of the hull shape can be considered as the determining factors. i) The curved aft overhang shape called "round stern". ii) The concave front stem form called "clipper bow" and the long bow spirit iii) The elegant curved sheer line that connects the upper ends of these two curves. These hull lines give a unique character to a gulet and differentiate it from other boats such as tırhandil and Aynakıç. iv) The inseparable part of the identity of a gulet is the pilot house, or "davlumbaz", which is an extension of the passenger cabin that does not depend on the hull shape and rises on the deck. This element, which protects the captain and passengers from spray, wind, and harsh sunlight, albeit a simple roof structure with its front and sides closed with glass and its rear open towards the stern deck, is maybe the strongest visual component. This structural element, built with

wood, has become essential for tourist gulets over time, as it establishes a protective and comfortable relationship with users. While sailing equipment has shrunk and disappeared like the lost limbs of evolving organisms, the pilot house has been developed, expanded, and diversified over time.

In 1971, BOTAŞ and the values it represented, which appeared on the first page of an article in Life Magazine about tourism in Turkey, played a significant role in the tourism history of Turkey. Haşim Birkan, who ordered the first tourism gulet with "davlumbaz", and master Ziya Güvendiren, who designed and built it, together created the first tourist gulet by combining local building knowledge with the needs of the day. By introducing this model to the Blue Voyage / Mavi Yolculuk activity, they provided a unique, comfortable holiday experience and thus created a very strong demand that would last decades, in the same direction.

Research and existing narratives about gulets suggested that these "traditional" boats are an economic value that somehow miraculously emerged as a result of the efforts of free entrepreneurs. Based on the findings, this article disagrees with this narrative in two key points: First, the statal/governmental planning decision for Bodrum Region to become a tourist center was determined at a very early stage, in early 1950's. Although it is claimed that the local pier was built with the aim of mandarin trade and the protection of fishing gulets through the insistence of a local member of the parliament, it has become clear that this protected harbor was actually built as an investment for the region to become a tourism center.

The second finding is that the first tourist boat built in this region, BOTAŞ, was commissioned and operated by Haşim Birkan, an Istanbul-based entrepreneur, through the tourism investment incentives made by the government at that time. According to records, in 1956-57, the government, through FAO, consulted with Howard I. Chapelle for the design of wooden fishing boats. In a separate Milliyet newspaper article from 5th of May, 1960, Prof. Fritz Baade, also a FAO consultant and advisor to Turkish Government, suggests the development of coastal tourism boats, up to 200 tons.

These findings indicate that an organized planning activity focusing on diminishing trade deficit by generating income from fishing and tourism activities has been carefully and consistently implemented over the course of many years. Gulet and Blue Voyage Tourism coupling, which is a perfect example of a Product/Service System Design, has been one of the primary economic activities that is used to promote Turkey's rich natural and historical resources and generate income, since the 1970's. The evolving morphology of gulets and its relation with various business models and the export potential of this product/service system, mainly consisting of a locally designed wooden sailing boat built with vernacular building techniques and additional services regarding luxury accomodation, culinary culture, historical site visits and watersports activities, is a subject of national interest that needs further research from socio-economic, tourism, history and product design perspectives.

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References

Binder, T. (2012). *Gayıktan Gulete.* Istanbul: Doğan Burda Dergi Yayıncılık.

Can, A. (2013, July 4). 90 Yıllık Cumhuriyet Döneminde Gemi Sanayimiz. Deniz Haber. Retrieved September 11, 2018, from https://www.denizhaber.com/90-yillik-cumhuriyet-doneminde-gemi-sanayimiz

Çakmak, T.F., İstanbullu Dinçer, F. (2016), *Deniz Turizmi.* Ankara: Detay Yayıncılık.

Çetin, N., & Atilla, N.K. (1979). Bodrum'da Haşim Birkan Evi. *Ev Dekorasyon, 19*, 30-36.

Çoban, C. (2015). *Bodrum Denizcilik Tarihi Araştırmaları.* Istanbul: PKitap Yayıncılık.

Delis, A. (2016). *Mediterranean*

Wooden Shipbuilding: Economy, Technology and Institutions in Syros in the Nineteenth Century. Leiden: Koninklijke Brill NV.

Ferreiro, L.D., & Pollara, A. (2016). Contested Waterlines. The Wave-Line Theory and Shipbuilding in the Nineteenth Century. *Technology and Culture, 57*(2), 414-444. http://www.jstor.org/stable/44017023

Güleryüz, A., & Langensiepen, B. (2007). *Osmanlı Donanması* (3rd ed.). Istanbul: Denizler Kitabevi.

Gür, R. (2002). *Bodrum 1930-1980.* Istanbul: Celsus Yayıncılık.

Sözer M, & Sözer S, (2020, May 14). *Ismail Kaptan ve Macerası.* Kuakmer. Retrieved May 21, 2020 from https://kuakmer.org/ismail-kaptan-ve-macerasi/

Kademoğlu, O. (2000). *Denizlerin Güzelleri.* Istanbul: Duran Kitapları.

Köküöz, A. N., & Kuyaş. Ö. (1995). Yüzyıllara Yayılan Gelenek Ahşap Tekne Yapımı. *Bilim ve Teknik, 338,* 40-48.

Kükner, A., Sarıöz, K., Güner, M., Bal, Ş., Akyıldız, H., Aydın, M., et al. (2009). Türk Tipi Guletlerin İncelenmesi ve Form Optimizasyonu. 106M086 Tübitak Research Project.

Mansur Coşar, F. (2015). *Bodrum - Ege'de Bir Kasaba.* Bodrum: DTO Bodrum Şubesi.

Müller-Wiener, W. (1998). *Istanbul Port.* Istanbul: Tarih Vakfı Yayınları.

Nutku, A, & Küçük, F. (1963). Turkish Coastal Vessels I - Çektirme, Gulet. *Gemi Enstitüsü Bülteni, 8*, 1-36.

Köyağasıoğlu, Y. (2014). *Denizin Kanatlı Perileri Yelkenliler.* İstanbul: Naviga Yayınları.

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Spiritual continuity and architectural transformations at Larisa's (Aeolis) sanctuary 'on the rocks'

Figen ÖZTÜRK AKAN[1]*, Turgut SANER[2]
[1] ozturkfig@itu.edu.tr • Architectural History Program, Graduate School, Istanbul Technical University, Istanbul, Turkey
[2] saner@itu.edu.tr • Department of Architecture, Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey

*Corresponding author
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Abstract
The major sanctuary in the ancient city of Larisa (Aeolis) consists of structures built at different periods -an altar, a small *oikos*-temple, a stoa, and a propylon- all constructed on the highest spot of the acropolis on solid bedrock. The architectural remains of the sanctuary, dated between the 7th and 4th centuries BCE and are mostly preserved at the foundation level. During the 20th century excavations, "a rectangular building with a hearth inside" was found under the temple which is believed to date back to the Early Bronze Age. Another arrangement made of circular stone features with a *baitylos* and other large rocks is thought to have been part of cultic practices, presumably related to the Mother Goddess. The Archaic-Greek temple and its dependencies were built on the Bronze Age core articulation of the acropolis. The prehistoric cup-marks and the small finds are associated with the cult of Mother Goddess/Cybele to indicate the cult continuity.
In numerous sanctuaries, which became widely known during the Archaic period in Western Anatolia, cult activities can be uninterruptedly traced back to the "pre-Greek" periods. Furthermore, most urban sanctuaries were deliberately chosen to be located at the highest rocky point of the settlement and dominate the surrounding areas. Besides the sacredness of the cult place, its visibility was likely to have been another essential consideration. Questioning the influence of these parameters in determining the location of the primary sanctuary in Larisa requires a comprehensive assessment in conjunction with the original context of the settlement.

Keywords
Bronze Age, Cult continuity, Larisa, Rock cult, Temple.

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1. Introduction

The ancient city of Larisa (Buruncuk) is located the south of the ancient region of Aeolis, in Menemen in northern İzmir Province. The settlement remains, which spread over a 2 km area from the volcanic Sardene (Dumanlı) Mountain to the southeast, dominate the Hermos (Gediz) Valley. The Hermos River flows south of the settlement, connecting this ancient region with inland Lydia to the east and the Aegean Sea to the west.

The settlement layout of Larisa comprises two hills and their surrounding areas (Figure 1). The higher hill in proximity to Dumanlı Mountain (Larisa East) is primarily distinguished by a powerful fort and a small urban area. The lower hill towards the west (Larisa West), situated at about 100 m above sea level, consists of an acropolis on the hilltop, residential areas on the southeast and northern slopes, and an extensive necropolis on the north, northeast, and east slopes. The acropolis itself encompasses a partially artificial area covering 800 square m, which is predominantly characterised by numerous rock clusters encircling the hill. The sanctuary is located within the rocky area at the top of the hill, furnished with representation buildings on the descending slope towards the west. The acropolis was fortified by monumental defensive walls since the Bronze Age.

The settlement history of Larisa can be traced back to the Neolithic period, with the earliest archaeological findings dating to the Late Neolithic-Early Chalcolithic era [1]. Throughout the Bronze Age, Larisa was continuously inhabited, particularly becoming prominent during the Early Bronze Age as indicated by small finds and architectural remains. In 20th century publications, these early layers are categorised as the "pre-Greek period", further separating finds into two distinct periods [2]. The earliest architectural remains are located beneath the temple, along with a hearth containing ceramic finds. From the second period, the most evident architectural remains are a fragment of the fortification wall and a cult complex with circular stone features discovered within the temple area. Despite the scarcity of remains and limited research, the Bronze Age settlement of Larisa exhibits similarities to settlement models of that period, with its well-defined upper, lower and outer settlements, as well as the emphasis on central power (Külekçi, 2021b, p. 301). The archaeological findings dating from the 2nd millennium to the 9th century BCE are scant in both the settlement and sanctuary (Özdoğan, 2018, p. 127). Although remarkable finds from the 8th and 7th centuries BCE exist, the visible architectural remains are predominantly dated from the 7th to the 4th centuries BCE. During the early 5th century, Larisa and its rule were probably under Persian power. Subsequently, Larisa remained under Athenian rule for a while in the second half of the 5th century, followed by continued suzerainty to the Persians. The abandonment of Larisa is thought to have occurred during the Galatian invasions at the beginning of the 3rd century BCE (Boehlau & Schefold, 1940, p. 42).

The earliest excavations in Larisa were carried out in 1902 by Lennart Kjellberg (Uppsala) and Johannes Boehlau (Kassel) (Mater, 2013, pp. 34-36). However, due to the impact of World War I and prevailing economic difficulties, the second campaign was delayed until 1932. Three excavations were undertaken until 1934, after which the excavations stopped completely because of insufficient financial resources (Hellström, 2003, p. 239). Excavations were focused primarily on the acropolis in Larisa West, including five trial trenches in the urban area and a group of grave units. The results of the excavations were gathered in the well-known *Larisa am Hermos* publications of 1940 and 1942 [3].

Between 2010 and 2021, an architectural survey was carried out under the direction of Turgut Saner [4]. The intensive research has revealed that the settlement area on a ca. 2 km long ridge was furnished with diverse urban, extra-urban, and rural functions. The architectural documentation of the temple, altar, and stoa was carried out as part of the field studies. In addition to the fieldwork, various research projects and theses, examining the archi-

tectural remains in the sanctuary, were conducted.

The primary purpose of this article is to question the parameters thought to be important in determining the location of the Archaic sanctuary at Larisa, such as cult continuity, the holiness associated with a natural element (bedrock), and the visibility of the cult place. To contextualise the findings, an examination of the ongoing discussions about the establishment of Greek sanctuaries is essential. It will be considered in a comparative context whether these parameters exhibit similarities with other cult sites in Western Anatolia. Furthermore, it aims to research the "Greek" identity of the sanctuary while demonstrating its tangible relationship with Bronze Age culture.

2. The "Greek" sanctuary of Larisa

The main sanctuary of Larisa is situated on a rock cluster southeast of the acropolis and atop the highest point of the Larisa-West (Figure 2). The *temenos*, which is located on a nearly two-meter slope decreasing from northeast to southwest, covers approximately one-third of the fortified area. The main components of the sanctuary consist of the temple and altar in the centre, the stoa on the north, the propylon on the east, the Northeast Building on the northeast and two cisterns on the southwest (Figure 3 and Figure 4). Although the structures, which do not all belong to the same construction program, have been significantly damaged, they are preserved at the foundation level.

The sanctuary witnessed numerous construction and renovation activities during different periods. An *oikos*-shaped temple measuring 7.50 x 4.25 m was built towards the end of the 7th century BCE. Based on the scanty remains, it is suggested that a 1.70 m wide terrace was constructed around the *naos* of the first temple. Although no architectural remnants have been discovered, small finds indicate that a

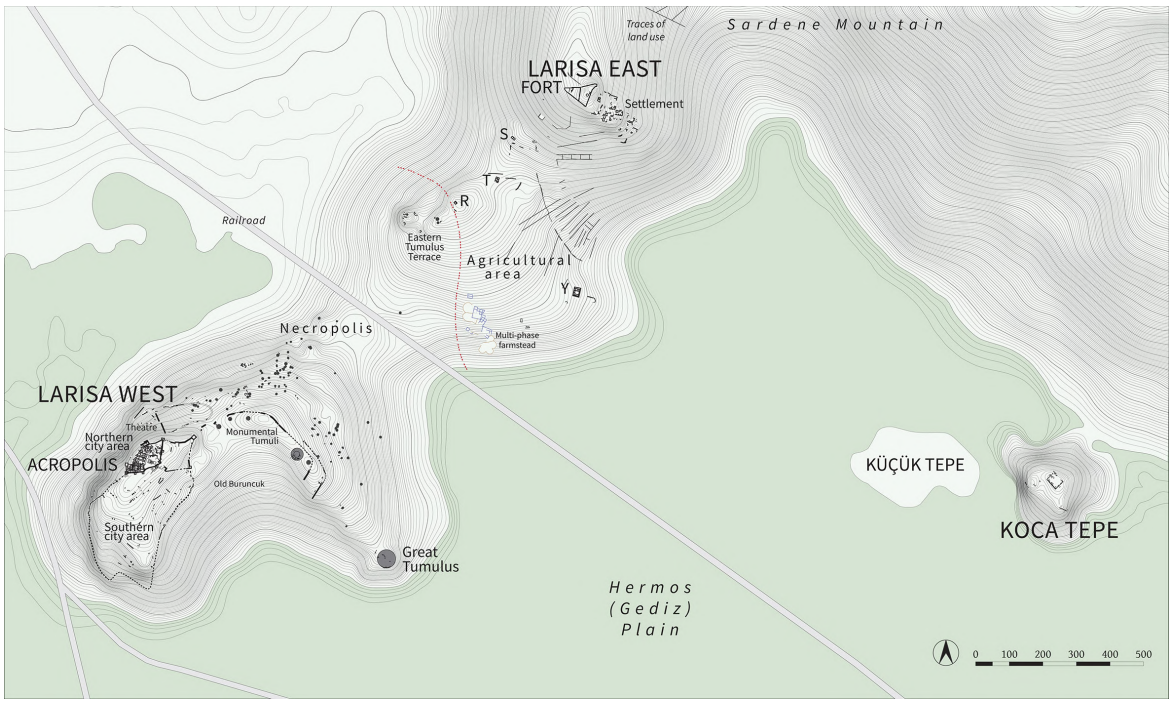

Figure 1. *General settlement plan of Larisa (Buruncuk) (Külekçi, 2021a).*

Figure 2. *Larisa West on Hermos Plain, view from south (Larisa Architectural Survey Archive).*

partly natural, partly levelled rock was used as an altar on the east side of the temple (Boehlau & Schefold, 1940, pp. 68-69). During the same construction program, a structure presumed to be a stoa was built to the north of the temple and altar. Moreover, the *temenos* must be surrounded by a *peribolos*, consisting of a partly natural and partly constructed rocky terrace (Boehlau & Schefold, 1940, p. 24).

Around 530 BCE, extensive renovation and construction was carried out on the sanctuary. The temple was enlarged while maintaining the same orientation and proportions as the first *naos*, describing a rectangular arrangement measuring 13 x 7.48 m. The foundation of the enlarged *naos* was constructed with stronger, more elaborately worked walls. Furthermore, a U-shaped foundation was built around this arrangement, consisting of different-sized blocks, a weak outer shell, and a loosely filled inside, which all indicate significant repairs. Only the stone beddings of the outer walls/steps of the altar have been preserved on the bedrock. These traces indicate that the structure, with its dimensions of approximately 7.25 x 6.50 m, could be considered "monumental" in comparison to the temple.

During the 5th century BCE, a terrace was created by adding a retaining wall to the west of the temple. Concurrently, the area surrounding the temple was organised, a wide ramp was constructed to the south, and limestone slabs were paved to the east and north. The construction of the propylon and the Northeast Building and the destruc-

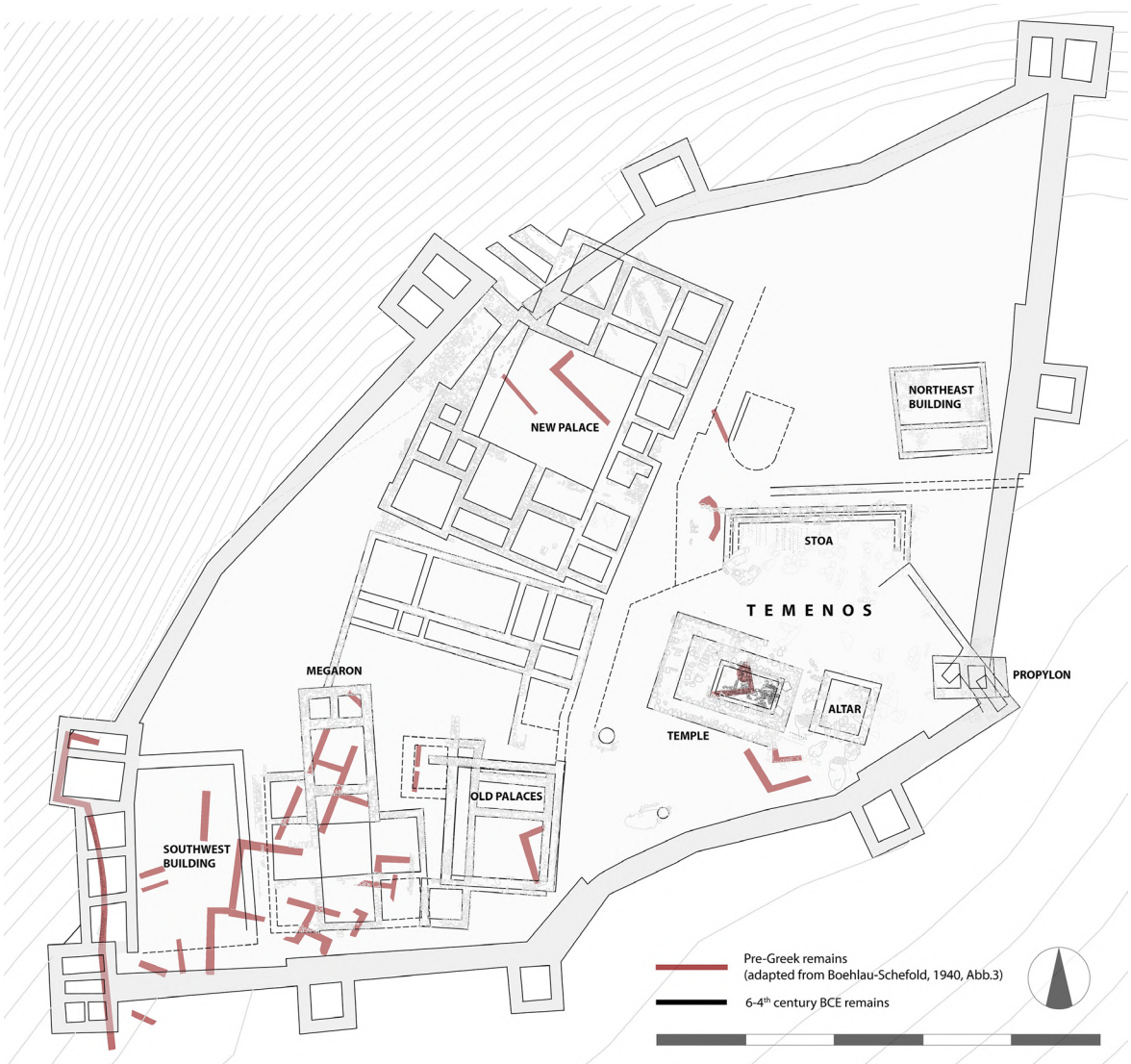

Figure 3. *Plan of the acropolis with buildings dating between 6th to 4th centuries BCE (Larisa Architectural Survey Archive) and "pre-Greek" remains of lower levels (adapted from Boehlau & Schefold, 1940, Abb. 3).*

tion of the late Archaic fortification walls were included in the same construction program (Boehlau & Schefold, 1940, pp. 34-36). Although some buildings were renovated, it is thought that there were no major changes in the *temenos* after this period.

The sanctuary is accepted to be dedicated to Athena due to the votive amphora that was inscribed carefully with the goddess's name, discovered in the northern part of the *temenos* (Boehlau & Schefold, 1940, pp. 57-60). However only this find, which is arguably weak, supports this assumption. According to 20th century publications, the cult of Athena held significant importance in Troas and Aeolis, thus making this cult a plausible suggestion for Larisa (Boehlau & Schefold, 1940, p. 22). There are also numerous female figurines with polos from the Archaic period raising the possibility that the Mother Goddess/Cybele cult might have been worshipped in Larisa (Boehlau & Schefold, 1942, Table 6). Additionally, the terracotta Cybele relief dated to the late 4th century BCE also makes it clear that this cult retained its significance even at much later periods (Öztürk, 2018, pp. 313-315).

3. The sanctuary in the Bronze Age

The earliest architectural remains at Larisa, underneath the first *naos* of the temple, were excavated to the bedrock during the 20th century excavations. The remnants found at three different levels were suggested to belong to three distinct phases (Boehlau & Schefold, 1940, pp. 57–58). The remains of the first period consist of a L-shaped

Figure 4. *Larisa West, temenos (Larisa Architectural Survey Archive).*

wall with one or two stone layers and the "hearth"-shaped arrangement in the middle resting directly on a rock cluster (Figure 5) [5]. The wall course with an east-west orientation measures approximately 3.60 m, and the southern course is 5 m in length. The excavation publication defined the remains as an *oikos* or megaron that functioned as the "ruler's house" accessed from the west (Boehlau & Schefold, 1940, pp. 57–58). The cultural layers that were not destroyed by a later votive (?) pit, a pile of yellowish terracotta brick (?) fragments, belonging to the superstructure of the "Megaron," emerged atop the bedrock. Above that layer, a blackish-ashy soil containing ceramic fragments from the second phase was found. The second phase of the "cult area" is defined by the rock formations around the temple (Figure 4). Near the southeast corner of the "Megaron," an unworked block is situated atop an oval-shaped pile of stones. Additionally, a second circular feature was found beneath the south wall of the *naos*. A pavement-like arrangement of small stones is located towards the easternmost part of the *naos*. The rocky formations are suggested to have been used in cultic rituals due to the large amount of ashy soil (Boehlau & Schefold, 1940, pp. 58-59).

Another oval-shaped stone arrangement, attributed to a third period, was found atop the pavement-like remains (Figure 5). It carried a large boulder that was about 1.40 m long, 0.70 m wide, and 0.75 m high, and it occupied the central axis of the Archaic *naos* [6]. This area is likely to be a continuation of the cult area, with the unhewn standing-stone (*baitylos*) presumably holding special significance for the cult. Around the Archaic temple and "pre-Greek" cult area, cup-marks were found hewn into outcrops of bedrock that were associated with libations or rain magic practices related to the Mother Goddess/Cybele (Boehlau &

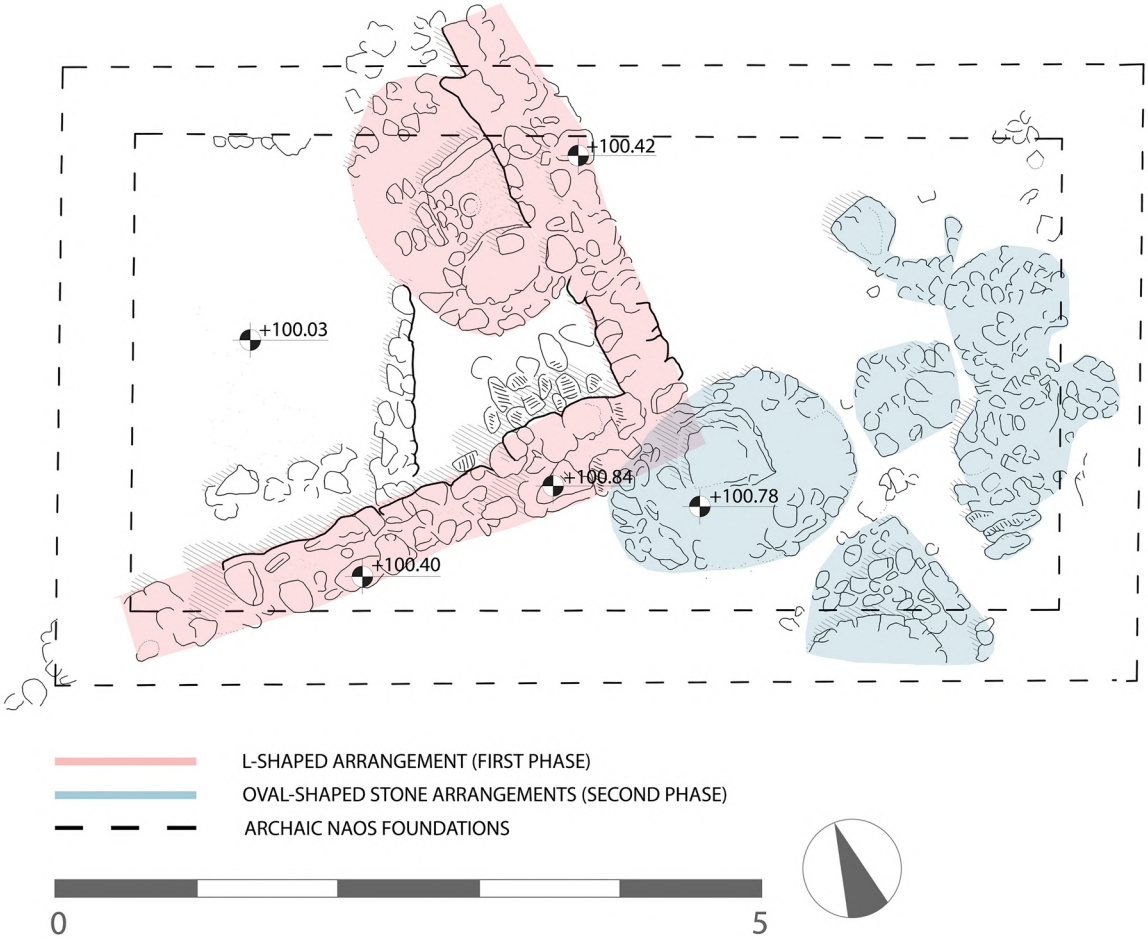

Figure 5. *L-shaped plan fragment and walls with curved courses under Archaic naos (adapted from Boehlau & Schefold, 1940, Abb. 34a).*

Schefold, 1940, p. 59). Cup-marks in Larisa, typically 15-20 cm in diameter and round in shape, are found especially in the south of the sanctuary (Figure 6). At the highest point of the area, where the Archaic altar was located, a rectangular stele hole measuring 0.66 x 0.27 m and 0.30 m deep was found to the northeast of the levelled rock clusters. Again, on the same rocky terrace, "pre-Greek" remains were revealed among the traces of the Archaic altar (Boehlau & Schefold, 1940, p. 24).

In summary, the vicinity of the "Greek" temple in Larisa constituted the pre-Greek nucleus of the upper city with a specialised -possibly religious- structure. The same area was transformed into a sacred centre surrounded by walls during the Middle Bronze Age (Külekçi, 2021a, p. 36). The finds indicate that the cult area was used extensively until the end of the Bronze Age, though the exact purpose of the use is not clear. Although, there is limited information about the periods between the Late Bronze Age and the 9th century BCE, the fact that the same area was rebuilt with sacred attributes during the Archaic period provides questions about cult continuity or recognizing the old cult area in memory.

4. The evolution of "Greek" sanctuaries

In recent years, there have been many discussions about the development/ evolution of early Greek sanctuaries. In the 1970s, studies highlighted a sudden and significant increase in the number of sanctuaries around the 8th century BCE (Coldstream, 1977; Hägg, 1983; Snodgrass, 1971). Archaeological evidence indicates that this transformation may represent population growth or the unification

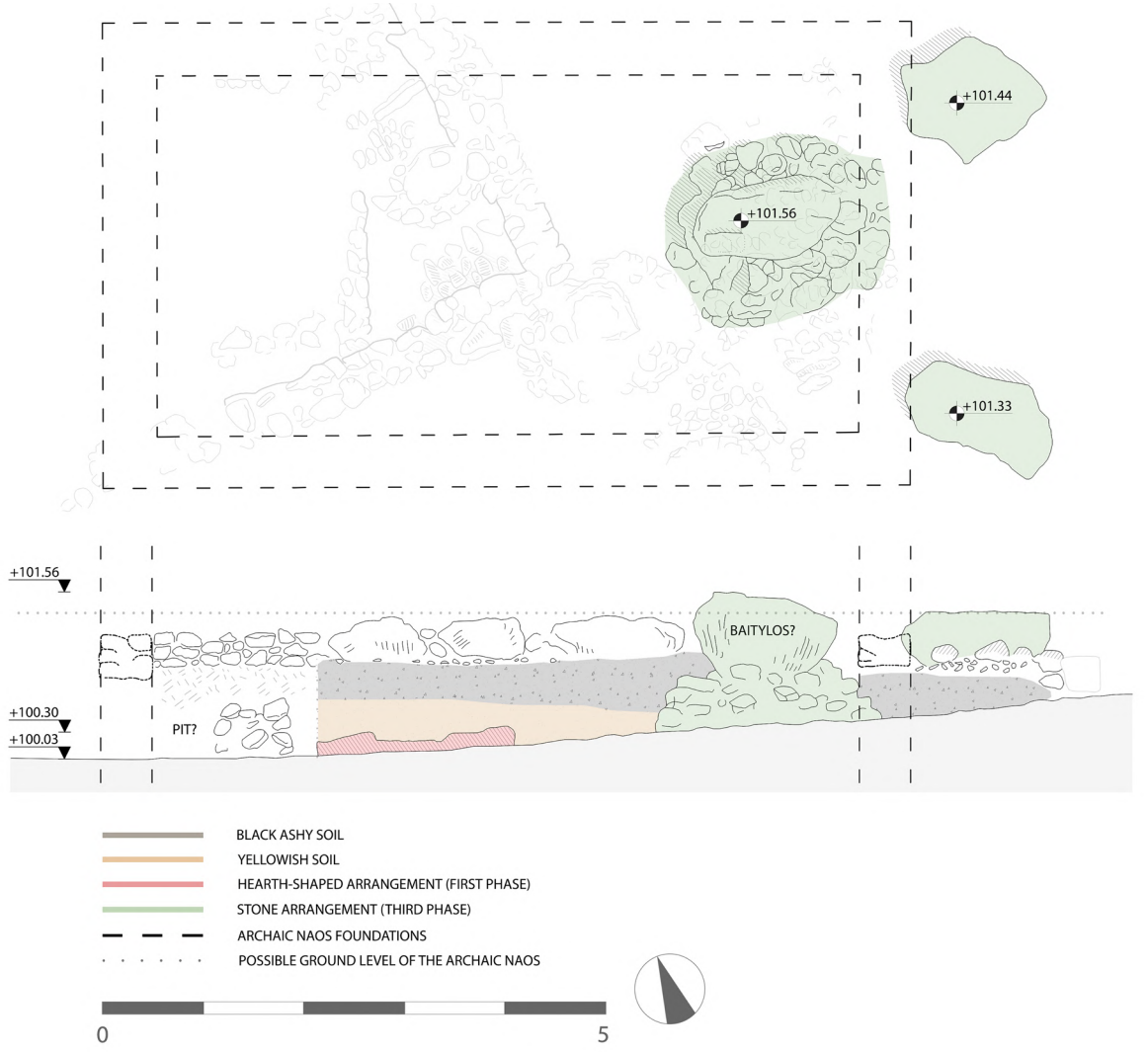

Figure 6. *Plan of the stone arrangement and section of the "pre-Greek" remains (adapted from Boehlau & Schefold, 1940, Abb. 34b, Abb. 35b).*

of diverse communities around centres (Bintliff, 1977, pp. 131–133; Eren, 2019, p. 228).

De Polignac established connections between the development of the Greek *"polis"* and sanctuaries (1984; 1995). He presented a *polis*-first model and suggested that the Greek sanctuaries emerged in the 8th century BCE. According to De Polignac, constructions that were expansive, large, and monumental, such as sanctuaries, needed a group of individuals with the capacity to provide organization, administration, financial resources, and labour (De Polignac, 1995, p. 13; Susmann, 2019, p. 20). However, this type of hierarchical and authoritarian centralised organization could not be observed in the Geometric and Archaic periods, but rather emerged with the Classical period (Malkin, 1996, p. 79-80; Polignac 2006, p. 205). Morris, who believes that from the second half of the 8th century BCE, the "Greek" sanctuary and also the relationship between sacred space and the domestic living space changed (1987, p. 189). While admitting that there are examples of shrines that were separated from the settlement in the 10th and 9th centuries, these examples are very rare. Instead, he claims that cult activities were predominantly domestic.

In contrast, more recent scholarship has hypothesised that there are few examples of sacred architecture from and before the 8th century BCE due to the scarcity of research (Sourvinou-Inwood 1993, pp. 1-9). Mazarakis-Ainian states that the small-scale buildings, which were separated from the settlements as ruler's dwellings, served both public and cultic purposes in the Early Iron Age (Mazarakis Ainian 1997, pp. 340-396). In these structures, which feature hearths and benches, evidence of ash, burnt animal bones, and votive objects is frequently found. Indeed, in addition to their role as a sacred space for the worship of the god/goddess and housing the cult statue and valuable

Figure 7. *Examples of cup-marks from the temenos.*

offerings, they also served as the *hestiatorion*, where ritual meals are eaten (Mazarakis-Ainian, 1988). Marinatos argues that there was no distinct or homogeneous architectural type that could be described as a "temple" or an architectural development that evolved from Bronze Age architecture. Due to their modest dimensions, Marinatos suggests that rectangular structures with hearths are banquet structures appealed to only the elites. In some regions, these structures served as the ruler's dwellings as well as the cultic needs of the community (1993, pp. 179-180).

The increase in recent excavations, surveys, and publications in Western Anatolia draws different perspectives on early settlements and sanctuaries. Settlements such as Phokaia, Miletos, Troy, Ephesos, and Smyrna have continuity from the Bronze Age [7]. The founding dates of the cities go back much further back than what is recorded in ancient sources, indicating that the so-called Greek *polis* may, in fact, be the continuation of the settlements with the local peoples of Anatolia (Eren, 2018, p. 228). Additionally, there are ongoing discussions about the extent and reality of the "Greek migrations," which are frequently mentioned in ancient sources and widely accepted in modern studies [8].

Evidence indicates that starting in the Bronze Age, sanctuaries became distinct from residential areas, with specialised structures or arrangements dedicated to cult activities. The continuity was not limited to settlements but also extends to sacred areas. Cult areas, such as those found in Troy, Phokaia, and Kalapodi, were used for the same purpose from the Bronze Age to the "Greek" period, even though there might have been changes in the cult practices. As a result, the focus of evaluating the development of the "Greek sanctuary" moved away from the concept of the "Greek *polis*" and towards "cult continuity" [9]. The major determinants in the location of sanctuaries now emphasize respecting old sacred areas, the sanctity derived from natural features, or the visibility of the cult area (Eren, 2015, p. 226).

5. Determining the location of the sanctuary

5.1. Cult continuity

The Archaic temple at Larisa was constructed on a rocky area (*baitylos* and its surroundings) to replace the Bronze Age cult area. The *baitylos* was believed to have been the central axis of the Archaic *naos*. The 20th century publications/researchers refer to the foundation of the *naos* as filled with boulders, possibly belonging to the old cult area (Boehlau & Schefold, 1940, p. 59). However, the relationship between the rock arrangement and the Archaic temple remains uncertain. It is possible that the *baitylos*, which protrudes 50 cm from the foundation of the temple, was visible in the first phase of the temple (Figure 5). Among the "pre-Greek" finds at Larisa, a few Mycenaean and, in very small fragments, Geometric period pottery was found. Based on these finds, the continuity of settlement in Larisa after the "Aeolian migration" was emphasized in the excavation publication (Boehlau & Schefold, 1942, p. 4). It has been suggested that Larisa was inhabited by the "Pelasgians" and destroyed by the Aeolians around 700 BCE (Boehlau & Schefold, 1942, p. 4). Although this theory is widely accepted and supported by archaeological finds and ancient sources, it remains controversial (Boehlau & Schefold, 1940, pp. 6-11). Therefore, it is possible that the area was used with low intensity or abandoned after the Bronze Age. In both cases, sanctity from the Bronze Age persisted, and its significance lasted until the Archaic period.

In numerous Aegean settlements that have been thoroughly examined, evidence of cult continuity can be discerned. The Temple of Athena and its surroundings, located near the theatre port in Miletos, are where the Bronze and Iron Age settlement developed (Greaves, 2002, p. 105). The temple was constructed atop the Mycenaean (?) walls, incorporating a piece of fortification wall. Additionally, an area referred to as the "Megaron" is found within the vicinity, where terracotta figurines and offering bowls have been discovered (Eren, 2017, p. 110; Niemeier & Niemeier, 1997, p. 196).

In Ephesos, around Artemision, in the Ayasuluk and Panayırdağ regions, there are two fortified settlements that were inhabited starting in the 2nd millennium BCE (Treziny, 2006, pp. 243-245). Situated in close proximity to the sea, Artemision also stands atop a hill at the mouth of the river (Kerschner, 2006, p. 366, pp. 378-379, Fig. 3). Although the plain on the hill is somewhat obscured by levelling and frequent new constructions, it is recognised as the initial location of the cult and the central point of the sanctuary [10]. The topographic reference of this location served as the orientation for all subsequent temples in later periods (Kerschner & Prochaska, 2011, p. 76). In the 7th century BCE, a cult building (*Naos* 1) was constructed to the west of the area where Late Bronze Age finds were unearthed. The dedication to the sanctity of the place must be the reason behind temples being consistently built on the same spot for centuries (Kerschner & Prochaska, 2011, p. 123).

The Sanctuary of Athena at Phokaia is one of the most extensively excavated and published sanctuaries around Larisa. The ceramic finds indicate that the rocky hill and its surroundings, where the temple is situated, were utilised as a sanctuary since the 3rd millennium BCE (Özyiğit, 1998, p. 773). To the west of the Sanctuary of Athena, six distinct oval temples were found, which dated between the beginning of the 2nd millennium BCE and the Protogeometric period (Özyiğit, 2019, p. 52). Beneath the Temple of Athena, an open-air cult area associated with the worship of the Mother Goddess was found, revealing numerous libation pits. It is thought that the open-air cult place was moved to the Harbour Sanctuary during the construction of the Temple of Athena in the 7th century BCE. The Harbour Sanctuary dedicated to Cybele is located on the rock clusters overlooking the sea, where the northern podium of the temple sits and served the cult uninterruptedly from the Bronze Age to the Greek period (Özyiğit, 2019, Plate 487).

In the "Western Sanctuary" of Troy, there is a multi-unit building known as the "Terrace House" dated to the Late Bronze Age (Troy VIIa). Ritual activity may have occurred within an elite household context, in which bronze figurines, ceramic bull figurines, ceramic and glass beads, spindle whorls, grinding stones, mortars, and fenestrated stands might have been utilised (Aslan, 2018, pp. 247-248). Cultural and religious changes occurred during the Early Iron Age, and while cult practices changed, the religious function remained (Aslan, 2018, pp. 249-250). During the Protogeometric period, the population decreased, and the settlement area was abandoned. However, archaeological findings indicate that people were preparing food, eating, and drinking for cult practices near the ruins of the Terrace House and the LBA Citadel Wall (Aslan, 2018, pp. 256-257). A cult building was constructed using the walls of the "terrace house" in the Geometric period. Additionally, at least 28 stone circles were found on a platform located next to the Late Bronze Age wall about 4-5 m above the ground level of the Geometric Cult Building. The stone circles are associated with hero cults, and the ash remains and numerous ceramic vessels indicate that rituals such as banquets or libations were held (Aslan, 2018, p. 266).

The cultural layers revealed that the Athena sanctuary at Klopedi was continuously occupied until the end of the Late Bronze Age. Near the Archaic temples A and B several small oval structures, which were dated to the 12th century BCE were discovered (Rougou & Douloumpekis, 2014, pp. 26-29). The earliest sacred structure in the sanctuary was discovered to the north of Temple B. The oval-shaped building that faced west and oriented east-west was dated from the 8th century BCE. Numerous votive objects, including a clay idol head, a mule head, copper jewellery, bronze knives, bronze arrowheads, and others, were found in a circular arrangement inside the building and thought to have a cultic context (Rougou, 2014, pp. 30-36).

Apart from these examples, in many settlements the Greek period sanctuary located on the Bronze Age or Iron Age remains, such as at sanctuary of Athena at Assos, Heraion at Samos, Chios Kato Phana, Klaros Apollon, and

Smyrna Athena [11].

The concept of cult continuity, as observed in various examples, entails two distinct aspects: the continuation of the sanctity of an area that was sacred at earlier dates, or an old settlement/remain being considered sacred in a later period and subsequently assuming a cultic role. It is debatable whether both aspects imply the same phenomenon, and which counts as cult continuity. However, the uninterrupted use of an ancient sanctuary with a cult function does not necessarily entail the cult and rituals remain remained unchanged. Even if the Bronze Age cult in Larisa was associated with the Mother Goddess, it remains uncertain whether it persisted precisely the same as the Archaic Mother Goddess cult. It is known that some rituals were abandoned in the Classical period, and cultic arrangements (cup-marks) remained under the ramp built to the south of the temple. Similarly, the open-air cult area, consisting of *baitylos* and surrounding rocks, changed during the Archaic period, with the construction of the temple. In Larisa, even if the cult did not change completely, the cult practices might have changed. Although the Aeolian migrations are controversial, the change in the cult practices suggests a different or socio-culturally altered community.

5.2. Sacred natural features: Rock

In both Anatolian and Greek sanctuaries, it is common to find a natural focus, such as a tree, stone, spring, or cave (Sourvinour-Inwood, 1993, p. 8; Scully, 1962, p. 44). The sanctuary in Larisa is situated atop a natural rock at the highest point of the hill, which likely played a significant role in selecting this area as a cult place. Cup-marks and unhewn standing stones dating to the Bronze Age indicate that the area was arranged as an open-air cult site dedicated to the Mother Goddess (Boehlau & Schefold, 1940, p. 59). However, rocky sanctuaries are found in extensive context, raising questions about whether they were arranged specifically for a particular god or goddess.

In Hittite and Urartian cults, rock cults associated with mountains, rocky terrain, and high hills held sacred significance allowing for interaction with the gods (Roller, 2013, p. 65, p. 82). The most prominent aspect of the Phrygian Mother Goddess, Cybele, is her connection with mountains, wilderness, and wildlife (Roller, 2013, p. 25). Representations of the Mother Goddess cult typically include carved steps, niches, statues, reliefs, standing stones, and cup-marks. Indeed, while there are cult areas in the mountains dedicated to the Mother Goddess, no structure akin to a "temple" dedicated to her has been discovered dating to the Bronze or Iron Ages (Roller, 2013, p. 105, p. 235).

In Larisa, the presence of cup-marks in the cult place is associated with the cult of the Mother Goddess. The cup-marks, typically round or oval shapes carved into the rock, are frequently found in many Late Bronze Age settlements across Anatolia and are linked to libation rituals, supported by textual and iconographic evidence (Luke & Roosevelt, 2017, p. 13). Cup-marks appear in different contexts and across a broad geography. They are found at entrances to citadels and buildings in various sites such as Troy, Kaymakçı, and Boğazköy [12]. Additionally, they are encountered at burial sites, along roads, and on processional routes. Numerous specimens can be found carved into rocky areas with expansive landscapes for cultic purposes. In Sirkeli, on the bedrock plateau above the relief carved into the rock are at least two cup-marks (Hawkins, 2015, p. 3). Likewise, above the rock relief at Fraktin are cup-marks in varying sizes extending in a line for at least 30 m (Ussishkin, 1975, p. 86). In Kaymakçı, numerous cup-marks were found in the rocky area extending along the northeastern slope within the citadel and overlooking Marmara Lake (Luke & Roosevelt, 2017, p. 6). On Kızbacı Hill, cup-marks are also hewn into outcrops that protrude from the hillside and overlook the mountain and the spring in the valley. Furthermore, two cup-marks were found carved on the open-air sanctuary at Yazılıkaya (Ussishkin, 1975, p. 91). In the rocky area of the Athena sanctuary of Phokaia, which served as a sanctuary of the Mother Goddess from the

3rd millennium BCE to the Archaic period, there are numerous libation pits and cup-marks associated with the cult (Erdoğan, 2018, pp. 136-140). Similarly, cup-marks were found in Alinda, along with a stele hole carved into the same bedrock and a cyclopean wall, all of which are considered parts of the sanctuary (Erdan, 2020, pp. 49-50).

At Larisa, the *baitylos* and the surrounding rocks, along with the stele hole, must be related to the same cult. In the 2nd millennium BCE, there was a belief in Anatolia, Syria, and the Eastern Mediterranean that rocks and stones were the residence of gods (Darga, 1969). The unhewn stones arranged in a standing position were considered cult images symbolizing the sacred being (Korfmann, 1998, pp. 373-377). Hittite texts reveal that these stones, known as "*ḫuwaši*" in the Hittite cult, were washed, cleaned, and offered sacrifices and libations (Darga, 1969, p. 499). In places where there is no temple or in open-air sanctuaries, *ḫuwaši* and *baitylos* serve as an altar (Darga, 1969, p. 502.; Yaman, 2013, p. 102). The most concrete evidence revealing the existence of *ḫuwaši* stones are the unhewn pedestals in Boğazköy and the standing stones in the open-air sanctuary in Kuşaklı/Sarissa (Macqueen, 1986, p. 120; Collins, 2007, p. 54). Examples of similar context have been found in the sanctuaries of Knossos and Koumasa, the fortification gates of Troy, the road leading to the palace complex in Beycesultan, and the sanctuary at Gerga, although they date to a later period [13]. In the second century AD, Pausanias (1.44.2, 9.27.1, 9.38.1, 9.24.3) mentions numerous instances of unwrought stones (*argoi lithoi*), believed to be the earliest images of the gods. For Pausanias, aniconic stones are cult objects reflecting a different local tradition of the past, which were transmitted without overshadowing the figural cult statues (Gaifman, 2012, pp. 74-75). The cult associated with aniconic depictions of the gods indicates an ancient tradition in Anatolia that continued for a long time (Held, 2020, p. 485).

Examples of cup-marks and standing stones (*baitylos*/*argoi lithos*) found in various regions suggest their association with nature-related festivals or cult activities. At the top of the acropolis in Larisa, standing stones are arranged in the oval stone structures, the stele hole carved into the bedrock, and the cup-marks display the similar rock cult. Indeed, the dating of the cup-marks to the 2nd millennium BCE aligns with the dating of the remains in Larisa.

5.3. Visibility

Larisa, which is described as "a hill settlement dominating the plain", offers visibility from the surrounding plain and main roads (Külekçi, 2021a, p. 32). The positioning of the Archaic sanctuary atop the hill in Larisa implies that "visibility" could have been another factor in site selection. This pattern of locating sacred places strategically chosen to dominate the landscape can be observed across different geographical regions. The preference to worship in high and visible places dates back to the Bronze Age, where societies worshipped, lived, and ruled in these high, isolated, and hard-to-reach places (Susmann, 2019, p. 157). Open-air sanctuaries at crossroads, low hills, or mountain peaks provide strong evidence of the continuity of cult practices, even if the cult has evolved over the centuries (Eder, 2019, p. 45).

The physical attributes provided by such locations – being visually recognizable, standing strong and inaccessible, and having a dominant position – were also adopted in the new sanctuaries established by the "Greeks" in the following centuries (Susmann, 2019, pp. x-xi, p. 118). Notably, the erection of monumental temples dedicated to the deities within sanctuaries visible from afar at the highest point of the settlement was regarded as evidence of the establishment of the Greek *polis* (Snodgrass, 2000, p. 17). Similar qualities are emphasized in ancient sources, when referring to the locations of the acropolis sanctuaries (Eren, 2015, p. 224) [14]. In addition, temples appeared as the power and prestige element of the Greek city-states; consequently, their visibility may have assumed even greater signif-

icance (Marinatos, 1993, p. 180). With the Archaic period, sacred areas began to be represented with ostentatious structures where votive offerings were kept safely, attracted more worshipers, more visible than open-air places, and displayed the community's piety to the god (Baleriaux, 2015, p. 105). It is conceivable that arrangements, such as terraces or podiums, were constructed to increase the visibility of those buildings.

Each settlement marked its natural environment with specific social, political and economic factors that can influence the placement of sacred spaces (Baleriaux, 2015, p. 21). For instance, in settlements like Larisa, presumed to derive their sustenance primarily from agriculture, the strategic placement of the acropolis sanctuary on a hill overlooking the plain, can be assumed to be motivated by the intention to exert dominance over the hinterland. The surrounding landscape is controlled by a fortress in Larisa East, whereas the visibility of the temple area (actually the entire acropolis grounds) in Larisa West emphasizes a manifestation of the rulers' power.

6. Conclusion

In the majority of studies concerning the establishment of Greek sanctuaries, a standardised approach has been employed, encompassing "Greek" cities and sanctuaries across a broad geographical range from Sicily to Western Anatolia. Nevertheless, the influence of regional traditions and differences in scale should be expected at numerous sacred sites. Recent investigations have revealed significant disparities in material culture even between settlements located in the northern and southern regions of Western Anatolia (Pavúk, 2022, pp. 49–51). Hence, it becomes essential to consider these regions in conjunction with their respective environments and communication networks. At present, research on the prehistory of Aeolis and the northern region of Western Anatolia remains insufficient to provide a comprehensive assessment of the continuity of sanctuaries. The excavations conducted during the 20th century predominantly focused on the "Greek" cultural layer. Nonetheless, contemporary studies have raised questions regarding the occurrence of large-scale Greek/Aeolian migrations and the level of "Greek" cultural presence within settlements in these regions (see endnote 8). The establishment of sanctuaries cannot be attributed solely to the "Greek" identity, as evidenced by examples such as Troy, Phokaia, and Ephesos which are located in the vicinity of Larisa. Instead, these sacred places maintained their characteristic sanctity over an extended period.

According to some perspectives, the worship of the Mother Goddess/Cybele is believed to have reached Western Anatolia during the Archaic period through the influence of Phrygia and Lydia (Roller, 2013, pp. 142-170; Marinatos, 2007, p. 353). However, the existence of the rock cult, which is thought to be the predecessor of the cult of Cybele and has similarities in terms of representation and religious practices in Western Anatolia, dates back to the Bronze Age. Indeed, the presence of a rock cult provides evidence that Larisa was influenced by significant cultures, such as the Hittites and Troy during the Bronze Age. Although it is debatable whether the cult evolved, it is essential to highlight that the cult persisted in the same location, maintaining a connection to the local Bronze Age cult area.

Although Larisa may not have held a prominent status as a significant city centre during the Bronze Age, it serves as an example of a developed settlement with distinct local characteristics and culture (Külekçi, 2021a, p. 36). Even during its most spectacular period in the Late Archaic/Early Classical era, Larisa, described as "rural" or "local", is not very different from the Bronze Age Larisa. Even though the information about Larisa's settlement characteristics from the 2nd millennium BCE to the Archaic period is limited, the few Mycenaean and Geometric period ceramics found in the "pre-Greek" finds may indicate that the occupation continued (Boehlau & Schefold, 1942, p. 4). However, stratigraphy does not have the ability to provide a definitive answer and should consider that

the finds not have been systematically documented. Since no excavations were carried out after 1934, the assessment of the settlement layers at Larisa is based on the observations made by 20th century researchers. Notably, ceramic finds and other small finds have to be reexamined in light of new information and discoveries. Therefore, it is debatable whether Larisa has concrete continuity from the Bronze Age to the Greek period based on the existing information.

Social and cultural memory likely played a significant role in forming the cultural and religious identity of the community, as evidenced by the continued use of the same cult area despite the ongoing debate about continuity. In addition, cultural memory may be preserved through concrete symbols such as ancient objects (*aide-mémoire*) or settlement/building remains (*lieux de mémoire*) (Assman, 2006, p. 8). The Bronze Age sanctuary at Larisa might have combined with local oral traditions to create a *lieux de mémoire* for the archaic settlement. The prominent physical location dominating the environment and the persistence of ancient cults could also be related to sociopolitical power. Establishing a tangible connection with an ancestral past arguably allows elites to legitimize their social status (Aslan, 2018, pp. 259-260, footnote: 284).

In conclusion, the Bronze Age sanctuary at Larisa, characterised by its local cults, remained a place of worship for an extended period without losing its "sacred" connotation(s). The strategic location of the sanctuary on a prominent and rocky hill likely contributed to its sanctity, allowing it to retain its importance over time despite changes in cults, cultures, and inhabitants. Throughout both the Bronze Age and the Archaic periods, this modest settlement benefitted from the advantages of its location and continued to be influenced by various cultures while preserving its distinct local and traditional characteristics.

Endnotes

[1] For the Prehistoric period of Larisa, see: Özdoğan, 2018, pp. 122-143; Boehlau and Schefold, 1940, pp. 3-22; Külekçi, 2021a, pp. 33-36.

[2] In the 20th century, researchers classified the artefacts solely by comparison with Troy. The first phase is dated later than Troy II. The second phase were compared with Troy V (Boehlau & Schefold, 1942, p. 4). Current studies indicate that Troy II is dated between 2500-2350 BCE and Troy V dates between 2000/1950-1750 BCE (Blum, Theater & Thumm, 2014, p. 789). An earlier report by Blegen from the beginning of the 20th century places the dating of Troy II between 2600-2300 BCE and Troy V between 2050-1900 BCE (1937, p. 12), Külekçi, 2021a, p. 34.

[3] Boehlau and Schefold, 1940; Åkerström and Kjellberg, 1940; Boehlau and Schefold, 1942.

[4] The ITU survey was conducted between 2010-2021 with the permission of the Turkish Ministry of Culture and Tourism – General Directory of Cultural Assets and Museums; and with the financial support of ITU (Project numbers 37267 and 33992). For detailed results and reports of the architectural surveys, see: Saner, Külekçi and Öncü, 2018; Saner, Külekçi and Mater, 2017; Saner, 2016. Besides the fieldwork, research carried out by ITU graduate students help create a solid picture of Larisa: Research history of Larisa based on archival documents (G. Mater, 2013), stone pieces of architecture kept in Istanbul (M. Arseven, 2013) and (F. Öztürk, 2016), the architecture of the Northeast Building (O. Yıldırım, 2018) and of the Propylon (E. Kapulu, 2018), and the agricultural area close to Larisa East (S. Kolay, 2020) have been completed as master's theses. The settlement structures of Larisa studied in Külekçi's doctoral dissertation (I. Külekçi, 2021a). Remains of ancient quarrying activities (G. Mater), the acropolis circuit (E. Denktaş), the so-called New Palace (D. Göçmen), the "Athena Sanctuary" (F. Öztürk), and the necropolis (O. Yıldırım) are currently being studied as doctoral theses.

[5] In the excavation publication, the arrangement is referred to as a hearth due to the presence of a clay layer on the floor that has been hardened by fire and exhibits a dark yellow colouration

(Boehlau & Schefold, 1940, p. 58.)

[6] In the excavation publication, this unhewn standing stone was referred to as the *baitylos*. Adjacent to the archaic *naos* foundation, towards the eastern corners, there are two additional blocks featuring flattened upper surfaces. About one-fourth of the height of all these blocks is surrounded by remnants from the "pre-Greek" era which were compared with those from Troy V.

[7] Phokaia: Özyiğit, 2003, p. 102; Miletos: Greaves, 2002, pp. 39-47.; Troya: Aslan, 2018, pp. 42-63; Ephesos: Büyükolancı, 2000, pp. 40.; Smyrna: Cook, 1958-59, pp. 9-10.

[8] For further discussions about Greek migrations: Arseven, 2013, pp. 5-17; Mac Sweeney, 2017, pp. 379-421; Mac Sweeney, 2022, pp. 72-78; Rose, 2008, pp. 399-430; Vaessen, 2014, pp. 1-78; Vlassopoulos, 2013, pp. 78-128.

[9] For further information about cult continuity: Cosmopoulos, 2014, pp. 401-427; De Polignac, 1995; Eder, 2019, pp. 25-52; Felsch, 1996; Morgan 1996; Whitley, 2001, pp. 137-140, Whitley, 2009, pp. 279-288.

[10] The first layer, primarily containing pottery and small finds dated to the 14th-13th centuries BCE, was overlaid with a second layer composed of thin clay and ash layers (Kerschner & Prochaska 2011, p. 76). The presence of clay protogeometric animal figures, miniature pots, terracotta figurines, and sacrificial animal bones in the second layer strongly indicates that this area was used for cultic activities. Forstenpointner, 2008, pp. 33-45.

[11] Assos Athena: Aslan and Rheidt, 2013, p. 195; Samos Heraion: Kouka and Menelaou, 2018, pp. 119-142; Chios Kato Phana: Beaumont, 2011, pp. 222-223; Claros Apollon: Akar Tanrıver, 2009; Smyrna Athena: Cook, 1958-59, pp. 9-10.; Akurgal, 1983, p. 13.

[12] Troy: Korfmann, 1998, pp. 373-377; Kaymakçı: Luke and Roosevelt, 2017, p. 6; Boğazköy: Ussishkin, 1975, pp. 92-93.

[13] Knossos, and Koumasa: Nilsson, 1950, p. 258. Troy: Korfmann, 1998, pp. 374-377. Beycesultan: Lloyd and Mellaart, 1965, pp. 28-29. Gerga: Held, 2020, pp. 485.

[14] Xenophon, Memorabilia, III. 8. 10.; Platon, Leges, 778c.; Aristotales, Politics, 1331b.

References

Akar-Tanrıver, D. S. (2009). *Apollon Klaros Kültü, Kehanet Pratikleri ve Adaklar* [Unpublished doctoral dissertation]. Ege Üniversitesi, İzmir.

Akurgal, E. (1983). *Alt-Smyrna: Wohnschichten und Athenatempel.* Türk Tarih Kurumu Basımevi.

Arseven, M. (2013). *Larisa'da (Buruncuk) bulunan arkaik taş mimari eserler* [Unpublished master's thesis]. İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

Arslan, N., & Rheidt, K. (2013). Assos. Berichtüber die Ausgrabungen und Forschungen zur Stadtentwicklungsgeschichte 2006 bis 2011, *Archäologischer Anzeiger, 2013/1*, 195-246.

Aslan, C. (2018). The West Sanctuary at Troy in the Protogeometric, Geometric, and Archaic Periods. *Studia Troica,* Monograph 10, 28-422.

Assman, A. (2006). Memory, individual and collective. In R. E. Goodin, & C. Tilly (Eds.), *The Oxford Handbook of Contextual Political Analysis,* 210-24. Oxford University Press.

Baleriaux, J. (2015). *Religious landscapes, places of meaning: the religious topography of Arcadia from the end of the bronze age to the early Imperial period* [Unpublished doctoral dissertation]. University of Oxford.

Beaumont, L. (2011). Chios in the "Dark Ages": New Evidence from Kato Phana. In A. M. Ainian (Ed.), *The Dark Ages Revisited: Acts of an International Symposium in Memory of William D.E. Coulson* (pp. 221-231). University of Thessaly Press.

Bintliff, J. L. (1977). *Natural Environment and Human Settlement in Prehistoric Greece,* BAR International Series: 28.

Blegen, C. W. (1937). New Evidence for Dating the Settlements at Troy. *The Annual of the British School at Athens 1936-1937, 37,* 8-12.

Blum, S. W. E., Thater, M., & Thumm-Doğrayan, D. (2014). Die Besiedlung der Troas vom Neolithikum bis zum Beginn der mittleren Bronzezeit: Chronologische Sequenz und Siedlungsstruktur. In E. Pernic-

ka, C. B. Rose, P. Jablonka (Eds.) *Troia 1987–2012: Grabungen und Forschungen I: Forschungsgeschichte, Methoden und Landschaft.* Studia Troica Monographien 5, 770–863.

Boehlau, J., & Schefold, K. (1940). *Larisa am Hermos. Die Ergebnisse der Ausgrabungen 1902–1934. I. Die Bauten.* Walter de Gruyter.

Boehlau, J., & Schefold, K. (1942). *Larisa am Hermos. Die Ergebnisse der Ausgrabungen 1902–1934. III. Die Kleinfunde.* Walter de Gruyter.

Coldstream, J. N. (1977). *Geometric Greece.* St. Martin's Press.

Collins, B. J. (2007). *The Hittites and their World.* SBL Press.

Cook, J. M. (1958/59). Old Smyrna, 1948-1951. *BSA,* 53-54, 1-38.

Cosmopoulos, M. (2014). Cult, Continuity, and Social Memory: Mycenaean Eleusis and the transition to the Early Iron Age. *American Journal of Archaeology, 118,* 401–427.

Darga, M. (1969). Hitit Metinlerinde Geçen NA^{4}ZI.KIN=NA^4 ḫuwaši Kelimesinin Anlamı Hakkında Bir Araştırma. *BELLETEN, 33*(132), 493-504.

Eder, B. (2019). The Role of Sanctuaries and the Formation of Greek Identities in the Late Bronze Age/Early Iron Age Transition. *Études d'archéologie, 15,* 25-53.

Erdan, E. (2020). Cup-Marks in Alinda. Alinda Araştırmaları 1. *Adnan Menderes Üniversitesi Yayınları, 66,* 45-62.

Erdoğan, A. (2018). Phokaia Liman Kaya Kutsal Alanı. Prof. Dr. Nuran Şahin'e Armağan Kitabı EPIPHANEIA =: a Festschrift for Prof. Dr. Nuran Şahin from her colleagues, friends and former students. *Ege Üniversitesi Yayınları Edebiyat Fakültesi, 198,* 136-152.

Eren, K. (2015). Arkaik Kutsal Alanlarda Yer Seçimini Belirleyen Etmenler. *Phaselis I,* 221-229.

Eren, K. (2017). Arkaik Dönem İonia'sında kutsal alanların organizasyonu ve "Tanrı(ça) imgeleri". In G. Duru, K. Eren, & E. Koparal (Eds.), *Arkeolojik Şeyler/Archaeological Things,* (pp. 105-116). Ege Yayınları.

Eren, K. (2018). Efsaneler ve Arkeolojik Kanıtlar Arasında Arkaik İonya Bölgesi. In M. Arslan, & F. Baz (Eds.), *Arkeoloji, Tarih ve Epigrafi'nin Arasında: Prof. Dr. Vedat Çelgin'in 68. Doğum Günü Onuruna Makaleler* (pp. 335-347). Arkeoloji ve Sanat Yayınları.

Eren, K. (2019). Hellen Polisinin Ortaya Çıkışı Güncel Çalışmalar Üzerine Değerlendirmeler. *MSGSÜ Sosyal Bilimler Dergisi, 3*(20), 225-236.

Felsch, R. C. S. (1996). *Kalapodi: ergebnisse der ausgrabungen im heiligtum der artemis und des apollon von hyampolis in der antiken phokis.* Philipp von Zabern.

Forstenpointner, G., Kerschner, M., & Muss, U. (2008). Das Artemision in der späten Bronzezeit und frühen Eisenzeit. In U. Muss (Ed.), *Die Archäologie der ephesischen Artemis. Gestalt und Ritual eines Heiligtums* (pp. 33–46). Phoibos Verlag.

Gaifman, M. (2012). The Aniconic Image of the Roman Near East. In T. Kaizer (Ed.), *The Variety of Local Religious Life in the Near East in the Hellenistic and Roman Periods* (pp. 37-72). Brill.

Greaves, A. M. (2002). *Miletos: A History.* Routledge.

Hägg, R. (Ed.). (1983). *The Greek Renaissance of the Eight Century BC.: Tradition and Innovation.* Proceedings of the Second International Symposium at the Swedish Institute in Athens, 1-5 June, 1981.

Hawkins, J. D. (2015). Hittite Monuments and their Sanctity. In A. D'Agostino, V. Orsi, & G. Torri (Eds.), *Sacred Landscapes of Hittite and Luwians. Proceedings of the International Conference in Honour of Franca Pecchioli Daddi.* Florence, February 6th-8th 2014, Studia Asiana 9, (pp. 1-9). Florence University Press.

Held, W. (2020). Gergakome. *Karialılar: Denizcilerden Kent Kuruculara* (pp. 480-487). Yapı Kredi Yayınları.

Hellström, P. (2003). 100 Years of Swedish Excavations in Turkey and a Bibliography, *Acta Bibliotheca Regia Stockholmiensis, 69,* 237-252.

Kapulu, E. (2018). *Larisa (Buruncuk) akropolündeki Propylon'un mimari-tipolojik özellikleri* [Unpublished master's thesis]. İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

Kerschner, M. (2006). Die Ionische Wanderung im Lichte neuer archäologischer Forschungen in Ephesos. In E. Olshausen, & H. Sonnabend (Eds.), *"Troianer sind wir gewesen" Migrationen in der antiken Welt.* Stuttgarter

Kolloquium zur Historischen Geographie des Altertums 8, Stuttgart 8.-12. Mai 2002, Geographica Historica, 21, 364–382.

Kerschner, M., & Prochaska, W. (2011). Die Tempel und Altäre der Artemis in Ephesos und ihre Baumaterialien. *ÖJh, 80,* 73–153.

Korfmann, M. (1998). Troia, an Ancient Anatolian Palatial and Trading Center: Archaeological Evidence for the Period of Troia VI/VII, *The Classical World,* May-Jun., Vol. 91, No.5, 369-385.

Kouka, O., & Menelaou, S. (2018). Settlement and Society in the Early Bronze Age Heraion: Exploring Stratigraphy, Architecture and Ceramic Innovation after mid-3rd Millennium BC. In E. Alram-Stern, & B. Horejs (Eds.), *Pottery Technologies and Sociocultural Connections between the Aegean and Anatolia during the 3rd millennium BC.* Oriental and European Archaeology, 10 (pp. 119-142). Österreichische Akademie der Wissenschaften.

Külekçi, I. (2021a). *Larisa (Buruncuk) Antik Kentinin Yerleşim Yapısı* [Unpublished doctoral dissertation]. İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

Külekçi, I. (2021b). The Settlement Dynamics of Larisa (Buruncuk) and Their References to the Bronze Age Legacy. In A. Payne, Š. Velhartická, & J. Wintjes (Eds.), *Beyond All Boundaries: Anatolia in the First Millennium BC,* (pp. 297–318). Peeters Publishers. https://doi.org/10.2307/j.ctv2tjd71x.16

Lloyd, S., & Mellaart, J. (1965). *Beycesultan II: Middle Bronze Age Architecture and Pottery,* British institute of archaeology at Ankara.

Luke, C., & Roosevelt, C. (2017). Cup-Marks and Citadels: Evidence for Libation in 2nd-Millennium B.C.E. Western Anatolia. *Bulletin of the American Schools of Oriental Research, 378*, 1-23. doi:10.5615/bullamerschoorie.378.0001

Macqueen, J. G. (1986). *The Hittites and Their Contemporaries in Asia Minor.* Thames and Hudson.

Mac Sweeney, N. (2017). Separating Fact from Fiction in the Ionian Migration, *Hesperia, 38*, 379-421.

Mac Sweeney, N. (2022). MÖ 2. Binyılın Sonlarında Batı Anadolu ve "İon Göçü" Sorunu/Western Anatolia through the end of the second millennium BC and the Question of the "Ionian Migration". In E. Koparal, & Y. Ersoy (Eds.) *Ionialılar: Ege Kıyılarının Bilge Sakinleri /Ionians: Sages of the Aegean Shore,* Anadolu uygarlıkları serisi, 11, 72-79. Yapı Kredi Yayınları.

Malkin, I. (1996). Territorial Domination and the Greek Sanctuary. In P. Hellström, & B. Alroth (Eds.), *Religion and Power in the Ancient Greek World* (pp. 75-81). Ubsaliensis S. Academiae.

Marinatos, N. (1993). *Minoan religion: ritual, image, and symbol.* University of South Carolina Press.

Marinatos, N. (2007). The Minoan Mother Goddess and her Son: Reflections on a Theocracy and its Deities. In S. Bickel, S. Schroer, R. Schurte, & C. Uehlinger (Eds.), *Bilder als Quellen. Studies on Ancient Near Eastern Artefacts and the Bible Inspired by the Work of Othmarr Keel,* (pp. 349-363).

Mater, G. (2013). *Larisa (Buruncuk) kazıları: Tarihçe, bürokrasi ve mimari buluntulara ilişkin bilgiler* [Unpublished doctoral dissertation]. İstanbul Teknik Üniversitesi, Sosyal Bilimler Enstitisü, İstanbul.

Mazarakis-Ainian, A. J. (1988). Early Greek Temples: Their Origin and Function. In R.Hagg, N. Marinatos, & G. Nordquist (Eds.), *Early Greek Cult Practice,* (pp. 105-119). Paul Astroms.

Mazarakis-Ainian, A. J. (1997). *From Rulers' Dwellings to Temples. Architecture, Religion and Society in Early Iron Age Greece (1100-700 B.C.).* Studies in Mediterranean Archaeology, 122, Paul Åströms förlag.

Morgan, C. (1996), From palace to polis? Religious developments on the Greek Mainland during the Bronze Age/Iron Age transition. In Hellström, P. & Alroth, B. (Eds), *Religion and Power in the Ancient Greek World,* (pp. 41–57). Acta Universitatis Upsaliensis.

Morris, I. (1987). *Burial and Ancient Society: the rise of the Greek city-state.* Cambridge University Press.

Niemeier B. & Niemeier W. D. (1997). Milet 1994-5, Projekt "Minoisch-Mikenisches bis Protogeometrisches Milet: Zielsetzung und Grabungen auf dem Stadionhugel und am Athenatempel, Archäologischer Anzeiger, 1997(2), 189-248.

Nilsson, M. P. (1950). *The Minoan-Mycenaean Religion and its Survival in Greek Religion.* C. W. K. Gleerup.

Özdoğan, M. (2018). Larisa in prehistory. Some considerations, inferences and prospects. In T. Saner, I. Külekçi, & Ö. E. Öncü (Eds.), *Larisa: Different lives different colours,* Mimarlık Tarihi Araştırmaları 3, 122–143.

Öztürk, F. (2018). Kybele relief depicted in a naiskos. In T. Saner, I. Külekçi, & Ö. E. Öncü (Eds.), *Larisa: Different lives different colours,* Mimarlık Tarihi Araştırmaları 3, 313–315.

Özyiğit, Ö. (1998). 1996 yılı Phokaia Kazı Çalışmaları. *KST 19*, 763-793.

Özyiğit, Ö. (2003). Phokaia'da Akurgal'ın kazıları ışığında son dönem çalışmaları. *Anadolu/Anatolia 25*, 97-106.

Özyiğit, Ö. (2019). *Phokaia III: Arkaik Dönem Athena Tapınağı.* Ege Yayınları.

Pavúk, P. (2022). Ionia in the Late Bronze Age. In E. Koparal, & Y. Ersoy (Eds.) *Ionialılar: Ege Kıyılarının Bilge Sakinleri /Ionians: Sages of the Aegean Shore,* Anadolu uygarlıkları serisi, 11, 48-59. Yapı Kredi Yayınları.

Polignac, F. de. (1984). *La naissance de la cité grecque: cultes, espace et société, VIIIe-VIIe siècles avant J.-C.* La Découverte.

Polignac, F. de. (1995). *Cults, territory, and the origins of the Greek city-state.* University of Chicago Press.

Polignac, F. de. (2006). Analyse de l'Espace et urbanisations en Grèce Archaïque: Quelques pistes de recherche récents. *Revue des études anciennes, 108,* 203-223.

Ρούγγου, Κ., & Δουλουμπέκης, Ν. (2014) *Αιολικό Ιερό Κλοπεδής Λέσβου,* Μυτιλήνη.

Roller, L. E. (2013). *Ana Tanrıça'nın İzinde: Anadolu Kybele Kültü.* Alfa Basım.

Rose, C. B. (2008). Separating Fact from Fiction in the Aiolian Migration. *Hesperia: The Journal of the American School of Classical Studies at Athens, 77*(3), 399–430.

Saner, T. (Eds.). (2016). *Larisa Buruncuk Mimari Araştırmaları,* Architectural Survey, 1, Ege Yayınları.

Saner, T., Külekçi, I., & Mater, G. (Eds.). (2017). *Architectural Survey at the Necropolis of Larisa (Buruncuk).* Mimarlık Tarihi Araştırmaları 2. İTÜ Vakfı Yayınları.

Saner, T., Külekçi, I., Öncü, Ö. E. (Eds.) (2018). *Larisa Different Lives Different Colours.* Mimarlık Tarihi Araştırmaları 3. İTÜ Vakfı Yayınları.

Scully, V. (1962). *The Earth, the Temple, and the Gods: Greek Sacred Architecture,* Yale University Press.

Snodgrass, A. M. (1971). *The Dark Age of Greece: An Archaeological Survey of the Eleventh to the Eighth Centuries.* Edinburgh University Press.

Snodgrass, A. M. (2000). *The Dark Age of the Greece: an archaeological survey of the eleventh to the eight centuries.* Routledge.

Sourvinou-Inwood, C. (1993). Early Sanctuaries, the eight century and ritual space: Fragments of a discourse. In N.Marinatos, & R. Hagg (Eds.), *Greek Sanctuaries. New Approaches,* (pp. 1-17). Routledge.

Susmann, N. (2019). *The Nature of Cult: Visualizing Continuity on the Greek Cultic Landscape in the Argolid and Messenia, c. 2800 – 146 BCE.* [Unpublished doctoral dissertation]. Department of Archaeology, Boston University.

Treziny, H. (2006). Urbanisme Archaïquedes villes Ioniennes: Un Point de vue Occidental. *Revue des études anciennes, 108,* 225-247.

Ussishkin, D. (1975). Hollows, 'Cup-Marks', and Hittite Stone Monuments. *Anatolian Studies, 25,* 85–103. https://doi.org/10.2307/3642576

Vaessen, R. (2014). *Cultural Dynamics in Ionia at the End of the Second Millennium BCE: New Archaeological Perspectives and Prospects.* [Unpublished doctoral dissertation]. The University of Sheffield, Department of Archaeology.

Vlassopoulos, K. (2013). *Greeks and Barbarians.* Cambridge University Press.

Whitley, J. (2001). *The Archaeology of Ancient Greece.* Cambridge University Press.

Whitley, J. (2009). The Chimera of Continuity: What Would 'Continuity of Cult' Actually Demonstrate?. In A. L. D'Agata, & A. Van de Moortel (Eds.), *Archaeologies of Cult: Essays on Ritual and Cult in Crete in Honor of Geraldine C. Gesell, Hesperia, 42,* 279–88. American School of Classical Studies at Athens.

Yaman, Ş. (2013). *Eski Yakındoğu'da Anikonik Tapınıma İşaret Eden Bir Kült Nesnesi Olarak Baitylos.* [Unpublished master's thesis]. İstanbul Üniversitesi Sosyal Bilimler Enstitüsü Tarih Anabilim Dalı Eskiçağ Tarihi Bilim Dalı, İstanbul.

Yıldırım, O. (2018). *Larisa (Buruncuk) akropolündeki Kuzeydoğu Yapısı.* [Unpublished master's thesis]. İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

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Impact of green practices on ecological conscious consumer behaviour: An empirical investigation of hotels in Sri Lanka

Shanika Lakmali PERERA[1], Jayanetti Koralalage Don Dhanu Thamasha JAYANETTI[2*], Kottahachchi Arachchige Tharusha Oshadee RANADEWA[3], Indunil SENEVIRATNE[4], Balasooriya Arachchige Kanchana Shiromi PERERA[5]
[1] shanilakmaliperera@gmail.com • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Colombo, Sri Lanka
[2] jayanettijkddt.21@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Colombo, Sri Lanka.
[3] tharushar@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Colombo, Sri Lanka
[4] isenevi@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Colombo, Sri Lanka
[5] kanchana@uom.lk • Department of Building Economics, Faculty of Architecture, University of Moratuwa, Colombo, Sri Lanka

** Corresponding author*
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Abstract
The rising attention towards ecologically conscious consumer behavior (ECCB) emphasises the need for implementing green practices to reduce environmental challenges and attract environmentally conscious consumers. Therefore, the adoption of green practices is imperative for the success of the hotel industry. As Sri Lanka's economy is largely supported by tourism, many hotels initiate green practices. However, there is a lack of evidence in research regarding ECCB on green practices of hotels in Sri Lanka. Therefore, this study aimed to investigate the impact of green practices on ECCB and propose strategies to improve the ECCB in the Sri Lankan context. Thus, a comprehensive literature review followed by a mixed approach occupying the case study strategy and survey strategy were adopted. Under the case study strategy, 15 semi-structured interviews among hotel employees, document reviews, and non-participant observations were used within three cases and its stakeholders. A questionnaire survey was carried out among 117 hotel customers. Descriptive frequency analysis and content analysis were used to analyse the data. The findings revealed that seven green initiatives were well accepted and positively impacted ECCB. Study recommends promoting the value of going green, providing education, and enlightening customers on benefits, to uplift ECCB. The study makes substantial contributions to both theoretical knowledge and practical implications within the industry by filling a research gap and providing insights into how consumers perceive and respond to green practices. The study opens areas for future research on investigating policy

Keywords
Customer satisfaction, ECCB, Green practices, Green hotels, Sri Lanka.

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1. Introduction

The tourism industry has experienced rapid growth and has become a significant contributor to the global economy (Tahiri et al., 2021). In Sri Lanka, the hotel industry plays a vital role in the country's economy, contributing to foreign exchange earnings and GDP (Bandara et al., 2020; World Travel and Tourism Council, 2018). However, the hotel sector's impact on the environment is substantial (Rahman et al., 2012). To address this, the adoption of green practices in hotels has become essential worldwide (Khatter et al., 2021). Implementing these practices helps reduce environmental damage, operating expenses, waste generation, and energy consumption while promoting a healthy environment for guests (Jiang & Kim, 2015; Graci & Kuehnel, 2011; Rahman et al., 2012; Manaktola & Jauhari, 2007; Kim & Ha, 2022). Embracing green practices in the hotel industry can lead to various positive impacts (Khatter et al., 2021).

Evidently, ecologically conscious consumer behaviour (ECCB) is getting progressive attention in marketing and consumer behaviour literature (Taufique et al., 2016; Vlaeminck et al., 2014). Hence, the impact of green practices on the ECCB is increasingly emerging throughout the world (Patwary et al., 2020). Research highlighted that customers encountered both positive experiences (Salem et al., 2022;Hays & Ozretic-Dosen, 2014; Jeong & Jang, 2010; Jiang & Kim, 2015) and negative experiences (Han & Chan, 2013; Kasim, 2004;Patwary et al., 2020) in hotels. Therefore, the implementation of green practices in hotels will have a direct influence on ECCB with the services provided by the hotels. According to Abdou et al. (2022), people are becoming increasingly aware about the environmental impacts caused by business activities. Therefore, satisfying the customers through proper implementation of green practices is an emerging issue of the hotels. Few studies, such as Robinot and Giannelloni (2010); Yusnita et al. (2016) and Li et al. (2017), attempted to investigate the correlations between ECCB and green practices in the global context. According to Latif et al. (2020), customer satisfaction is country specific. However, there is a lack of research to analyse the relationship between green practices and ECCB in the Sri Lankan hotels. Therefore, this paper aims to investigate the impact of green practices of the hotels on ECCB in Sri Lanka and to propose strategies to enhance ECCB through green practices. In achieving the aim, key research questions were developed as;

- RQ1. What are the green practices implemented in Sri Lankan hotels?
- RQ2. How these green practices implemented in Sri Lankan hotels impact on ECCB?
- RQ3. What are the suitable strategies to enhance the ECCB of hotel consumers?

Finding answers to these research questions provide the apparatus to investigate the impact as well the strategies to enhance ECCB, which clearly aligns with the research aim.

The study is significant in two aspects. Initially from a theoretical perspective, the study adds to the body of knowledge on ECCB in Sri Lankan Green hotels by identifying factors that affect ECCB pertaining to green practices in Sri Lankan hotels. As a contribution to the industry, the study attempts to identify factors that affect ECCB in Sri Lankan green hotels and to suggest strategies to improve ECCB. The paper begins with an introduction to the research. Literature review critically analyses the theoretical background of the research and methodology illustrates and justifies the research method adopted for the study. Data analysis and discussion of the findings present the overall outcome of the study based on the empirical findings. Finally, conclusion summarises the study findings and emphasises the opportunities for future studies.

2. Literature review

With the world moving more in to green, more hotels are beginning to welcome green practices given growing interest and awareness on sustainable practices (Yang et al., 2023). In the new global economy, environmentally friendly practices have become a critical issue for firms. The increasing

attention given to the benefits of those policies has prompted research on the environmentally viable options in businesses that encourage employees to engage in environmental activities (Pham et al., 2023). Going green was considered as having negative impact on profitability in the past, however now the business is realizing environmental well-being can provide positive economical outcomes as well (Sheth et al., 2011). The attention and the concern for environment and sustainable hotel practices in the tourist industry show a growth over the past 20 years, with regards to drivers, benefits, and the degree of implementation (Molina-Azorín, 2009). Even though going green is considered fruitful, there are several challenges in the process as well and organisations need to keep on investing and strategizing (Adrita et al., 2023). The drive of the hotels to go green was not only initiated by the industry itself, however the increasing customer trends towards sustainable choices has created a highly positive impact as well (Fernández-Robin et al., 2023).

2.1. Ecologically conscious consumer behaviour

The growing attention of global warming has alarmed the people to be more environmentally responsible. Lately, with increased attention on environmental concerns, consumers are shifting towards more eco-friendly choices and moving away from conventional purchases (Akehurst et al., 2012). If a consumer is environmentally conscious, they are likely to contemplate the repercussions of their purchasing choices. Follows and Jobber (2000) illustrated this with the example of an individual who is mindful of the environmental impact of generated waste and is possibly interested in the eco-friendliness of product packaging. If a consumer determines that the environmental consequences are significant, this may lead to the preference for environmentally friendly products in their purchases (Brochado et al., 2017). Hence, unlike in the past, customer awareness of green movements and ECCB has now led organisations to consider shifting green (Yarimoglu & Gunay, 2019; Ahn et al., 2019). The way customers perceive a hotel's environmentally friendly practices directly influences the positive image of the hotel's commitment to sustainability. Simultaneously, this positive green image significantly contributes to customers' intentions to support and choose certified hotels (Leaniz et al., 2018). ECCB is getting progressive attention in marketing and consumer behavior literature (Lin & Hsu, 2013; Vlaeminck et al., 2014). According to Roberts (1996), ECCB can be defined as the behaviour of those who purchase products and services which they perceive to have a positive (or less negative) impact on the environment. Hence, in an environmentally friendly market, customers are aware of the impact of their purchasing decisions (Han et al. 2011), which closely relates to environmental issues (Goncalves et al., 2016). Consumers around the world, especially in Europe, are converting as ecologically conscious consumers, being environmentally aware and having a desire for the green practices (Nekmahmud et al., 2022).

2.2. ECCB and the green concept in hotels

Consumers' increasing environmental consciousness has led to a shift towards environmentally friendly consumption behaviors (Moise et al., 2021). As a result, hotels are under pressure to adopt green practices that mitigate their impact on the natural environment (Verma & Chandra, 2018). Evidence shows that many hotels have already started incorporating green practices into their daily operations (Leaniz et al., 2018). The adoption of green practices not only garners better customer appreciation but also brings various benefits to hotels. Previous studies have highlighted the economic advantages, operational cost savings, and reduced environmental impacts associated with going green in the hotel industry (Berezan et al., 2014; Chen, 2015; Geerts, 2014; Graci & Dodds, 2008; Rahman et al., 2012; Singh et al., 2014; Tzschentke, et al., 2004). Consequently, the growing customer

attention to environmental issues and the potential benefits have motivated hotels to embrace green practices (Dodds & Holmes, 2016).

Customer satisfaction is an important consideration for hotel management, as it relates to ECCB (Li et al., 2020). Previous research has established a positive connection between green practices in hotels and ECCB (Berezan et al., 2014; Li et al., 2017; Moise, Gil-Saura, and Ruiz-Molina, 2018). The implementation of green initiatives in the hotel industry has a significant impact on ECCB, and hotels must actively participate in environmental conservation to remain competitive (Yusof et al., 2017). However, it should be noted that the outcomes of green initiatives can vary, resulting in both positive and negative effects on customer perception (Yu et al., 2017).

According to Teng et al. (2018), the main objective of green hotels is to foster customer loyalty. A global survey of over 30,000 travelers found that 79% of respondents preferred hotels with green practices (TripAdvisor, 2013). The use of renewable energy sources was found to enhance customer satisfaction (Robinot & Giannelloni, 2010). Lee et al. (2010) identified the role of customer perceptions and expectations in shaping the image of a green hotel. Baloglu and Millar (2011) noted customers' preference for environmentally friendly goods, although some may hesitate to pay extra for green accommodations (Lee et al., 2010). Jauhari and Manaktola (2007) highlighted the variations in customer perceptions and willingness to pay for green improvements. Robinot and Giannelloni (2010), however, found no significant impact of going green on customer behavior in a study conducted in France. While previous literature generally supports the positive effects of green hotel practices, there are conflicting opinions on their effectiveness.

Previous literature confirms that a robust link exists between green practices and the ECCB. This affiliation provides hotels to gain benefits and the study will attempt to analyse in depth how these green practices would have an effect on ECCB.

2.3. Existing green practices in the hotels

Green practices of hotels are visible in many formats and literature stressed that all these practices are aimed to minimise the stress and the adverse impact on natural environment embedding environmental related aspects as core pillars of operation (Acampora et al., 2022). The implementation of green practices in the hotel industry has become a pivotal aspect of hotel management strategy (Kim & Chan, 2013). Referring literature, it was noted that green practices used by hotels are grouped in under few categories. Authors such as Kasimu et al. (2012) have classified green practices into four groups: energy management, waste management, water savings and general support for green practices. In contrast, Kim et al. (2012) classified such practices into five as (1) solid waste and water in rooms, (2) energy, (3) solid waste and water in cleaning, (4) water saving options for customers and (5) biodiversity. Through examining the literature, seven major green practices were identified that are successfully followed by hotels (Han et al., 2018; Rogerson & Sims, 2012; Hsieh, 2012).

Singh et al. (2014) and Perramon et al. (2014) identified sustainable water management as a key green practice in hotels, achieved through low flow water fittings, rainwater harvesting, and recycling. Hsieh (2012) and Rogerson and Sims (2012) emphasized energy conservation as crucial. Benson (2013) suggested minimizing energy consumption with efficient equipment, renewable energy, and daylight utilization. Solid waste management involves recycling (Timothy & Teye, 2009), composting (Alexander, 2002), and refillable items (Ernst & Young, 2008). Air quality management includes filtration, open spaces, and eco-friendly cleaning (Benson, 2013). Environmental purchasing promotes recycled, local, and biodegradable products (Timothy & Teye, 2009; Ernst & Young, 2008; Hsieh, 2012). Community awareness entails environmental education for employees and customer engagement (Ernst & Young, 2008; Berezan et al.,

2014). Incorporating green practices in CSR projects benefits hotels and communities (Miller et al., 2012). Regular monitoring (Miller et al., 2012) and permit management (Lee et al., 2010; Hsieh, 2012) ensure compliance and eco-friendly practices.

However, few researchers have raised concerns over some of the practices as well. Heisterkamp (2009) emphasized the need for more tangible actions from green hotels. Wolff (2008) argued against the effectiveness of linen and towel reuse programs. Conversely, Hsieh (2012) and Berezan et al. (2014) found that customers trust energy efficiency, waste handling, air quality management, environmental purchasing, and water conservation. Overall, the literature supports the acceptance of green practices by hotel consumers, which will be empirically tested in subsequent sections.

2.4. Green Practices in Sri Lankan hotels

After the end of the separatist war in 2009, Sri Lanka became a popular tourist destination, ranking highly in various travel guides (Fernando et al., 2017; Dissanayake & Samarathunga, 2021). Despite this, eco-tourism accounted for only 1% of total tourist arrivals (Arachchi, 2014). The Ministry of Tourism declared the Year 2000 as the Year of Ecotourism to promote nature-focused, wildlife, and environmental tourism (Fernando & Shariff, 2013; Gunapala, 2014). In line with this, hotels in Sri Lanka have embraced alternative forms of sustainable tourism to promote ecotourism (Arachchi et al., 2015).

A study conducted by Wijesundara (2017) identified the use of low energy lighting, and paper-based marketing and promotional materials; purchases made from local suppliers; recruitment and hiring of local people for jobs; establishment of a green work culture; and donations for green initiatives as some of the best sustainable practices followed by Sri Lankan hotels. Similarly, Kularatne et al. (2019) added that by being environmentally responsible, the efficiency of the hotels can be enhanced. He further stated that Sri Lanka with its naturistic conditions have a better chance of adhering to green concepts. Arachchi et al. (2015) and Kularatne et al. (2019) highlighted that Sri Lankan hotels follow the practices stated in the Green Globe and Leadership in Energy and Environmental Design (LEED) and the practices recommended by the Green Building Council of Sri Lanka (GBCSL).

Several studies have been conducted with in Sri Lanka in the realms of environment friendly practices in hotels. Weerakoon & Arulrajah (2021) conducted a study on a district of Sri Lanka, Polonnaruwa, to assess how employee behaviour contributes to the sustainable eco-friendly hotels. In the study it analyses the significance of employee contribution in sustaining a green process. Another study investigated the additional cost undergone by the hotels to adopt green practices (Weerasekara, 2022). Moreover, a study was conducted to assess the relationship between green attributes of hotels and how that would impact the revisiting decisions of the customers (Jayasinghe & Weerasekara, 2021). Customer loyalty towards sustainable hotels in Sri Lanka were analysed using case study theory to understand the how loyal customers tend to be if the hotel is sustainable (Silva et al., 2021). A study by Madhunimasha & Pathmini, (2019) examined the impact of Green Marketing Mix strategies on customer-based brand equity in green hotels in Sri Lanka. Another study was carried among the restaurants in a town named Vavuniya in Sri Lanka to understand the how the customer purchase intentions are influenced due to green practices (Pushpanathan & Lanka, 2021). Furthermore, a study was conducted to investigate the implication of green balanced scorecard on sustainable performance in Sri Lankan hospitality industry (de Silva et al., 2021). Analysing these studies, it is proven that even though studies were conducted among areas related to green buildings and environmentally friendly practices of buildings, a clear gap is visible and yet to be addressed in the area of identifying the link between ECCB on green practices of Sri Lankan hotels. Therefore, this clearly proves that the thorough research is vital to

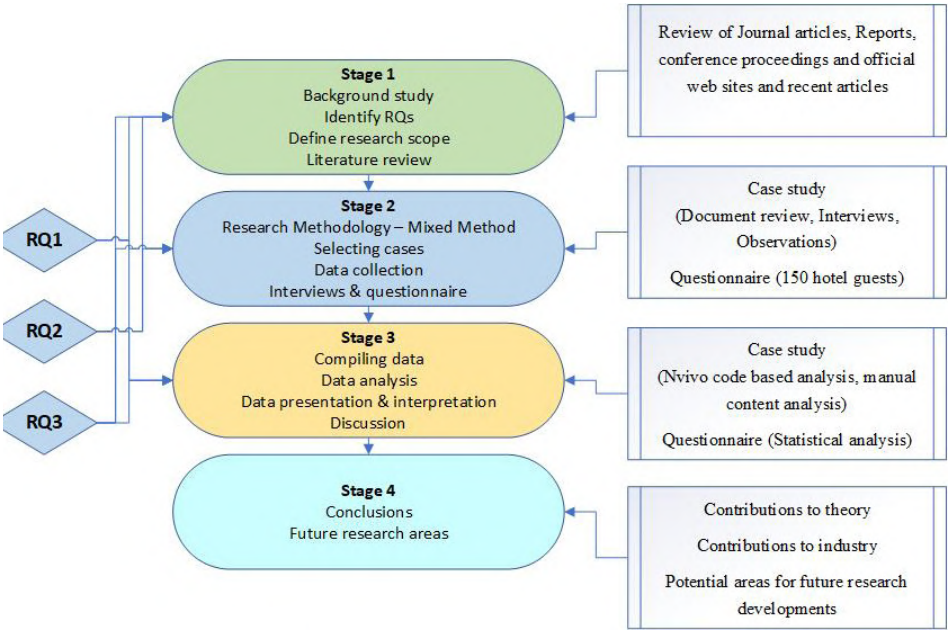

Figure 1. *The research process.*

investigate the impact of green practices on ECCB in Sri Lankan hotels.

3. Method

3.1. Research design and process

Creswell et al. (2007) define mixed methods research focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Dawson (2002) explains that mixed research allows to investigate reasoning from a quantitative perspective. Such designs have been used to augment traditional methods for assessing and monitoring the impacts of recreation and tourism on the physical environment (Mackay 2004). Since the study is aimed at investigating the impact of green practices of Sri Lankan hotels on ECCB, the study would need a research apparatus that collects both quantitative and qualitative data. The study needs a quantitative approach to measure the impact of green practices on ECCB. This would allow the researchers to identify how many existing practices have positively influenced hotel guests (Saunders et al., 2019). This approach would certainly provide justifiable result since it allows to investigate the impact by a larger sample. On the other hand qualitative approach is used to identify the strategies to enhance ECCB. In identifying strategies authors need a mechanism to investigate data in depth. In identifying strategies, it is essential that authors get to interview the most suitable people regarding the matter and to delve into depth and reasoning. In such manner, a qualitative approach provides the best route (Saunders et al., 2019). Since both qualitative and quantitative methods suffice the abovementioned needs of the research, study adopted the mixed method as the overall method of the research. Figure 1 provides a guide to the research process adopted in the research.

The study began with a background study and an extensive literature review to examine the theoretical background of ECCB and green practices in hotels. The literature review identified seven key areas of green practices commonly implemented in hotels. To enhance ECCB in green practices, the study utilised case studies and questionnaires, as the main research strategies. Under case studies, expert interviews, document reviews, and non-participatory observations were carried out. Prior consent was obtained from the interviewees, and they were encouraged to freely express their ideas without bias. All data collected were anonymized using codes to ensure respondent anonymity.

Table 1. *Profiles of the cases.*

Criteria	Hotel A	Hotel B	Hotel C
Category	Five stars	Four stars	Five stars
Location	Dambulla	Kandy	Galle
Number of Rooms	152	36	154
Age of the building	21 years	12 years	38 years
Number of Employees	350	50	260
Documents reviewed	Company records, Green certification documents, Customer feedbacks	Company records, Green certification documents, Customer feedbacks	Company records, Green certification documents, Customer feedbacks
Green rating system	LEED - Browns, Green Globe SL, Green SL, Travel Life – Gold, ISO 14001	Green Globe Travel Life	Green Globe Travel Life
Year of Certified	LEED- 2000 Green Globe- 1994 ISO 14001- 2002 Travel Life- 2016	Green Globe- 2015 Travel Life- 2017	Green Globe- 2013 Travel Life- 2016

3.2. Research strategy

Considering the scope of the study and the nature of the research questions, this research adopted two main strategies to find answers such as case studies and a questionnaire surveys as described below.

3.2.1. Case studies

Saunders et al., (2009) depict that case study help scholars to analyse phenomenon in depth to grasp the relationships. Furthermore, case studies allow critical analysis and understanding of reasoning and help to find the most suitable answer in a practical circumstance (Yin 2018). Thus, the study adopted the case study strategy to investigate the impact of green practices on ECCB in hotels in Sri Lanka and to propose strategies to enhance ECCB in the hotels in Sri Lanka. This allows researchers to discuss the how and why aspect of selecting the strategies and provides the justifications by the comments of the experts. In identifying cases hotels were selected under several criteria. The main criteria for selection were the existence of green practices within the hotel. Further, maintain a green certification during last five years were considered as another selection criterion. The number of cases were limited to three after reaching data saturation. While investigating the 4th case authors observed the data is repeating in the same pattern and no new data is emerging. This showcased data saturation where no new information or themes emerge in data collection, indicating that the researcher has comprehensively explored and understood the relevant aspects of the phenomenon under investigation (Saunders et al., 2018). Therefore, authors limited the number of cases to three conferring to Saunders et al. (2018). Furthermore, the number of cases were limited due to the time constraints, financial constraints and the accessibility as well. In selecting the cases for the study, a thorough selection process was followed. The profiles of the selected cases are summarized in Table 1 to enable cross-case analysis.

As depicted Table 1, all the selected hotels provided a reasonable level of green practice and showcased a satisfactory level of green certification. Accordingly, the case studies conducted in this study involved semi-structured interviews with the hotel managers, non-participant observations around the hotels and a document review to collect the empirical data required for the study as described below.

3.2.1.1. Semi-structured interviews

According to Edwards and Holland (2013), semi-structured interviews allow asking questions from the interviewees using a flexible, yet structured approach. Semi structured interviews provide the ability to investigate data in-depth, seek justifications and to understand the reasoning behind a phenomenon. This also allows the experts to reflect on their own responses to questions and to develop more accurate and comprehensive answers (Kallio et al., 2016). In this study authors needed to collect data on how the existing practices have an impact on customers, what their responses have been, and to craft strategies to enhance their satisfaction levels. This needed a flexible, and an elaborative mechanism, thus, semi-structured interviews were used in the study to review the current green practices, impact of those practices on customers' satisfaction and strategies to improve the green practices in the hotels. As the initial step of the interview, a comprehensive interview guide was prepared with the data identified from literature. In forming the interview questions authors used the data gathered from the literature review. A pilot interview was conducted with an expert in the industry who possessed both practical

and academic knowledge on the subject to make sure the interview questions are well aligned with the scope of the research. The key strategies identified from literature were presented to the hotel management staff and they were validated. Further, new strategies were suggested during the empirical data collection.

The interviews were audio recorded with full permission of the experts and transcribed into textual data prior to analysis using Nvivo. Average interviews extended between one and half hours to two hours. In conducting the interviews experts were provided with the freedom to select the place thus most of the interviews were conducted at their office premises. However, authors assured that while the interviews are being conducted no other party was involved and experts were given the freedom to express their honest opinion. Furthermore, authors assured that all the collected data are anonymized and treated confidential to gain more realistic information. Table 2 depicts the profiles of the hotel employees interviewed selected through purposive sampling.

Yin (2014) explained the selection criteria rely on the limitations of convenience, judgment, time, and cost. Kothari (2004) clarified that purposive sampling allows researcher to select respondents for the survey intentionally. Thus, considering the nature of the study nonprobability purposive sampling method was adopted to select informants as the study requires to harness evidence specifically related to green practices and customer satisfaction (Dolores & C. Tongco, 2006). Purposive sampling allowed researchers to select the most suitable, educated and experienced experts in the area of green practices in the hotel sector. Fifteen professionals with each one having minimum or more than five years of experience in the hotel sector were interviewed to get an in-depth understanding on the research phenomenon conforming to the sample size suggested by Mason (2010). In selecting the experts, authors assured to select executive or above management level employees who had direct contact and interest with hotels green practices and who worked in a related role.

Table 2. *Profiles of the interviewees.*

Case	Interviewee code	Designation	Work Experience (Years)	Involvement in Green-related job role
A	A1	Learning and Development Manager	25	✓
	A2	Human Resource Manager	05	✓
	A3	Maintenance Engineer	09	✓
	A4	Assistant Engineer	12	✓
	A5	Facilities Manager	10	✓
B	B1	Group Maintenance Executive	20	✓
	B2	Maintenance Supervisor	05	✓
	B3	Facilities Manager	10	✓
	B4	Assistant Engineer	08	✓
	B5	Human Resource Manager	05	✓
C	C1	Chief Engineer	06	✓
	C2	Maintenance Supervisor	05	✓
	C3	Assistant Engineer	05	✓
	C4	Engineer	10	✓
	C5	Facilities Manager	14	✓

3.2.1.2. Non- participant observations and document review

Nonparticipant observation in research provide the ability to observe and grasp the "real-life" scenarios pertinent to a phenomenon (Mulhall 2003). To carry out an in-depth investigation on the green practices currently being implemented in the hotels in Sri Lanka, non-participant observations on the hotels and a document review were conducted. The researchers visited the premises of all three hotels and attended the progress review meetings with the top management of the hotels as observers. This allowed authors to gain a more realistic perspective on existing green practices, its current status, and the efforts made by the hotel management to enhance the satisfaction levels of hotel customers. The data collection further included a document review which entailed investigating green certificates and supporting documents submitted for the renewal of the certificates, company records and customer feedback reports as mentioned in Table 1, to identify the green practices currently being implemented at the hotels and how well they are being received by hotel guests.

Code-based content analysis was used to analyse the data using Nvivo12 to reduce the time taken to analyse the data. According to Hsieh and Shan-

non (2005), content analysis is one of the main strategies for evaluating and coding text information in a qualitative approach. Text information can be gathered from interviews, surveys, findings, focus groups and printed media in the form of verbal, digital or written format (Kondracki , Wellman, & Amundson, 2002). Content analysis provides text for subjective interpretation by systematic coding and patterns (Hsieh & Shannon, 2005). In addition, manual content analysis was also be carried out for documents reviewed and observations recorded.

3.2.2. Questionnaire survey with the customers

As stated by Check and Schutt (2012) and Yin (2015), questionnaires are common data collection methods in case study research which allow for comprehensive and in-depth data collection. Moreover, questionnaire survey provides validity and reliability to the research findings (Taherdoost, 2016). To investigate the satisfaction level and impacts hotel users have on the existing green practices, authors needed to examine how hotel customers respond to existing green practices. Moreover, authors needed a considerable number of the hotel customers' response for reliability and validation. Thus to determine the customer satisfaction level on the green practices, a questionnaire was distributed among the customers of green hotels. In selecting the guests, authors screen them through several basic aspects such as how many stays they plan to spend at the hotel, weather they have any basic knowledge on green practices in hotels and their preference over green practices in hotels compared to a conventional hotel. Therefore, sample were selected from guests who stayed more than two nights at the hotel and who knew about green practices and showed clear interest. Then through the consent and the assistance of the hotel management, researchers selected a sample of 150 hotel guests. The questionnaire distributed online, and the number of completed questionnaires returned was 117 accounting to 78% response rate.

In developing the questionnaire following approach was adopted. Initially authors identified the existing green practices in the selected hotels. In this process as mentioned in Section 2, authors identified existing green practices through a comprehensive literature review. Subsequently these literature findings were investigated with in the hotels for their existence and they were empirically tested. Moreover, additional practices were also identified through the data gathered from the hotels. This finalized list of green practices were used as the final list in developing the questionnaire. In the questionnaire the authors questioned the hotel gusts under the following key areas to check their satisfaction level. As an example, under Water conservation green practices, guests were questioned on their satisfaction level from 1-5, on a Likert scale. Likewise, authors grouped the identified green practices under seven key areas such as: Water conservation, Energy conservation, Solid waste management, Air quality, Environmental purchasing, Community awareness and Maintenance of permits. Those green practices were then used to develop the questionnaire to gain the perspective of the hotel consumers. The respondents were given a five-point Likert scale to mark their responses to each question, using 5 for highly satisfied and 1 for highly dissatisfied. The ECCB level of each green practice was determined by calculating the mean values of each practice (Albaum, 1997; Miller, Mayer, & Baloglu, 2012).

As the questionnaire survey was conducted online, the gathered data were in the digital format. According to Rudestam and Newton (2007), the collection of data in the digital form is convenient in quantitative research. In order to analyse and interpret the quantitative data from questionnaires, descriptive frequency analysis was used. Mean values were calculated to interpret the satisfaction level based on the 5-point Likert scale. The degree of satisfaction was determined by the set of mean values as shown below (Othman et al., 2011).

MV 0.5 - 1.5: Highly Dissatisfied
MV 1.5 - 2.5: Dissatisfied
MV 2.5 - 3.5: Moderately Satisfied
MV 3.5 - 4.5: Satisfied

MV 4.5 - 5.5: Highly Satisfied

The mean value(MV) ranges were identified with the respective satisfaction level. Additionally, The analysed data were presented using bar charts for each green practice along with the mean value that can be assigned for it based on the questionnaire findings in section 4.

4. Research findings and analysis

This section clearly outlines the key findings of the data collection. The findings were discussed under three main sections i.e., Existing green practices in Sri Lankan hotels, ECCB on existing green practices and strategies to enhance ECCB as discussed below in line with answering the research questions.

4.1. Existing green practices in Sri Lankan hotels

Green practices currently followed in hotels were identified by interviewing the hotel management, making non-participant observations, and conducting a document review. The questions on green practices were grouped under seven areas, identified through the comprehensive literature review. Table 3 presents the summary of the green practices that being implemented in all three hotels.

As evidenced in Table 3, most of the green initiatives identified through the literature were being satisfactorily practiced in all three hotels. All the respondents showcased interest in implementing green practices in their respective hotels. Environmental purchasing, community awareness, and maintenance of permits were visible in all the hotels. Even though water conservation is crucial for a hotel, a rainwater harvesting system is installed only in Hotel B. A3 indicated that a rainwater harvesting system was not installed in Hotel A emphasising the inadequate space and negative impressions on overall design through rainwater harvesting system. However, B3 contradicted the idea of A3 by stating that, the design team managed to blend it with the existing architecture of the buildings as the rainwater harvesting system was considered essential in Hotel B. The use of energy efficient sensors was observed only in two hotels, A and C. The interviewees, A3, C4 and C5, commented that even though the initial cost of the sensors was high, the state-of-the-art technology used in them have made them energy efficient and user friendly.

Table 3. *Summary of the green practices implemented in three hotels.*

GREEN PRACTICE	A	B	C	GREEN PRACTICE	A	B	C
Water Conservation				**Air Quality**			
Using low flow water fittings	✔	✔	✔	Using air filtration	✔	✔	✔
Using water saving devices	✔	✔	✔	Maintaining a smoke free environment	✔	✔	✔
Rainwater harvesting	✘	✔	✘	Designing more open spaces	✔	✔	✘
Using recycled water for gardening/ toilet flushing	✔	✔	✔	Using bicycles/ public transport to reduce air pollution in the premises	✔	✘	✘
Reusing towel and linen to reduce water consumption	✔	✔	✔	Maintaining the surroundings with green plants/ decorations	✔	✔	✔
Using grey water for landscaping	✔	✔	✔	**Environmental Purchasing**			
Energy Conservation				Providing organic food	✔	✔	✔
Implementing measures to reduce energy consumption	✔	✔	✔	Using recycled eco-friendly packaging such as takeout boxes and bags	✔	✔	✔
Using energy-saving equipment	✔	✔	✔	Purchasing locally grown food	✔	✔	✔
Using occupancy sensors and timers	✔	✘	✔	Purchasing green products	✔	✔	✔
Using renewable energy sources	✔	✔	✔	**Community Awareness**			
Using key cards to turn on/off the electricity supply in the hotel rooms	✔	✔	✔	Conducting awareness programs on green practices for the customers	✔	✔	✔
Using digital thermostats in hotel rooms	✔	✔	✔	Training employees on eco-friendly practices	✔	✔	✔
Using a building management system (BMS) to control heating, ventilation, and air conditioning (HVAC) and electricity supply	✔	✔	✔	Conducting environmental educational programmes for the local community	✔	✔	✔
Using reminder cards to alert customers to turn off lights	✔	✔	✔	Obtaining feedback from the customers on the green practices	✔	✔	✔
Solid Waste Management				Conducting CSR projects	✔	✔	✔
Using a waste management strategy (3R, 4R, 7R, etc.)	✔	✔	✔	Using in-room TVs to inform the customers about the hotel environmental policies	✔	✔	✔
Use recycling bins to separate waste	✔	✔	✔	**Maintenance of Permits**			
Composting waste	✔	✔	✔	Compliance with the legislation	✔	✔	✔
Using refillable dispensers for shampoos, conditioners, and soaps	✘	✘	✘	Obtaining green certification from the government or green organisations	✔	✔	✔
Supplying cosmetics/ amenities made from natural ingredients	✘	✘	✘	Adhering to laws and regulations (building codes/ incentives)	✔	✔	✔
				Displaying certificates showing the authorisation of eco-friendly practices	✔	✔	✔

In two of the three hotels, bicycles and common vehicles were not used. According to hotel management, customers are not eager to use bicycles and common vehicles as it compromises the comfort level. The hotels were unable to implement green practices such as the use of refillable dispensers for shampoos, conditioners, and soaps and supply of cosmetics/ amenities made from natural ingredients. According to B2, these hotels are unable to implement the two green practices as they are bound to adhere to certain hygiene standards that do not allow reusing of products or equipment. C2 and C5 however do not agree with B2 on the point of maintaining quality and hygiene but stated that the high cost of 100% natural products is another factor that hinders the use of cosmetics made from natural ingredients. The results indicated the green practices that require improvements. However, all the respondents indicated

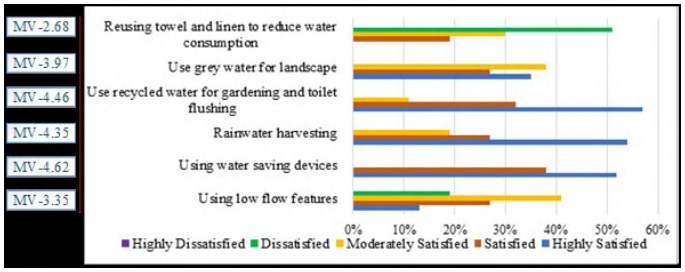

Figure 2. *ECCB on sustainable management of water.*

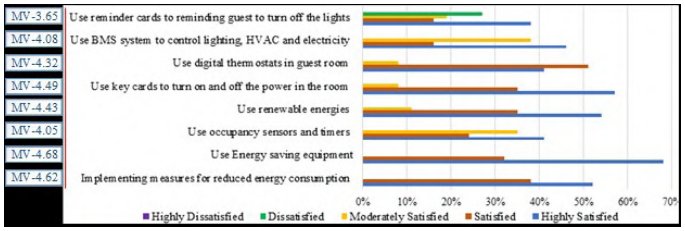

Figure 3. *ECCB on energy conservation.*

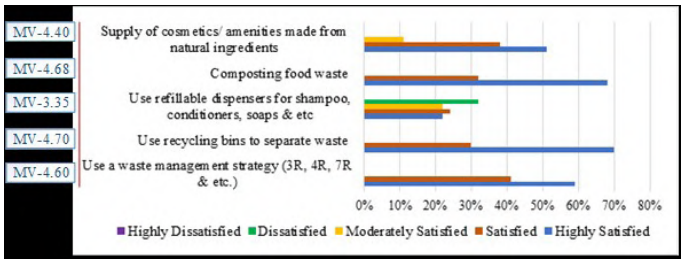

Figure 4. *ECCB on solid waste management.*

that the implementation of green practices is mainly influenced by ECCB and the views of the hotel guests.

4.2. Impact of green practices on ECCB

To analyse the impact of ECCB on green practices, 150 questionnaires were distributed among the customers of all three case study hotels to determine their satisfaction levels with regard to seven green practices identified from the literature. The following section provide a detailed analysis of each of these key areas below.

4.2.1. ECCB on sustainable management of water

Water conservation and sustainable water management except rainwater harvesting were observed in all of all three cases. Figure 1 indicates the customer satisfaction levels on sustainable water management at the hotels.

According to Figure 1, 57% of the customers surveyed were highly satisfied with the use of recycled water for gardening and toilet flushing. The customers indicated that they are willing to use recycled water unless it compromises hygiene standards. More than 50% of the customers were highly satisfied with rainwater harvesting and the use of water saving devices. As mentioned already, only one of the hotels employed rainwater harvesting. Almost 51% of the customers were dissatisfied with the reuse of towels and linen to reduce water consumption, whose mean value of 2.68 was the lowest among the six green practices coming under sustainable management of water. However, 49% of the customers showed willingness to reuse linen as long as hygiene is maintained. This showed a split result among customers. On the same subject, hotel management is in the view that they did not provide new linen unless otherwise requested by the guests within the same stay. In this section the highest satisfaction level was recorded on the use of water saving devices with a mean value of 4.62.

4.2.2. ECCB on energy conservation

Hotels are energy intensive buildings that incur high cost for energy. Figure 2 shows customer satisfaction levels on energy conserving green practices.

The mean values received by seven of the eight green initiatives were above four. A vast majority of customers were satisfied with most of the energy conservation practices followed in the hotels. However, they had differing views on the use of reminder cards to alert customers to turn off their room lights and 27% of them were not enthusiastic on that practice. However, 37% of the customers were highly satisfied with it. The use of energy saving equipment with the highest mean value (4.68) was the most preferred energy saving practice with almost 70% of the customers were being highly satisfied with that practice.

4.2.3. ECCB on solid waste management

Figure 3 presents the analysis of the customer satisfaction levels on solid waste management practices implemented in three hotels.

More than 50% of the customers

were highly satisfied with all of the green practices associated with solid waste management except the use of refillable dispensers for shampoos, conditioners, and soaps with which approximately 32% of the customers have been dissatisfied (Figure 3). The percentage of customers (70%) who were highly satisfied with the use of recycled bins to separate waste was the highest among the percentage of customers who had expressed a high satisfaction. Guests showed similar satisfaction for composting waste as well. Approximately 50% of the customers have indicated a high level of satisfaction with the supply of cosmetics and amenities made from natural ingredients. The mean values obtained by all of the green practices except refilling of products exceeded four.

4.2.4. ECCB on ensuring air quality

Figure 4 presents the analysis of the satisfaction levels of customers on ensuring air quality in three hotels.

More than 50% of the surveyed customers indicated that they are highly satisfied with each of the green practices coming under air quality. All of the green practices in this category except the use of bicycles or public transport to reduce air pollution within the premises have been considered highly satisfying by more than 45% of the customers. However, 43% of the customers have been moderately satisfied with the use of bicycles or public transport to reduce air pollution within the premises. Only 19% of the customers have been highly satisfied with this practice. Both the use of air filtration and a smoke free environment have each obtained the highest mean value of 4.62, with 62% and 38% of the customers being moderately satisfied and satisfied with them, respectively. The mean values received by the green practices indicate that all of the green initiatives except the use of cycles and public transport have been favourably considered by the customers.

4.2.5. ECCB on environmental purchasing

The green practice environmental purchasing has been adopted by all three hotels. Figure 5 below presents

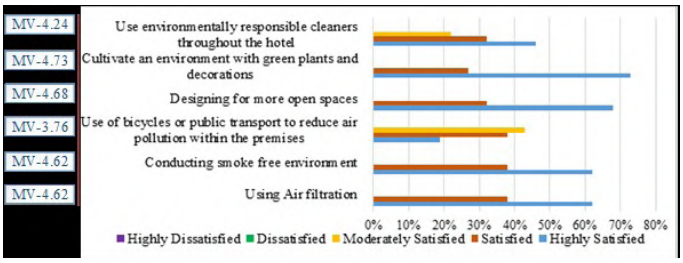

Figure 5. *ECCB on ensuring air quality.*

Figure 6. *ECCB on environmental purchasing.*

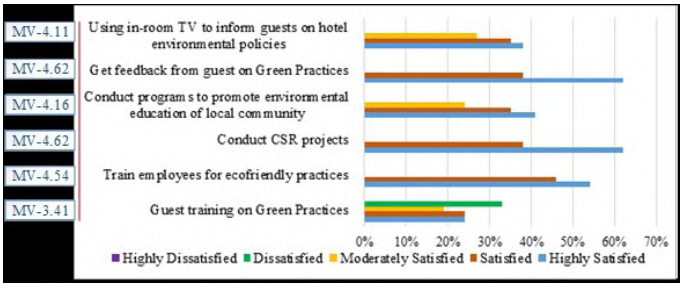

Figure 7. *ECCB on community awareness.*

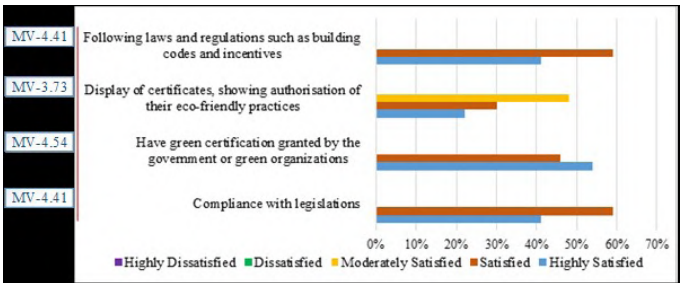

Figure 8. *ECCB on the maintenance of permits.*

the percentage of customers who have indicated their customer satisfaction level for each of the green practices associated with environmental purchasing.

More than 50% of the customers have expressed a high satisfaction for all of the green practices mentioned under environmental purchasing. The percentage of the customers is highest in respect of the use of recycled, eco-friendly packaging, such as takeout boxes and bags. The mean value of each of the two green practices provid-

Table 4. *ECCB on green practices.*

GREEN PRACTICE	Mean	GREEN PRACTICE	Mean
Water Conservation		**Air Quality**	
Using low flow features	3.35	Using Air filtration	4.62
Using water saving devices	4.62	Conducting smoke free environment	4.62
Rainwater harvesting	4.35	Use of bicycles or public transport to reduce air pollution within the premises	3.76
Use recycled water for gardening and toilet flushing	4.46	Designing for more open spaces	4.68
Use grey water for landscape	3.97	Cultivate an environment with green plants and decorations	4.73
Reusing towel and linen to reduce water consumption	2.68	Use environmentally responsible cleaners throughout the hotel	4.24
Energy Conservation		**Environmental Purchasing**	
Implementing measures for reduced energy consumption	4.62	Purchase locally grown food from locally suppliers	4.6
Use energy saving equipment	4.68	Use recycled eco-friendly packaging such as takeout boxes and bags	4.62
Use occupancy sensors and timers	4.05	Provide organic food	4.6
Use renewable energies	4.43	Purchase green products	4.54
Use key cards to turn on and off the power in the room	4.49	**Community Awareness**	
Use digital thermostats in guest room	4.32	Guest training on Green Practices	3.41
Use BMS system to control lighting, HVAC and electricity	4.08	Train employees for eco-friendly practices	4.54
Use reminder cards to reminding guest to turn off the lights	3.65	Conduct CSR projects	4.62
Solid Waste Management		Conduct programs to promote environmental education of local community	4.16
Use a waste management strategy (3R, 4R, 7R etc.)	4.6	Get feedback from guest on Green Practices	4.62
Use recycling bins to separate waste	4.7	Using in-room TV to inform guests on hotel environmental policies	4.11
Use refillable dispensers for shampoo, conditioners, soaps & etc.	3.35	**Maintenance of Permits**	
Composting food waste	4.68	Compliance with legislations	4.41
Supply of cosmetics/ amenities made from natural ingredients	4.4	Have green certification granted by the government or green organizations	4.54
		Display of certificates, showing authorisation of their eco-friendly practices	3.73
		Following laws and regulations such as building codes and incentives	4.41

ing organic food and purchasing locally grown food is 4.6. All four green practices coming under environmental purchasing have provided an acceptable level of satisfaction to more than 30% of the customers. An intriguing observation in this section is that all practices have scored mean values above 4 indicating the high level of customer satisfaction on them.

4.2.6. ECCB on community awareness

As discussed in the literature, a hotel can gain a vast range of benefits by promoting their eco-friendly practices among the community. Hence, community awareness is one of the main areas that could impact customer satisfaction and Figure 6 below presents the results of the analysis.

Over 50% of the customers have expressed a high level of satisfaction over three of the green practices associated with community awareness as visible. Almost 62% per cent of the customers have expressed a high level of satisfaction on conducting CSR projects and obtaining feedback from customers on the green practices of the hotels. Training employees on eco-friendly practices has obtained a mean value of 4.54, and nearly 55% of the customers have expressed a high level of satisfaction with this green practice. However, 33% of the customers have expressed dissatisfaction on conducting training programmes for customers on green practices. A3 and B2 opined that customers are dissatisfied with this practice as it disturbs relaxation. A2 mentioned that customers consider such training as a nuisance.

4.2.7. ECCB on the maintenance of permits

Compliance with legislation and maintenance of permits elevate the overall reputation of hotels. Figure 7 provides the mean values obtained by the green practices associated with the maintenance of permits and the percentage of customers.

Over 50% of the customers have indicated that they are satisfied with three of the four green practices at large. Forty-one per cent of the customers have been highly satisfied with two of the practices: compliance with legislation and following of laws and regulations, such as building codes and incentives. The display of certificates indicating the authorisation of their eco-friendly practices has been considered by 48% of the customers as being moderately satisfying. All of the green practices associated with the maintenance of permits have obtained an approximate mean value of 4. Green certification granted by the government or green organizations have both obtained the highest mean value (4.54).

The analysis clearly depicts that vast majority of the green practice offered by the hotels were overwhelmingly accepted by hotel customers and they indicate they are satisfied with these practices except for several practices. The Table 4 presents a comprehensive overview of various green practices, each accompanied by a mean score reflecting their perceived satisfaction level as per the views of the hotel guests.

The practices are categorised into key areas such as Water Conservation, Air Quality, Energy Conservation, En-

vironmental Purchasing, Solid Waste Management, Community Awareness, and Maintenance of Permits. The mean scores provide a measure of how well each practice is perceived to be contributing to environmental sustainability, with higher scores indicating a more positive satisfaction among hotel customers. The analysis indicates that even though there are a few green practices that are not fully accepted by the hotel guests, overwhelming majority of green practices are well received by the hotel guests, and they were satisfied by them.

4.3. Strategies to improve ECCB on green practices

A key objective of the study was to propose strategies that will improve ECCB on green practices. These strategies were collected through interviews with the hotel managements, non- participant observations, and the document review. To do so a coding structure was used as follows.

- Top-Level Code: Strategies to improve customer satisfaction towards green goals
- Sub Codes
- Conduct training and awareness programs for employees
- Mechanism to evaluate customer satisfaction before leaving the hotel
- Conducting program to make guests feel more aware
- Promoting green concept through social media
- Compliance with standards
- Benchmarking
- Develop procedures enhancing public relationship

One of the strategies that was emphasized by the interviewees was providing education for hotel employees. C2 highlighted that, employees do not possess adequate knowledge and awareness about green practices. A1 noted the importance of knowing the benefits and value of green practices by both the customers and employees of the hotels. B1 responded that to implement and maintain green practices successfully, the employees have to be knowledgeable and informative. The idea was further strengthened by the comment of C1 as he reiterated only if the employees had inert knowledge they would continue and sustain the practices and able to educate guests when needed. Thus, conducting training and awareness programmes was considered one of the top strategies that can be adopted to enhance customer satisfaction in hotels.

The study findings suggest that implementing an effective feedback mechanism is crucial for obtaining customer input. Feedback loops can be utilized to gather data and develop action plans to assess customer satisfaction with hotel services. Hotel management should prioritize meeting customer preferences and desires rather than focusing solely on standard amenities. Respondents emphasized the importance of educating hotel customers about the benefits and best practices related to green initiatives. A1, B1, B4 and C2 suggested conducting demonstrations, dramas, group activities, and providing information on energy-saving through green concepts. These initiatives can encourage customers to take responsibility for environmental conservation, thereby enhancing ECCB.

Promoting the existing green practices in the hotels using diverse procedures is one of the strategies suggested as it would enhance the customers' awareness on green initiatives and their tangible benefits. As stated by B2, green practices may surprise the customers, if they had no prior knowledge about such practices being implemented in the hotel. According to A1, most of the customers prefer to get information related to available green practices beforehand which will ultimately uplift their satisfaction with the practices. However, it is noted by majority of interviewees of the hotel staff that it must be done in a manner that does not disturb the guests by any mean. Further, complying and benchmarking with global standards such as LEED was suggested as a strategy by the hotel managements as customers from developed countries possess green awareness and familiarity with global standards. C2, B1 and B3 expressed that since majority if the guests are from all over the world it is imperative to highlight globally renowned stan-

dards. Procedures enhancing public relationship were the least advocated strategy as the difficulty of implementing executing such strategy. However, A2 mentioned that through the promotional campaign they attempt to elevate the relationship with the public with the modern social media platforms. On the contrary, B5 mentioned that it has no tangible outcomes.

5. Discussion

This section provides a critical discussion on the findings of the above discussed section with one-by-one comparison with the literature and the interpretation of the empirical findings as well.

5.1. Green practices in Sri Lankan hotels

The study findings indicate that all three hotels have implemented a majority of the green practices mentioned in the literature. Seven green initiatives were identified from the literature as being applicable in Sri Lanka: sustainable water management, energy conservation, solid waste management, satisfactory air quality, environmental purchasing, community awareness, and maintenance of permits. According to Perramon et al. (2014), these practices are already being implemented in top green hotels throughout the world. All three hotels selected for this study also demonstrated an interest towards executing these green practices at large.

Water conservation and waste reduction are the major aspects of environmentally responsible management in hotels (Singh et al., 2014). Even though, rainwater harvesting is suitable for a tropical country like Sri Lanka, only one of the three hotels had implemented it. According to Perramon et al. (2014), rainwater harvesting is important for hotels as the water consumption in a hotel building is higher than that in any other type of building. Similarly, the use of refilling techniques and supply of 100% natural products are imperative in hotels (Alexander, 2002; Ernst & Young, 2008). However, all three hotels were not implementing these practices as it is difficult for the hotels to comply with other standards and high cost. The hotel managements also highlighted the difficulty of maintaining solid waste management in their hotels. Alexander (2002) stated that hotels often hesitate to implement solid waste management programmes due to poor coordination and cooperation among the management, employees, and customers. The green initiative of using bicycles and public transport was also not implemented in two of the hotels due to reluctance of the customers to relinquish their comforts. According to the managements of all three hotels, although the hotels were eager to provide such facilities, the customers are not keen about them as highlighted by Wolff (2008). The results clearly imply that hotels have executes many strategies however they are reluctant to go ahead with strategies that would create concern in the minds of the guests.

5.2. Hotel users' ECCB on the existing green practices

The data analysis indicated that customers have a favourable perception of the green practices currently followed in Sri Lankan hotels. According to Prakash et al., (2022), water conservation and waste management practices are appreciated by hotel customers and hotel managements. The study findings confirmed the literature findings as majority of the customers were satisfied with the suggested green practices. However, 51% of the customers who were interviewed were dissatisfied with the reuse of towels and linen to reduce water consumption. According to a study done by Blose et al. (2014), the attitudes of the hotel customers to this green practice will depend on how it is presented to the customers and its perception by the customers, Yu et al. (2017) highlighted that some customers, however, would not mind reusing linen to conserve water but some of the hotels also might consider the reuse of linen as a poor cleaning practice and thus would be reluctant to implement it.

Hotels have complex functional areas which require different energy levels as the day progresses (Shao et al. 2020). The ECCB on energy conservation was high, indicating that most of

the customers agreed with such practices. As indicated by Pirani and Arafat (2016), customer satisfaction can be achieved through proper solid waste management practices. Similarly, a study conducted by Zhang et al. (2017) concluded that, maintaining a satisfactory indoor air quality is a concept well accepted by hotel customers in general. The hotel customers in Sri Lanka were highly satisfied with this practice. Khan et al., (2022) and Li et al. (2017) proved that hotels positively accepted green purchasing practices, such as environmental purchasing, which was well accepted by Sri Lankan hotel customers.

Increasing the awareness on green is another practice emphasized by several scholars. Berezan et al. (2014) stated that increasing the awareness of customers about green practices can compel the hotels to reduce their carbon footprints. Research findings indicated that, Sri Lankan hotel customers accept most of the green initiatives except training of customers on green practices. Managing green permits, maintaining the stipulated standards, and showcasing the green rating of the hotel are vital for customer satisfaction on green. According to Lee et al. (2010), 83% of English holidaymakers would choose a hotel that has received a green award. Most of the activities related to maintaining green permits were accepted by the hotel customers who were interviewed.

As per the collected data green practices were appreciated by the hotel guests as portrayed in data. Giving close attention to the responses of the hotel guests and scrutinising the ideas shared by the hotel employees reveal an intriguing fact. In general, the hotel customers have accepted the green practices and showcased their willingness to integrate with them show their satisfaction as indicated by Acampora et al. (2022). However, when certain green initiatives hinder their ability to enjoy the stay or relaxation, they seem to be displeased. Furthermore, it is understandable through the results that customer satisfaction has a positive relationship to green initiatives implemented by hotels overall.

5.3. Strategies to improve customer satisfaction on Green Practices

With the aim of enhancing customer satisfaction on green principals, several key strategies were proposed with reference to literature and the feedback received from the interviewees. One strategy accepted by the interviewees is providing knowledge on green practices to the employees of hotels. This strategy has been mentioned by Yu et al. (2017) who stated that when green knowledge of employees is insufficient, the implementation of green practices and presentation of green practices to the customers gets adversely affected. Thus, a key strategy that hotels can adopt is to ensure that their employees understand how to implement green practices and effectively interact with customers during their stay in green hotels.

Increasing customer awareness on green practices is a strategy that was suggested by the hotel managements. This idea is cited by Chen and Peng (2014), who stated that the customers have to be educated about green practices by making them available within the hotel premises or on the hotel website providing detailed information about the green practices of the hotels. On the contrary, Yarimoglu & Gunay (2019) and Ahn et al. (2019) argued that customers training could negatively affect customer satisfaction, if implemented in an unfavourable way. The study also acknowledged that communicating and promoting green practices will provide improved satisfaction for customers and bring benefits to hotel as well. This idea is clearly emphasised by the study of Mogaji et al. (2022) as well where it highlights the importance of effectively communicating the green initiatives. The customers will be satisfied when they are made aware of the green practices and the benefits. Further supporting this argument, Gao and Mattila (2014) stated that regardless of the service outcome, customer satisfaction would be higher when customers perceive that the hotel has engaged green initiatives

to help the society.

Projecting and maintaining the image of the hotel with regard to green is important to achieve customer satisfaction. Sri Lankan hotels have to maintain globally recognised standards as a strategy, which was endorsed by the interviewees as well. The literature also noted the advantages of maintaining a reputable green image and complying with global standards. Studies by Mohiuddin & Al-Amin, (2022) and Martínez (2015) highlighted that acquiring a reputable green image through environmental certifications (Green Globe Certification, Energy Star, Green Seals) help customers to trust the commitment and dedication of the companies towards becoming truly green. Thus, the companies have to adopt green concepts not just as a mere marketing tool but as a core fundament of the business. As confirmed through the research findings, improving feedback gathering will help collect honest responses, ideas, and suggestions of the customers and provide an insight into how the green activities of the hotels can be initiated to enhance the ECCB.

6. Conclusions

The study aimed to investigate the impact of green practices on ECCB in Sri Lankan hotels. Authors adopted a mixed research approach achieving the aim of the study. In this regard, three prominent hotels in Sri Lanka were studied to collect the required data for the research. Initially a comprehensive literature review was carried out and the key findings of the literature were taken as a benchmark to analyse the current level of green practices in the hotels. As per the findings, all three hotels were found to implement seven key green practices such as: Water conservation, Energy conservation, Solid waste management, Air quality, Environmental purchasing, Community awareness, and maintenance of permits to a satisfactory level.

The study assessed customer satisfaction on green practices in three hotels using a questionnaire survey among 117 hotel customers. The findings revealed that customers showcased a positive satisfactory level towards green initiatives such as environmental purchasing, water and energy conservation, community awareness, air quality maintenance, solid waste management, and permit maintenance. However, satisfaction was lower for linen reuse, customer training on green activities, and the use of refillable bottles due to concerns about hygiene and perceived interference with freedom and privacy. Moreover to identify strategies to enhance ECCB authors conducted interviews with hotel staff and management to identify key strategies such as educating hotel staff, improving customer feedback mechanisms, educating customers, promoting research, and benchmarking against global standards.

The contributions of the study are twofold. Initially from a theoretical perspective the study fills the knowledge gap on ECCB in green hotels in the context of Sri Lanka by identifying factors that affect ECCB pertaining to green practices. Moreover, the study presents a reliable outcome in which it presents how hotel consumers perceive each and every green practice and their underlying factors. This provides a clear idea on how consumers response to existing green practices in the Sri Lankan hotels.

Secondly, from an industry perspective the study provides insights to Sri Lankan hotel owners on how to incorporate green initiatives into their businesses and increase ECCB, which will ultimately increase the profitability of the hotels and ultimately to the environment. The developed strategies can be directly used by hotel management in reinventing how to approach the ecologically conscious customer base and wining their trust. As a practical implication, the findings on customers behavioral patterns with regards to green practices could be used as guidelines for green hotels to improve their delivery of service in satisfying clients.

7. Future research areas

The study invites for further research in few aspects. The study opens an avenue to investigate on ECCB of Sri Lankan hotel customers from a different perspective. Policy makers

and regulatory bodies could use this study as a guideline to investigate how important ECCB on economy and tourism development. This would create an impactful link between the hotel sector, authorities and consumers.

From a practical perspective considering the green hotel sector, this study opens the way to study on the barriers in implementing the identified new strategies to increase ECCB.

Future research can explore the cultural factors that shape consumer perceptions and behaviors related to green practices in hotels and investigate how cultural differences impact the effectiveness of eco-friendly initiatives and if there are variations in consumer responses across different regions. Moreover, there is a vacuum to research on validating the identified strategies on real case scenarios. Researchers can investigate the feasibility of the suggested strategies in real cases and assess the accuracy and the usability as well.

References

Abdou, A. H., Shehata, H. S., Mahmoud, H. M. E., Albakhit, A. I., & Almakhayitah, M. Y. (2022). The Effect of Environmentally Sustainable Practices on Customer Citizenship Behavior in Eco-Friendly Hotels: Does the Green Perceived Value Matter? *Sustainability*, *14*(12), 7167. https://doi.org/10.3390/su14127167

Acampora, A., Lucchetti, M. C., Merli, R., & Ali, F. (2022). The theoretical development and research methodology in green hotels research: A systematic literature review. *Journal of Hospitality and Tourism Management*, *51*, 512-528.

Adrita, U. W., & Mohiuddin, M. F. (2020). Impact of opportunity and ability to translate environmental attitude into ecologically conscious consumer behavior. *Journal of Marketing Theory and Practice*, *28*(2), 173-186.

Ahn, J., & Kwon, J. (2019). Green hotel brands in Malaysia: perceived value, cost, anticipated emotion, and revisit intention. *Current Issues in Tourism, 23*(12), 1559-1574. 10.1080/13683500.2019.1646715

Albaum, G. (1997). The Likert scale revisited. *International Journal of Market Research, 39*(02), 1-24. doi:-doi:10.1177/147078539703900202

Alexander, S. (2002). Green hotels: Opportunities and resources for Success. In C. Kennedy (Ed.), *Zero Waste Alliance*. Retrieved from https://docplayer.net/14204743-Green-hotels-opportunities-and-resources-for-success.html

Amandeep, A. (2017). Green hotels and sustainable hotel operations in India. *International Journal of Management and Social Sciences Research*, *06*(02), 13-16.

Ankush, A., & Megha , G. (2015). Green hotels: A step towards environmental. *Global Journal For Research Analysis, 04*(03), 1-2. doi:10.15373/2249555X

Akehurst, G., Afonso, C. & Martins Gonçalves, H. (2012) Re-examining green purchase behaviour and the green consumer profile: new evidences. *Management Decision, 50*, 972– 988. doi:10.1108/00251741211227726

Arachchi, R. (2014). Perception of the eco tourism concepts and its practices in the hotel industry: The case in eco resorts in Sri Lanka. *Wayamba Journal of Management , 03*(02), 30-43.

Arachchi, R.S.S.W., Khatibi, A., & Shukri, M. (2015). Comparison of Eco-Tourism Practices in Sri Lankan Eco Resorts from Customer and Supplier Viewpoint. *International Journal of Liberal Arts and Social Science 3*. 22-34.

Bandara, S. G. D. K., Abdeen, F. N., Disaratna, V., & Perera, B. A. K. S. (2020). Employee welfare and job satisfaction in the Sri Lankan hotel industry. *International Journal of Construction Management*, 1–10. doi:10.1080/15623599.2020.1839705

Baloglu, S., & Millar, M. (2011). Hotel guests' preferences for green guest room attributes. *Cornell Hospitality Quarterly, 52*(3), 302–311. doi:10.1177/1938965511409031

Benson, J. (2013). Sustainable strategies for green hotel design. *Master's Theses and Doctoral Dissertations, 556.* http://commons.emich.edu/theses/556

Berezan, O., Millar, M., & Raab, C. (2014). Sustainable hotel practices and customer satisfaction levels. *International Journal of Hospitality and Tourism Administration, 38*(03), 361-387.

Blose, J. E., Mack, R. W., & Pitts, R. E. (2014). The Influence of Message Framing on Hotel Guests' Linen-Reuse Intentions. *Cornell Hos-*

pitality Quarterly, 56(2), 145–154. doi:10.1177/1938965514556480

Brochado, A., Teiga, N., & Oliveira-Brochado, F. (2017). The ecological conscious consumer behaviour: are the activists different?. *International Journal of Consumer Studies*, *41*(2), 138-146.

Check, J., & Schutt , R. (2012). Survey research. *Research methods in education*, 159–185.

Chen, A., & Peng, N. (2014). Recommending green hotels to travel agencies' customers. *Annals of Tourism Research, 48*, 284–289. doi:10.1016/j.annals.2014.07.003

Chen, J. (2015). From sustainability to customer loyalty: a case of full service hotels' guest. *Journal of Retailing and Consumer Services, 22*(2015), 261-265. 10.1016/j.jretconser.2014.08.007

Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). *Qualitative Research Designs, 35*(2), 236–264. https://doi.org/10.1177/0011000006287390

Dawson, C. (2002). *Practical research methods : a user-friendly guide to mastering research techniques and projects.* How to Books.

de Silva, P. O., Herath, H. M. J. ., & Udawaththa, U. D. I. . (2021). The Implication of Green Balanced Scorecard on Sustainable Performance in the Hospitality Industry. *17th International Conference on Business Management*, 203–227.

Dissanayake, D. M. M. I., & Samarathunga, W. H. M. S. (2021). Post-war city to a tourism city: the perspectives of local stakeholders on post-war city tourism development in Jaffna, Sri Lanka. *International Journal of Tourism Cities*.

Dodds, R., & Holmes, M., (2016). Hotel & business management is there a benefit from being green? Assessing benefits from marketing sustainability by North American hotels. *Journal of Hotel & Business Management*, *5*(2), 1–9. https://doi.org/10.4172/2169-0286.1000145.

Dominici, G., & Guzzo, R. (2010). Customer Satisfaction in the Hotel Industry: A Case Study from Sicily. *International Journal of Marketing Studies, 2*(2). doi:10.5539/ijms.v2n2p3

Dominici, G., & Guzzo, R. (2010). Customer Satisfaction in the Hotel Industry: A Case Study from Sicily. *International Journal of Marketing Studies, 2*(2). doi:10.5539/ijms.v2n2p3

Edwards, R., & Holland, J. (2013). *What is qualitative interviewing?* Bloomsbury Academic, London. https://doi.org/10.5040/9781472545244

Ernst & Young's (2008). Global hospitality insights–hospitality going green. *Hotel News Resource*. https://www.hotelnewsresource.com/article36072.html

Fernando, S., Bandara, J. S., & Smith, C. (2017). *Tourism in Sri Lanka. The Routledge Handbook of Tourism in Asia* In M. C. Hall & S. J. Page (Eds.), 251-264. Abingdon,Oxon, UK: Routledge.

Fernando, S.L.J., & Shariff, N. M. (2013). Wetland ecotourism in Sri Lanka: Issues and challenges. *Geografia. International Journal of Development, Society and Environment. 9*, 99-105.

Fernández-Robin, C., Celemín-Pedroche, M. S., Santander-Astorga, P., & Alonso-Almeida, M. D. M. (2019). Green practices in hospitality: A contingency approach. *Sustainability*, *11*(13), 3737.

Flick, U. (2018). *An introduction to qualitative research*. Sage Publications Limited.

Follows, S.B. & Jobber, D. (2000). Environmentally responsible purchase behaviour: a test of a consumer model. *European Journal of Marketing, 34*, 723–746. doi:10.1108/03090560010322009

Gao, Yixing & Mattila, Anna. (2014). Improving consumer satisfaction in green hotels: The roles of perceived warmth, perceived competence, and CSR motive. *International Journal of Hospitality Management. 42*. 20–31. 10.1016/j.ijhm.2014.06.003.

Geerts, W. (2014). Environmental certification schemes: hotel managers' views and perceptions. *International Journal of Hospitality Management, 39*, 87-96. https://doi.org/10.1016/j.ijhm.2014.02.007

Goncalves, O., Robinot, E., & Michel, H. (2016). Does It Pay to Be Green? The Case of French Ski Resorts. *Journal of Travel Research*, *55*(7), 889-903. https://doi.org/10.1177/0047287515601238

Graci, S., & Dodds, R. (2008). Why go green? The business case for environmental commitment in the Canadian hotel industry. *Anatolia*, *19*(02), 251-270. https://doi.org/10.1080/13032917.

2008.9687072

Gunapala, A. (2014, July). Factors Affecting Customer Satisfaction Related to the Tourist Hotel Industry in Sri Lanka. *Journal of Tourism and Hospitality Management, 2*(7), 265-278. doi:10.17265/2328-2169/2014.07.001

Han, H., Hsu, L., Lee, J., & Sheu, C. (2011). Are lodging customers ready to go green? An examination of attitudes, demographics, and eco-friendly intentions. *International Journal of Hospitality Management, 30*(02), 345-355. 10.1016/j.ijhm.2010.07.008

Han, H., Lee, J.-S., Trang, H. L. T., & Kim, W. (2018). Water conservation and waste reduction management for increasing guest loyalty and green hotel practices. *International Journal of Hospitality Management, 75*, 58–66. doi:10.1016/j.ijhm.2018.03.012

Han, X., & Chan, K. (2013). Perception of green hotels among tourists in Hong Kong: An exploratory study. *Services Marketing Quarterly, 34*(4), 339–352. doi:10.1080/15332969.2013.827069

Hays, D., & Ozretic-Dosen, D. (2014). Greening hotels - building green values into hotel services. *Tourism and Hospitality Management, 20*(1), 85–102

Heisterkamp, M. (2009). Guests Expect More from Green Programs. *Hotel & Motel Management: Green Focus*: http://www.HotelWorldNetwork.com/heisterkamp

Hemmelskamp, J., & Brockmann, K. (1997). Environmental labels -The German 'blue angel'. *Futures, 29*(01), 67–76.

Hsieh, Y. (2012). Hotel companies environmental policies & practices: A content analysis of web pages. *International Journal of Contemporary Hospitality Management , 24*(01), 97–121. doi.org/10.1108/095961112

Jayasinghe, J. A. S. C., & Weerasekara, W. M. T. K. (2021). Impact of green attributes on revisiting intentions of tourists in sri lankan hotels : The mediating effect of overall satisfaction impact of green attributes on revisiting intentions of tourists in sri lankan hotels . *Sri Lanka Journal of Marketing*, *March*. https://doi.org/10.4038/sljmuok.v7i0.47

Jeong, E., & Jang, S. (2010). Effects of restaurant green practices: Which practices are important and effective?. *Caesars Hospitality Research Summit.*

Jiang, Y., & Kim, Y. (2015). Developing multi-dimensional green value: Extending social exchange theory to explore customers' purchase intention in green hotels – evidence from Korea. *International Journal of Contemporary Hospitality Management, 27*(02), 308–33. doi.org/10.1108/IJCHM-08- 2013-0383

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of advanced nursing*, *72*(12), 2954-2965.

Kasim, A. (2004). Socio-environmentally responsible hotel business: Do tourists to Penang Island, Malaysia care?. *Journal of Hospitality & Leisure Marketing, 11*(04), 5–28. doi.org/10.1300/J150v11n04_02

Khan, S. A. R., Yu, Z., Umar, M., & Tanveer, M. (2022). Green capabilities and green purchasing practices: A strategy striving towards sustainable operations. *Business Strategy and the Environment*.

Khatter, A., White, L., Pyke, J., & McGrath, M. (2021). Barriers and drivers of environmental sustainability: Australian hotels. *International Journal of Contemporary Hospitality Management*, *33*(5), 1830–1849. https://doi.org/10.1108/IJCHM-08-2020-0929

Kim, T., & Ha, J. (2022). An investigation of customer psychological perceptions of green consciousness in a green hotel context: Applying an extended theory of planned behaviour. *International Journal of Environmental Research and Public Health*, *19*(11), 6795. https://doi.org/10.3390/ijerph19116795

Kularatne, T., Wilson, C., Månsson, J., Hoang, V., & Lee, B. (2019). Do environmentally sustainable practices make hotels more efficient? A study of major hotels in Sri Lanka. *Tourism Management, 71*, 213–225. doi:10.1016/j.tourman.2018.09.009

Latif, K. F., Pérez, A., & Sahibzada, U. F. (2020). Corporate social responsibility (CSR) and customer loyalty in the hotel industry: A cross-country study. *International Journal of Hospitality Management*, *89*, 102565. doi:10.1016/j.ijhm.2020.102565

Lee, J., Hsu, L., Han, H., & kim, Y. (2010). Understanding how con-

sumers view green hotels: How a hotel's green image can influence behavioural intentions. *Journal of Sustainable Tourism, 18*(7), 901–914. doi.org/10.1080/09669581003777747

Li, H., Liu, Y., Tan, C.-W. and Hu, F. (2020). Comprehending customer satisfaction with hotels: Data analysis of consumer-generated reviews, *International Journal of Contemporary Hospitality Management, 32*(5), 1713-1735. https://doi.org/10.1108/IJCHM-06-2019-0581

Li, X., Yu, Y., & Jai , T.-M. (2017). The impact of green experience on customer satisfaction: evidence from TripAdvisor . *International Journal of Contemporary Hospitality Management, 29*(5), 1340-1361. doi.org/10.1108/IJCHM-07-2015-0371

Lin, H. Y., Hsu, M. H., (2013). Using social cognitive theory to investigate green consumer behavior. *Business Strategy and the Environment*

MacKay, R. B., & McKiernan, P. (2004). Exploring strategy context with foresight. *European Management Review, 1,* 69–77. https://doi.org/10.1057/PALGRAVE.EMR.1500010

Madhunimasha, C., & Pathmini, S. (2019). *The Impact of Green Marketing Mix Strategies on Customer-Based Brand Equity in Green Hotels : Matale District in Sri Lanka.* 2008.

Manaktola, K., & Jauhari, V. (2007). Exploring consumer attitude and behaviour towards green practices in the lodging industry in India. *International Journal of Contemporary Hospitality Management, 19*(5), 364-377. doi:http://dx.doi.org/10.1108/09596110710757534

Martínez, P. (2015). Customer loyalty: exploring its antecedents from a green marketing perspective. *International Journal of Contemporary Hospitality Management, 27*(5), 896–917. doi:10.1108/ijchm-03-2014-0115

Martínez García de Leaniz, P., Herrero Crespo, Á., & Gómez López, R. (2018). Customer responses to environmentally certified hotels: The moderating effect of environmental consciousness on the formation of behavioural intentions. *Journal of Sustainable Tourism*, *26*(7), 1160-1177

Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *qualitative social research,* 11(3).

Miller, M., Mayer, K., & Baloglu, S. (2012). Importance of green hotel attributes to business and leisure travellers. *Journal of Hospitality Marketing & Management , 21*(4), 395–413. dx.doi.org/10.1080/19368623.2012.624294

Mogaji, E., Adeola, O., Adisa, I., Hinson, R. E., Mukonza, C., & Kirgiz, A. C. (2022). Green marketing in emerging economies: communication and brand perspective: an introduction. In *Green Marketing in Emerging Economies*. 1-16. Palgrave Macmillan, Cham

Mohiuddin, M., & Al-Amin, S. (2022). Green management in SMEs of Bangladesh: Present Scenario, implementation obstacles and policy options. *American Academic Scientific Research Journal for Engineering*, *85*(1), 278–286. https://asrjetsjournal.org/index.php/American_Scientific_Journal/article/view/7248%0Ahttp://asrjetsjournal.org/

Molina-Azorín, J. F. (2009). Understanding how mixed methods research is undertaken within a specific research community: The case of business studies. *International Journal of Multiple Research Approaches*, *3*(1), 47-57.

Moise, M. S., Gil-Saura, I., Eugenia, M., Molina, M.E.R. (2021). The importance of green practices for hotel guests : does gender matter ? *Economic Research Ekonomska Istraživanja, 34*(1), 3508–3529. https://doi.org/10.1080/1331677X.2021.1875863

Mulhall, A. (2003). In the field: notes on observation in qualitative research. *Journal of advanced nursing*, *41*(3), 306-313.

Nekmahmud, M., Ramkissoon, H., & Fekete-Farkas, M. (2022). Green purchase and sustainable consumption: A comparative study between European and Non-European tourists. *Tourism Management Perspectives*, *43*,

Nguyen, N. P., & Mogaji, E. (2022). A theoretical framework for the influence of green marketing communication on consumer behaviour in emerging economies. In *Green Marketing in Emerging Economies* (pp. 253-274). Palgrave Macmillan, Cham.

Othman, A. R., Yin, T. S., Sulaiman, S., Ibrahim, M. I. M., & Razha-Rashid, M. (2011). Application of mean and

standard deviation in questionnaire surveys. *Menemui Matematik (Discovering Mathematics)*, *33*(1), 11-22.

Patwary, A. K., Omar, H., & Tahir, S. (2020). The impact of perceived environmental responsibility on tourists' intention to visit green hotel: The mediating role of attitude. *Geojournal of Tourism and Geosites*, *34*(1), 9–13. https://doi.org/10.30892/GTG.34101-612

Perramon, J., Alonso-Almeida, M. del M., Llach, J., & Bagur-Femenías, L. (2014). Green practices in restaurants: Impact on firm performance. *Operations Management Research, 7*(1-2), 2–12. doi:10.1007/s12063-014-0084-y

Pham, N. T., Chiappetta Jabbour, C. J., Vo-Thanh, T., Huynh, T. L. D., & Santos, C. (2023). Greening hotels: Does motivating hotel employees promote in-role green performance? The role of culture. *Journal of Sustainable Tourism*, *31*(4), 951-970.

Pirani, S. I., & Arafat, H. A. (2016). Reduction of food waste generation in the hospitality industry. *Journal of Cleaner Production, 132*, 129–145. doi:10.1016/j.jclepro.2015.07.146

Prakash, S., Sharma, V. P., Singh, R., & Vijayvargy, L. (2022). Adopting green and sustainable practices in the hotel industry operations- an analysis of critical performance indicators for improved environmental quality. *Management of Environmental Quality. 34*(4), 1057-1076. https://doi.org/10.1108/MEQ-03-2022-0090

Pushpanathan, A., & Lanka, S. (2021). Green marketing practices and customer purchase intention : a study of restaurants in Vavuniya town area. *Journal of Business Management, 4*(02), 50–67.

Rahman, I., Reynolds, D., Svaren, S. (2012). How green are in North American hotels? An exploration of low-cost adoption practices. International Journal of Hospitality Management, 31(03), 720-727.

Roberts, J. A. (1996). Green consumers in the 1990s: Profile and implications for advertising. *Journal of Business Research, 36*(3), 217–231. https://doi.org/10.1016/0148-2963(95)00150-6

Robinot, E., & Giannelloni, J.-L. (2010). Do hotels' 'green' attributes contribute to customer satisfaction?. *Journal of Services Marketing, 24*(02), 157–169. http://doi.org/10.1108/08876041011031127

Rogerson, J., & Sims, S. (2012). The greening of urban hotels in South Africa: Evidence from Gauteng. *Urban Forum , 23*(3), 391–407. doi:10.1007/s12132-012-9160-2

Rudestam, K. E., & Newton, R. R. (2007). The method chapter: Describing your research plan. Surviving your dissertation: A comprehensive guide to content and process, 87-117.

Salem, I. E., Elbaz, A. M., Al-Alawi, A., Alkathiri, N. A., & Rashwan, K. A. (2022). Investigating the role of green hotel sustainable strategies to improve customer cognitive and affective image: Evidence from PLS-SEM and fsQCA. *Sustainability*, *14*(6). https://doi.org/10.3390/su14063545

Sheth, J. N., Sethia, N. K., & Srinivas, S. (2011). Mindful consumption: A customer-centric approach to sustainability. *Journal of the academy of marketing science*, *39*, 21-39.

Saufi, M. (2016). The Effectiveness of go green implementation among Society in Kota Bharu, Kelantan . *European Journal of Multidisciplinary Studies, 01*(01), 7-11.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students*, (8thed). UK: Pearson.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H. & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & Quantity*, 52(4), 1893-1907.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students* (5th ed.). Harlow, England: Prentice Hall.

Shao, M., Wang, X., Bu, Z., Chen, X., & Wang, Y. (2020). Prediction of energy consumption in hotel buildings via support vector machines. *Sustainable Cities and Society*, *57*(102128), 1-9. doi:10.1016/j.scs.2020.102128

Silva, L., Dissanayake, P., Kumarasiri, B. and Soorige, D. (2021). Customer loyalty towards sustainable hotels: Case studies in Sri Lanka. In: Sandanayake, Y.G., Gunatilake, S. and Waidyasekara, K.G.A.S (Eds.), *Proceedings of the 9th World Construction Symposium, 9-10*

July 2021, Sri Lanka. pp. 231-243

Singh, N., Cranage, D., & Lee, S. (2014). Green strategies for hotels: estimation of recycling benefits. *International Journal of Hospitality Management, 43*, 13-22. https://doi.org/10.1016/j.ijhm.2014.07.006

Smith, E., & Perks, S. (2010). A perceptual study of the impact of green practice implementation on business functions. *Southern Africa Business Review, 03*(14), 1–29.

Sri Lanka Tourism development Authority [SLTDA]: Tourism industry report. 2018. [accessed 2018 Dec 1].Retrieved from http://www.sltda.lk/sites/default/files/industry-report-Q2-2018.pdf.

Suki, N. M., & Suki, N. M. (2015). Consumers' environmental behaviour towards staying at a green hotel: Moderation of green hotel knowledge. *Management of Environmental Quality: An International Journal, 26*(1), 103-117. doi.org/10.1108/MEQ-02-2014-0023

Taherdoost, H. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. *International Journal of Academic Research in Management (IJARM), 5*(3). https://ssrn.com/abstract=3205040

Tahiri, A., Kovaçi, I., Lekiqi, B., & Rexhepi, A. (2021). Tourism and hotel industry: Definition, concepts and development – the case of Kosovo. *Quality - Access to Success*, *22*(182), 110–115.

Taufique, K. M. R., Siwar, C., Chamhuri, N., & Sarah, F. H. (2016). Integrating general environmental knowledge and eco-label knowledge in understanding ecologically conscious consumer behaviour. *Procedia Economics and Finance*, *37*, 39-45.

Teng, C.-C., Lu, A.C.C. and Huang, T.-T. (2018), Drivers of consumers' behavioural intention toward green hotels. *International Journal of Contemporary Hospitality Management, 30*(2), 1134-1151. https://doi.org/10.1108/IJCHM-04-2017-0203

The Green Hotels Association USA (2022). *What Are Green Hotels?* Retrieved 31 July 2022, from http://greenhotels.com/index.php.

Timothy, D., Teye, V. (2009). Tourism and the Lodging Sector. London: Routledge, https://doi.org/10.4324/9780080942810

Tolba, M. (2014). Strengths and weaknesses in the assessment of sustainable tourism: a case study of the Nabq protected area in Egypt. *Sustainable tourism VI , 187*, 1-12. 10.2495/ST140121

Trip Advisor, (2013), "Trip Advisor Green Leaders™ Program highlights eco-friendly hotels to help travelers plan greener trips", available at: www.tripadvisor.com/PressCenter-i5903-c1-Press_Releases.html (accessed 24 June 2020).

Tzschentke, N., Kirk, D., & Lynch, P. (2004). Reasons for going green in serviced accommodation establishments. *International Journal of Contemporary Hospitality Management, 16*(02), 116-124. https://doi.org/10.1108/09596110410520007

Verma, V. K., & Chandra, B. (2016). Hotel guest's perception and choice dynamics for green hotel attribute: A mix method approach. *Indian Journal of Science and Technology, 9*(1), 1–9. https://doi.org/10.17485/ijst/2016/v9i11/82635

Vlaeminck, P., Jiang, T., Vranken, L., 2014. Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket. *Ecological Economics 108*, 180-190.

Wijesundara, N. (2018). Adoption of sustainable tourism practices by hotel operators in Deep South of Sri Lanka. *International Journal of Research in Management Science and Technology. 5*(6), 1-11.

Weerakoon, W. M. S. M. B., & Arulrajah, A. A. (2021). *Employee Green Behaviour of Selected Hotels in Polonnaruwa Area of Sri Lanka*. *11*(1)

Wolff, C. (2008). Second Nature. *Lodging Hospitality, 64*(2), 24-26. doi:10.17485/ijst/2016/v9i5/77601

World Trade Organization. (2022). Why tourism?. *World Tourism Barometer*. Retrieved from: http://www2.unwto.org/content/why-tourism.

World Travel and Tourism Council; Travel & tourism economic impact. 2018 [accessed 2018 Dec 20]. Retrieved from https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2018/srilanka2018.pdf

Yang, Y., Jiang, L., & Wang, Y. (2023). Why do hotels go green? Understand-

ing TripAdvisor GreenLeaders participation. *International journal of contemporary hospitality management*, *35*(5), 1670-1690.

Yarimoglu. E., & Gunay T. (2019). The extended theory of planned behaviour in Turkish customers' intentions to visit green hotels. *Business Strategy and the Environment*, *29*(3), 1097-1108. https://doi.org/10.1002/bse.2419

Yin, R. K. (2018). *Case study research and applications* (Vol. 6). Thousand Oaks, CA: Sage.

Yin, R. K. (2015). *Qualitative research from start to finish*. Guilford publications.

Yu, Y., Liu, J., Feng, N., Song, B., & Zheng, Z. (2017). Combining sequence and Gene Ontology for protein module detection in the Weighted Network. *Journal of Theoretical Biology, 412,* 107–112. https://doi.org/10.1016/j.jtbi.2016.10.010

Yusnita, Y., Ibrahim, Y., & Awang, Z. (2016). The influence of a green image and customer satisfaction towards customer loyalty in the hotel industry. *International Conference on Hospitality and Tourism Management, 04*, 69-79 doi.org/10.17501/icoht.2016.4109

Yusof, N., Awang, H., & Iranmanesh, M. (2017). Determinants and outcomes of environmental practices in Malaysian construction projects. *Journal of Cleaner Production, 156,* 345–354. https://doi.org/10.1016/J.JCLEPRO.2017.04.064

Zhang, L., Wu, J., Liu, H., & Zhang, X. (2017). The value of going green in the hotel industry: Evidence from Beijing. *Real Estate Economics, 48*(1), doi:10.1111/1540-6229.12225

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Reflections on the vernacular mosques in the Souf region, Algeria: An attempt to inventory the local architectural language

Sami ZERARI [1]*, Alessandra CIRAFICI[2], Leila SRITI[3], Vincenzo PACE[4], Alice PALMIERI[5]
[1] sami.zerari@unicampania.it • Department of Architecture and Industrial Design, University of Campania "Luigi Vanvitelli", Aversa, Italy
[2] alessandra.cirafici@unicampania.it • Department of Architecture and Industrial Design, University of Campania "Luigi Vanvitelli", Aversa, Italy
[3] l.sriti@univ-biskra.dz • Department of Architecture, Faculty of Science and Technology, University of Biskra, Biskra, Algeria
[4] vincenzo.pace@unipd.it • Department of Philosophy, Sociology, Education and Applied Psychology, University of Padova, Padova, Italy
[5] alice.palmieri@unicampania.it • Department of Architecture and Industrial Design, University of Campania "Luigi Vanvitelli", Aversa, Italy

*Corresponding author
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Abstract
The architectural design of mosques has evolved and been interpreted within various Islamic countries, influenced by diverse local contexts and specific circumstances. This article investigates the vernacular mosques in the Souf region, located in the southeast of Algeria. The study aims to reveal the local architectural language used in these mosques in order to develop an inventory of vernacular mosques. The investigation employs a hybrid approach, combining historical research methods, morphological analysis, and typology. The tools and techniques of data collection were based mainly on architectural surveys, in-situ observations, and non-directive interviews with the local inhabitants (testimonies). The findings confirmed that although the architecture of the vernacular mosques of the Souf respects the archetype of the Arab mosque and expresses a vernacular style particular to the region. However, their three-dimensional morphology presents a specific silhouette that is not found elsewhere in Algeria. These mosques are distinguished by their staircase minaret and raised dome (on a double tambour), which often dominates the mosques by their height and monumentality.

Keywords
Architectural language, Inventory, The Souf region (Algeria), Vernacular mosques.

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1. Introduction

From the earliest human communities, religion has played a pivotal role in shaping the identity of people through various dimensions. Over time, religious buildings and places of worship have evolved into enduring elements of cultural heritage, passed down from one generation to the next. Temples, churches, and mosques are among the most prevalent embodiments of religious architecture, serving as spaces for veneration, meditation, and spiritual practice for groups as well as individuals.

The emergence and widespread adoption of Islam since the 7th century A.D. have bequeathed an undeniable cultural legacy. The mosque stands as the principal religious structure in Islam, serving a multitude of functions, including congregational prayer (*salat al-jama'ah*). In its most elemental and widely prevalent form, the medieval mosque encompasses a courtyard surrounded by a portico adjoining a covered room. However, this description, despite its deliberate inclusiveness, hardly captures the diversity of forms and uses that define this quintessential religious edifice (Hillenbrand, 1985). The mosque embodies the meanings of the Muslim religion in its symbolic and aesthetic aspects. As a sacred building, the mosque is an iconic system through which a religion shows how the world is represented in all its aspects and vital spheres (Knott et al., 2016; Sklair, 2010). In this sense, by configuring the vital space of a city and a village, the mosque can reflect the specific characteristics of the natural environment and the anthropic space in which this sacred building was built (Becci et al., 2013).

The architecture of mosques presents a wide range of styles, shaped by influences such as cultural and geographical environments, the patron's intentions, and the skills of the builders and artisans involved in the construction process (Taib & Rasdi, 2012). Furthermore, political factors have significantly contributed to shaping artistic styles, with each authority and dynasty seeking to imprint its own artistic personality on the environment (Benyoucef, 2005, p.13). This has resulted in a diversity of stylistic interpretations across different parts of the Islamic world. Most scholars of Islamic art and architecture categorise mosque architecture into three major stylistic families (or stylistic models): the Arab Mosque (also known as a hypostyle mosque), the Persian Mosque (Iwan mosque), and the Ottoman Mosque (central-dome mosque). Each stylistic family has its developmental stages, from its inception to the zenith of its architectural expression. In addition to these three main stylistic families (Figure 1), Saoud and Al-Hassani (2002) add a fourth. This is a category of mosques that were developed by Mongol patronages in the Indian subcon-

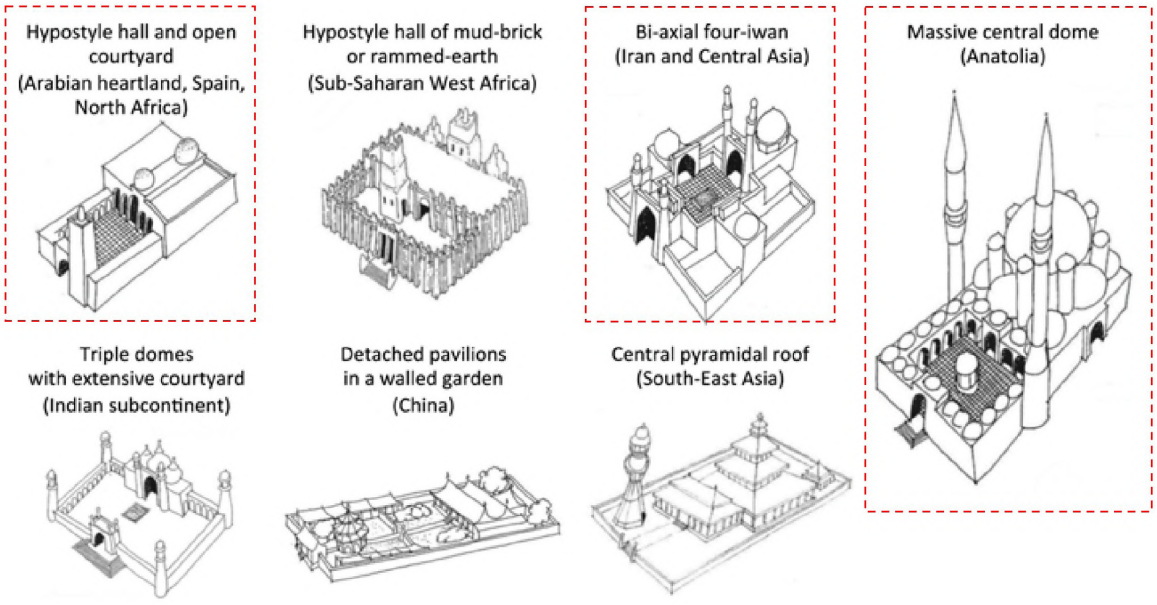


Figure 1. *Mosque types around the world (Van-Der-Wusten, 2015).*

tinent. The morphology of Mongolian mosques is the result of a combination of the three styles mentioned above with a taste for a new style derived from the local culture. These mosques feature a horizontal hypostyle hall, a flat roof covered by a large bulbous dome, and a large entrance porch reminiscent of Persian mosques. Other styles, such as the Chinese style or the African style, also exist but are not considered to be the main forms of mosques and are not called typical mosque models, as their countries do not form Islamic empires and have less influence (Kamiya, 2006).

The architecture of the Arab mosque has been interpreted in two different ways. In major capitals, the mosques were constructed under the patronage of the rulers, who have given them a monumental appearance. It was the time of the emergence of the so-called "Hispano-Maghreb" or "Hispano-Moorish" style that reflected the potency and prestige of the rulers. In contrast, in villages and hamlets, the adoption of the Arab mosque model gave rise to vernacular architecture (Zerari et al., 2023), as exemplified in the Saharan regions of Algeria, where mosque architecture exhibits a diverse array of designs, each reflecting the characteristics of its respective region.

In this regard, most researchers and academicians agree that the term "vernacular" expresses usage in everyday life by ordinary people in a particular region. Thus, "vernacular architecture" can be defined as an architectural style shaped by local needs, the availability of building materials, and adherence to local traditions at a particular time and place; usually of unknown authorship and making little reference to the "chief styles" or theories of architecture. "Chief styles" refer to architectural expressions and designs that typify a particular architecture during a defined period (Zwerger, 2019).

Vernacular architecture comprises diverse architectural forms, whether they are used for sacred or profane purposes. It is shaped not by formally educated architects, but by the design aptitude, expertise, and traditions of local builders. Giuseppe Pagano was the first to coin the term "spontaneous architecture" to describe vernacular architecture, emphasising its natural rather than haphazard character (Asadpour, 2020). Paul Oliver was among the pioneering scholars who dedicated significant efforts to researching vernacular architecture, its typology, and related definitions. The term "vernacular" in the context of architecture was popularised through his contributions to the field of linguistics (Asadpour, 2020; Damyar & Nari Ghomi, 2012, p.72; Oliver, 1996). According to Hourigan (2015), the term "vernacular" and its associated vocabulary such as "traditional", "everyday", "local", and "indigenous" are not clearly defined or interpreted across educational disciplines. The study of the vernacular in architectural research seems to wage a continuing battle against the questioning of its relevance and boundaries.

As Islam spread across the Saharan regions of Algeria, various local architectural styles developed, some of which remain relatively unknown, particularly in minor cities, villages, and hamlets. This knowledge gap is particularly noticeable in the Souf region, located in the south-eastern part of Algeria. Surprisingly, the unique architectural style of vernacular mosques in the Souf has remained unexplored in previous scholarly investigations. These mosques have been overlooked in academic studies conducted within the region, despite their significance.

This oversight means that the vernacular mosques of the Souf represent a neglected aspect of the region's architectural heritage. They face the risk of gradual deterioration due to human activities and natural forces. Consequently, there is an urgent need for in-depth research and exploration of these mosques before they potentially vanish. This provides a substantial rationale for selecting the Souf region as the focus of the investigation.

While the fundamental principles of the Arab mosque archetype are retained, the architectural design of vernacular mosques in the Souf appears to be shaped by local specificities, resulting in a distinct typology specific to the region. It is worth noting that this notion of specificity is comprehensive, encompassing various dimen-

sions related to the local environment, including the physical, sociocultural, historical, geographical, and the incorporation of exogenous stylistic influences. Additionally, the vernacular mosques seem to share morphological similarities with vernacular residential architecture. Consequently, to enrich the present study and understand the architectural logic underlying these mosques, it is necessary to give a brief overview of residential architecture.

This article aims to reveal the local architectural language of the vernacular mosques in the Souf to develop a comprehensive inventory of vernacular mosques. It fills the existing knowledge gap by offering a deeper insight into the architectural and cultural dimensions of these vernacular mosques. By doing so, it contributes to the broader discourse on architectural diversity and cultural heritage, paving the way for their appreciation, conservation, and continued cultural significance.

To achieve these objectives, the present article employs a hybrid approach, combining morphological analysis, typology, and historical research methods.

2. Overview of the Arab Mosque architecture

Throughout the history of architecture, various mosque styles have evolved worldwide. However, to align with the focus of this study, it is pertinent to delve into the evolution of the Arab mosque.

The Arab Mosque is the oldest and most widespread style. It derives its name (Arab mosque) from the Arab ethnic group predominantly residing in the Arab world (or Arab homeland). The Arab Mosque typically consists of an open courtyard with a surrounding portico, a minaret with a square section, and a prayer room with several rows of columns (hypostyle prayer room), which are arranged parallel and/or perpendicular to the Qibla wall. The style of the Arab Mosque is primarily prevalent in regions such as the Maghreb (North Africa), Egypt, Arabia, and Syria, albeit with significant regional variations (Allani-Bouhoula, 2014; Hillenbrand, 1985). Over time, the Arab mosque architecture has evolved from simple designs and functions to more intricate forms and layouts.

The development of the Arab Mosque can be traced back to the Umayyad Empire (660–750 A.D.), followed by the Abbasid Empire (750–10th century). After the fall of the Abbasid, local dynasties emerged, asserting their hegemony in all Muslim territories. In the Maghreb, for instance, the influence of the Kharidjites in Spain and Egypt during the 9th–10th centuries resulted in the "Hispano-Maghreb" or "Hispano-Moorish" style mosque. This style drew inspiration from Umayyad mosques, particularly the Great Mosque of Damascus, featuring a rectangular shape, a wide, shallow prayer hall, naves parallel to the Qibla wall, and an axial nave (or axis of the Mihrab) perpendicular to the Qibla wall [1]. The Hispano-Maghreb style reached its zenith during the Almoravid (10th–12th centuries) and Almohad (12th–13th centuries) periods (Benyoucef, 2005, p.14; p.18). While retaining the fundamental characteristics of the Arab Mosque at the level of spatial organisation, the Hispano-Maghreb style introduced unprecedented dimensions of artistic expression, including intricate decoration.

In the introduction to his book "L'art religieux musulman en Algérie," Bouruiba (1973, p.5) noted that no important religious monuments have been left in Algeria by the Almohads, who succeeded the Hammadids and the Almoravids. Indeed, the Almohads certainly worked on the great mosque of Tlemcen and founded the Qubba of Sidi Abu Madyan. The absence felt in terms of important Almohad production was explained, according to the same author, by the fact that Abd Al-Mumin and his descendants were mainly interested in Morocco and Andalusia, which were so dear to them. Emblematic examples from the Almohad period, such as the Mosques of Tinmal, Kutubiyya, the Kasbah of Marrakech, the Mosque of Taza, the Mosque of Hassan in Rabat, and the Great Mosque of Seville, attest to the birth and flourishing of Hispano-Moorish art, serving as inspirations for subsequent generations.

Despite the Ottoman Empire's arrival in the 16th century, leading to the end of local dynastic rule in the Maghreb, the adoption of the Arab Mosque plan continued, particularly in regions less influenced by Turkish-Ottoman regency. The Saharan regions in the south of the Maghreb, in particular, maintained the Arab mosque style, showcasing distinctive stylistic expressions.

During the rule of local dynasties in the Maghreb, the architecture of Arab Mosques developed differently in major capitals compared to villages and hamlets. In major cities, rulers patronised mosques, imparting them with a monumental and prestigious appearance. In contrast, in rural areas, mosque construction evolved into vernacular architecture. Local builders interpreted the Arab Mosque according to their tastes, traditions, and site constraints. The communities collectively engaged in the construction process, under the guidance of skilled builders, thus creating vernacular mosque styles specific to each locality.

In this context, it is essential to recognise that vernacular mosques are the oldest and most continuous style in the history of Muslim religious architecture. Among the most universal vernacular mosques in the Maghreb are the Ibadite mosques found in Djerba, Tunisia, and the M'Zab Valley, Algeria. These mosques are distinguished from Arab-style mosques by several characteristics. According to Benkari (2019) and Prévost (2009), the most important characteristics of Ibadi mosques are the multiplication of mihrabs and the existence of an open-air prayer space in addition to the covered prayer room. Ibadi mosques present a sort of affinity, which relates them both to their Arab-Berber origins and to the principles of Ibadism [2].

3. The state of the art in morphological analysis and typology: A focus on mosques

Typo-morphology is a fundamental concept in architectural and urban studies, representing a multidisciplinary approach that focuses on the relationship between urban form, architecture, and the physical environment. This approach seeks to analyse and understand how the built environment and its spatial organisation shape and are shaped by society, culture, and history.

At its core, typo-morphology combines two key elements: "typo," referring to typology, which deals with the classification and categorisation of architectural and urban elements, and "morphology," which explores the formal and spatial characteristics of these elements (Khaznadar & Baper, 2023). Together, they form a comprehensive method for investigating the physical structure of cities, buildings, and public spaces.

According to Trotta-Brambilla and Novarina (2019), typo-morphology was developed in Italy by architects and urbanists in the early 1960s. It presents a diverse set of theoretical references, urban studies and analyses, projects, plans, and realizations, and can, for this reason, be considered as an urban planning model. Twenty years after its creation, typo-morphology spread to France, where French architects and urbanists drew from some of the elements that make up this model, interpreting and combining them with other urban references, with the perspective of inventing a new discipline: urban design.

The review of the state of the art is organised into two sections. The first section provides an overview of previous studies that have employed morphological analysis and typology as methods to investigate mosque architecture. The second section highlights the lack of research on vernacular mosques in the Souf region. The purpose of the state of the art is to establish an epistemological position concerning the subject of study within this article, emphasising its uniqueness and its scholarly contribution to existing knowledge.

Morphological analysis and typology have been instrumental in studying various categories of architecture, including places of Muslim worship. Notably, numerous studies have been conducted on mosques in regions where Islam has thrived, including Iraq, Tunisia, Turkey, Indonesia, Malaysia, Iran, Greece, and more. By critically evaluating these studies and comparing

their findings, it becomes evident that morphological analysis and typology often encompass a hybrid of chronological, stylistic, cultural, geographical, and other contextual factors. These methodologies have typically been applied to a set of mosques or specific mosque components such as domes and minarets. Moreover, architectural research on mosques has delved into formal, constructional, organisational, and decorative criteria, determined by scholars according to the objectives of their respective investigations (Alamdari et al., 2017; Asadi & Majidi, 2015; Ashkan et al., 2012; Budi & Wibowo, 2018; Ghouchani et al., 2019; Hüsnü, 2013; Istiqomah & Budi, 2013; Loukma & Stefanidou, 2017; Mustafa & Hassan, 2013; Mustafa & Ismael, 2019; Othman et al., 2008; Ouedraogo, 2007; Shah et al., 2016; Zerari et al., 2020; Zerari et al., 2023).

The application of morphological analysis, as developed by the *Laboratoire d'Analyse des Formes* (LAF) under the guidance of Professor Duprat, appears to have been primarily adopted in the Maghreb. Notable examples include studies conducted by Chakroun (2005) and Cherif and Allani-Bouhoula (2017). Chakroun's (2005) study aimed to analyse the morphology of a collection of minarets from the Ottoman period to define the characteristics of the Ottoman architectural style. Cherif and Allani-Bouhoula's (2017) research delved into ancient Tunisian mosques, creating a morphological classification of these structures.

Bouruiba (1987) in the book "*L'apport de l'Algérie à l'architecture arabo-musulmane,*" offered a detailed method for describing and analysing mosques. This seminal work was concerned primarily with local dynasties in the central Maghreb and the Ottoman period, which extended from the 16th century until the onset of French colonisation in the early 19th century. Bouruiba (1987, p.24) employed a canonical definition of the mosque, comprising five fundamental structural elements: the prayer hall (with its mihrab carved into the Qibla wall), the courtyard (enclosed), the rear part of the courtyard (*mu'akhar*), the side parts of the courtyard (*mudjannabat*), and the minaret. Bourouiba's study focuses on the general morphology of mosques (mosque shape, prayer room shape, courtyard shape and layout, mihrab and minaret styles, etc.), concluding with architectural details. While this study was concerned with mosques built during significant dynasties or historical periods in Algeria, thus neglecting vernacular mosques, it nonetheless represented a pioneering accomplishment in the realm of cultural heritage in Algeria, particularly concerning mosques. Given its significance, several Algerian scholars have adopted the structure of Bourouiba's book to analyse the morphology of mosques in Algeria. Noteworthy examples include Menhour's master's thesis (2012) on the evolution of Ottoman mosques in Constantine as religious architectural heritage, Merzoug's thesis (2012) on the architectural and artistic study of minarets in Tlemcen's mosques, and Redjem's study (2014), which explored the evolution of architectural and architectural elements of mosques as a design reference, focusing on historical mosques in Constantine.

Except for the M'Zab Valley, the religious architecture of southern Algeria remains an understudied area in terms of morphological and typological research. Indeed, the mosques of the Souf region require in-depth scientific investigation. Although some published and unpublished studies have explored the residential architecture and natural environment of the Souf, these investigations have not extended their focus to encompass vernacular mosques (Bataillon,1955; Côte, 2009, 2005; Échallier, 1968; Najah, 1971; Remini & Souaci, 2019; Remini, 2006; Zerari et al., 2022).

When examining the construction techniques employed in residential architecture within the Souf region, Côte (2009, p.33) underscored an outward similarity between vernacular houses and mosques. This French geographer (1934-2022) specifically highlighted that the utilisation of construction techniques involving domes and barrel vaults extended beyond residential structures to encompass mosques in the region. Marc Côte's observation

represents a significant step forward in the exploration of vernacular mosques and the alignment of researchers' positions for reading these mosques.

Travelogues and scientific explorations from the French colonial period do not provide substantive textual insights into the architecture of Souf mosques (Cat, 1892; Daviault, 1947; Jacqueton & Gsell, 1911; Largeau, 1881). Cauvet (1923), like Côte (2009), stressed the similarities between religious and civil architecture in interpreting the diversification of mausoleum forms in the Maghreb but did not single out any particular region.

Iconography (photographs, paintings, etc.) from the French colonial period is not abundant regarding the vernacular mosques of the Souf. An intriguing source features photographs of several vernacular mosques in the Souf, depicting them in their original condition. However, it lacks a comprehensive discussion of the architectural aspects of these religious places. This source is part of a series centered around art and culture, which was published in 1970 through the collaborative efforts of the Algerian Ministry of Culture and Information, along with various actors in the cultural heritage domain. Table 1 summarises the typology and morphology of mosques in previous studies.

Most of the studies mentioned above applied morphological analysis and typology as methods, but without explicit reference to any specific school or theory (Table 1). Typological classification and morphological analysis can be a complex process, and researchers may choose different attitudes to approach case studies, depending on their research objectives and the availability of data. The following is a general approach to the steps that can be followed in classifying mosques typologically:

- Data collection: The first step involves gathering data about a set of mosques to be studied. This may include information about their geographic location, historical period, architectural style, size, spatial layout, specific architectural features, etc;
- Establishment of classification criteria: Depending on the goals of the analysis, classification criteria are established. The main criteria used in the typological and morphological analysis of mosques can relate to the architectural style; historical period; geographic location; size and scale; spatial organisation; specific architectural features; function and usage of spaces; cultural and religious influences; construction history, etc.
- Initial classification: Mosques are initially classified based on the established criteria. This may involve grouping mosques with similar characteristics into preliminary categories;
- Comparative analysis: Researchers can conduct a comparative analysis of mosques within each category. This may include examining similarities and differences between mosques in terms of architecture, history, culture, etc;
- Refinement of classification: Based on the results of the comparative analysis, the classification may be refined. Some categories may be merged or subdivided based on specific emerging characteristics;
- Documentation and report: Once the typological classification is completed, the results are documented and presented in a research report. This report may include illustrations, diagrams, maps, and other visual elements to better convey the findings.

The state of the art in morphological analysis and typology sets the stage for an epistemological positioning regarding the vernacular mosque in the Souf region, a style that has been overlooked in previous studies.

4. Methodology and data collection tools

This paper is focused on one of the most disputable regions in the Algerian Sahara, the Souf. Administratively, this region corresponds to the wilaya (province) of El Oued, located in the south-east of Algeria, bordering Tunisia and many other Algerian wilayas such as Biskra and Ouargla (Figure 2). Over its history, the Souf knew the passage of various civilisations and cultures, including prehistoric influences,

Table 1. *Typo-morphology of mosques in previous studies (developed by authors).*

Author(s)	Typological and morphological analysis criteria
Zerari et al., 2023	Size and spatiality of mosques; presence or absence of certain elements (mausoleum and minaret).
Zerari et al., 2020	Presence or absence of certain basic components of the minaret; external silhouette of the minarets; form of the balcony; presence or absence of decoration.
Ghouchani et al., 2019	Layout and spatial organisation; hierarchy of spaces; circulation patterns.
Mustafa & Ismael, 2019	Spatial organisation and layout.
Budi & Wibowo, 2018	Floor level; main building material; roof forms; number of minarets.
Cherif & Allani-Bouhoula, 2017	Segmentation of the mosque plan; shape of the courtyards.
Loukma & Stefanidou, 2017	Degree of complexity, spatial organisation; roof forms.
Alamdari et al., 2017	Access patterns; method and relationship between certain spaces.
Shah et al., 2016	Typological element; spatial organisation; roof form; building technology; articulation in design.
Asadi & Majidi, 2015	Architectural styles; layouts and spatial organisation; functional aspects.
Istiqomah & Budi, 2013	Number of masses composing the building; presence or absence of transitional space; roof forms.
Hüsnü, 2013	Location; form of mosques; architectural layout; relationship with the surrounding urban environment.
Mustafa & Hassan, 2013	Spatial organisation; roof forms; functional efficiency.
Ashkan et al., 2012	Form and silhouette of domes; structural elements of domes.
Othman et al., 2008	Layout and spatial organisation; functional aspects.
Ouedraogo, 2007	Design development; construction technology.
Chakroun, 2005	Segmentation of the minarets, shape of the different segments composing the minarets.
Bouruiba, 1987	Form of mosque; form of the prayer hall; form of courtyard, style of minarets, form of the mihrab.

Arab-Muslim penetration, and French colonisation from 1872 to 1962. Notably, the Souf did not experience Ottoman rule (Côte, 2009; Zerari et al., 2023).

To achieve the objectives of the present study and ensure its feasibility, a hybrid approach was employed, combining morphological analysis, typology, and historical research methods. This approach primarily relied on architectural surveys that emphasised the original appearance of mosques, with transformations or alterations of the specimens not considered within the present analysis. At this stage, on-site observation of mosques played a crucial role in comprehending their architectural logic deeply.

It is important to highlight that this study did not heavily rely on local institutional archives due to the absence of specific graphical documentation related to vernacular mosques. In fact, Algeria faced significant challenges in archival management, and a considerable number of restoration initiatives were undertaken by private people without conducting prior architectural surveys on the structures in question. This shortcoming posed a number of constraints on the study of vernacular mosques in the region. In addition, in the Saharan regions of Algeria, the archiving of vernacular buildings began with the French colonisation, through the restoration of certain local buildings or through exploratory research. Unfortunately, the Souf region has not been as fortunate as neighbouring regions in terms of restoration efforts. Consequently, there seems to be a limited availability of colonial-period archives that could be utilised in this study.

The study focused on mosques constructed from the 7th century until Algeria's independence in 1962. The post-independence period was excluded from the study, as it marks a shift away from the local building culture. A representative sample of mosques (S1, S2, S3, S4, and S5), reflecting the local architecture, was documented. These mosques were randomly selected and are dispersed throughout the Souf region (Figure 2 and Table 2).

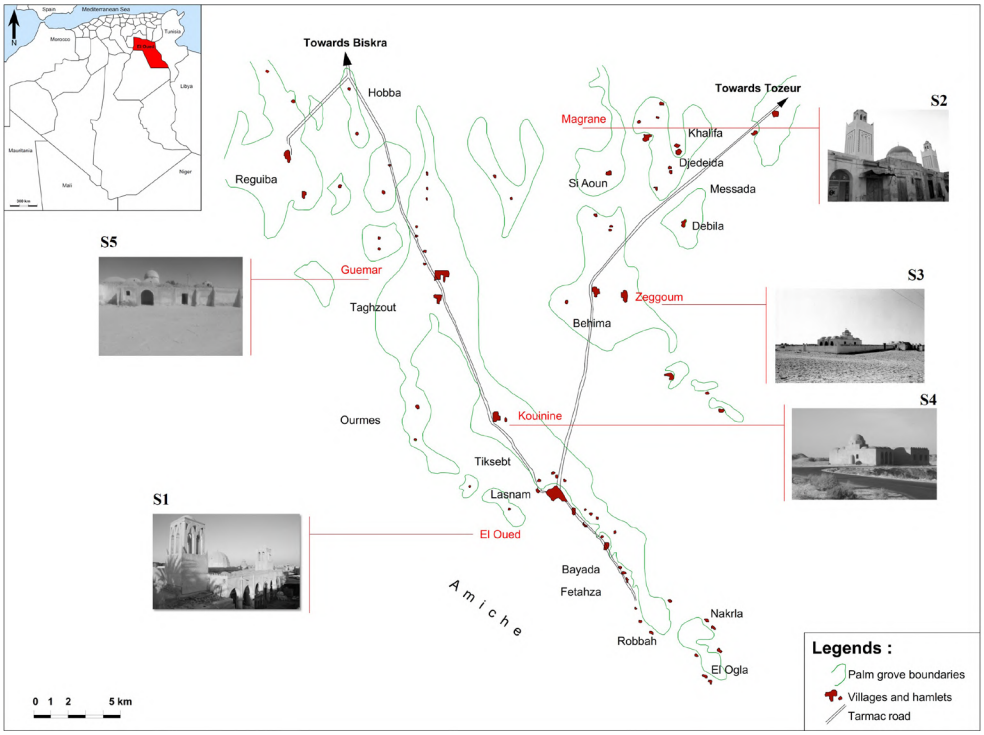
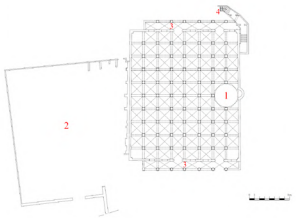
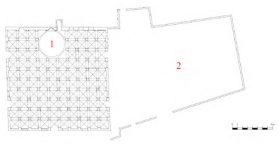
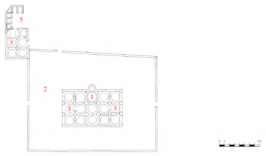
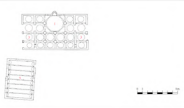
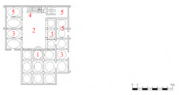


Figure 2. *Maps showing the location of the Souf region and the studied mosques (developed by authors).*

Table 2. *Plan and layout of the vernacular mosques in the Souf (developed by authors).*

Codes	Identification	Plans	Notes
S1	**The mosque of Sidi Massoud in El Oued**		The mosque was built towards the end of the 16th century. It underwent restoration and renovation during the French colonial period. Additional facilities, including the courtyard, were incorporated into the mosque during the post-colonial period. This mosque remains operational to this day.
S2	**The mosque of El Atik in Megrane**		This mosque was founded in 1816 and built in 1932. Two minarets were added to the mosque in 1970. In the late 1980s, arcades were also incorporated on each side and behind the prayer room. This mosque remains operational to this day.
S3	**The mosque of Sahn Gharbi in Zeggoum**		This mosque was built in the early 1960s. It is in a state of neglect.
S4	**The mosque of Omaya Bahi in Kouinine**		This mosque was built in the early 1920s. It is in a state of neglect.
S5	**The mosque of El Houde (or Salman El Farissi) in Guemar**		This mosque was built between 1944 and 1945. It is in a state of neglect.
Legends		**(1)** prayer hall; **(2)** sand-covered open courtyard; **(3)** sabat (portico); **(4)** minaret; **(5)** annexes.	

To enhance the study, old photographs were employed to investigate the appearance of certain mosques that may have been demolished or reconstructed in recent times. These old photographs provided valuable insights into the original appearance of the mosques, contributing to the reliability of the analysis.

In addition to architectural surveys and old photographs, another complementary tool was utilised: the survey sheet. This survey sheet outlined the primary characteristics of the studied buildings, incorporating headings epistemologically developed based on a review of the state of the art in morphological analysis and typology, the objectives of the research, and a critical examination of a sample of mosques. The survey sheet was organised into seven (07) headings, encompassing all relevant morphological aspects of the mosques under investigation: 1) identification of the mosque; 2) complexity of the mosque; 3) general shape of the mosque; 4) configuration of the prayer room; 5) roofing system and building materials; 6) architecture of the minaret; and 7) state of the premises.

Each survey sheet included the date(s) of the field trip(s) (Table 3). This proposed survey sheet primarily served to establish criteria for the morphological and typological analyses of the selected mosques.

In this research, data collection also incorporated non-directive individual interviews (testimonies) by giving the floor to different actors including former inhabitants and users of the mosques. These interviews aimed to compile important events in the history of the mosques. Given the open-ended questions in these interviews, the authors (interviewers) provided general direction to the conversations, encouraging interviewees to delve further into their oral history and allowing them to guide the process. The interviews were carried out in 2021/2022 and 2022/2023, and conversations primarily revolved around topics such as the dating and potential transformations of the mosques, as well as insights into the origins of the builders. This approach aimed to detect external contributions and stylistic variations in the studied architecture. Interviews were either transcribed in written form or recorded in audio, as appropriate. The number of interviewees varied according to the locality of the surveyed mosque. For example, samples S3, S4, and S5 are located in abandoned areas, and the interview was therefore only conducted with a few people found near their gardens. As for samples S1 and S2, they are still largely functional, and the interview was conducted with dozens of people. A meticulous cross-referencing of testimonies specific to each mosque was carried out to verify and ensure the accuracy of each mosque's identification. Notably, the individuals interviewed expressed great pride in sharing insights about their cultural heritage.

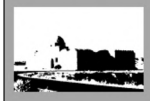
The collected data were analysed and interpreted in an attempt to develop an inventory of vernacular mosques. The interpretation focused on the spatial organisation and layout of the mosques, the outward form of the mosques, and especially distinctive architectural elements, including domes and minarets.

5. Presentation of the built environment in the Souf region: An introduction to understanding the architecture of vernacular mosques

Urbanisation in the Souf region began with the sedentarisation of nomadic and semi-nomadic populations. This transformation coincided with the successive arrival of the Banu Hillal tribes [3]. As a result, numerous Ksourian settlements emerged across the region. These settlements followed the principles of Arab-Muslim medinas, with the sacred building as a focal point within the urban fabric.

The vernacular houses in the Souf are characterised by their geometric forms, typically centered around a large open courtyard surrounded by a few rooms. Each house typically features one or two sabats, serving as feminine spaces, and may include a loom and a stone grain mill. Regardless of whether they are found in villages or hamlets, these houses are divided internally by load-bearing walls constructed from local stones (tefza and louss). The

Table 3. *The proposed survey sheet for an analytical study of the mosque (developed by authors).*

Survey sheet number ….					
The date of the survey	.. /.. / 20...	.. /.. / 20...		.. /.. / 20...	
Identification of the mosque 	Name of the mosque	……..……..…… ……			
	Locality	……..…… ……..……			
	Date/period of construction	…… …… ……..…… ……..…… ……..……			
	Historical peculiarity	……..…… ……..……..…… ……..……			
The complexity of the mosque	Individual building (mosque free from any annexes)				…..
	Situation in complex	Presence of mausoleum			…..
		Presence of the room for the recitation of the Qur'an			…..
		Other supplementary spaces			…..
The general shape of the mosque	Regular mosque	Rectangular			…..
		Square			…..
	Irregular mosque				…..
Configuration of the prayer room	The shape of the prayer room	Regular prayer room	Rectangular	Wider than deep	…..
				Deeper than wide	…..
			Square		…..
		Irregular prayer room			…..
	Type of prayer room plan	Prayer room with naves perpendicular to the qibla wall			…..
		Prayer room with naves parallel to the qibla wall			…..
		Prayer room with naves perpendicular and parallel to the qibla wall			…..
		Prayer room with a large central dome			…..
Roofing system and building materials	Dome	Number	One dome		…..
			Two domes		…..
			Three domes		…..
			Four domes		…..
		Disposition	On the mihrab axis	Before the mihrab	…..
				In the centre of the prayer room	…..
			Above the mausoleum		…..
			Above other annexed spaces		…..
	Flat roof made of palm wood				…..
	Vaulted roof	Barrel vault			…..
		Groin vault			…..
		Other ……			
	Construction materials	Earth			…..
		Stone			…..
		Other ……..……			
The architecture of the minaret	Number of minarets	Without minaret			…..
		With minaret			…..
	Position of the minaret in relation to the mosque's composition	……..…… ……..……			
	Silhouette of the minaret	……..…… ……..…… ……			
	Decoration of the minaret	Decoration with niches			…..
		Lyse or other linear elements			…..
		Harmonious segmentation			…..
		Rhythm of the openings			…..
		Merlon			…..
		Other……..…… ……..…… ……			
	Lantern	Present …..	Lantern shape and decoration	…… …… …… ……..……	
		Absent …..			
State of the premises	State of conservation	…… …… ……..…… ……			
	Possible transformations	Spaces	…… ……..……	…… ……	…… ……
		Date/ period	……..…… ……..……	…… ……..…	…… ……
		Description	…… ……..……	…… ……..…	…… ……

rooms are usually covered with domed or barrel-vaulted roofing systems, and the facades of the houses often exhibit plain surfaces punctuated by buttresses, giving them a fortified appearance. This vernacular architectural style reflects the contributions of Arab-Muslim, Berber, and Sudanese cultures, which have shaped the local architectural identity (Zerari et al., 2022).

While the similarity between residential and religious architecture mainly concerns construction techniques and outward morphology, as Côte (2009, p.33) indicated, the spatial organisation and layout of the mosques of the Souf region feature specific elements that differentiate them, particularly in relation to their sacred purpose, which is Muslim prayer (Figure 3).

6. Analysing and discussing the morphology and typology of vernacular mosques in the Souf region from a historical perspective

Based on the main headings outlined in the survey sheet, which was devised notably in accordance with the state of the art in morphological analysis and typology of mosques worldwide, the following discussion and analysis will focus on two levels: 1) spatial organisation and layout of the mosques, and 2) architectural attributes of minarets and domes.

6.1. Spatial organisation and layout of the mosques

At this level, the discussion is structured in accordance with the Arab mosque model, which predominantly consists of a hypostyle prayer room, an open courtyard surrounded by porticos, and a minaret.

At first glance, vernacular mosques in the Souf region exhibit simplicity in their design. They are typically single-story structures, with their size determined by their location within the urban fabric and the population density they serve. Therefore, mosques in villages tend to be larger than those in hamlets, which were primarily inhabited by farmers during the summer, giving these mosques a more rural appearance.

These mosques are enclosed spaces comprising a square or rectangular prayer hall and an open courtyard covered in sand. Geometric precision characterises their layout, following the principles of the Arab mosque model. However, what sets these mosques apart is the absence of minarets in their spatial organisation scheme.

The topological relationship between the courtyard and the prayer hall varies. The courtyard can be located on one side, behind the prayer room, or in front of the prayer room (behind the Qibla wall). In some cases, the courtyard may be absent. This absence could be due to the mosque's isolated location, where the surroundings effectively serve as the courtyard, or in compact urban fabrics with limited space (Table 2 and Table 4). Importantly, the architecture of these mosques evolved over time to adapt to the needs of the inhabitants. Local oral history indicates that some vernacular mosques initially began as open-air sacred spaces demarcated from the profane space by date palm leaves (*Djrid*), resembling primitive places of worship. These places were often located near water sources (wells). As the population decided to build proper mosques for protection

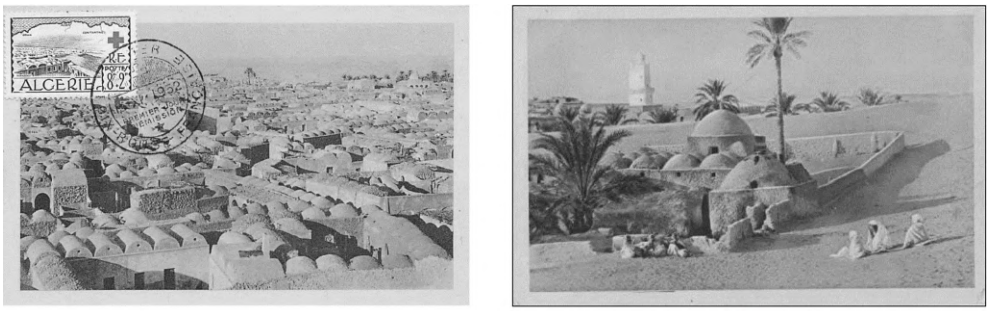
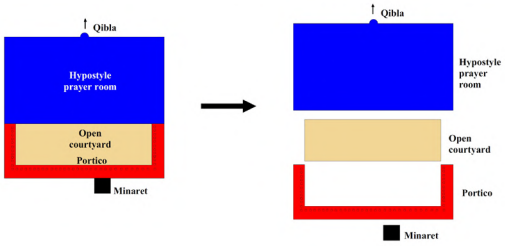
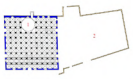
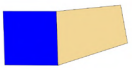
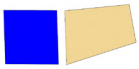
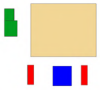


Figure 3. *Old postcards showing similarity between residential and religious architecture: a) Overview of El Oued city showing the vernacular houses; b) Mosque in El Oued (www.delcampe.net).*

Table 4. *Morphological and typological characterisation of the layout of the studied mosques (developed by authors).*

Characterisation of the layouts					
Morphological decomposition of the Arab mosque model					
Mosque codes	**S1**	**S2**	**S3**	**S4**	**S5**
Plans					
Morphological composition of mosques					
Morphological decomposition of mosques					
Type of prayer rooms	Groin-vaulted prayer room		Doomed prayer room		
	Note: mosques with doomed prayer room are generally located in hamlets and are small in size, while mosques in villages and cities are covered with groin vaults and are large in size.				
Morphological components — **Prayer room**	X	X	X	X	X
Courtyard	/	X	X	/	X
Portico	X	/	X	X	X
Minaret	/	/	/	/	/
	Note: in the case of S1 and S5, there is no minaret section, but there is a staircase leading to the terrace.				
Topological relationship (prayer room/courtyard)	No courtyard (absence)	The courtyard on one side of the prayer room (adjacency)	The prayer room included in the courtyard (enclosure)	The surrounding of the mosque used as a courtyard (absence)	The courtyard in front of the prayer room (adjacency)

from the harsh climate, they primarily constructed covered prayer halls and gradually added more spaces.

The courtyards, where they exist, often feature a mihrab carved into the enclosure wall, confirming their use as an open prayer area, especially during the Maghrib and Isha prayers (sunset and night prayers) in summer to take advantage of the cooler weather. This is notably due to the sand covering the courtyard: sand plays an essential role in moderating indoor temperatures by absorbing excess heat during the day and quickly releasing it at night to maintain more comfortable conditions. The courtyards were also used in winter when the covered rooms became crowded, especially during the Friday prayer (weekly prayer). The courtyard often had sabats in the form of porticos with semi-circular arcs, serving as spaces for relaxation and socialisation for the inhabitants. In some cases, additional sabat were added on either side of the prayer room, functioning as entrance porches to prevent sand from entering the prayer space.

Vernacular mosques in the Souf may include annexed spaces, such as room for recitation and memorisation of the Qur'an or storage. The well, which is the source of water for ablution, may either be located within the courtyard or separate from the main mosque structure.

The structural grid of the prayer room is divided into units, each covered by a surbased dome or groin vault and supported by four circular or polygonal pillars, creating a hypostyle space with rows running parallel and perpendicular to the Qibla wall. The mihrab's axis is marked by a single

monumentally raised double-tambour dome, often with squinches. These tambours are pierced with small openings, allowing natural light and ventilation into the prayer space.

The mihrab extends into the Qibla wall and overlooks either the courtyard or the outside (public space) depending on the courtyard's position relative to the prayer hall. Unlike many other Algerian Saharan regions, the terraces of Souf mosques, like the houses, are not accessible to users (Figure 4 and Figure 5).

These mosques are constructed entirely from locally available stones, namely Lous and Tefza, employing a consistent building logic characterised by load-bearing walls and domed or vaulted roofs. Notably, most vernacular mosques in the Souf do not include burial spaces, in contrast to many Saharan regions in Algeria. For instance, Zerari et al., (2019) conducted research in the Ziban region, which revealed that it is home to mosques associated with mausoleums of Muslim saints, named after them.

6.2. Minarets and domes of the Souf as a local architectural language

A typical minaret comprises four main sections: the base, tower, gallery-balcony (from which the muezzin calls to prayer), and the lantern. Builders have ingeniously combined these basic elements, resulting in significant morphological diversity among minarets (Zerari et al., 2020).

The Arab Mosque model that evolved in the Maghreb region features a single minaret with a square or rectangular section. The design and ornamentation of this minaret exhibit variations influenced by regional and historical factors. In the Saharan regions of Algeria, the minaret serves as a distinguishing criterion, influencing the appearance of mosques. The presence or absence of a minaret has led to different mosque configurations; its shape also varies and reveals regional architectural specificities. This is evident in the Souf region.

Originally, vernacular mosques in the Souf did not feature minarets. Instead, they were identified by a prominent dome above the prayer hall, dominating the entire mosque and its surroundings. In general, this dome is raised on a double tambour—a square and an octagonal shape—creating squinches. Squinches are present in each corner of the square plan and consist of filled-in spaces that transform the square plan into a polygonal shape so that the circular base of the dome can rest on it. This technique is prominently observed in the religious heritage of Tunisia, particularly originating from the Ottoman period.

In the absence of minarets, the call to prayer was made either from the sabat or from the low enclosure wall of the mosque. In some mosques, the call was made from the terraces, and in these cases, a modest structural device was provided to shield the muezzin from the hot sun. This structural device consists of a straight staircase, terminated by a covered resting platform (resembling a box-like structure without a lantern), from which the muezzin calls to prayer five times a day. In this regard, this structural device adopted in the vernacular mosques of the Souf can be termed a "staircase-minaret" (Figure 6). Regrettably, most vernacular mosques have lost their authentic charm due to successive unprofessional transformations and renovations. For example, in 1970, two tall minarets were added to the mosque of El Atik in Magrane locality to increase its visibility, but these minarets did not align with the local architectural language of the Souf (Figure 2 and Table 2). Other mosques have been entirely demolished and rebuilt, with only photographs remaining to depict their original appearance.

Based on the testimony of the local population, several hypotheses can be advanced to explain the absence of minarets in most vernacular mosques of the Souf, and to elucidate the reasons for the adoption and prevalence of the so-called "staircase-minaret."

Some elderly locals suggest that minarets were deliberately omitted in the vernacular mosques of the Souf because people aimed to emulate the Prophet's mosque in the medina, where the minaret was not present. Another logical explanation for the absence of

Figure 4. *Interior views of El Houde Mosque in Geumar (authors).*

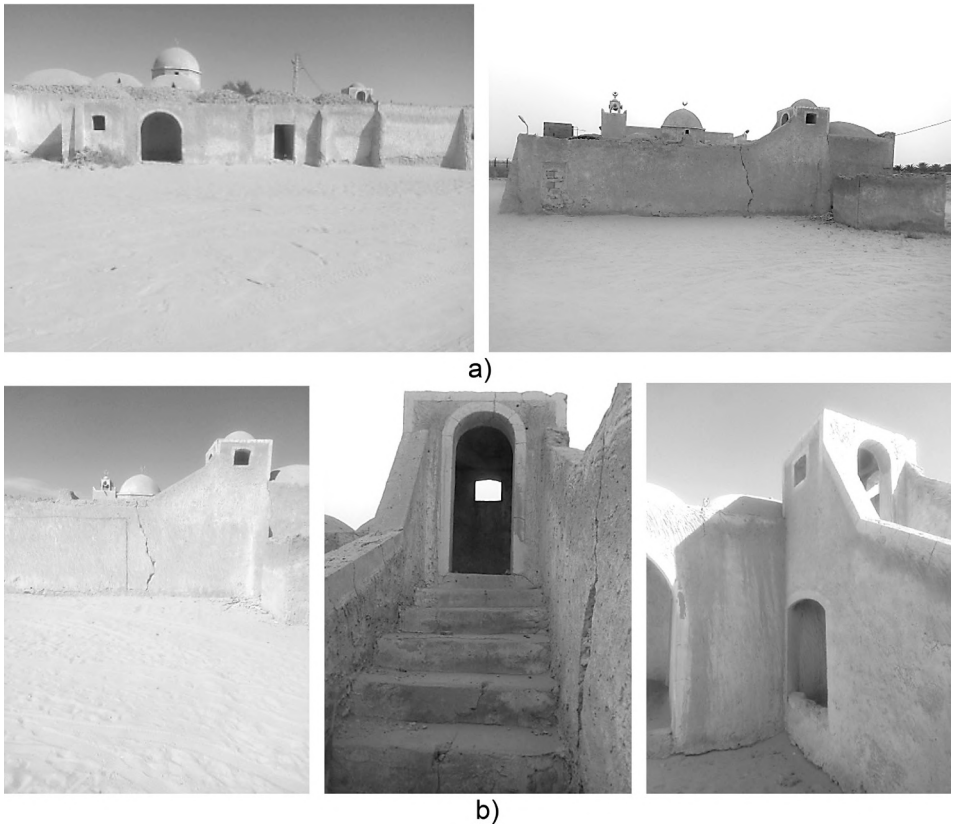


Figure 5. *Views of El Houde mosque in Geumar: a) general views of the mosque; b) views of staircase-minaret (authors).*

minarets is social and cultural. During the call to prayer (adhan), the muezzin might inadvertently transgress the privacy of the houses surrounding the mosque, which are introverted onto the open courtyard. To address this concern, the minaret was ingeniously incorporated at a low height to preserve

the privacy of the residents within their domestic space. The staircase-minaret serves the function of the call to prayer without being associated with a towering structure. Some residents propose a geographical explanation, suggesting that the desert climate, characterised by winds accompanied by sand whirlwinds, has discouraged the adoption of tall minarets as vertical elements. Consequently, these constraints render the construction of such minarets functionally unnecessary. Furthermore, the heat and dryness of the environment do not seem to explain the particular shape of the minaret, as other Algerian Saharan regions have adopted tall minarets with covered balcony. In the Souf, vernacular mosques are primarily identified by their raised domes, as explained earlier (Figure 6).

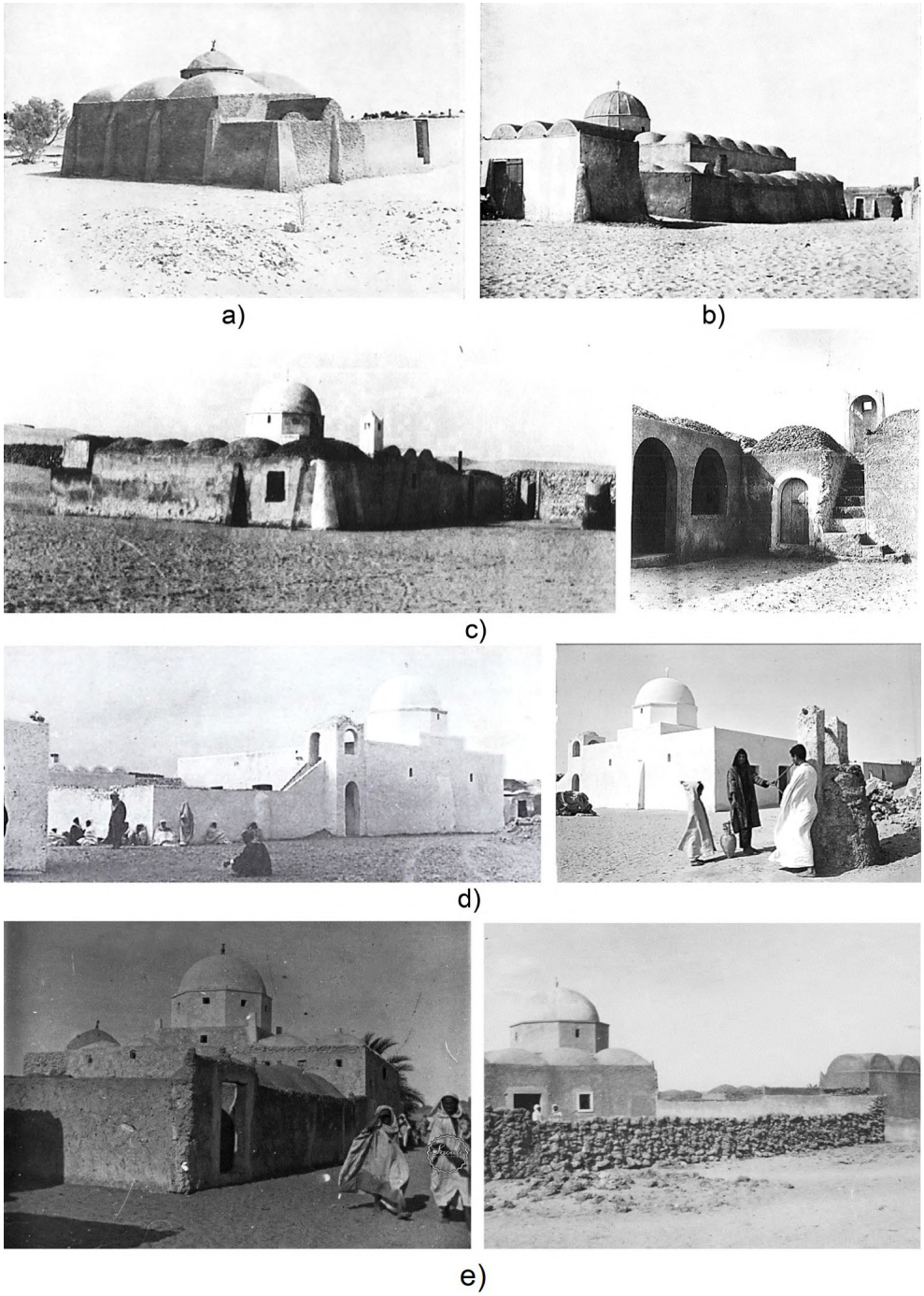


Figure 6. *Views of vernacular mosques in the Souf (location unidentified): a) & b) mosques without minaret; c) mosque with a staircase-minaret; d) general views of a mosque, showing the water well, the raised dome, and the staircase-minaret (Algerian Ministry of Culture and Information, 1970; www.delcampe.net); e) mosques without minaret (www.facebook.com/ffathi.saouli).*

Despite these suppositions and proposed explanations, which are based on limited evidence, the origin of the staircase-minaret remains a rather contentious subject. This type of minaret has been used in various parts of the Muslim world, even in regions with different climatic conditions, since the early days of Islam. Prévost (2009), in "*Les mosquées ibadites du Maghreb*," provides an overview of this subject, citing Bloom (1989) and Schacht (1954, 1961). The staircase-minaret was common in the East during the 7th century A.D., corresponding to the first century of the Hegira. The earliest examples of staircase-minarets were built in Egypt at the request of Caliph Muawiya, who ordered that the mosque of Amr ibn al-As in Al-Fustat (Cairo, Egypt) be equipped with four minarets. These minarets likely consisted of staircases leading from the street to modest structures resembling gatehouses built at each corner of the mosque's roof.

Other parts of the Muslim world have also adopted the use of staircase-minarets over the centuries. These distinctive architectural elements can be found in various locations, including rural Egypt, Central and Western Anatolia, Ajdabiyya in Libya, the Persian Gulf city of Siraf, East Africa, and Fulani mosques in West Africa and the Sahel (Figure 7).

The Ibadis of Djerba introduced the staircase-minaret to West Africa. Indeed, the Ibadis of the Maghreb held a monopoly on trans-Saharan trade for several centuries and played a significant role in Islamizing the regions they engaged with. They transmitted numerous architectural traditions that were preserved by the Fulani ethnic groups. Consequently, Malekite mosques among the Fulani adopted the staircase-minaret design, distinctively lacking a minbar and featuring a rectangular mihrab—characteristics inherited from the Ibadis. It is worth

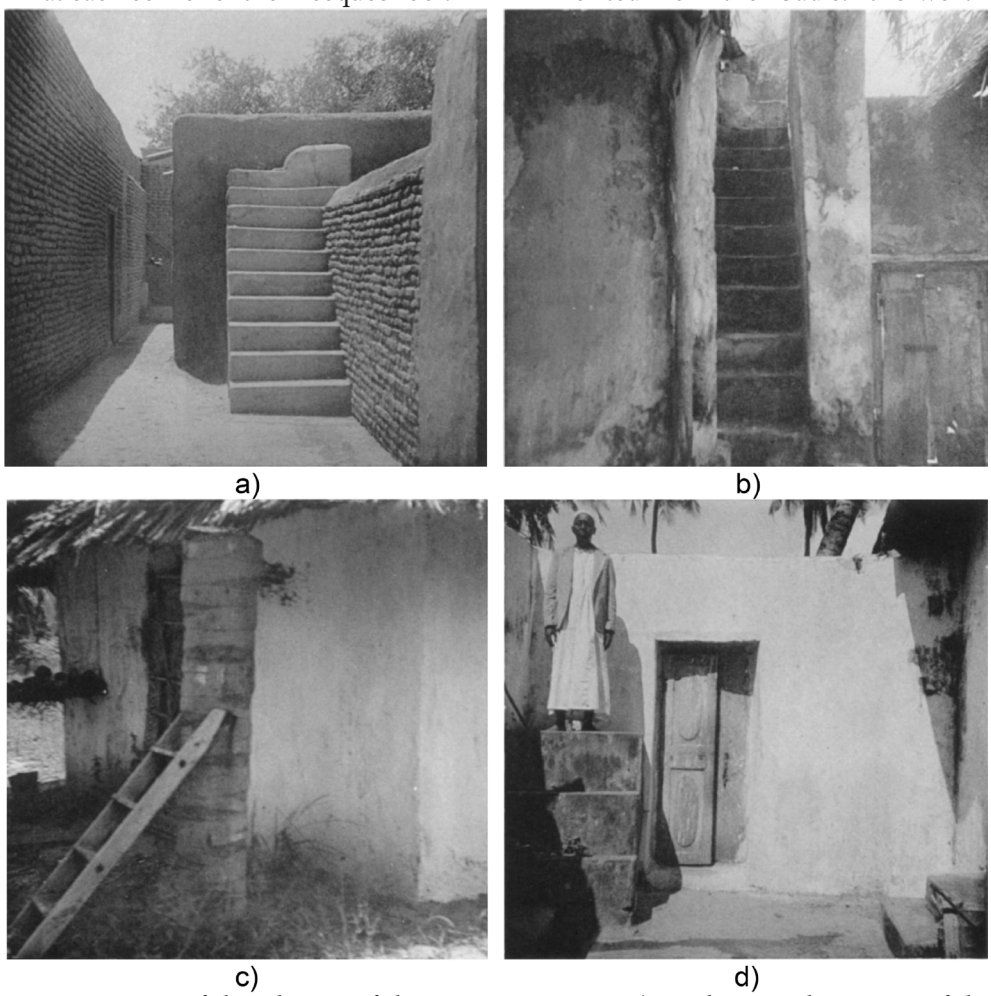


Figure 7. *Views of the adoption of the staircase-minarets: a) Omdurman, the mosque of the Khalifa Abdallah; b) Bagamoyo, the great mosque; c) Kilomo, wooden ladder serving as a minaret; d) Pangani, masjid Mwana Sukali (Schacht, 1961).*

noting that the diffusion of the staircase-minaret does not appear to serve a purely religious purpose, as it was also used in Malekite mosques in Djerba. Nonetheless, this architectural element remains a subject of debate in the context of Ibadi mosques in the Maghreb (Chekhab-Abudaya, 2017; Prévost, 2009; Schacht, 1954, pp. 17-21). Furthermore, in the M'Zab valley, each of the five ksour contains a tall pyramidal minaret, commonly referred to as the "Saharan style" or "Mozabite style." As Chekhab-Abudaya (2017) suggested, this choice was likely influenced by the fact that the mosques of the M'Zab valley served as places of refuge during enemy attacks, with the tall minarets functioning as watchtowers for defensive purposes. Prévost (2022) added that despite the presence of tall pyramidal minarets in the M'Zab Valley, several mosques in the region's cemeteries feature staircase minarets, reaffirming the widespread use of this design and its connection to the Ibadi tradition.

To deeply investigate the formal and stylistic variations of a building compared to others in its category, it is crucial to contextualise it comprehensively. Cauvet (1923, p.286), when interpreting the diversification of mausoleum forms in the Maghreb, whether independent or associated with mosques, stated that the mindset, habits, and mentality of nations influence their tastes in construction. However, these tastes can vary depending on the factors that bring about changes in the lives of nations.

In this context, some vernacular mosques in the Souf exhibit stylistic variations distinct from the prevalent style in the region. For instance, the Sidi Massoud Mosque is a variant, featuring four minarets. Located in El

Figure 8. *Views of the Sidi Massoud Mosque in El Oued: a) before the construction of the minarets; b) after the construction of the minarets (www.delcampe.net); c) aerial view showing the four staircase-minarets (Richer de Forges & Jarrige, 2017).*

Oued, the capital of the Souf, within the traditional Al-Aachache district near the marketplace, this mosque was established towards the end of the 16th century by Sheikh (preacher) Massoud Al-Chabi. According to Daviault (1947, p.10), Massoud Al-Chabi was a revered figure known for his kindness and piety, highly venerated by the locals. The mosque was erected in his honour and named after him (the mosque of Sidi Massoud), even though he was not buried there. According to Najah (1971, p.125), this Sheikh is from the region of Tozeur in Tunisia; he wanted to gather the predominantly nomadic or semi-nomadic population to increase the rank of his followers and facilitate his relations as well as to establish his spiritual and congregational prestige.

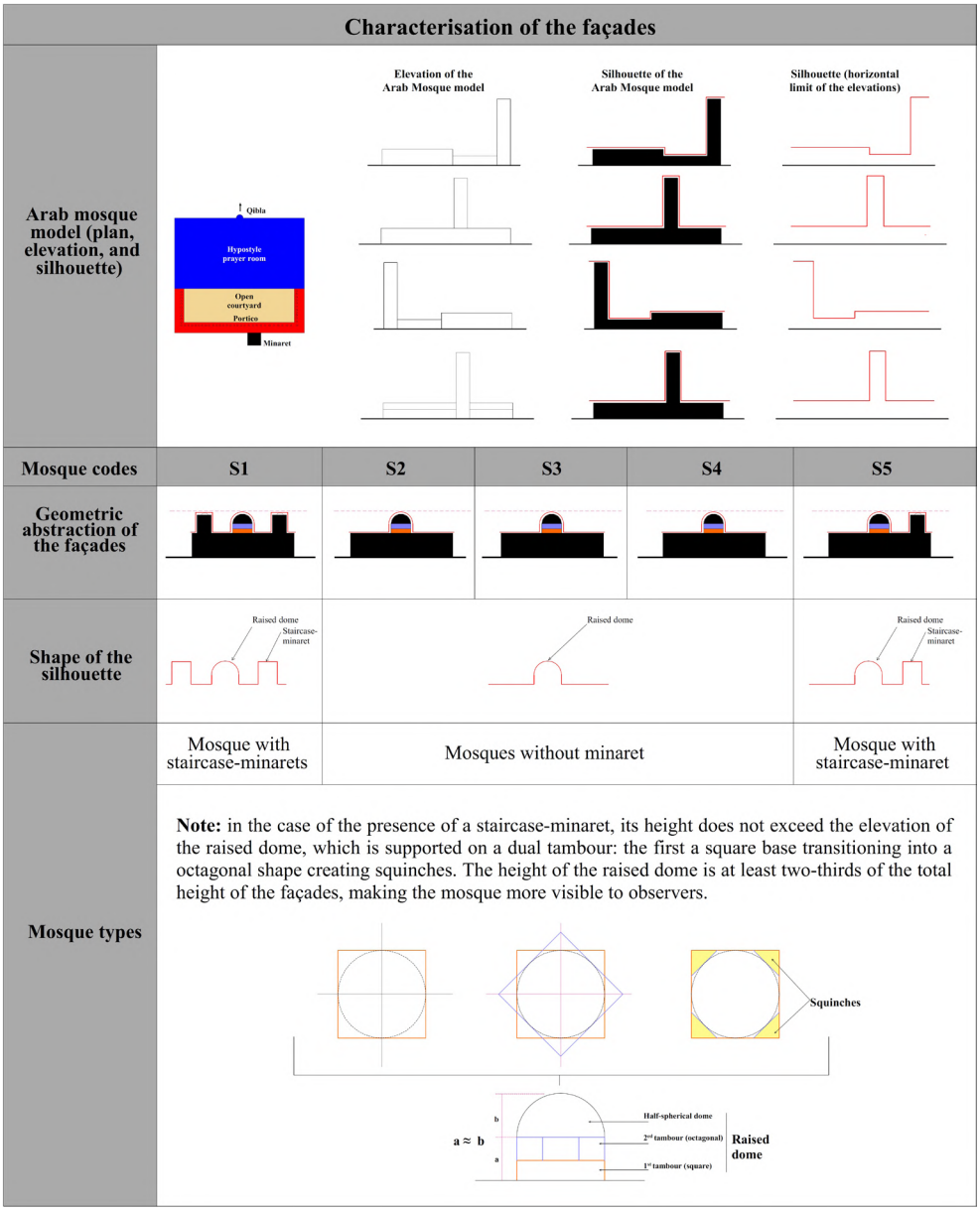
Originally constructed without a minaret, the mosque underwent changes in the early 20th century when four minarets were added, as evidenced by a comparison of old postcards taken at different times (Figure 8). These minarets are relatively modest in height, not surpassing the main dome's elevation above the prayer room, which formerly served as the sole identifying feature of the mosque. The silhouette of these four added minarets appears to draw inspiration from local staircase-minarets. They are situated at the four corners of the mosque's roof and are accessible via a ground-floor staircase, leading to the terrace and then to the tops of each minaret.

In light of these observations, vernacular mosques in the Souf region can be categorised into two groups (or types). Since the raised dome above the prayer room is a prominent element in all these mosques, the classification is based on the presence or absence of a minaret. These groups consist of mosques without minarets and mosques featuring a box-like structure resembling a staircase-minaret. The adoption of the staircase-minaret in the Souf is not constrained by chronological factors. Regardless of the mosque type, the dome above the prayer room serves as a defining feature of the vernacular Souf style (Table 5).

It is worth mentioning that a limited number of vernacular mosques in which the minarets are intentionally designed to resemble tall towers; thus, this architectural style is not prevalent/predominant in the Souf region. In such cases, the minaret becomes a dominant architectural element in vernacular mosques. One example is the mosque of Sidi Salem in El Oued. Originally established without a minaret in the early 19th century, additional structures, including a tall minaret and other facilities, were added around 1830, giving the mosque significant character. This initial minaret had a pyramidal shape and featured a covered balcony. According to local testimonies, this minaret was reconstructed at the end of the 19th century, as evidenced by two postcards taken before and after the reconstruction (Figure 9). The silhouette of the reconstructed minaret bears a resemblance to the minaret of the Great Mosque of Kairouan in Tunisia. It stands at a total height of approximately 19 meters. It comprises two superimposed towers with square sections: the first measuring 4.90 x 4.90 meters and ending in an open cantilevered balcony, while the second approximately 4 x 4 meters, terminates in an open balcony-terrace and a lantern. This minaret has been preserved and is considered a local landmark in El Oued. During the French colonial period, it was well-known to visitors of the Souf region. In 1899, the writer and journalist Isabelle Eberhardt (1877-1904) ascended to the top of this minaret and had a comprehensive view of the locality. This is how she gave El Oued the famous expression "the city of a thousand domes," given that the vernacular architecture was distinguished from other Algerian Saharan regions by the exclusive and widespread use of an original roofing system dominated by domes.

The mosques of the Souf exhibit certain similarities with the vernacular mosques of the Maghreb, not only at the minaret-staircase level but also at the level of the roof type. In an architectural and historical study of the Sabaa Rggoud Mosque (Mosque of the Seven Sleepers) in Chenini-Tataouine, Tunisia, conducted by Ladhari (2018), common features in morphology were discovered between this mosque and

Table 5. *Morphological and typological characterisation of the façades of the studied mosques (developed by authors).*



some heritage mosques in Libya and the Souf region. These features are primarily related to the type of roof and its distinct silhouette. In general, the raised dome signifies religious spaces and distinguishes sacred buildings from the surrounding built environment. In light of the lack of archaeological evidence and historical sources, Ladhari (2018) proposed an interesting hypothesis regarding the architectural style of the Seven Sleepers Mosque (Figure 10), suggesting that it reflects certain Ottoman influences, notably observable in the central dome with a raised tambour.

By cross-referencing all the information presented, the vernacular mosques of the Souf region, much like the houses, seem to embody a hybrid style influenced by architectural acculturation, shaped by various cultural contexts characterising the genesis of architecture in the Souf. Indeed, the contributions of Arab-Muslim, Berber, and Nubian-Sudanese cultures have played a pivotal role in shaping the architectural identity of the vernacular mosques of the Souf. Concerning the Ottoman influence on the architectural style of these mosques, it is plausible that this influence was imported from Tunisia, as the Souf region was not under Ottoman rule and maintained contact with the Djerid and northern Ifriqiya during medieval and modern times [4].

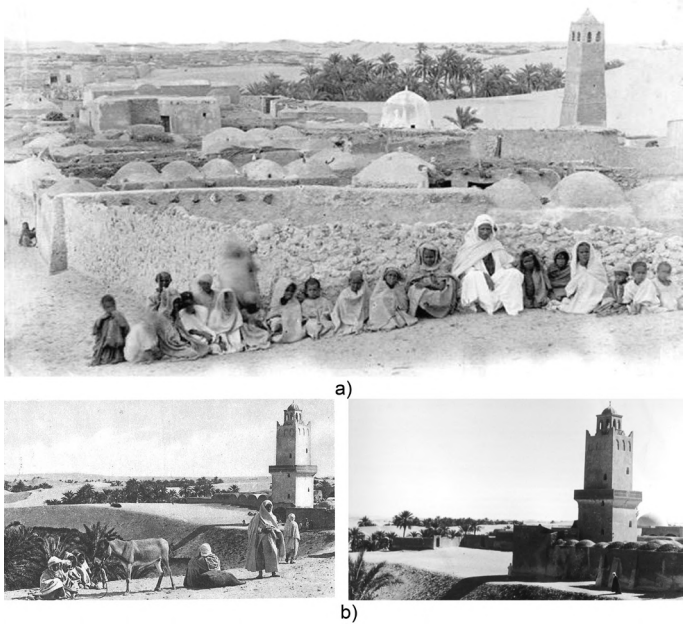


Figure 9. *Views of the minaret of the Sidi Salem Mosque: a) before its reconstruction (mosque's archive); b) after its reconstruction (www.delcampe.net).*

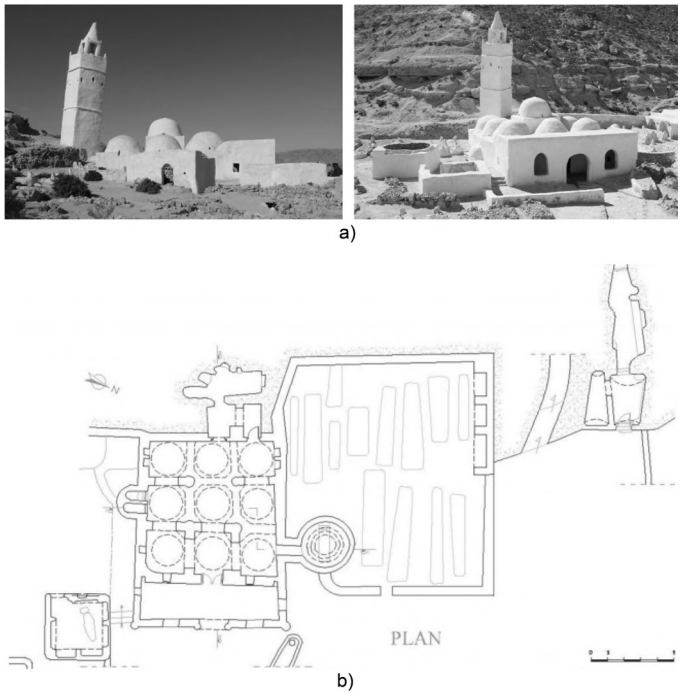


Figure 10. *The mosque of the Seven Sleepers in Chenini-Tataouine, Tunisia: a) exterior views of the mosque; b) plan of the mosque (Ladhari, 2018).*

7. The vernacular mosques of the Souf as a source of inspiration for Western architects

Throughout the French colonisation of Algeria, Western architects created a variety of architectural styles and expressions, each reflective of a distinct period. Towards the end of the 19th century and the start of the 20th century, they displayed a keen interest in the revival of local architecture. This revival encompassed the restoration of existing local structures and the reinterpretation of specific local architectural languages, particularly in the context of religious architecture, for the design of new edifices that introduced functions foreign to the local culture of the time, such as railway stations, institutions, post offices, banks, and more. This endeavour at acculturation is commonly referred to by authors [5] as the "neo-Moorish style."

Mosques, being the primary religious edifices, inevitably served as a wellspring of inspiration for Western architects. They have drawn inspiration from the architectural elements and design principles of mosques. Elements like arches, domes, and minarets have found their way into European architectural styles. Some buildings look like mosques from the outside.

Given that the vernacular architecture of the Souf, including mosques, features elements of the "Sudanese style," [6] the idea of reviving the local built heritage led to the emergence of the "neo-Sudanese style." This style, though not extensively explored in current research, can be found in several regions of southern Algeria where the "Sudanese style" is distinctly expressed. As a result, the "neo-Sudanese style" varies according to the specific local styles it reinterprets, thereby giving rise to diverse stylistic expressions. This phenomenon underscores the concept of "regionalism" in architecture. The "neo-Moorish style" and the "neo-Sudanese style" are emanations of the differences in vernacular architectural languages between northern and southern Algeria.

The neo-Sudanese style particular to the Souf region stands out due to its eclecticism. Since most mosques in the Souf are characterised by the absence of minarets (or the presence of staircase-minaret), Western architects imported these architectural elements from neighbouring Saharan regions and incorporated them into the design of new buildings in the Souf. An illustrative example is the Hôtel Transatlantique in El Oued, designed by architect Jacques Guiauchain (1884-1960). Guiauchain reinterpreted elements such as domes, open sand-cov-

ered courtyards, and porticos from the local architecture of the Souf, drawing inspiration for the minaret's style from the M'Zab Valley (Figure 11). It is worth noting that the pinnacles at the minaret's corners are a distinctive feature of the M'Zab style and can also be found in the Oued Righ region at the corners of mausoleums. According to Ravéreau (1981, p.155), this architectural element traces its origins to the Ibadi community of Algeria, given that the Ibadis of Algeria settled in the Oued Righ before isolating themselves in the M'Zab Valley.

The Hôtel Transatlantique in El Oued presents similarities with the local mosques, especially at the level of its silhouette, traced by the raised dome and the surbased domes that characterises the mosque in the Souf.

8. Conclusion

This study delved into the vernacular architecture of mosques in the Souf region, located in south-east Algeria. It aimed to reveal the local architectural language of the vernacular mosques in the Souf to develop an inventory from a historical perspective. This research stemmed from a compelling necessity to conduct comprehensive and rigorous scientific inquiries into the vernacular mosques of the Souf region, with a primary focus on highlighting their architectural significance and cultural importance. The underlying motivation behind this study lies in the recognition that the vernacular mosques of the Souf constitute a rich and distinctive architectural heritage that has remained largely unexplored and underrepresented in academic research.

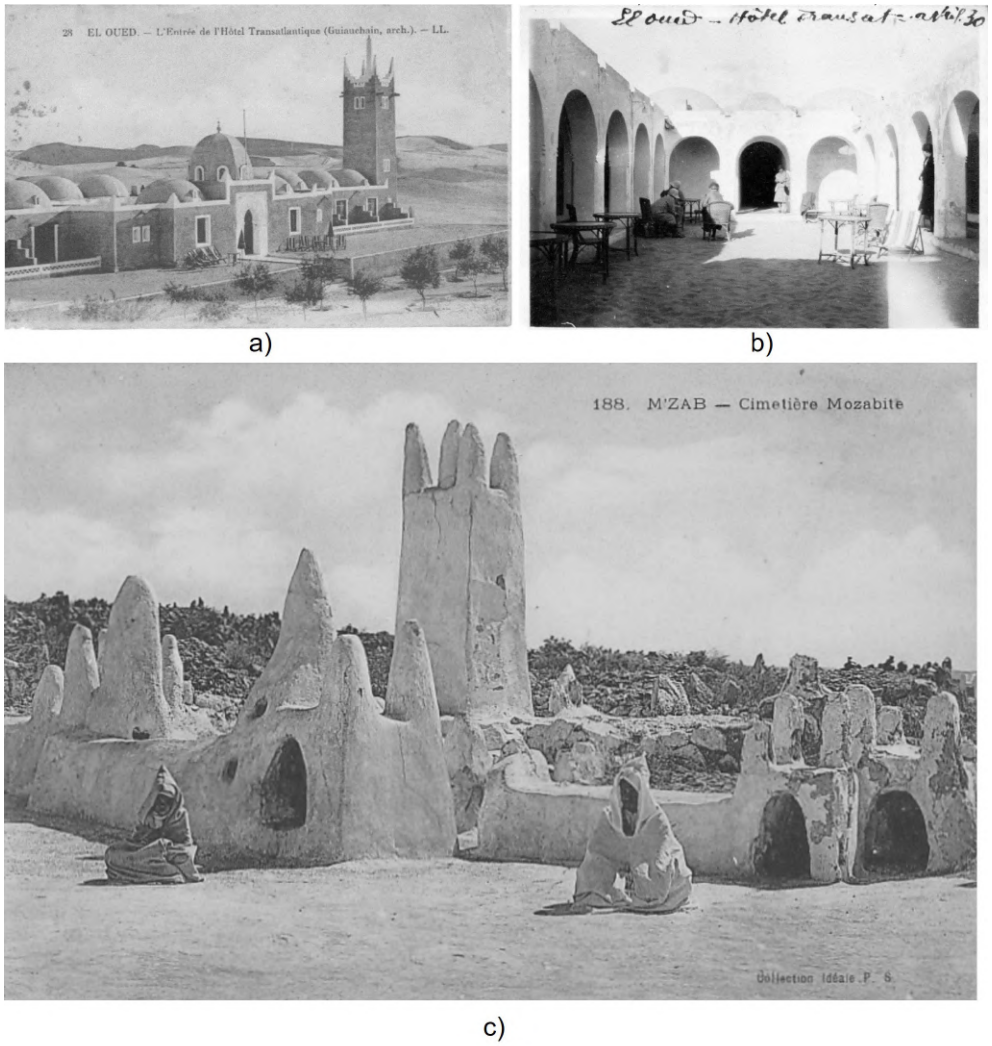


Figure 11. *a) View of the Transatlantique Hotel in the locality of El Oued; b) view of the portico and the sand-covered courtyard of the hotel; c) View of the funerary monuments in a cemetery in M'Zab Valley (www.delcampe.net).*

The findings unequivocally established that the architectural style of vernacular mosques in the Souf is unique and distinct from any other found in Algeria. These mosques adhere to the two-dimensional architectural model of Arab mosques while distinctly embodying the vernacular style of the region in three dimensions. In general, these mosques differ from the Arab model in that there is no minaret in their spatial organisation; instead, they have a distinctive staircase-minaret and a raised dome (on a double tambour), often dominating the mosque with its height and grandeur. This gave the mosque a particular silhouette. Staircase-minaret was common in many parts of the Muslim world including rural Egypt, Central and Western Anatolia, Ajdabiyya in Libya, the Persian Gulf city of Siraf, East Africa, and Fulani mosques in West Africa, and the Sahel. Furthermore, the investigation revealed that the stylistic influences on the vernacular mosques in the Souf encompass elements of Saharan/Sudanese, Berber, and Arab architectural styles. This architectural acculturation has created a distinctive style that differs from those of mosques throughout the Algerian Sahara.

This study ultimately shed light on the role of European architects in reinterpreting the local architectural language, which, in turn, played a pivotal role in the emergence of the "neo-Sudanese style." This style marked a significant departure from traditional architectural forms and ushered in a new era of design and construction in the region. Western architects, seeking to blend local influences with their own expertise, created a unique architectural fusion that had a profound impact on the architectural landscape of the Souf region. This "neo-Sudanese style" reflects the dynamic interplay between cultural exchange and the evolution of architectural traditions in the context of the vernacular mosques of the Souf.

Despite certain limitations in the data collection process, the study's findings are promising. They have provided the means for the exploration and inventory of a previously undiscovered vernacular architectural language of these mosques. This research has the potential to inspire scholars from diverse cultural heritage fields to delve deeper into the study of vernacular mosque styles, to preserve and valorise their cultural and historical importance.

Endnotes

[1] For a comprehensive understanding of Umayyad architecture, refer to (Saoud, 2002).

[2] Ibadism is one of the principal sects within Islam, with adherents residing as a minority in various regions of the Muslim world. Notably, Ibadism is prevalent in Oman, East Africa, Algeria's M'Zab valley, the Nafus mountains in Libya, and the island of Djerba in Tunisia. The Ibadi community in Algeria is known as Mozabites, and they primarily inhabit the M'Zab valley in the northern Sahara of Algeria.

[3] To delve deeper into the Banu Hillal tribes, consult (Zerari et al., 2022).

[4] For insights into the interactions and exchanges between the Souf and Tunisia's Djerid region, refer to (Araar, 2021).

[5] For a comprehensive exploration of the neo-Moorish architectural style, see (Béguin, 1983; Bacha, 2011; Zerrouki, 2021).

References

Alamdari, A.H., Mousavi, S.E., Sheikholeslami, H.K., & Saadatmand, M. (2017). The Typology of the Mosque-Schools of Iran Based on the Method of Access. *BAGH-E NAZAR, 14*(53), 57-68.

Algerian Ministry of Culture and Information. (1970). *The Mosques in Algeria, Art and Culture Series* (t. 1). Madrid: Al Tamira Rotopress.

Allani-Bouhoula, N. (2014). Morphological Knowledge for the Modeling of Ottoman Mosques. *Civil Engineering and Architecture, 2*(2), 72-81.

Araar, M. (2021). Le Djérid, le Souf et le nord de l'Ifrīqiya. Échanges et contacts durant le Moyen Âge et l'époque moderne. *Revue des mondes musulmans et de la Méditerranée,* (149), 145-168.

Asadi, L., & Majidi, H. (2015). Typology of School-Mosque in Ilkhani, Timurid, Safavid and Qajar Eras. *Inter-*

national Journal of Science, Technology and Society, 3(2), 143-149.

Asadpour, A. (2020). Defining the Concepts & Approaches in Vernacular Architecture Studies. *Nature: National Academic Journal of Architecture, 7*(2), 241-255.

Ashkan, M., Ahmad, Y., & Arbi, E. (2012). Pointed Dome Architecture in the Middle East and Central Asia: Evolution, Definitions of Morphology, and Typologies. *International Journal of architectural Heritage, 6*(1), 46-61.

Bacha, M. (2011). Des influences traditionnelles et patrimoniales sur les architectures du Maghreb contemporain. In M. Bacha (Ed.), *Architectures au Maghreb (XIX e–XX e siècles)* (pp. 11-33). Tours: Presses Universitaires François-Rabelais.

Bataillon, C. (1955). Le Souf, étude de géographie humaine (Unpublished thesis). Institut de recherches sahariennes, University of Algiers, Algeria.

Becci, I., Burchardt, M., & Casanova, J. (2013). *Topographies of faith: Religion in urban spaces.* Leiden: Brill.

Béguin, F. (Ed.). (1983). *Arabisances. Décor architectural et tracé urbain en Afrique du nord, 1830-1950.* Dunod.

Ben Younes, H, (2018). L'architecture des mosquées Ibadites au Mzab et à Djerba : propriétés syntaxiques et modes de structuration. *Al-Sabîl: Revue d'Histoire, d'Archéologie et d'architecture maghrébines, 6.*

Benkari, N. (2019). The Architecture of Ibadi Mosques in M'zab, Djerba, and Oman. *Journal of Islamic Architecture, 5*(4), 173-180.

Benyoucef, B. (2005). *Introduction à l'histoire de l'architecture islamique.* Alger: Office des Publications Universitaires.

Bloom, J. (1989). *Minaret Symbol of Islam.* Oxford: University Press.

Bouruiba, R. (1973). *L'art religieux musulman en Algérie.* Alger: SNED.

Bouruiba, R. (1987). *L'apport de l'Algérie à l'architecture arabo-musulmane.* Alger: Office des Publications Universitaires.

Budi, B.S., & Wibowo, A. S. (2018). A Typological Study of Historical Mosques in West Sumatra, Indonesia. *Journal of Asian Architecture and Building Engineering, 17*(1), 1-8.

Cat, E. (1892). *À travers le désert.* Paris: Librairie Gedalge.

Cauvet, (1923). Les marabouts: petits monument funéraire et votifs du nord de l'Afrique. *Revue africaine,* (31), 274-329.

Chakroun, L. (2005). *Analyse morphologique de quelques minarets de l'époque ottomane : essai de définition d'un 'style' ottoman.* Paper presented at 7e congrès sur le corpus d'archéologie ottomane dans le monde, Tunis.

Chekhab-Abudaya, M. (2017). Une influence de l'ibadisme sur l'architecture religieuse au Sahara. In V. Prevost (Ed.), *Les Ibadites : Mode de vie, organisation et patrimoine d'une minorité musulmane* (76, pp. 116-124). Presse universitaire du Midi.

Cherif, I., & Allani-Bouhoula, N. (2017). Ancient Tunisian Mosques: Morphological Knowledge and Classification. *Int. J. of Herit. Archit, 1*(3), 503–511.

Côte, M. (Ed.). (2005). *La ville et le désert: le Bas-Sahara algérien.* Paris: Karthala Éditions.

Côte, M. (2009). *Si le Souf m'était conté, comment se fait et se défait un paysage.* Constantine: Média-plus.

Damyar, S., & Nari Ghomi, M. (2012). The Comparative Study of the Space Concept in the Vernacular Architecture and Modern Architecture. *Journal of Fine Arts: Architecture & Urban Planning, 17*(1), 65-72.

Daviault, L. (1947). *Le Souf (sud constantinois)* (53). Cannes: Institut Coopératif de l'École Moderne.

Échallier, J.C. (1968). Essai sur l'habitat sédentaire traditionnel au Sahara algérien (Unpublished doctoral dissertation). University of Paris, France.

Ghouchani, M., Taji, M., & Kordafshari, F. (2019). The Effect of Qibla Direction on the Hierarchy of Movement in Mosque: A Case Study of Mosques in Yazd, Iran. *Frontiers of Architectural Research, 8*(3), 396-405.

Hillenbrand, R. (1985). The Mosque in the Medieval Islamic World. In S. Cantacuzino (Ed.), *Architecture in Continuity* (pp.33-51). New York: Aperture.

Hourigan, N. (2015). Confronting classifications-when and what is vernacular architecture. *Civil Engineering and Architecture, 3*(1), 22-30.

Hüsnü, U. (2013). Geleneksel Şehir

Dokularında Camilerin Morfolojik Analizi; Gaziantep Örneği. *Artium, 1*(1), 27-32.

Istiqomah, E., & Budi, B.S. (2013). Architectural Characteristics Study on Community Mosques in Priangan 1900–1942. *Journal of Islamic Architecture, 2*(4), 179-191.

Jacqueton, G., & Gsell, S. (1911). *Algérie et Tunisie.* Paris: Librairie Hachette et Cie.

Kamiya, T. (2006). Introduction to Islamic Architecture, Classification and Types of Mosques. Retrieved from https://www.ne.jp/asahi/arc/ind/1_primer/types/typ_eng.htm

Khaznadar, B.M.A., & Baper, S.Y. (2023). Sustainable Continuity of Cultural Heritage: An Approach for Studying Architectural Identity Using Typo-Morphology Analysis and Perception Survey. *Sustainability, 15*(11), 9050.

Knott, K., Krech, V., & Meyer, B. (2016). Iconic Religion in Urban Space. *Material Religion, 12*(2), 123-136.

Ladhari, A. (2018). Mosquée des Sept Dormants à Chenini-Tataouine : étude architecturale et historique. *Al-Sabîl: Revue d'Histoire, d'Archéologie et d'Architecture Maghrébines,* (6).

Largeau, V. (1881). *Le Sahara algérien, les déserts de l'Erg*. Paris: Hachette & Cie.

Loukma, M., & Stefanidou, M. (2017). The Morphology and Typology of the Ottoman Mosques of Northern Greece. *International Journal of Heritage Architecture, 1*(1), 78-88.

Menhour, A. (2012). Évolution de la mosquée en tant que patrimoine architectural religieux, Cas de la mosquée ottomane à Constantine (Published master's thesis). Mentouri Brothers University of Constantine, Algeria.

Merzoug, N.A. (2012). Minarets des mosquées de Tlemcen, étude architecturale et artistique (Published master's thesis). Abou Bekr Belkaid University-Tlemcen, Algeria.

Mustafa, F. A., & Hassan, A. S. (2013). Mosque Layout Design: An Analytical Study of Mosque Layouts in the Early Ottoman Period. *Frontiers of Architectural Research, 2*(4), 445-456.

Mustafa, F.A., & Ismael, Z.K. (2019). A typological Study of the Historical Mosques in Erbil City. *Sulaimania Journal for Engineering Sciences, 6*(3), 11-28.

Najah, A. (1971). *Le Souf des oasis.* Alger: Éditions la maison des livres.

Oliver, P. (1996). Vernacular Studies: Objectives and Applications. *Traditional Dwellings and Settlements Review, 8*(1), 12-12.

Othman, R., Inangda, N., & Ahmad, Y. (2008). A Typological Study of Mosque Internal Spatial Arrangement: A Case Study on Malaysian Mosques (1700-2007). *Journal of Design and Built Environment, 4*(1), 41-54.

Ouedraogo, A. (2007). Les mosquées de Ouagadougou (Burkina-Faso): organisation et fonctionnement. *Insaniyat,* (38), 45-71.

Pradines, S. (2022). The Mosques of the Niger Valleys. In S. Pradines (Ed.). H*istoric Mosques in Sub-Saharan Africa: From Timbuktu to Zanzibar* (pp. 7–114). Leiden; Boston: Brill. DOI: https://doi.org/10.1163/9789004472617_003

Prevost, V. (2009). Les mosquées ibadites du Maghreb. *Revue des mondes musulmans et de la Méditerranée,* (125).

Prevost, V. (2022). Quelques remarques sur la diffusion du minaret-escalier et son lien avec les ibadites. In M. Meouak., C. De La Puente (Eds.), *Connected Stories: Contact, Traditions and Transmissions in Premodern Mediterranean Islam* (pp. 194-216). De Gruyter.

Ravéreau A. (1981). *Le M'zab, une leçon d'architecture.* Paris: Sindbad ACTES SUD.

Redjem, M. (2014). L'évolution des éléments architecturaux et architectoniques de la mosquée en vue d'un cadre référentiel de conception. Cas des mosquées historiques de Constantine (Published master's thesis). Badji Mokhtar-Annaba University, Algeria.

Remini, B. (2006). La disparition des ghouts dans la région d'El Oued (Algérie). *Larhyss Journal,* (5), 49-62.

Remini, B., & Souaci, B.E. (2019). Le Souf : quand le forage et le pivot menacent le ghout !. *Larhyss Journal,* (37), 23-38.

Richer de Forges, R., & Jarrige, P. (2017). *Aventures aériennes (1), Pilote à El-Oued.* Mis en pages et illustré par Pierre Jarrige

Ringgenberg, P. (2009). *L'univers symbolique des arts islamiques.* Paris:

L'Harmattan.

Saoud, R. (2002). Muslim Architecture Under the Umayyad Patronage (661-750 AD). *Foundation for Science Technology and Civilisation,* 1-6.

Saoud, R., & Al-Hassani, S. (2002). *A Review on Mosque Architecture.* Manchester: FSTC.

Schacht, J. (1954). Sur la diffusion des formes d'architecture religieuse musulmane à travers le Sahara. *Travaux de l'Institut de Recherches Sahariennes, 11*(1), 11-27.

Schacht, J. (1961). Further Notes on the Staircase Minaret. *Ars Orientalis,* (4), 137-141.

Shah, M. A., Arbi, E., & Keumala, N. (2016). Historiography of Mosque Architecture in Malaysia: Analysis of Texts by 5 Authors. *Journal of Design and Built Environment, 16*(2), 44-54.

Sklair, L. (2010). Iconic Architecture and Culture-Ideology of Consumerism. *Theory, Culture and Society, 27*(5), 135-159.

Taib, M. Z. M., & Rasdi, M. T. (2012). Islamic architecture evolution: Perception and behaviour. *Procedia-Social and Behavioral Sciences, 49*, 293-303.

Trotta-Brambilla, G., & Novarina, G. (2019). La typo-morphologie en Italie et en France. Élaboration, appropriation et diffusion d'un modèle urbanistique. *Revue Internationale d'Urbanisme, 6.*

Van Der Wusten, H. (2015). The Religious Context in Political Place-Making. In: Brunn, S. (eds.), *The Changing World Religion Map* (pp. 3409-3433). Dordrecht: Springer.

Van Staëvel, J. P. (2017). L'art almohade fut-il révolutionnaire?. *Perspective, 2*, 81-102.

Zerrouki, A. (2021). From Moorish to Neo-Moorish in Oranie (Algeria): A Style Between Rupture and Continuity. *Conservation Science in Cultural Heritage, 21*(1), 181–203.

Zwerger, K. (2019). Vernacular Architecture: A Term Denoting and Transporting Diverse Content. *Built Heritage, 3,* 14-25.

Zerari, S., Sriti, L., & Pace, V, (2019). Berber contributions to Muslim religious architecture in the Ziban (Algeria): Case of mosques. *International Journal of Human Settlements, 3*(1), 43-52.

Zerari, S., Sriti, L., & Pace, V. (2020). Morphological Diversity of Ancient Minarets Architecture in The Ziban Region (Algeria): The Question of Form, Style and Character. *METU Journal of the Faculty of Architecture, 37*(2), 127-152.

Zerari, S., Cirafici, A., & Sriti, L. (2022). Issue in the expression of local identity in the Saharan regions of Algeria: in search of references to vernacular architecture. *Conservation Science in Cultural Heritage, 22*(1), 181-206.

Zerari, S., Pace, V., & Sriti, L. (2023). Towards an Understanding of the Local Interpretations of the Arab Mosque Model in the Saharan Regions. Re-exploration of the Ziban in South-Eastern Algeria. *ArcHistoR,* (19), 96-129.

Contributors

Huriye ARMAĞAN DOĞAN
Huriye Armağan Doğan is an architect with specialisation in cultural heritage protection and a scientific researcher. Before her full-time scientific occupation, she practised as an architect in Turkey in various restoration projects. Her research interests are Adaptive reuse, Preservation and Perception of Cultural Heritage, Early 20th Century Architecture, Cultural Memory.

Hatice Hümanur BAGLI
Graduated from Industrial Design Department at METU, received her Master's from Hacettepe University, Department of Graphic Design and PhD from Istanbul Technical University, Department of ID. She has worked in the Department of ID at ITU, and at Şehir University. Currently working at Marmara University, as department head of ID.

Alessandra CIRAFICI
Alessandra Cirafici is an architect, Ph.D., and full professor at the University of Campania "Luigi Vanvitelli", Aversa, Italy. She graduated as an architect in 1989 from the University of Naples— Federico II. In 1995, she obtained her Ph.D. degree in building surveying and representation, and in 1997, she was awarded a scholarship for postgraduate studies at the University of Palermo. Since 2016, Cirafici has been a member of several boards of the Ph.D. programme in Architecture, Design, and Cultural Heritage. Cirafici is currently involved in issues relating to the representation role in communication for cultural heritage. Her major research interests include the geometric-configurative representation of space, which studies the problematic of perception and communication processes in both architecture and documentation.

Mehmet Turgut ÇIRPANLI
Graduated from METU in 1996, and from MSU in 1999, he has taught Industrial Design in several universities and institutions since 2001. Currently focusing on vernacular wooden boat building in the Aegean Sea Region and yacht design, he is working as a full time instructor in Kadir Has University.

P. A. P. V. D. S. DISARATNA
P. A. P. V. D. S. Disaratna is a Senior Lecturer (Grade I) in Quantity Surveying in the Department of Building Economics at the University of Moratuwa. He is also playing a crucial role on the Board of Quantity Surveying Education and Training. Since 2012, his dedicated contributions have significantly enhanced the education and training framework at the Institute of Quantity Surveyors, Sri Lanka. His research expertise spans risk management, construction procurement, quantity surveying, facilities management, and property development. His work contributes valuable insights to these vital areas within the built environment.

Beyza DOGAN
Graduated from Industrial Design Department at METU. After completing her Master's in Italy, she worked in design offices based in Milan and San Francisco, provided design consultancy in Turkey and Germany. Her work has been recognized by international design awards, currently works as Design Lead at Miele Design Center.

R. R. GOHUNUWATTA
R. R. Gohunuwatta is a graduated Quantity Surveyor with first-class merit from the Department of Building Economics at the University of Moratuwa. Currently, she excels as a quantity surveyor in the industry, leveraging her expertise and academic achievements.

Murat GÜNAYDIN
Dr. H. Murat Günaydın is a professor with extensive experience in construction engineering and project management. He has held various academic and administrative roles at Izmir Institute of Technology and Istanbul Technical University. Dr. Günaydın specializes in quality management, system development, and project management, providing training, research, and consultancy services.

J.K.D.D.T. JAYANETTI
J.K.D.D.T. Jayanetti is a lecturer and researcher in construction management. He currently pursues a Ph.D. at the University of Moratuwa Sri Lanka and has published several Scopus-indexed journal articles and conference papers related to construction management.

Elif KIRPIK
Elif Kırpık is an academician with a B.Sc. in Urban and Regional Planning from ITU, an M.Sc. in Urban Regeneration and Planning from YTU, and is currently pursuing a Ph.D. in Urban Planning at YTU. Her professional interests include urban resilience, GIS, participatory planning, urban regeneration and research methodology.

Mehdi KHAKZAND
Dr. Mehdi Khakzand is an Associate Professor in Landscape Architecture at Iran University of Science and Technology. He previously worked as an Assistant Professor at the University of Tehran. His expertise includes environmental studies, landscape design, and design education, making significant contributions to research and pedagogy in the field.

Burçe KARADAĞ
Graduated from the Bachelor of Fine Arts and Architecture Programs at the Rhode Island School of Design in 2014 and the Architectural Design Masters Program at ITU in 2020. Continues to study in the Architectural Design PhD Program at ITU.

Alice PALMIERI
Alice Palmieri is an architect, Ph.D., and researcher at the University of Campania "Luigi Vanvitelli", Aversa, Italy. She graduated as an architect in 2012 from the University of Roma Tre and in 2017, she obtained her Ph.D. degree in Architecture, Design, and Cultural Heritage. Her research focused on the valorisation and communication of cultural heritage, especially archaeological. Currently, her research is proceeding in the field of digital technologies applied to fruition of cultural heritage. Her major research interests include the configurative representation of space, which studies the problematic of perception and communication processes in both architecture and documentation.

B.A.K.S. PERERA
B.A.K.S. Perera (Kanchana Perera) is a Professor in Quantity Surveying attached to the Department of Building Economics, University of Moratuwa. She is also serving as the director of the Staff Development Centre of the University of Moratuwa. Prof. Perera is a Chartered Quantity Surveyor and a Fellow Member of the Institute of Quantity Surveyors, Sri Lanka (IQSL), the Australian Institute of Quantity Surveyors (AIQS), and the Royal Institution of Chartered Surveyors (RICS). Her key research interests are in risk management, construction procurement, quantity surveying, facility management, and property development. She has published altogether more than fifty refereed journal articles and conference papers in these areas.

H. A. H. P. PERERA
H. A. H. P. Perera is a graduate of the Department of Building Economics, University of Moratuwa, Sri Lanka. He holds a First Class in B.Sc. (Hons.) Quantity Surveying and currently serves as a dedicated research assistant for a non-governmental organization. His commitment to research aligns with his academic excellence.

S.L. PERERA
S.L. Perera is a graduate of the Department of Building Economics, University of Moratuwa, Sri Lanka.

Gülfer ORAZ
Dr. Gülfer Oraz is a graduate of the Department of Architecture at Istanbul Technical University and currently works as a faculty member in the same department. She teaches undergraduate and graduate courses in both the Architecture and Interior Architecture Departments, focusing on project and construction management.

Figen ÖZTÜRK AKAN
Figen Öztürk Akan is PhD candidate at Istanbul Technical University and Research Assistant at Yıldız Technical University, Department of Architecture. She was a member of Larisa (Aeolis) Architectural Survey between 2013-2021, also takes part in Tarsus Gözlükule Excavations since 2016 with BOUN.

K.A.T.O. RANADEWA
Dr. K.A.T.O. Ranadewa is a senior lecturer at the University of Moratuwa, Sri Lanka, and a researcher in the built environment sector with over 30 refereed papers in the area of construction management. She has published several articles in the area of Green construction and BIM as well.

Indunil SENEVIRATNE
Indunil Seneviratne is a senior lecturer at the University of Moratuwa, Sri Lanka, and a researcher in the built environment sector with numerous publications in the area of construction management.

Leila SRITI
Leila Sriti is an architect, Ph.D., and full professor at the University of Biskra, Algeria. From 1992 to 1998, she received her Bachelor's degree in Architecture and Urbanism and her Master's degree in Architecture for Hot and Arid Regions from the same University. In 2013, Sriti earned her Ph.D. degree in Architecture from the University of Biskra. She is currently working as a full Professor at the same university and supervising many Ph.D. projects in Algeria. Her major research interests include architectural heritage in the south of Algeria (hot and dry climate), energy efficiency in building, climatic adaptability of building envelopes, as well as sustainability strategies.

Turgut SANER
Professor Turgut Saner is a member of the Department of History of Architecture in Istanbul Technical University. The early stages of ancient Greek architecture in Asia Minor and the reception of European styles in late Ottoman art and architecture are among his research interests.

Alaleh SAMIR
Alaleh Samir is an architecture Ph.D. student in Islamic Azad University. She researches architecture design methodology and philosophy, behavior settings, environmental psychology, and semiotics of architecture.

Ecem TEZEL
Dr. Tezel is an academic with teaching and research experience in the project and construction management field. She is currently working at Istanbul Technical University Faculty of Architecture Department of Architecture. Her research interests include construction project management, building information modeling, and facility management.

Asuman TÜRKÜN
Asuman Türkün earned her B.Sc., M.Sc. and Ph.D. from METU and retired from YTÜ in 2023, where she had been working since 2006. Currently, she is still involved in research and teaching in the fields of urban sociology, social movements, urban transformation, methodology in social sciences, and women's labor.

Mürüvet TÜRESOY
Mürüvet Türesoy is a senior architect who graduated from İstanbul Technical University, experienced in design and construction companies in various projects. Türesoy is about to submit her doctoral dissertation to ITU Graduate School, Faculty of Architecture in Project and Construction Management Program. She graduated from İstanbul University, Faculty of Letters, Department of English Language and Literature.

Gülname TURAN
Gülname TURAN is a member of the Faculty of Architecture, Department of Industrial Design at the Istanbul Technical University. Her research, publication areas and practice include industrial design, crafts, design history, design education, service design, and social innovation.

Pınar IRLAYICI ÇAKMAK
Dr. Cakmak received her B.Arch (2005), MSc (2008), and PhD (2014) from ITU. Since 2007, she has been working at ITU, recently as an Associate Professor of Project & Construction Management in the Department of Architecture. Her research interests include construction management, contract management, dispute resolution, and digitalization in construction.

Pace VINCENZO
Pace Vincenzo professor emeritus at the Department of Philosophy, Sociology, Pedagogy and Applied Psychology (FISPPA), University of Padova, Italy. He graduated in Law, Literature, and Philosophy at the University of Padova, Italy. He was a full professor (currently retired) in the Sociology of Religions. He is a holder of the Islam and Human Rights module in the European Master on Human Rights and Democratisation. He is a co-editor of the Annual Review of the Sociology of Religion, published by Brill, Leiden-Boston.

Sami ZERARI
Sami Zerari is an architect specialising in the field of cultural heritage. He received his Bachelor's degree in Urbanism and Architecture, and his Master's degree in Urban and Architectural Heritage in the Sahara from the University of Biskra, Algeria. In 2021, Zerari received his Ph.D. degree in architecture with honours from the same university. He is currently studying for his Ph.D. research course—37th cycle with administration headquarters at the University of Campania "Luigi Vanvitelli", Aversa, Italy; the course of Architecture, Industrial Design, and Cultural Heritage. His major research interests include the history of architecture, conservation of cultural heritage, historical building analysis, cultural studies, etc.

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