A+ArchDesign

Istanbul Aydın University
International Journal of Architecture and Design
Year: **5** Issue **2 - 2019 December**

İstanbul Aydın Üniversitesi
Mimarlık ve Tasarım Dergisi
Yıl: **5** Sayı **2 - 2019 Aralık**

Genel DOI: 10.17932/IAU.ARCH.2015.017

Cilt 5 Sayı 2 DOI: 10.17932/IAU.ARCH.2015.017/2019.502

A+ArchDesign

ISSN: 2149-5904

Proprietor - Sahibi
Assoc. Prof. Mustafa Aydın

Editor-in-Chief - Yazı İşleri Sorumlusu
Zeynep AKYAR

Editor - Editör
Assoc. Prof. Dr. Ayşe SİREL

Associate Editor - Editör Yardımcısı
Assoc. Prof. Dr. Gökçen Firdevs YÜCEL CAYMAZ

Editorial Board - Editörler Kurulu
Assoc. Prof. Dr. Ayşe SİREL
Assoc. Prof. Dr. Gökçen Firdevs YÜCEL CAYMAZ

Language - Dil
English - Türkçe

Publication Period - Yayın Periyodu
Published twice a year - *Yılda İki Kez Yayınlanır*
June - December / *Haziran - Aralık*

Year: 5 Number: 2 - 2019 / *Yıl: 5 Sayı: 2 - 2019*

Administrative Coordinator - İdari Koordinatör
Tamer BAYRAK

Turkish Redaction - Türkçe Redaksiyonu
Süheyla AĞAN

Cover Design - Kapak Tasarım
Nabi SARIBAŞ

Grafik Tasarım - Graphic Design
Elif HAMAMCI

Correspondence Address - Yazışma Adresi
Beşyol Mahallesi, İnönü Caddesi, No: 38 Sefaköy, 34295
Küçükçekmece/İstanbul **Tel:** 0212 4441428 - **Fax:** 0212 425 57 97
Web: www.aydin.edu.tr - **E-mail:** aarchdesign@aydin.edu.tr

Printed by - Baskı
Şan Ofset Matbaacılık
Adres: Hamidiye Mah. Anadolu Cad. No:50 Kağıthane - İstanbul
Tel: 0(212) 289 24 24
Faks: 0(212) 289 07 87

Advisory Board - Hakem Kurulu

***Referees for this issue**

Istanbul Aydın University, Faculty of Architecture and Design , A + Arch Design is A Double-Blind Peer-Reviewed Journal Which Provides A Platform For Publication Of Original Scientific Research And Applied Practice Studies. Positioned As A Vehicle For Academics And Practitioners To Share Field Research, The Journal Aims To Appeal To Both Researchers And Academicians.

İstanbul Aydın Üniversitesi, Mimarlık ve Tasarım Fakültesi, A+Arch Design Dergisi özgün bilimsel araştırmalar ile uygulama çalışmalarına yer veren ve bu niteliği ile hem araştırmacılara hem de uygulamadaki akademisyenlere seslenmeyi amaçlayan hakem sistemini kullanan bir dergidir.

Contents - İçindekiler

Doi Num - Doi Numbers

From Editor - Editörden

The international journal A+ArchDesign is expecting manuscripts worldwide, reporting on original theoretical and/or experimental work and tutorial expositions of permanent reference value are welcome. Proposals can be focused on new and timely research topics and innovative issues for sharing knowledge and experiences in the fields of Architecture- Interior Design, Urban Planning and Landscape Architecture, Industrial Design, Civil Engineering-Sciences.

A+ArchDesign is an international periodical journal peer reviewed by Scientific Committee. It will be published twice a year (June and December). Editorial Board is authorized to accept/reject the manuscripts based on the evaluation of international experts. The papers should be written in English. The manuscript should be sent in electronic submission via. https://dergipark.org.tr/aarch

Assoc. Prof. Dr. Ayşe SİREL

Effective Project Team Organization in Project Management Practices

Dr. Karen Boujaoude Khoury
Notre Dame University; Faculty of Arts, Architecture and Design
Department of Architecture
kaboujaoudeh@ndu.edu.lb

Abstract: *The study focuses on architecture practice and the tensions that arise within the profession as a result of a variety of systems of performance. Particularly it gives attention to the weak collaboration between the design-construction phases that are composed of several sequential steps called the project process. The problem arises from a lack of organization and the need for project management in architecture as a result of the increase in interrelated tasks assigned for the architect to deal with and the complexity of architecture projects in hand. These organized jobs require a number of expertise working together who might not have same interests to share common goals. The study covers the importance and significance of project management in the construction industry and analyzes the problems in managing architecture projects raising potential conflicts in communication and stressing on weak collaboration in the architecture engineering construction industry (AEC industry). The research highlights the importance of project team organization in the success of project delivery and determines the means and tools of successful communication for that purpose. The elements facilitating team communication are listed as effective variables essential for the success of project delivery.*

Keywords: *Project management, construction, team organization, building*

Proje Yönetimi Uygulamalarında Etkili Proje Ekibi Organizasyonu

Öz: *Çalışma, mimarlık pratiği ve çeşitli performans sistemlerinin sonucu olarak meslek içinde ortaya çıkan gerginliklere odaklanmaktadır. Özellikle proje süreci olarak adlandırılan birkaç ardışık adımlardan oluşan tasarım-inşaat aşamaları arasındaki zayıf işbirliğine dikkat verir. Sorun, mimarın başa çıkabilmek için verdiği birbiriyle bağlantılı görevlerin artması ve mimari projelerin eldeki karmaşıklığı sonucunda organizasyon eksikliği ve mimaride proje yönetimine duyulan ihtiyaçtan kaynaklanmaktadır. Bu organize işler, ortak hedefleri paylaşmak için aynı ilgi alanlarına sahip olmayan birlikte çalışan bir dizi uzmanlık gerektirir.*

Anahtar kelimeler: *Proje yönetimi, yapım, takım organizasyonu, bina.*

1. INTRODUCTION

Construction projects and their outcomes seriously influence the contemporary culture; therefore, the significance of a well-functioning construction industry is an essential element [1]. In various, several countries; the construction industry has, nevertheless, concerned analysis for unsuccessful outcomes such as time and cost overruns, low productivity, poor quality, and insufficient customer satisfaction [2]. Practitioners, researchers, and the social order at large have consequently, called for a change in interrelations, behavior, and dealings in order to boost the probability for project success and improve results [3]. The customer is proposed to act as a change mediator in such a transformation [4].

Doi Num : 10.17932/IAU.ARCH.2015.017/arch_v05i2001

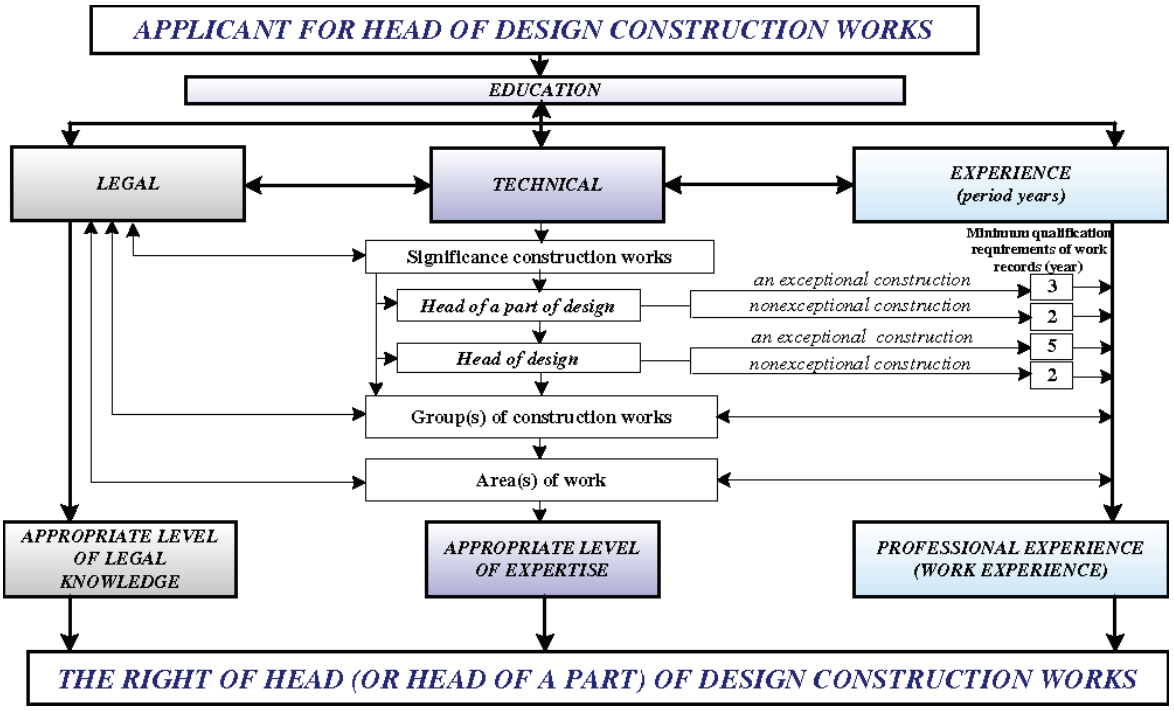


Figure 1. Applicant for head of design construction works [5]

Even though many attempts have been made within the last two decades to develop and apply new technologies in order to improve quality and costs, no major change have affected the construction industry over the same period of time. The AEC industry has been opposing all the business changes for productivity improvement as in other industries. The present condition of division needs to be changed. Change is required to generate a setting that enhances innovation, clarifies communication, and assimilates the design, manufacturing and construction processes. While every architectural product is fairly becoming the subject of change, all the products are tagged with various titles, periods and concepts under the influence of the transformation process. This situation puts the matter of consumption on the agenda and sets up a world in which constructed models are gradually consumed and considerations of quality become lost under the title of "diversification" [6].

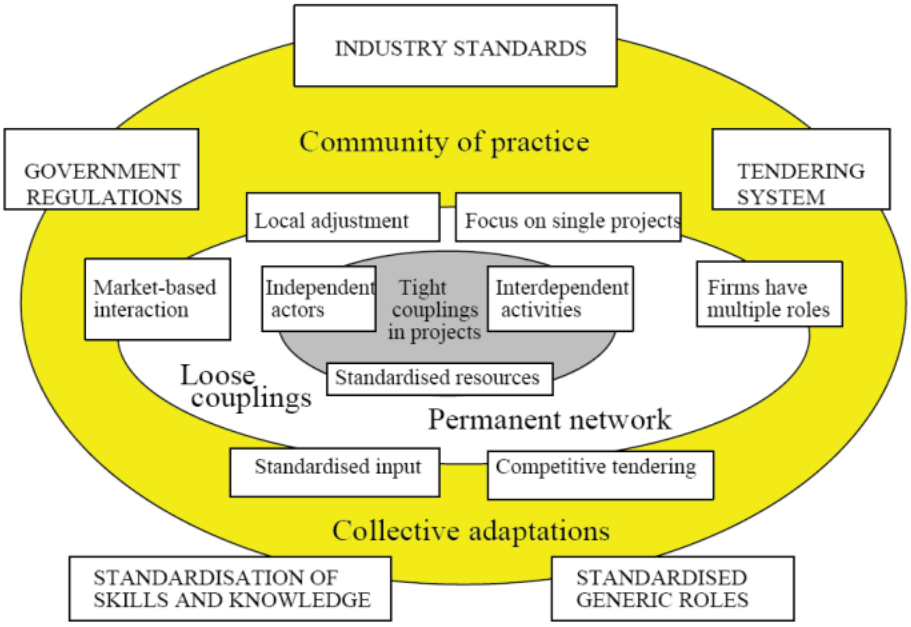


Figure 2. The pattern of couplings [7]

The construction industry is known for its slow pace of change and its multiple divisions in process [7]. Any architecture project should follow a definite process from design to construction. It is a multi-stage process, which includes design conception, approval of design by the client, construction plans, specialized tasks approved, and finally construction or implementation on site. It is considered a multi-organization process, which involves the client, designer, contractor, supplier, consultant, etc. Since the sequence of the tasks in the construction project requests the completion of one task in order to start the other, then data related was considered the basic concept upon which the exchange of information in such projects should be studied [8].

1.1. Research Objective

Project management in architecture is the organization of activities performed in construction organizations that mainly deal with "planning, executing, coordinating, and controlling projects," resulting in building new structures [9]. Unluckily, due to poor value of management practices, several construction projects do not meet their targets [10, 11]. Consequently, the incentive for this research is the call for project success improvement in the construction region. Particularly, this work focuses the effect of different organizational structures on communication within a construction project [12, 13, 14].

The significance of project management in the construction sector has quickly increased in the last few decades. Accordingly, project managers, planners, and estimators ought to struggle to constantly advance their project management qualifications. Inefficient productivity, such as time delays and cost overruns, are not uncommon in construction projects [15], and the reasons behind these troubles have concerned the awareness of construction practitioners and researchers. For instance, Mansfield et al. (1994) [16] acknowledged the four vital factors behind time delays and cost overruns as finance and payment problems, poor deal management, modifications in site conditions, and scarcity of materials. Moreover, the study by Kaming et al. (1997) [17] reveals the major factors affecting time delays are design changes, poor effort productivity, insufficient planning, and resources deficiency, whereas cost overruns are normally

attributable to objects price increases, inexact material evaluation, and project complexity. Similarly, (Malik et al. 2007) [18] recommended that time delays and cost overruns occur principally as a consequence of payment difficulties.

Project management is defined as the organization of a set of orders and commands in adequate detail to tell the project team precisely what must be done, once it must be accomplished and what resources to make use of in order to generate the deliverables of the project productively and effectively [19].

The project manager, who must make certain that the project, is carried out appropriately and to the complete fulfillment of all relevant stakeholders. Major compensations of proper project planning are to:

- get rid of or reduce uncertainty;
- develop efficiency of the process;
- get hold of a better understanding of project objectives; and
- Grant a basis for monitoring and controlling effort [20].

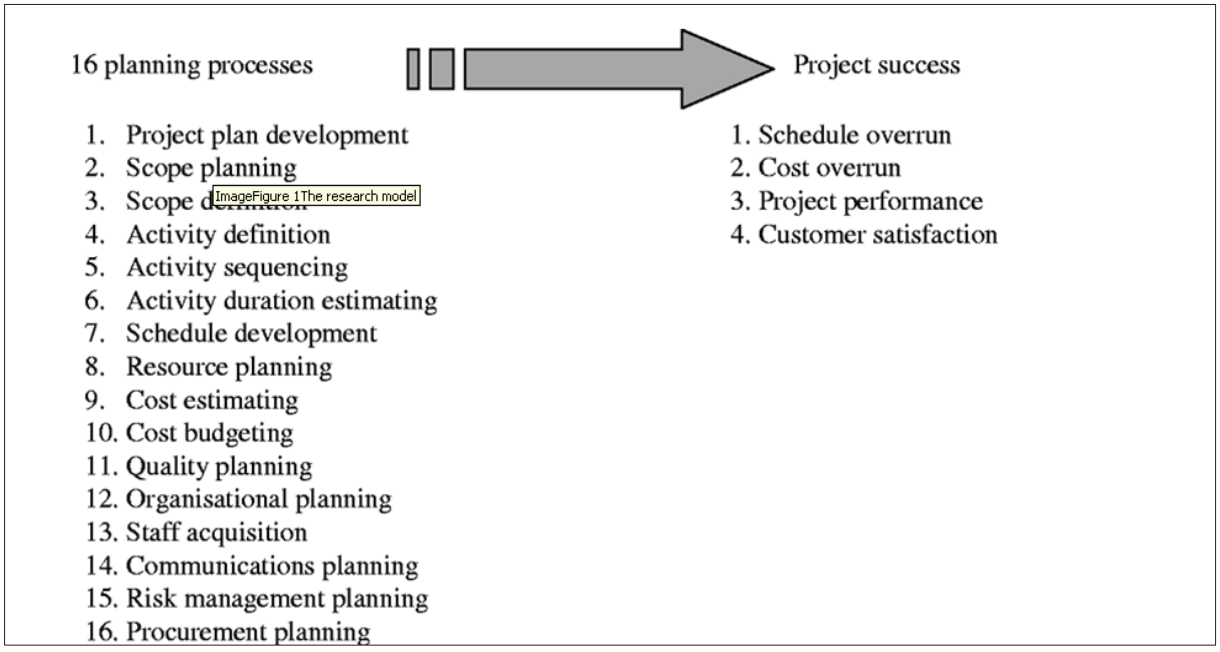


Figure 3. The Planning Phases and Process [21]

The main product of the planning phase is the project plan as achieved by the project team during the planning phase of the project. The project plan includes the following elements: general idea, project objectives, universal approach, contractual features, calendars, possessions, personnel, risk-management plan, and assessment methods [19]. (Sequentially to extend a project plan, more than a few managerial processes ought to be executed. Probable lists of planning processes are established in dissimilar sources. For instance, Russell and Taylor (2003) [22] recognized seven planning processes, which consist of defining project objectives, identifying activities, establishing preference relationships, manufacturing time estimates, acquiring project completion time, comparing project timetable objectives, and shaping resource requirements to assemble objectives. Kerzner (2006) [20] spot nine major mechanisms of the planning phase as intention, plan, calendar, financial plan, estimate, organization, strategy, process and typical.

2. LITERATURE REVIEW

Little attention is given to the design team who organizes the process of functions from the beginning till the end of project. The arrangement of the design team structure is therefore a basic step in the process of the process management. As noted by Chiu, "*Team organization is one of the major tasks in design collaboration, because it can affect design communication and performance*." Where he focuses in his study, *An Organizational View of Design Communication in Design Collaboration*, on the importance of organization on the whole process of the project and its quality [23].

Referring to general managerial journals, Jack Welch suggested reducing the boundaries that create a closure over one's work and separates the tasks of one project, all this without leading to a chaotic form or structure. This reflects the need of smooth communication in the organization structure between the parties in the practice.

Most construction projects drift towards increased complications, vagueness, and time pressure in construction projects, which has rendered long-established procurement measures and outdated governance forms [3, 24]. Therefore, a transformation towards improved flexibility, organization, data exchange, and collaboration is usually essential for the demanding construction project characteristics [24]. Since the usual competitive procurement actions create many obstacles in today's demanding project contexts [24].

The next section will cover the theories on the value of organizational structures in the success of project management and delivers a variety of project delivery systems that are analyzed and examined in each of the case studies of this research.

Professional coordination such as joint ventures reveals the technical advantage and cost reduction to complete the assigned tasks, but within this evolution, the architect finds himself a partner of many in the same project which reduces his value in his profession and limits his job. The architect struggles between several tasks in architecture practice; trying to manage between design, engineering solutions, interior decorations and construction and implementation. Communication conditions between several people is summarized in the figure below:

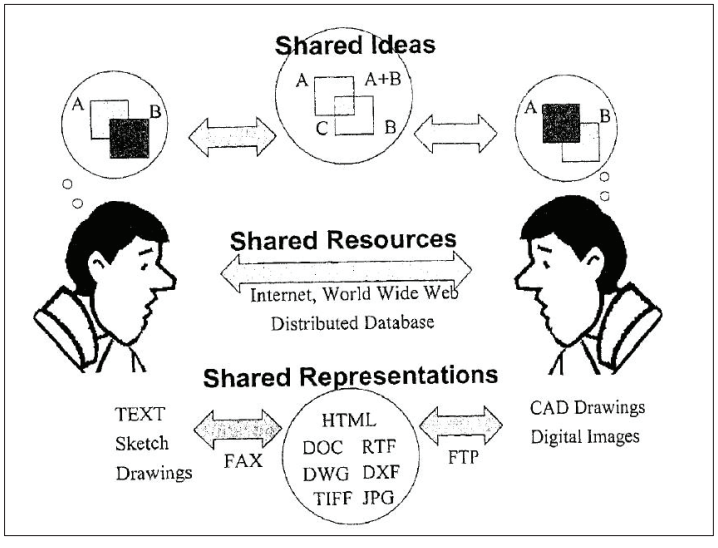


Figure 4. Communication between participants [25].

A chain of communication theories have been recognized by researchers of organizational behavior and management science. The active process of human communication results in the effect of one person on the other intentionally or involuntarily through different aspects of resources and materials [25].

The way a project team is structured can play a major role in how it functions. Different styles of team will have different characteristics. Within a team you will find a mixture of different people with different assignments - but that does not necessarily require a hierarchy. The best team cultures develop where team members recognize that everyone else also has important value to contribute [25].

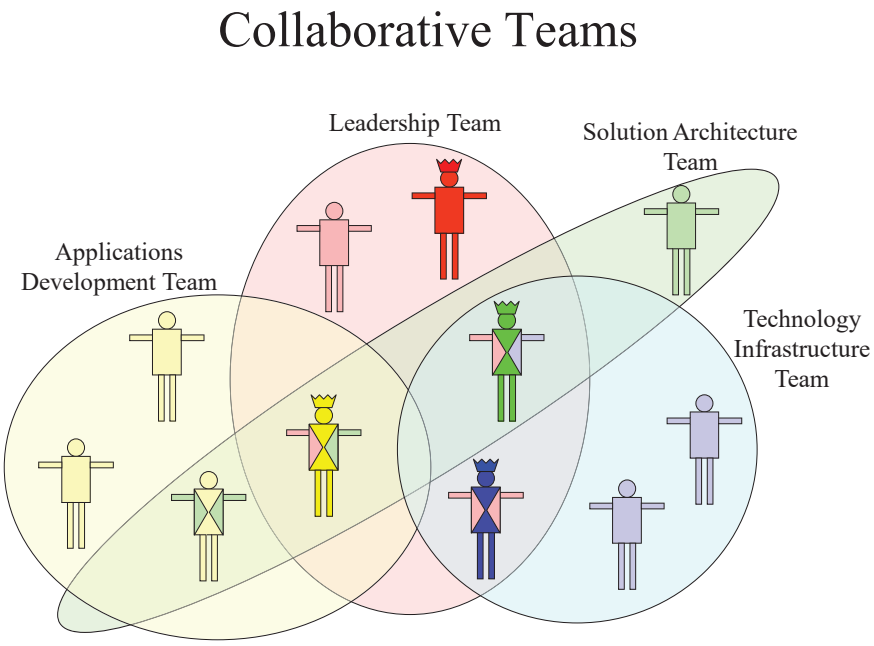


Figure 5. Collaborative teams [26]

The figure extracted from a study on collaborative teams reveals a diagonal selection of members belonging to a variety of positions which enriches the communication process and makes it more successful.

A fine, well-organized design process requires many features, but they are all based on four concepts: recognizing the tasks and their principal uniqueness; previous programming, along with the work schedule; scheduling resources, in terms of equipment and resources, and re-estimating [20]. Robinson et al observes that the preparation of building works, both public and private, is a complex task, and its main intention involves "supplying drawings for the various work fronts so that it is possible to understand, clearly and precisely, exactly what is to be built." [27].

Cole 2000 highlights the value of this practice, since it allows problems and defects to be defeated and put right by anticipating them. Cox et al 2006, in the meantime, points out that the preparation of works is intended to facilitate a number of factors, " like quality, safety, deadlines, cost and environment, and so it is a complex process, with all these factors being interconnected " [28].

Importance of team organization in the design of buildings is attracting the attention of many researchers due to the increase in the complexity of technical and organizational structure of any construction project [24].

Harmonizing team communication is: a team effort and it would appear that a bottom-up approach to the management of team communication is required to improve effectiveness. Developing a common understanding of effective communication in the team and using the most appropriate means for the purpose is a fundamental aspect of team performance. Team members have to experience the practical and effective use of new communication technologies in their daily work" as understood by Eriksson and Westerberg in 2010.

The success of a team-based organization is related to the management systems and structures which must be supportive of teamwork, together with employee selection method; reimbursement and incentive programs; performance evaluation procedures; teaching programs, mainly with reference to team-skills; information organizations to meet the requirements of empowered teams; and scheduling and resource allocation systems [24].

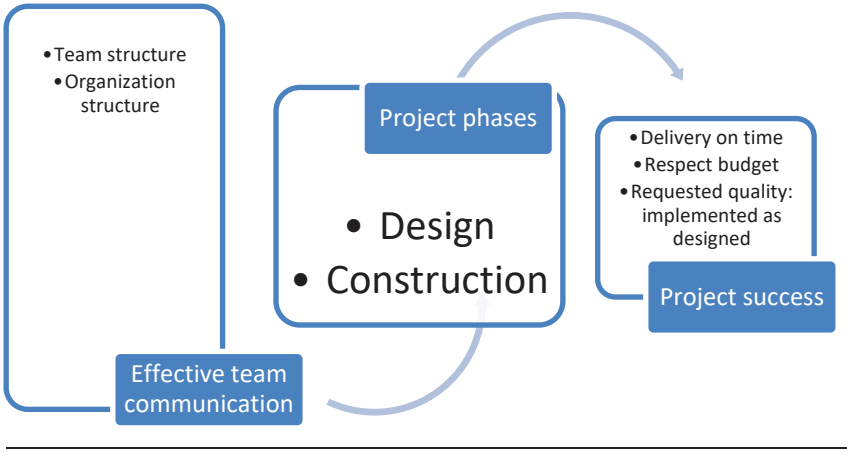
The effect of team organization on communication in project management, which is exposed in the literature review, is tested in all case studies to indicate facilitators and ensure successful project delivery.

3. THE RESEARCH METHODOLOGY

The article refers to a study of 7 different case studies chosen from the top 10 architecture firms in Lebanon. They encounter 85% of the Lebanese construction market. They follow different organization models and cover a variety of business construction projects. The case studies include design and construction participants from the same or separate organizations or even geographically distant firms in order to define the project's needs and goals. The cases also summarize the relationship between the architect and the different project delivery systems and his/her job according to other participants. The principles extracted are studied and summarized to be used in the structure of productive communication teams in project management.

Table 1. Summary of case studies

Project name	**Scale**	**Duration**	**Type**	**Location**	**Construction Cost**
Beirut National Library	Medium	3 years	Governmental	Beirut	7 million dollars
Credit Libanais	Medium	4 years	Private	Beirut	7 million dollars
Clemenceau 306	Medium	4 years	Private	Beirut	9 million dollars
A Public project in Beirut City District	Large	6 years	Public	Beirut	50 million dollars
Urban Project in Jeddah-KSA	Large	6 years	Public/Urban	Jeddah	70 million dollars
Emergency Unit Rehabilitation and Extension	Medium	3 years	Institutional	Beirut	2 million dollars
Residential and commercial project in Beirut	Large	5 years	Private/ Public	Beirut	10 million dollars



The study examines different project delivery systems and their effect on the project's success through effective team communication.

Different design process models in the selected case studies reveal the importance of team structure and communication links between participants.

With respect to Chan, and based on the study of communication structure in several case studies, the more complex the project is, the more organization becomes hierarchal. Therefore, it is essential to break the whole group into smaller ones that makes communication easy and more efficient in terms of information flow. He points out both, the mesh and star network in the organization structure that are used between or within groups. The level of communication is determined by the size and nature of project [25].

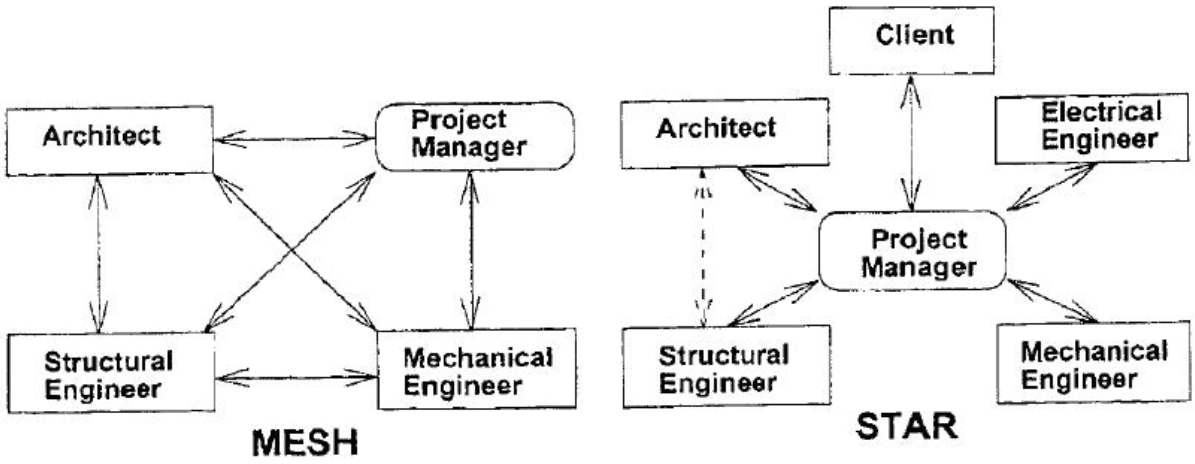


Figure 6. Organization Structure as Centralized and Decentralized [25:33].

Based on this study, architecture firms are considered dynamic dealing with several entities that makes their organization closer to a decentralized system. This stresses upon the need for a well-organized structure in architecture firms that strengthens communication between all involved members.

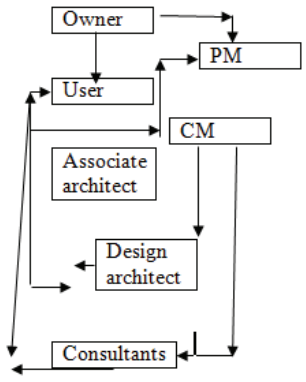
"The notion in complexity hypothesis reverses the usual views of project management achieved over the last 50 years and move from a Cartesian/Newtonian paradigm to a more "complex" view [29]. Although there is no one definite definition of "complexity theory" as its main beliefs have enthused many academics and practitioners in the field of managerial studies, business management [30], and recently disaster management and communication [31]. Normally, complexity theory is very much concerned with: the study of the dynamics of complex adaptive systems which are non-linear, have self-organizing attributes and emergent properties" [18].

"The casual, relaxed communication networks in oppose to the emergence of a disaster as the new communication structures are constructed between project participants based on the shared information and anxiety. Changes and guidelines driven by the top management are usually doubtful to create preferred effects lacking local individuals' coordination. They frequently exchange energy with their surroundings through the self-organizing and emergent property of the complex systems; they even permit impulsive and natural manners and generate new patterns. This allows them to bear in a state that is far-from-equilibrium, "on the edge of chaos" [32], where order and disorder, stability and chaos co-exist." [15].

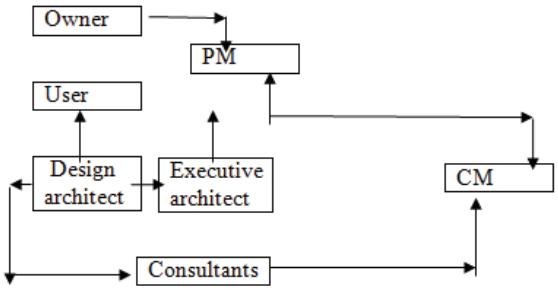
Kaufman explains the need and importance of communication in the human social life. "In applying complexity theory to communication management in the context of crisis response, the interactive patterns between individuals and organizations that underlying the shifting social aggregations can be better understood" [20].

An increase in the flow of information tends to drive an organization away from stability; at some critical points [33]. A suitable style of management and leadership encouraging communication and association between organizational members is necessary to allow self-organizing of communication" [15].

The team organization structure extracted from the several case studies are summarized as follows:

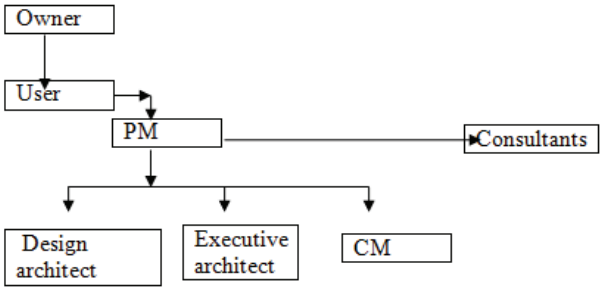
The Beirut National Library Project	
	The design architect is legally under the executive, however he has direct communication with the user which made it easy for both to transform the conceptual idea into reality in construction. The project manager developed a smooth communication system between all the participants which ensured the design quality of the project.

The Credit Libanais Headquarters



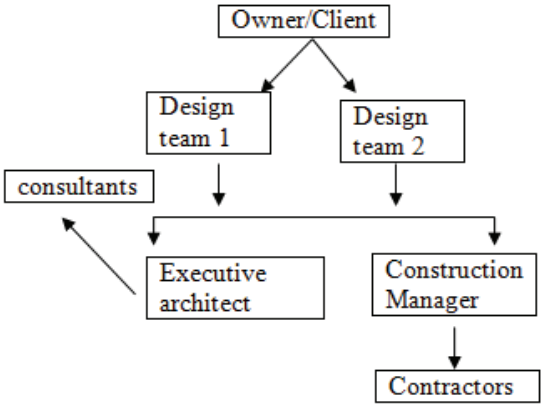
The owner who selected the executive architect caused a tension in the relationship between the design architect and himself. But the role that the executive architect played was important in defining the roles of each participant and drawing a system of interaction which made the collaborative system easy and clear.

The Clemenceau 306



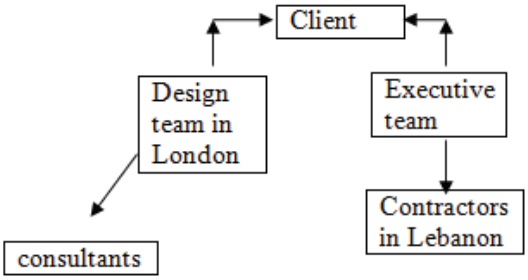
The hierarchal system of work made the communication clear and easy, however elongated the time frame of the project which was saved by increasing the number of participants especially in the execution phase. The project manager who was assigned responsible for the whole project redesigned the structure to follow up the planned outline.

A Public project in Beirut City District



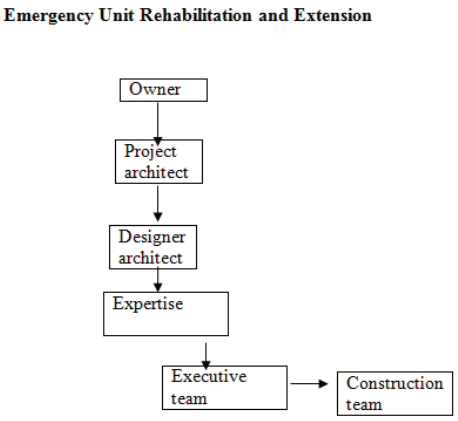
The work had to be accomplished in parallel with another design department assigned by the client. This system of work resulted with a clash on the approval of designed plans which limited the role of the architect to the cad drawings only.Contractors did not have any relation or contact with the design architects or the executive architects. They had to learn new technological innovations in order to understand the designed plans.

Urban Project in Jeddah-KSA



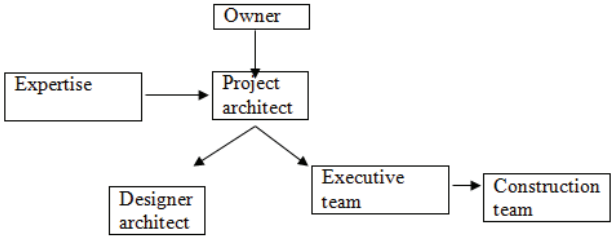
The client who is the mediator between the design team and the executive team in different countries was the one who took all decisions from the design phase to the construction. The lack of communication between the design and construction teams lead to a misunderstanding in the execution of designed drawings.

Emergency Unit Rehabilitation and Extension



The linearity in the exchange of information and the system of interaction made the process from design till construction an easy and non complicated one even though the teams were far away geographically. The use of IT was important and the project architect had the role of the coordinator between all participants.

Residential and commercial project in Beirut



The hierarchal structure had a positive impact on the delivery of project in terms of time and quality. In spite of referring to the client for each modification, the integrated system of work made communication simple and the exchange of information easy.

Team communication facilitators are summarized and listed in the table 2:

Facilitators	Owner	Project manager	Design Architect	Executive architect	Consultant	Construction manager
Organizational System						
1 Contact With Client			X	X		X
2 Local Partner	X					
3 Originality	X		X	X		
4 Ability To Work With New Methods		X		X	X	X
5 Leadership/ Clear Objectives	X	X				
6 Local Collaborator			X	X		
7 Partnering	X					
8 Learning				X		
9 Participation In The Design Process	X	X				
10 Informal Communication			X	X		
11 Flexibility	X					
12 Lessons Learnt			X			
13 Direct Operation			X	X		

The impact of team structure on the communication linkages has been examined through each proposition:

P1:The impact of team structure on communication links

Proposition1: The impact of team structure on communication links determined the participant's role in successful communication. This did not vary whether the firm had local or international links. In either cases, the factor had a high impact on affecting the communication links that leads to the success of the architecture project and stresses on the importance of people rather than organizations.

P2: The impact of project delivery system on communication links

Proposition 2: The impact of project delivery system on communication links was delivered by all firms according to the organization of tasks related to each project. The models presented a common structure that enhances communication between participants. This happens to be the hierarchal structure, the most effective one in architecture firms in Lebanon. It focuses on the Importance of people and team structure.

4. RESULTS (In terms of organization structure and human factor)

Building the team: organization structure

Teambuilding is significant for the successful achievement of any project. The purpose of the team is to deliver a project that completes on time, is on or below budget, is cost-effective to all team members, with no claims, and consequences in a pleased owner. Challenge, certification battles, doing hazardous actions

out of spite, and other disturbing actions may result in at least an unpleasant work atmosphere and more likely an unproductive project.

The client plays a guidance role in encouraging and maintaining the team setting. Structuring and preserving the team is in this individual's best interest. Ways of team building start with establishing common goals, accepting and establishing mutual respect between team members.

"Productive teamwork is an essential aspect of professional practice. Architects can improve their ability to work together by employing a set of basic team-building activities that can help architecture teams improve communication, creativity, and performance." [34].

The construction team is frequently considered as including the architect or engineer (design team), owner (client's representative), and freelancer (builder). The design team is composed of architects, engineers and consultants that create the construction plans for the client. The client could be a public or private unit that presents the project necessities and financial support for design and construction. The outworker typically builds an exclusive project in a very aggressive setting. Other members that affect a project team are public involvement and governmental regulators.

The human factor

These team members allocate the common goal of building a project, but because of contradictory and challenging concern a project may undergo a need of teamwork. These disconnected interests are a result of the broken nature of the industry, developing new team members for every project, and the diverse perspectives or priorities that are common to some degree in all projects.

The construction method is a very viable setting for the client, design team, and contractor. The owner requests the finest value and uppermost quality for their given budget. The design team struggles to accomplish this for the owner and is within the restrictions to activate a successful business. The contractor works in a very competitive industry where revenue margins are low and risk are high. The competitive scenery of these members may cause a crash of the teamwork vital to an extremely successful project. This collapse causes; early information flow, mistrust, too much documentation, costly delays, reduced quality, and eventually affects the cost and timetable of a project.

The need to organize people is therefore a must when involved members increase and communication becomes more complicated. "*In integrated project delivery, the architect and contractor work together, often as part of the same integrated firm. As a result, project communication and coordination often run more smoothly than in traditional project delivery, which separates designer and builder. This collaboration has many benefits for design and construction practitioners and their clients*." [34].

5. DISCUSSION

Teamwork and its success criteria

Teamwork is known as "cooperative effort by the members of a group or team to achieve a common goal" [35]. The case studies identify successful practices team members that can be used to generate an improved cooperative endeavor between members of the project team or teambuilding in the construction industry. Teambuilding is defined as a procedure planned to develop a project's performance. Enhancing the performance is delivering a project with high quality, within the budget, on time and without any claims or disagreements.

Teambuilding engages definite tasks that are usually a division of the construction process but are accomplished with the purpose to generate a team. The objectives of these activities are to promote communications, support coordination and cooperation, keep away from possible problems, disputes and maintain high moral.

Teambuilding requests a firm effort on somebody's part; this is usually done by the client delegate or a Construction Manager (CM). The owner's representative or CM naturally has construction contracting knowledge and their background is either from the design professional's or builder's point of view. These participants of the team should make it their assignment and take a management role to generate and foster teambuilding since it is in their and the projects best significance. This management and control cannot work as a top down mandated procedure but should be more of a trainer or even cheerleader helping as the role model and making available tools to promote teambuilding. The manager of the teambuilding hard work should know the strengths of individuals and organizations and use this to help make the team more interconnected and organized.

Defining Team Goals

The earliest step in teambuilding is to congress the team and organize common and shared project goals. This can be as easy as a preconstruction assembly or as official as a facilitated partnering conference [36]. All the project stakeholders should be there at this kick-off meeting. A team operates professionally when everybody agrees upon shared project goals and objectives. This meeting also provides as a method for the group of actors to get to be acquainted with one another and extend a team "win-win" attitude rather than we/they manners.

Cooperatively the team should describe and agree upon common team and project goals that offer reason, meeting point, and direction. Goals should be precise, considerable, achievable, significant, and time-bound. Throughout the recognition of stakeholders' particular goals for the project, common objectives can appear [24].

A straightforward illustration of a team objective is the project schedule. The builder makes a revenue by finishing as soon as possible. The client may call for a competence by a precise date, as seen in case number two, Credit Libanais Headquarters project, where the design team only has a restricted time frame for the construction phase budgeted. A win-win approach is the feature for each of the participant's objectives i.e. builder desires; fast replies to demand for information, owners requests; general coordination and cooperation, and the designer needs; assist with field solutions to problems against redesign.

Building successful Team Communication

Unsuccessful communication can create excessive stress and pressure between team members, which lowers equally honest and efficiency that can show the way to loss of time and money. Efficient teams work during breakdowns in connections by rising and promoting open and clear communication among its team members. The three key fundamentals to successful project communications are significance, awareness, and happening. Appropriate communication is alert, to the point, and task-oriented. Approachable communication engages the enthusiasm to collect information from others, dynamic listening, and building on thoughts and views from others. Occurrence is recognized communication ways and timely reactions. Postponed upon desired communication within team members can only cause matters to irritate and lead to a collapse of the team and its performance.

Excellent team negotiations rely on how fine team members are capable to communicate with each other. By accepting others and passing on your thoughts you will help breakdown communication obstacles.

Strategies for practicing open communications are:

- Be enthusiastic to convey yourself and your views completely.
- Stay away from becoming annoyed or annoyed when another person's view varies from yours.
- Be prepared to modify your views as new information becomes accessible.
- Consider win-win by looking for common ground on matters.
- Apply pro-active listening.

Pro-active listening is discovering others ideas to a certain extent than debating their ideas. Bender and Septelka 2000 [37], have proposed five steps in applying pro-active listening:

1. Support the person to communicate their ideas, opinions, and views.
2. Watch and pay attention to what the other person thinks, feels, means and does.
3. Understand what the other said by means of open-ended questions.
4. Accept by paraphrasing and playing back what the other assumed without judgment or problem solving.
5. Interpret what they said and watch and listen, or ask for verification, that you correctly interpreted their ideas, thoughts, and views.

Some barriers to watch out for are:

- Judging a person idea by condemning, name calling, identifying or admiring evaluatively.
- Transferring solutions by arranging, ultimatums, frightening, moralizing, advising, or too much and unsuitable questions.
- Keep away from the other's persons worries by switching, using reasonable opinions, or encouraging.
- "Silent treatment" moving away from calls, delayed reactions, avoiding uncomfortable matters [38].

Frequent team meetings are an efficient communication technique to talk about project matters. All the stakeholders need to be in presence and the gathering needs to be prearranged to be successful. The meeting must include a chosen facilitator that maintains the meeting on time, improves open discussions so that everybody is heard, and reports decisions completed in the meeting. Everybody on the team is full of activity and the majority of meetings can be seized successfully within an hour. The meeting schedule should be sent out previous to the meetings and meeting notes with allocated action items must punctually go after all meetings. In a meeting it is simple to misunderstand what was said and an official recording will permit everyone to interpret and understand the identical interpretations thus saving the project time and money. A way needs to be in place to permit corrections to be completed to the minutes if there is an inconsistency in what was recorded.

Communication among team members has never been so simple and fast. Email, cell phones, the internet, and extranets all permit projects to be organized 24 hours, 7 days a week. Several cautions come with via these innovative technologies that tolerate immediate communications. With the failure of personal contact we mislay the capability to watch and ensure the sender's body verbal communication. Electronic mail can be quickly written and can communicate incorrect purposes when not sufficient time is permitted for the sender or receiver to examine the communications or problem in a complete point of view. Email can be rapidly forwarded to others without the senders' awareness, so make sure what you write down is projected for anyone's eyes. It is significant that you consider first and make sure you are not expressive over the issue and it is suggested to make clear any issues by calling first ahead of writing.

6. CONCLUSION

The study was based on the supposition that with the increase in division and assessment of the tectonic, architectural design has more and more become a communicative organizational process, in which a variety of participants are concerned with different viewpoints and expertise. For that reason, the achievement of the project depends a lot upon how the team is organized and well thought of by having strategies that support facilitators and reduce inhibitors to communication.

Successful projects engage organizations that support frequent restructuring of their civilization and involve people in search of an advanced standard of success. The participant's obligation and devotion to the project's success also delivers an improved project. Consequently, the success of the project basically depends on the people and their organizations and the values determined in this thesis can assist the communications among these people and organizations.

REFERENCES

[1] Cheung, S.-O., Lam, T.-I., Leung, M.-Y., Wan, Y.-W. (2001). An analytical hierarchy process based procurement selection method. Construction Management and Economics 19 (4), 427–437.

[2] Ai Lin Teo, E., Ling, F.Y., Chong, A. (2005). Framework for project managers to manage construction safety. International Journal of Project Management 23 (4), 329–341.

[3] Dubois and Gadde (2002). The Construction Industry as a loosely coupled system. Implications for productivity and innovativity.

[4] Assaf, S.A., Al-Hejji, S. (2006). Causes of delay in large construction projects. International Journal of Project Management 24 (4), 349–357.

[5] *(International Journal of Information Technology and Decision Making 2012)*

[6] Fernie, S., Thorpe, A. (2007). Exploring change in construction: supply chain management. Engineering, Construction and Architectural Management 14 (4), 319–333.

[7] Dubois, A., & Gadde, L. E. (2000). Supply strategy and network effects—purchasing behaviour in the construction industry. *European journal of purchasing & supply management*, *6*(3-4), 207-215.

[8] Green, S. (2002). The human resource management implications of lean construction: critical perspectives and conceptual chasms. Journal of Construction Research 3 (1), 147–165.

[9] Blyth, K., Lewis, J., Kaka, A. (2004)."Developing a framework for a standardized works programme for building projects", *Construction Innovation*, Vol. 4 No.4, pp.193.

[10] Brown *et al.* (2001)**.** "The facilities management role in new building procurement", *Facilities*, Vol. 9 No.3/4, pp.119.

[11] World Bank (1996). *World Bank Survey of International Construction Projects*, World Bank, London,

[12] Zwikael, O., Shimizu, K., Globerson, S. (2005), "Cultural differences in project management processes: a field study", *International Journal of Project Management*, Vol. 23 No.6, pp.454-62.

[13] Kerzner, H. (2006). *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 9th ed., Wiley, New York, NY.

[14] Turner, J.R. (1999), *The Handbook of Project-based Management: Improving the Processes for Achieving Strategic Objectives*, McGraw-Hill, London.

[15] Lo, T.Y., Fung, I.W.H., Tung, K.C.F. (2006). Construction delays in Hong Kong civil engineering projects. Journal of Construction Engineering and Management 132 (6), 636–649.

[16] Mansfield, N.R., Ugwu, O.O., Doran, T. (1994). Causes of delay and cost overruns in Nigerian construction projects. International Journal of Project Management 12 (4), 254–260.

[17] Kaming, P.F., Olomolaiye, P.O., Holt, G.D., Harris, F.C. (1997). Factors influencing construction time and cost overruns on high-rise projects in Indonesia. Construction Management and Economics 15 (1), 83–94.Frimpong et al. 2003

[18] Malik, M.A.K., McDermott, P., Swan, W. (2007). "Building trust in construction projects", *Supply Chain Management*, Vol. 12 No.6, pp.385-91.

[19] Meredith, J.R., Mantel, S.J. (2006), *Project Management – A Managerial Approach*, 6th ed., Wiley, New York, NY,

[20] Kerzner, H. (2006), *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 9th ed., Wiley, New York, NY,

[21] Zwikael, O., Shimizu, K., Globerson, S. (2005), "Cultural differences in project management processes: a field study", *International Journal of Project Management*, Vol. 23 No.6, pp.454-62.

[22] Russell, R.S., Taylor, B.W. (2003), *Operations Management*, 4th ed., Pearson Education, Upper Saddle River, NJ, .

[23] Chiu, Mao-Lin. (2002). An Organizational View of Design Communication in Design Collaboration

Egan, J., 1998. Rethinking Construction. HMSO, London.

[24] Eriksson and Westerberg, (2010). Effects of cooperative procurement procedures on construction project performance: A conceptual framework. International Journal of Project Management 29 (2011) 197–208

[25] Chan, A., Chan, A. (2004). Key performance indicators for measuring construction success. Benchmarking: An International Journal 11 (2), 203–221.

[26] Den Otter, A., & Emmitt, S. (2007). Exploring effectiveness of team communication. *Engineering, Construction and Architectural Management*.

[27] Robinson, H.S., Carrillo, P.M., Anumba, C.J., Al-Ghassani, A.M. (2005), "Review and implementation of performance management models in construction engineering organisations", *Construction Innovation*, Vol. 5 No.4, pp.203-17.

[28] Rwamamara, R. (2007). Planning the Healthy Construction Workplace through Risk Assessment and Design Methods. Civil, Mining, and Environmental Engineering, Lulea˚, Lulea˚ University of Technology, Doctoral Thesis.

[29] Cooke-Davies, T. (2002). The "real" success factors on projects. International Journal of Project Management 20 (3), 185–190.

[30] Petersen, D.R., Murphree, E.L. (2004). The impact of owner representatives in a design-build construction environment, *Project Management Journal*, Vol. 35 No.3, pp.27-38.

[31] Munns, A.K., Bjeirmi, B.F. (1996). The role of project management in achieving project success. International Journal of Project Management 14 (2), 81–87.

[32] Leung, M.Y., Ng, S.T., Cheung, S.O. (2004). Measuring construction project participant satisfaction, *Construction Management and Economics*, Vol. 22 No.3, pp.319.

[33] Sarshar, M., Haigh, R., Amaratunga, D. (2004). Improving project processes: best practice case study, *Construction Innovation*, Vol. 4 No.2, pp.69-82.

[34] The AIA handbook 14th ed.pp.110

[35] Webster's 1984, Dictionary

[36] F Schneider, A Mágori, Z Orosz, T Pulay - Orvosi hetilap,(2005). A review of the progress towards the adoption of supply chain management (SCM) relationships in construction. European Journal of Purchasing and Supply Management

[37] Septelka, D. M., & Cooper, J. A. (2000). Construction of High Performance Equipment Foundations. In *Construction Congress VI: Building Together for a Better Tomorrow in an Increasingly Complex World* (pp. 768-777).

[38] Belle, R.A. (2002). Critical market forces and design-build, DBIA online.

KAREN BOUJAOUDE KHOURY, Dr.
She is worked as an Assistant Professor of Department of Architecture in Notre Dame University, Beirut, Lebanon since 2006. She also has worked as an Assistant Professor in Lebanese American University, Byblos, Lebanese in 2013-2014. She carries out planning and managing schedules for architectural projects since 2004. She holds a BSc. Degree in Architecture from Lebanese American University, a MSc. Degree in International Business from Bordeaux Business School, and a PhD degree in Business Administration from Grenoble Ecole de Management. Her research interests lie in architecture along with business management, communication, organization and problem diagnosis skills.

Historical Evolution of the "Expression" Problem in Design and Applications

Yılmaz Kuyumcu
Istanbul Aydın University,
Faculty of Architecture and Design
Department of Architecture
yilmazkuyumcu@gmail.com

Abstract: *The expression of a design or an earlier work for a presentation or an implementation has improved in history. Today, the introduction of digital technologies in architecture and topology has led to the partial or complete abandonment of some of the methods used until recently in education and practice by the replacement of new forms of measurement and presentation. The expression of a new design or an already existing building or space is transformed by new production methods and products; as well as directing the production area and society to transform and develop. This article summarizes the brief history and present-day status of this two-way relationship.*

Keywords: *Descriptive geometry, Perspectives, Point cloud, Laser measurement, Photogrammetry, Pixel.*

Tasarımda ve Uygulamalarda İfade Sorununun Tarihsel Gelişimi

Öz: *Bir tasarımın ya da daha önce gerçekleşmiş bir eserin, bir sunum ya da uygulama için ifade edilmesi tarih içinde gelişmeler göstermiştir. Günümüzde de bilgisayarların ve programlarının bu alana girmesi, yakın geçmişe kadar kullanılan bazı yöntemlerin eğitimde ve uygulamada kısmen ya da tamamen terk edilmesine ve yeni ölçüm ve sunum şekillerinin bunların yerini almasına neden olmuştur. Tasarımın ya da mevcut olanın anlatımı hem yeni üretim yöntem ve ürünlerinden etkilenerek dönüşmekte, hem de üretim alanını ve toplumu dönüşmeye, gelişmeye yönlendirmektedir. Bu makalede, bu iki yönlü ilişkinin kısa tarihi ve günümüzdeki durumu özetlenmiştir.*

Anahtar kelimeler: *Deskriptif geometri, perspektifler, nokta bulut, lazer ölçüm, fotogrametri, piksel.*

1. INTRODUCTION

During a university trip, while visiting the Suleymaniye Mosque, a student asked if Sinan could have built this structure by combining the three aspects as plan, section, and elevation; with the same methods that we use today (Figure 1). We answered him "no". Because at first, each different plan and cross-section should be drawn separately, then a key such as later's descriptive geometry would be needed for the design to show their relationship between the plans, sections and elevation which are independent from each other (Figure 1) (the Scaled model in this example)

Doi Num : 10.17932/IAU.ARCH.2015.017/arch_v05i2002

Figure 1. Miniature 1 Sinan built Suleymaniye mosque with a scaled model as shown in Nakkaş Osman's miniature. The model of Mimar Sinan and his work. Nakkaş Osman 1560 Dublin Library Ireland

2. "UNDERSTANDING" THE PAST WITH THE CULTURE OF TODAY

Expressing the designs which were realized in the past with different methods again through today's methods leads to problems. This is not only a problem of today, but has been a problem through the different phases of history and has manifested itself in different ways, for which solutions have been sought. The expression of a newly designed or previously constructed object/space has created problems that need to be solved both in terms of presentation and implementation, [1] because, it is insufficient to explain its environment, proportional dimensions and traces of its history.

On the other hand, the three- or two-dimensional expression of three-dimensional design in terms of shapes and opportunities, not only influenced the designers and their designs but also oriented the production processes [2]. The uncertainties arising from the inadequacy of the written description, [3] or the experimental particularities of the model by its difficulties in measuring and having precisions for application without technical drawings is left behind as a solution.

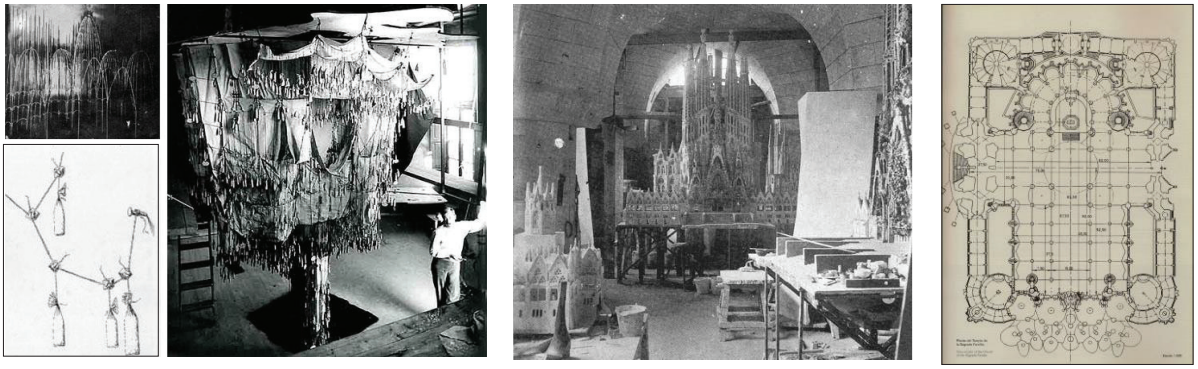


Photo 1. Left: Gaudi in his studio experimenting with force models. Middle: model and right: drawing's of Sagrada Familia. A building like Sagrada Familia realization is not possible without both models and technical drawings.

Today the drawing mathematics (geometry), thanks to its precision, permits the creation of a contract framework beyond presentation; it has also transformed all areas of design and practice starting from education till the stage of production. The development of the methods and tools of technology has been both the instrument and the driving force of the development of societies in this field [4].

Written scripts of the pre-Renaissance, later the scaled models and the stone builders' stereotomy (Figure 2) method (the method used to subdivide the stones to form a whole) are some of the historical examples of such developments.

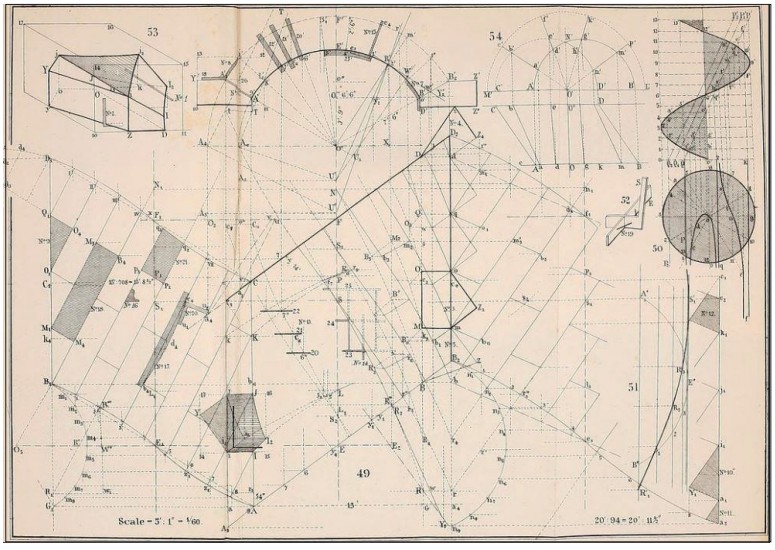


Figure 2. Stereotomy: Problems in stone cutting. For students of engineering and architecture 1875 Warren, S. Edward (Samuel Edward), 1831-1909 New York: J. Wiley and son Image from page 144

The development of the perspective and representative drawing methods that became theoretical during the Renaissance period, opened the gap between architectural design and construction, has re-shaped the production. With the industrial revolution, new expressive methods were officially settle down: perspective and parallel projection [5]. In Beaux-arts school, it became the main axes of education because of the reasons arising from the production process of this period. (Prototypes, standards, regulations…) (Figure 3).

The scalable expression of object or space, are the dominant means of different periods of these historical developments [6]. Throughout history, the development of expression methods has been effective in societies by creating a scientific information field. Nowadays, the roles of computers in this field have brought great innovations to our globalized world thanks to increasingly science and technology. The process with the "trio" of plan/section/elevation are characteristics of modern periods of architecture [7].

The effect of the industrial revolution's production models on architecture has led to the spread of descriptive geometry and perspective. For centuries, it formed the education of design professions. Also, it became a formal process and ultimately shaping production. The influence of production models of the Industrial Revolution on architecture also led to the popularization of descriptive geometry and perspective. Its education, its use in official transactions and finally its direction of production remained the dominant method. [8]. During these periods, the model was used either for projects of very mixed

structures (e.g. oil refineries) or presentation of a design for various purposes and written descriptions that are limited due to the cost estimations and reports.

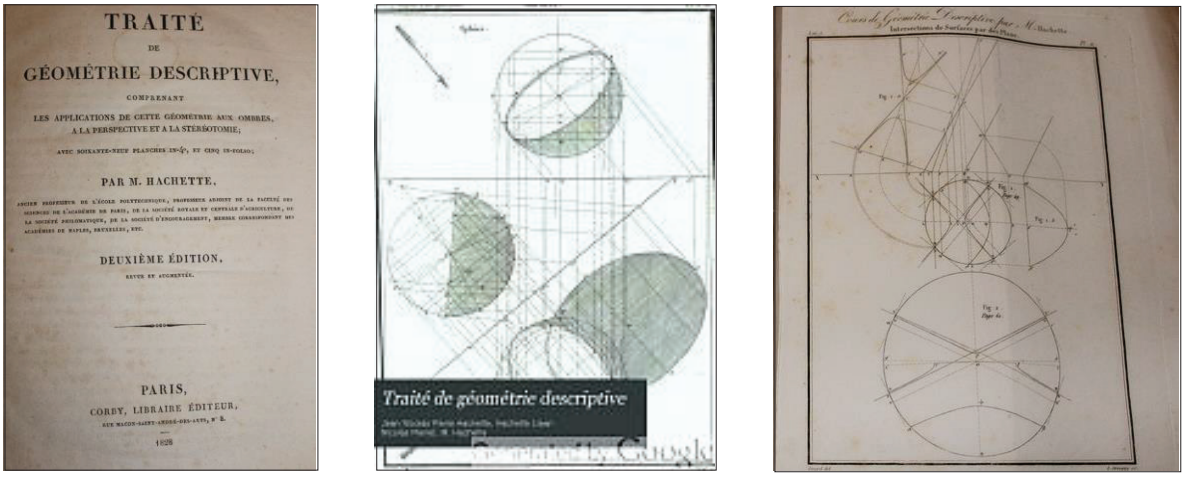


Figure 3. French mathematician Jean Nicolas Pierre Hachette (N: 1769) from the book Traite de Descriptive. Middle: Paralel projection of spheres with their shadows on perpendicular plans. Right photo: Cutting the surfaces with plans [3].

3. CONTEMPORARY PROBLEMS OF "THE EXPRESSION"

The problems arising from inadequate expressions of the plan, section, elevation triad facing the developments in today's materials and techniques are tried to be solved by the development of digital media and particularly virtual reality. Thus, how designs will affect their environment can be questioned in advance. Besides, a very large area was opened from cost calculations to building physics applications. It is possible now to construct models with 3D printers. All these bring great convenience starting from design to production (Figure 4). As a result of its deeply affected design education, leading to the development of new materials, techniques and changed the curriculum in the education of design professions [8].

Figure 4. Cultural Center Changsha Shı, Zaha Hadid Architects, China Photo: Virgile Simon Bertrand

On the other hand, parallel projection and perspective, even if they have lost their importance over time and have been removed from most education programs, still maintain their dominant position in the "expression" of the projects.

The fact that the perspectives have certain rules that form a common technical language, ended up creating a huge variety of perspectives (Figure 5) depending on their usage.

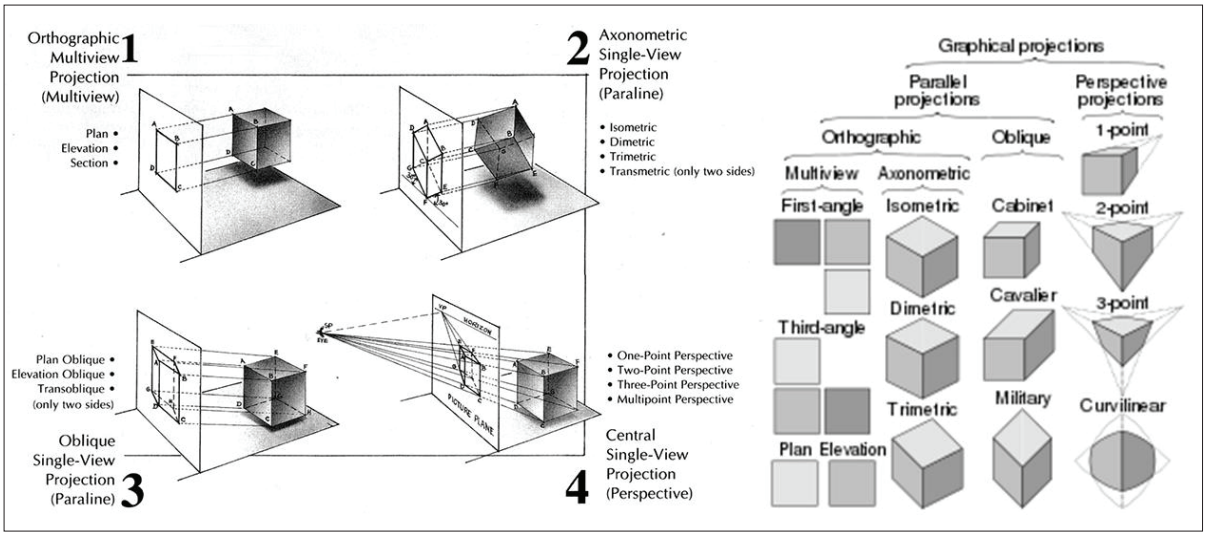


Figure 5. Left perspective shadows (Dibujo Técnico), Right Perspectives (Freeclipart)

Different perspective types can be categorized as orthographic, axonometric (isometric, dimetric, trimetric), and oblique views. In opposition to the descriptive geometry, the perspective representation has advantages that parallel projection cannot provide, and these remain as one of the most effective forms for understanding a complicated object or space.

The linear perspectives, the repetition of the drawings by reducing the eye perception, led to the emergence of different types of geometries such as spherical projection perspectives. For example, today spherical geometry is used in determining aircraft routes and determining flight paths. Although perspective provides a realistic appearance due to its proximity to our eye perception, descriptive geometry is required for dimensioning.

4.TRANSITION FROM PERSPECTIVE TO DESCRIPTIVE GEOMETRY; DIFFERENT SOLUTIONS FOR PERSPECTIVE CORRECTION.

It is seen in the On-site photo (Figure 6), software such as Photoshop… programs can eliminate vanishing points and restore parallel projection. It also allows the photograph to be enlarged proportionally according to the measurements and enables a transition from photograph to drawing with acceptable margins of error.

These programs provide the base which can be used to make descriptive drawings and measurements on photos. However, they are far from showing the whole object or space. The representation of an object or space in two dimensions is sufficient only for this purpose and they are inadequate to explain a three dimensional whole.

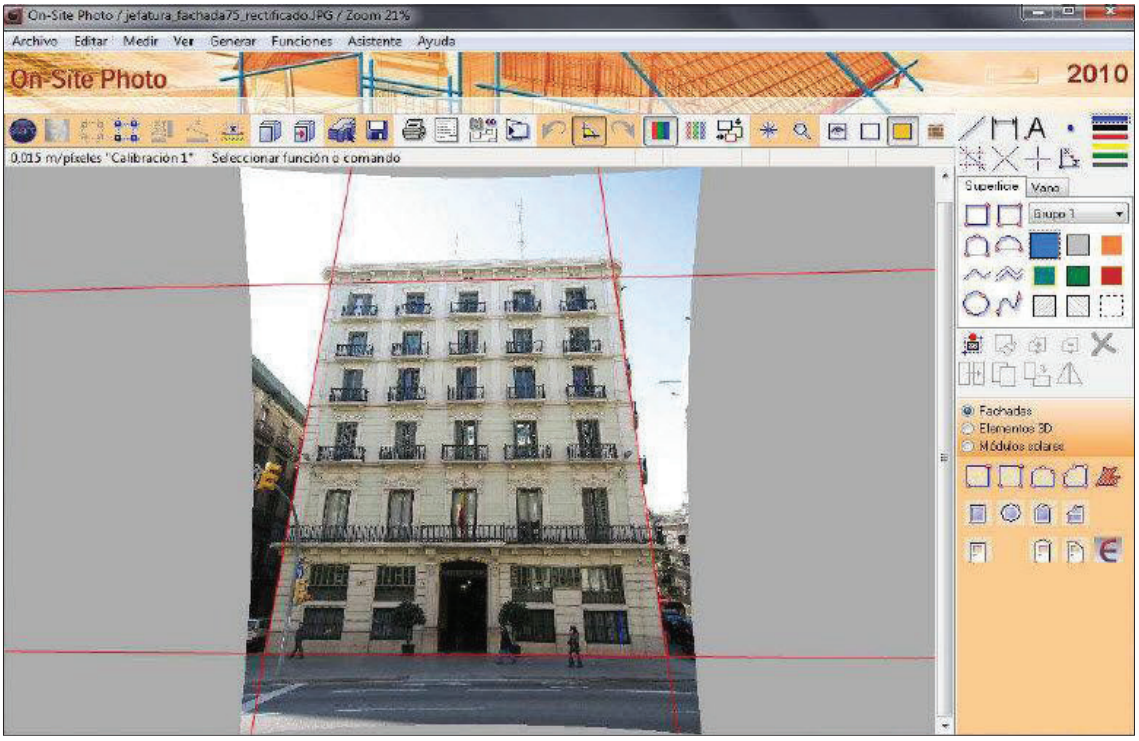


Figure 6. On-site photo program above. By aligning the perspective lines in the picture, it is possible to define a single surface of the facade consisting essentially of parallel lines.

The fact that several perspectives or photographs are not sufficient for the representation of the entity constitutes a problem today in the actions requiring a holistic approach. For instance, it is necessary for the three-dimensional presentations of the materials used, as well as for the processes such as to perform quantity takeoff and cost estimations in the computer environment in parallel to the development of the project.

For this reason, the combination of perspectives or the number of photographs must be extended to cover all surfaces of the object and to form a three-dimensional, scaled, proportionately defined 'whole' and to explain the dimensions and attributes of each element covered. In any case, both parallel projection and perspective can present only a limited part of the whole. However, the demand for the whole has increased today.

5. THE EFFECTS OF TECHNOLOGICAL DEVELOPMENTS ON ARCHITECTURAL AND DESIGN PROFESSIONS

Nowadays, all design and production offices and enterprises use computer programs. The development of these programs both boosts the productivity of the individual and increases production in terms of content and quantity [9]. The intended product is also suitable for agreed presentation models. These are the patterns required by both law, contracts and construction.

Even if it's supported by three-dimensional elements and renders the presentation by plan/section/elevation is in reality, stay relatively limited to abstract lines and descriptions. The representations of material, texture, color, environmental effects, temporal changes, all are limited. Images can be misleading. The resulting product and its environment may differ from the design or a

structure constructed with insufficient details can be quite different from its original or project. Nowadays, thanks to the opportunities provided by the computer, greater proximity can be achieved between the proposed, detected and the actual. However, the emergence and development of new information and measurement tools not only change this environment, but also enrich it.

6. REPRESENTATION BETWEEN THE PRESENTATION OF THE NEW DESIGN AND THE PRESENTATION OF THE EXISTING SPACE AND OBJECTS

The presentations used in the process that starts with the two-dimensional drawings of the designer, the implementation of designers' drawings and the two-dimensional expression of the "existent" show similarities in the scope we mentioned at the beginning.

Both have mental or material forms and are presented according to the same rules. Both use general and detailed expression scales. These details differ depending on the scales. Both are adaptable to an agreed-upon legitimately admit form. The intended product also must be convenient for agreed-upon presentation patterns. On the other hand, it is not possible to say that the new methods and materials which provide these opportunities are considered sufficient by different domains of professions [9].

7. FROM THE GEOMETRY OF PERCEPTION TO THE GEOMETRY OF REAL POINTS: NEW TECHNOLOGIES

"The Laser" (Light Amplification by Stimulated Emission of Radiation) beams found after the Second World War are used in many different fields as well as in measuring distances and angles. thereby, a higher sensitivity is achieved compared to the measurements made with meters or optical instruments, saving time and money and increasing the efficiency of the individual (Figure 7). Today we are using three different methods for the laser distance measurement in the function of the distance: 1. Interference Measurement Method, 2.Beam Modulation Telemetry 3.Pulse Echo Techniques.

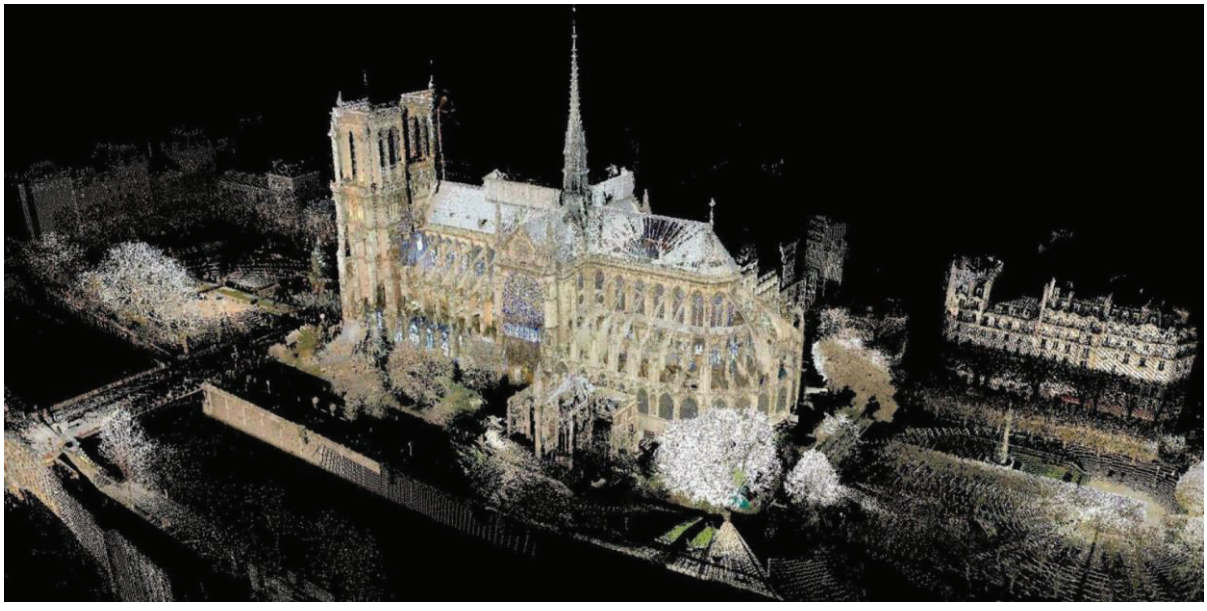


Figure 7. Laser technology and the point cloud representation of Notre Dame De Paris will help its restitution.

Since the post-war years, the laser technics pairing with computers and the introduction of measurements into specific computer programs have brought a new concept to laser measurement such as "point cloud". Point cloud refers to the name given to a cloud cluster obtained by placing laser measurements in space, sometimes referred to as millions of points. The fact that laser measurements give the location of many points with high precision constitutes the threshold of important developments in the industry, construction, architecture, cartography etc. These include more accurate measurements, more realistic applications, and compliance with environmental data.

The measurement of the laser beam is performed by varying methods depending on the distance. Among them are triangulation, phase difference or pulse method come to the forefront for measuring the distance very precisely. It is increasingly common to create point clouds by positioning a large number of points with laser measurement technique, or by positioning the pixels of the photos with photogrammetry technique, and in both cases colorize and fill the gaps between them by mesh. The importance of this method in architecture, industry, archaeology, cartography and many other domains is increasing as it has enabled approaching the whole more than ever.

The advantages of these methods are the possibility of precision and error calculations, the ability to detect changes over time, the ability to obtain high-resolution digital field models (DTM) and finally the ability to obtain scale models with 3-D printers. The fact that the number of points positioned with the help of the laser is very large provides a great sensitivity in measurements. Holograms are also another use of the laser to show the projects in space.

8. THE DEVELOPMENT OF PHOTOGRAMMETRY FROM PHOTO GRANULES TO COMPUTER PIXELS

The development of the photography from the granules that form the smallest units of analog photographs to the pixels of the computer environment enabled the addition of other features to these pixels. Now, we have the model of the cameras, the lens, it's identification number, the coordinates of the location where the photo was taken and the angle of the photograph. With the evaluations of pixels, the image of the point taken, angle of the photograph, and the distance to the spot where the photograph is taken is known and the spread of this to cameras integrated into mobile phones makes these possibilities available everywhere, any time.

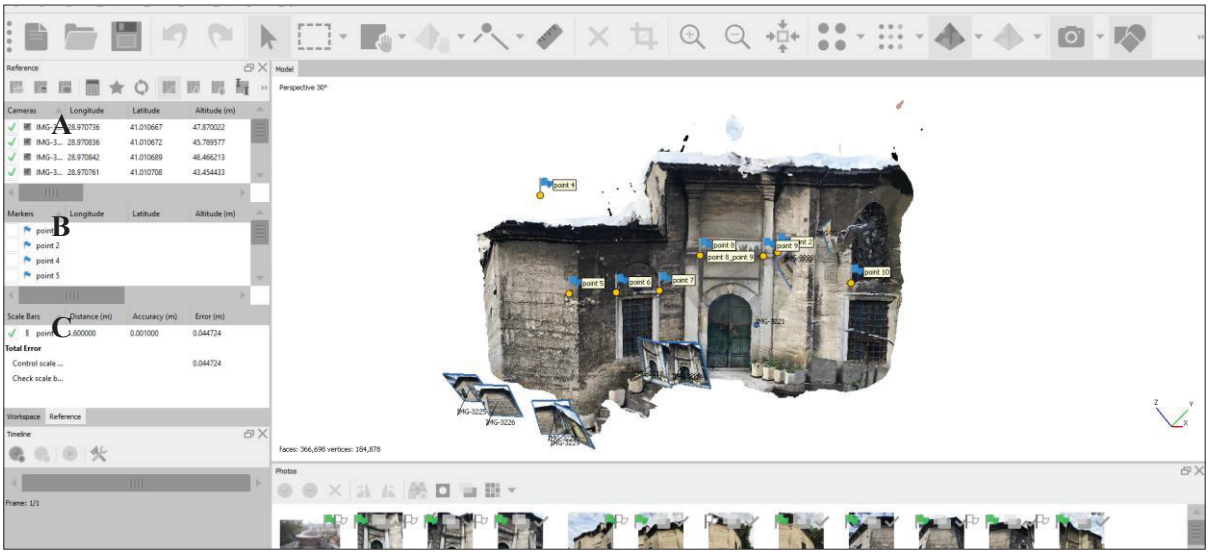


Figure 8. T.C Aydın University student work Nuruosmaniye Library A. The location of each photograph in the coordination system (latitude/longitude / altitude above sea level) with the margin of error. B. Reference points on the photo. C. Checkpoints between points, an error margin of measurements (4% in this example), photographs at inside bottom. (Survey And Advanced Communication Techniques III Course)

Just like the dots used in laser measurements, photos consist of millions of dots (pixels) so that they can be matched; images taken from different angles can be combined to provide a three-dimensional image of the object/location; making photogrammetry easier and cheaper than laser measurement (Figure 8).

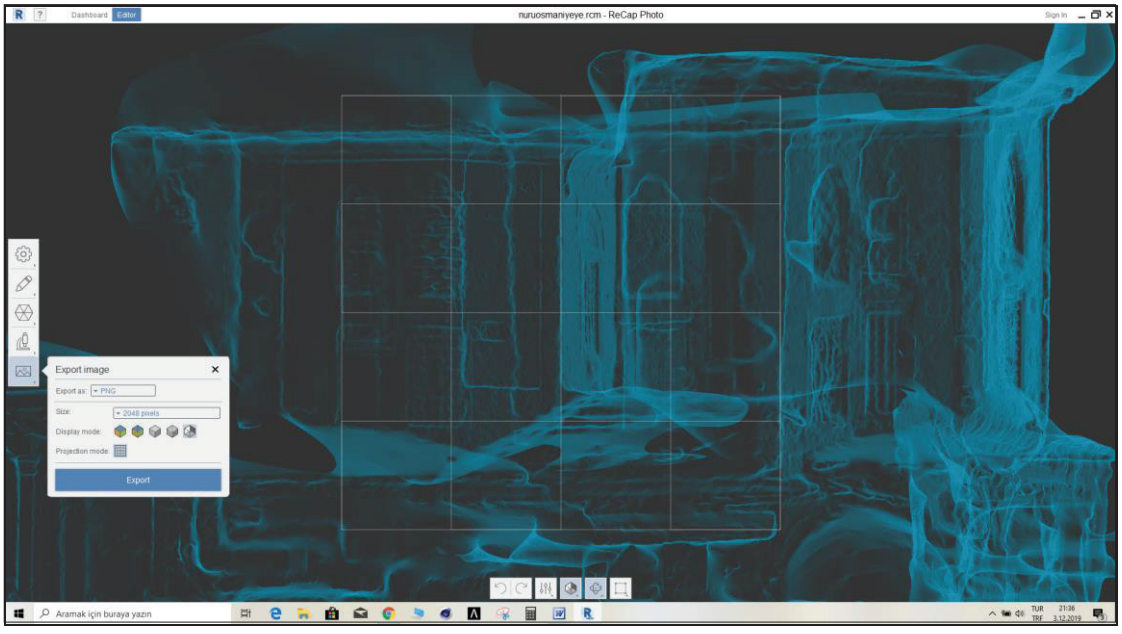


Figure 9. T.C Aydın University student work Three-dimensional pixel-based photogrammetry Nuruosmaniye Library (Aydın University Survey And Advanced Communication Techniques III Course)

Numerous programs using photogrammetry are now available for architects, engineers: Agisoft, Autodesk Recap (*Figure 9)*...etc. Also, three-dimensional drawing programs benefit from point cloud techniques. They started to use pixel information to create fixed points in the moving image, thus rendering a moving image and adding a new three-dimensional model. The conventional three-dimension design programs such as C4D, 3DS and MAYA, etc. allow this.

9. T.C AYDIN UNIVERSITY AND TECHNOLOGICAL DEVELOPMENTS

Photogrammetry techniques and their specific program usages are explained within the scope of the curriculums at the universities. (Agisoft, Recap, Zephyr…etc) They are shown to our students as practical, 3D models that are used for modeling the objects or places they have created in the computer environment (Figure 10). In this regard, studies are carried out in the industrial design and architecture in Survey and Communication Media Courses for 2, 3, 4-grade students among other departments [10].

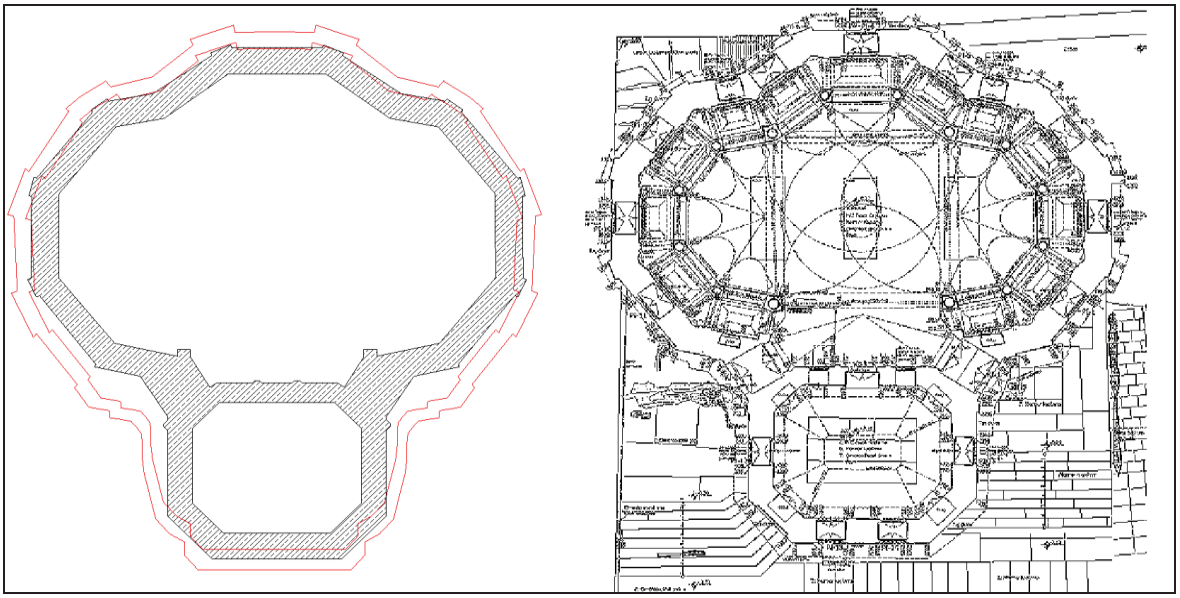


Figure 10. T.C Aydın university student work: Nuruosmaniye Library. (Software used in the study is Autodesk Recap program student version). Red contour on the left is the eaves drawing of the building obtained from the cloud, the hatched part is the walls drawing obtained from the measurement and the survey on the right. The difference increases at the bottom, where the number of photos decreases. (Survey And Advanced Communication Techniques III Course)

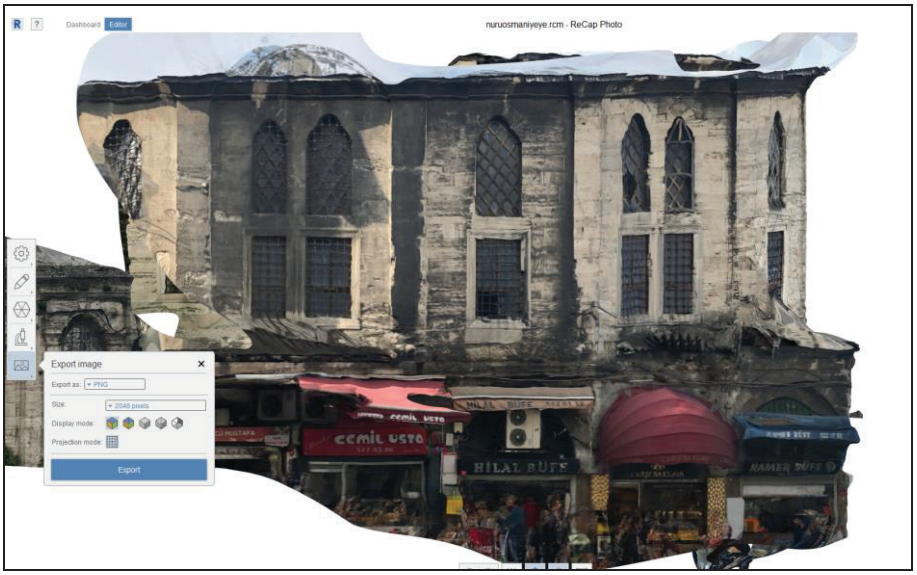


Figure 11. T.C Aydın University student work Nuruosmaniye Library solid model. 2019 Autodesk Recap software used in the study.

Here we see a three-dimensional model of one of our students' facades of the Nuruosmaniye Library (Figure 11), created by combining approximately 60 digital photographs. In this model, abrasions, distortions, faulty applications and faulty material selections that are difficult to show in the classical survey are far beyond the traditional outline drawings (Figure 12).

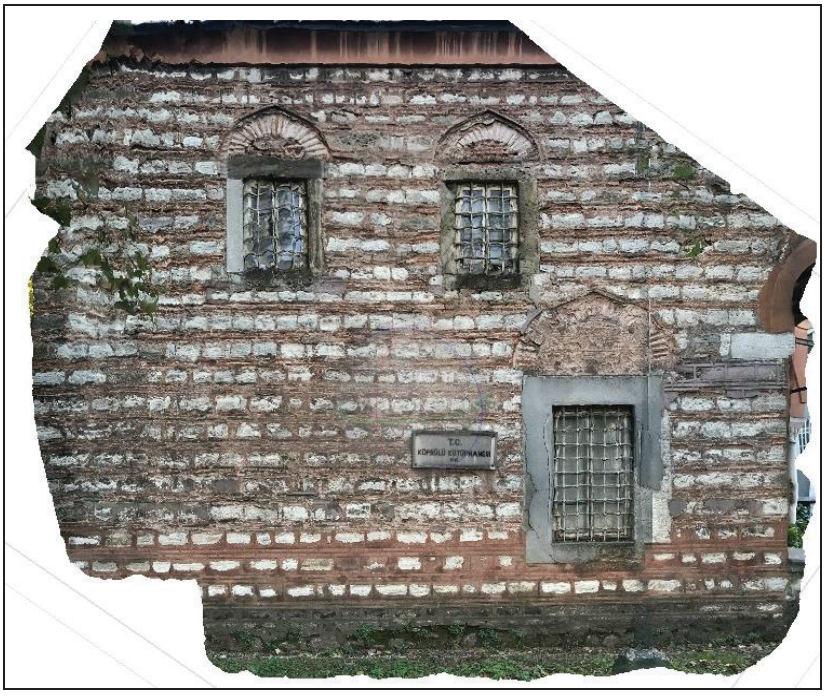


Figure 12. T.C Aydın University student study work The orthophotography photo of the Köprülü Library was formed by analyzing 394000 surfaces, 192000 intersections and pixels.

The development of a 3D printer in both material and dimension, increases the importance of measurement techniques (Figure 13).

Figure 13. 3D Printed version of the model obtained by photogrammetry above. (The Vomela Companies Chase Kasel December 2017 Pix4Dmapper)

10. CONCLUSION AND EVALUATION

The written expression used throughout the history along with the drawings (e.g. the texts of Abbe Suger's Gothic cathedral should be), the model (e.g as shown in Mimar Sinan's miniature), the stereotomy used by stonemasons, the parallel projection of recent periods are not only methods that describe the imaginary or define what exists, but also forms types of expression that guide practice, define contracts, form the basis for legal processes.

Today, the presence of new production methods and materials and the fact that societies are more culturally and economically intensive and relatively developed has also increased expectations from design to the realization. Now, the trio of plans, sections, appearances is not enough to meet these demands. New methods are required. On the other hand, this triumvirate continues its professional and legal dominance. The newly developed techniques are only used as complementary aid of expression. But new technics as 3d scanning are not in usage enough yet.

In the education field, the pressure of these new requirements is felt intensely and the changes made in the education plans attempt to keep up with the developments in the technology and products. The work of man and machine are different. While the machine performs its function without questioning; man is shaped by his work. He internalizes it, makes it a subject of education and tries to improve it.

Today, compared to the huge amount of information generated by the development of technologies; the position, education, and formation of the majority are insufficient. A new kind of person who susceptible to the requirement of pieces of information at the same time to produce information, also to reach it, to be

able to use it for the development of human knowledge. Otherwise, the information stack remains only as a stack and cannot be used or evaluated. Failure to achieve this increases the inequalities in the world. In some areas, the situation is worse and people are pacified due to the lack of adaptation to this pile of information. People try to follow what is presented in front of them to accept, without question, without debate. It is more important than ever to educate people who will meet the new requirements in today's world where technology is developing faster than the societies.

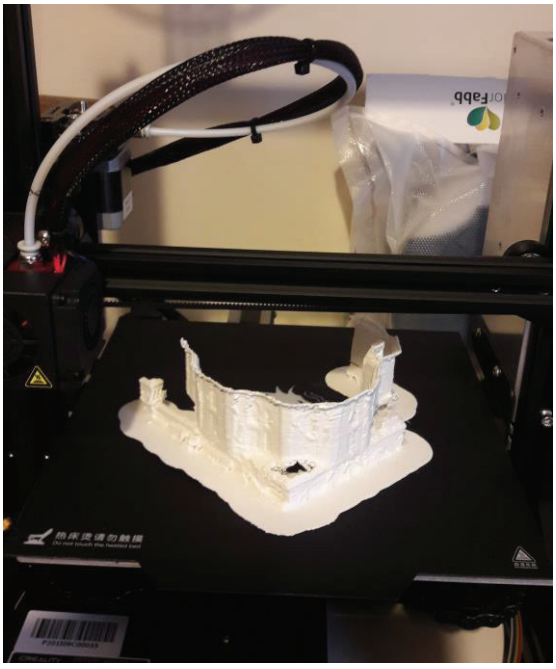


Figure 14. From photogrammetry to 3D printer

REFERENCES

[1] Yağmur, Ö., Aydın, N., Saral, N., Bulat, S. (2018). Tasarım Eğitiminde Düşünceyi (Üç Boyutlu) Nesneleştirmede Temel Tasarım İlkelerinin Ayakkabı Heykellerde Uygulanması, *Journal of Ataturk University Institute of Fine Arts,* 41, 1300-9206, 104-112.

[2] Salet, F. (1967). Panofsky (Erwin). Architecture Gothique et Pensée Scolastique. Traduction et postface de Pierre Bourdieu. *Bulletin Monumental*, *125*(3), 325-326.

[3] Hachette, J. N. P. (1828). *Traité de géométrie descriptive: comprenant les applications de cette géométrie aux ombres a la perspective et a la stéréotomie...* Corby.

[4] Göker, A. (1999). Yeni Teknolojiler Sanayide Değişim ve Yeni Sanayiler. *Ankara: MMO Sanayi Kongresi*.

[5] Texier, S. (2012). *Paris: panorama de l'architecture de l'Antiquité à nos jours*. Parigramme.

[6] Bayraç, H. N. (2003). Yeni Ekonomi'nin Toplumsal, Ekonomik Ve Teknolojik Boyutları. *Sosyal Bilimler Dergisi*, *4*(1).

[7] Tan, F. Peker, N. (2018). Architecture of drawing and drawing as an architectural motivation. *Betonart,* 59:20-30

[8] Menges, A., Sheil, B., Glynn, R., & Skavara, M. (Eds.). (2017). *Fabricate: rethinking design and construction* (Vol. 3). UCL Press.

[9] Çivici, T., & Kale, S. (2007). Mimari tasarım bürolarında bilişim teknolojilerinin kullanımını etkileyen faktörler: Bir yapısal denklem modeli. *İnşaat Yönetimi Kongresi Bildiriler Kitabı*, 30-31.

[10] Levashev, S. P. (2019). Segmentation of a Point Cloud by Data on Laser Scanning Intensities. *Pattern Recognition and Image Analysis*, *29*(1), 144-155.

YILMAZ KUYUMCU, Lecturer, DIP.DPLG

Architect Lecturer in Istanbul Aydin University. Diplome: UPA Lille France 1982 as DPLG He is a lecturer at Aydin University in charge of Survey, Integration, Computer Aid Design Programmes and Materials in Architecture and Industrial Design. Research interests are architectural design, history of Architecture, Building Information Systems.

Background of a History: Cappadocia Houses

Assoc. Prof. Dr. Arzu ERÇETİN
İstanbul Kultur University
Department of Interior Architecture &Environmental Design
a.eceoglu@iku.edu.tr

Abstract: *Cappadocia has hosted many cultures with its history. There are works of art in the region belonging to the pre-Christian period, the period when Christianity arose and developed, and the periods of Islam. The architectural structure of the region is shaped by the features offered by the geographical structure. It has created the identity of the region with its striking architecture on the surface and mysterious underground cities underground. Having a heritage of a large number of different structure types of buildings, province of Nevsehir, and especially Cappadocia region in Turkey with structures and groups of structures is very important for the whole world. 60 million years ago; the region formed by the eroding of the soft layers formed with the lava and ashes erupted by Erciyes, Hasandağı and Güllüdağ, by rain and wind for millions of years, has hosted many beliefs and civilizations with its historical and architectural texture dating back to the Paleolithic period. The main purpose of the paper is to discuss the architectural works of the Cappadocia region, which provides integrity with the geographical location, in terms of history, the concept of space and the organization of the space and to reveal a research.*

Keywords: *Cappadocia, Structure, Space organization, History, Geographical space*

Bir Tarih'in Arka Planı: Kapadokya Evleri

Öz: *Kapadokya, tarihi ile birçok medeniyete ev sahipliği yapmıştır. Hıristiyanlık öncesi dönemi, Hıristiyanlığın ortaya çıktığı ve geliştiği dönem ve İslamiyet dönemlerine ait bölgede birçok eser bulunmaktadır. Bölgenin mimari yapısı coğrafi yapının sunmuş olduğu özelliklerle şekillenmiştir. Yerüstündeki göz alıcı mimarisi ve yeraltındaki gizemli yeraltı şehirleri ile bölgenin kimliğini oluşturmuştur. Mimari açıdan çok sayıda ve birbirinden farklı yapı türleri mirasına sahip olan Nevşehir ili özellikle Kapadokya bölgesi yapı ve yapı grupları ile Türkiye ve tüm dünya açısından önem teşkil etmektedir. 60 milyon yıl önce; Erciyes, Hasandağı ve Güllüdağ'ın püskürttüğü lav ve küllerin oluşturduğu yumuşak tabakaların milyonlarca yıl boyunca yağmur ve rüzgâr tarafından aşındırılmasıyla oluşan bölge, Paleolitik döneme uzanan tarihi ve mimari dokusu ile birçok inanç ve medeniyete ev sahipliği yapmıştır. Bildirinin asıl amacı coğrafi mekân ile bütünlük sağlayan kapadokya bölgesinin mimari eserlerini*

Anahtar Kelimeler: *Kapadokya, Yapı, Mekân organizasyonu, Tarih, Coğrafi mekân*

Doi Num : 10.17932/IAU.ARCH.2015.017/arch_v05i2003

1. INTRODUCTION

Cappadocia region is one of the oldest places used as a settlement area in the historical process. Cappadocia is one of the most important centers of the *Hittite* Kingdom. Besides being an important settlement area for the Hittites, it also covers the center where the "Assyrian" trade colonies, an important milestone in Anatolian civilization, were established. In addition to being the place where the trade of Mesopotamia moved to Anatolia, Cappadocia is also known as the place that helped Assyrians to bring the indigenous writing of Mesopotamia to here, and it also became one of the important centers of the Silk Road in the Middle Ages and later in the Ottoman period [1]. It is an important belief center for Christians around the world in terms of being the hiding place of Christians who escaped from the persecution of the Roman Empire in the early Christian period [2]. As can be understood from the originality of the churches built in the region, it is understood that there is a cult center for the wall frescoes. For these reasons, the natural forms that came from the geographic structure of Cappadocia in the region are the residential areas preferred by people especially for the purposes of hiding and defense.

The Nevşehir-Ürgüp area, which constitutes an important part of the Cappadocia region, therefore has a structure suitable for human life and housing construction. Today, the region used as a residential area is used with different space functions while preserving its historical textures.

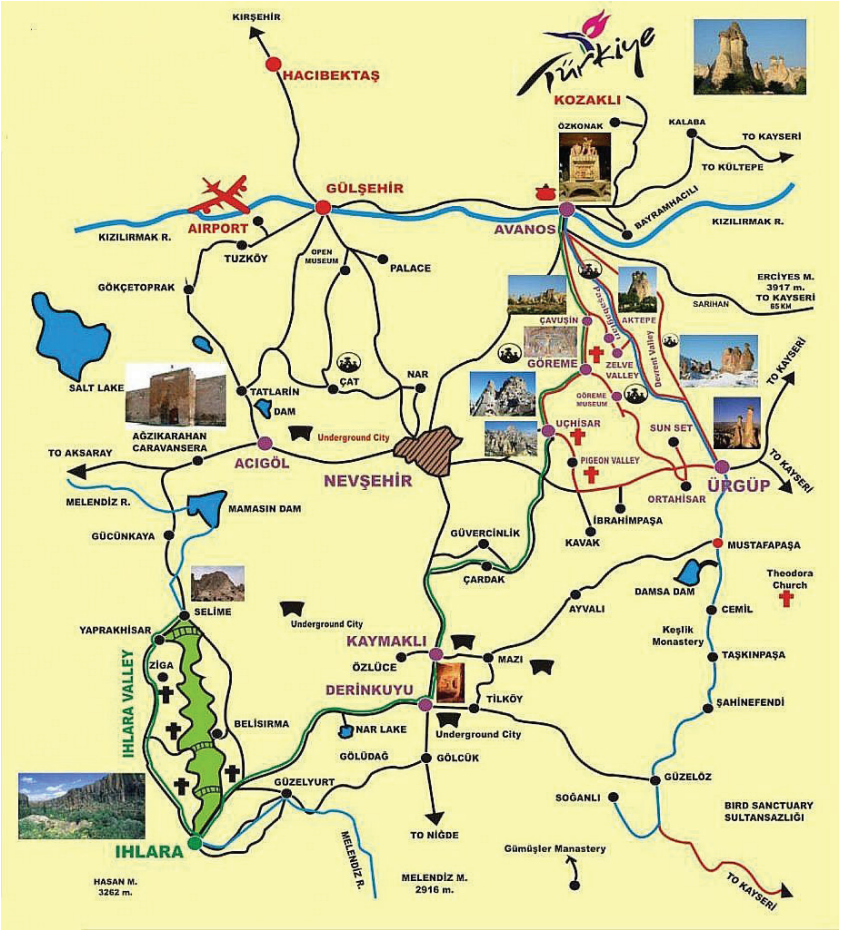


Figure 1. Nevşehir settlement plan
https://www.kapadokyarehberliturlar.com/harita-uzeri-bilgiler/Erişim Tarihi 02.03.2020

2. AN OVERVIEW OF URGUP ARCHITECTURE

There are marks showing that human settlements have been found in Cappadocia region since the very ancient times. The local people, who created the places by digging the rocks in form of masses, not only led to erosion that wore the environment as a result of these excavations but also helped to enrich the geological structure of the environment. Communities have been in close contact with nature and have created different types of settlements depending on changing physical and geographical conditions.

"The relationship between the environment and the form of human settlements becomes more open and observable as physical shapes become more difficult in Cappadocia, which is the interesting aspect of Cappadocia. The variety of settlements shows that geographical conditions have more impact on settlements as they become more and more harder besides getting more difficult. While the dwellings are well-defined and have independent architectural characteristics in the smooth plateaus or in low slope areas, on the lands that emerged as a result of volcanic formations, they had to get out of the normal housing types with the influence of nature and as opposed to the ongoing building process, they obtained rock forms."

Cappadocia region has a rich texture by showing different social, cultural, political and spatial features in the historical process. When the general architectural character of the Cappadocia Region is examined, Ürgüp dwelling architecture and its characteristics draw attention. When the historical process is taken into consideration, it can be seen that the Cappadocia Region has spread to wide geography. Within the scope of this study, the dwelling architecture of Ürgüp, which is one of the important settlements within the borders of Cappadocia, and the structural and spatial characteristics of Ürgüp dwellings will be examined. It is possible to say that the social, political, cultural and climatic effects of the region where Ürgüp residences have different characteristics are reflected in the dwelling architecture (Figure 2). Ürgüp houses have been examined under three headings in the researches. These are;

- Carved rock-dwelling
- Carved rock-dwelling + Masonry dwelling
- Masonry dwelling

First of all, the building materials used are the same. There may be only minor conditions that depend on the environment. Especially the stones are in this state. The colors of the stones, the degree of hardness may differ depending on the region. Typical poplar and tar tree in wood flooring; The window cabinet door door leaves, floor and ceiling coverings also open pine tree.

It is the construction technique in a common matter. The stone building system and technique used in the region are also applied in Uçhisar. Some changes are only observed in stone decorations. This change and diversity is due to the style and style of the masters working in the region. The settlement, which was formed as a rock carving (rock dam), was formed in the form of horizontal layers and vertical connections within this main mass, which covers an area of 95 meters and covers an area of 9.000 m^2. It was used for protection purposes and equipped accordingly, and this main mass was used up to 15 centuries [12].

Later, rock-carved spaces started to spread especially to the slopes overlooking Güvercinlik Valley on the south-east side of the area. It spread to the Fairy Chimneys in the northwest. The southern slopes, on the other hand, have chosen the location of the settlement in terms of seeing the natural landscape and the suitability of the east-south-east slopes for micro-climatic reasons. In the late 16th and 17th centuries, places were built using cut stones obtained from the tuff structure of the region with arches and vaults, and the original city texture and housing types that we are trying to protect.

The streets were formed in parallel to the slopes and the houses were created by carving the elevation differences between these streets. (See Analysis Sheet 1: Texture-Structure-Street Relationship) The houses are usually surrounded by walls from the lower level. The courtyard is entered through a wide door, one-storey and two-storey spaces are placed on the rock-carved spaces around the courtyard in one direction. The 2nd floors are always structured so as not to cover the view of the building behind it. The first floor was used as the terrace of the other. These spaces are accessed by stone stairs leading from behind.

Figure 2. Rock carved housing example, Masonry housing example (Author photo archive 2019/2020)

The structures and forms of the villages in the valleys of Cappadocia are determined by the geological features of the place that the villagers chose to settle. For this reason, it is seen that the villages are sometimes located underground, sometimes on the rocky faces of mountain valleys or along the slopes, and sometimes on individual rocks one by one. “We see the similar effects that people made when they cut holes in the rocks, in forces that erode nature. Therefore, places that look like multi-storey space arrangements usually do not prove to be a multi-storey settlement pattern in the area. The carving process was abandoned at the upper levels with the wearing of the valley floors and went down to the lower levels by following the valley floor. On the other hand, to reach the valley floors and connect different levels, stairs were carved, rope stairs were built and paths were opened on the slopes of the rocks” (M.G. Kalaycı). Also, we can see Churches (Figure 3) that have been carved into tufa rocks since IV. Century. Even though the modernity and richness of these churches in those periods, they are in ruins today, they still maintain their entire splendor with their engravings still on their walls. Although these churches were affected by wearing, they were more resistant to earthquakes than structures built in the same period. The underground cities built by the public in order to protect themselves from the attacks were also achieved by the engraving method that the geological structure allowed. Examples of these underground cities are three-storey underground city in Kaymaklı and seven-storey underground city in Derinkuyu.

Figure 3. Church entrance and wall processing example (Author photo archive 2019/2020)

In the region, which has a completely organic texture, the architectural structure was developed depending on the topography. Old houses built with rock carved spaces and stone materials and masonry technique give an appearance as if they overcame each other along the slopes. These settlements, which have an extremely adjacent and dense texture, also show a harmonious integrity with the natural environment. Some of the structures carved into the rock in Cappadocia were built for security purposes and some were built for seclusion purposes. There are no traces of settlements except for the small holes for doors, windows or ventilation. In Ürgüp and in its surroundings; as a result of natural structure, environmental conditions, wars and occupations, a very original residential architecture has emerged. Stone houses in Cappadocia are residential, whether shaped by human intervention or subject to no treatment.

In Anatolia, privacy has an important place in traditional houses, examples of which have survived to the present day. For this reason, in houses with a yard, the walls of the courtyard are high and more closed planning has been used in the houses without a courtyard on the ground floor level. On the contrary, in Ürgüp houses, there is a structuring more intertwined with the street. The outer walls of the houses shape the street. Houses are usually entered directly from the street. In the houses with courtyards, the courtyard is usually at the back of the house. There is almost no example with large courtyards. In the existing small courtyards, generally, nothing is planted. The floor of the courtyards is stone paving or compacted earth lining. These spaces are general circulation areas. Places such as barn, hayloft, warehouse and tandoori house open onto the courtyard. The stairs that go upstairs are also located here. In some houses located in areas with high land slope, the ground floor can be entered from one street, while the upper floor can be entered from the other upper street. If you enter the courtyard from the street first and then to the house, the connection between the courtyard and the street in this type of residence is established through the “front-entrance door” (opening to the environment - a common one used by everyone). The toilet is located adjacent to the sentence door, on the right or left. Another remarkable feature in traditional Ürgüp residences is that the courtyards of the houses are usually located at the back of the building. The reason for this is to leave space for the courtyard in between while adding masonry houses to the rock-carved houses that were built in the past.

According to Binan (1994), they are distinguished from other types of dwelling by being generally symmetrical in the plan schemes of masonry houses. Towards the end of the 19th century, rich plans and front layouts were adapted to the architecture of the region. In the Cappadocia region, Mustafapaşa (Sinasos) and Güzelyurt (Gelveri) residences are the residential settlements that have survived until today. In addition, these are the dwellings built by people that were in a close relationship with other cities of Anatolia in the region, built at one time based on the principle of universal planning. We see that these examples are the dwellings with interior and middle courtyard plan types and also have local characteristics and they started to appear in the other big cities as well as from the beginning of 19th century.

According to the structure-open space relationship, we can divide the Ürgüp residences into two with and without a courtyard [3].

2.1. Dwellings Without a Yard

In this type of residence, the entrance to the building is directly from the street. The outer walls of the building shape the street. There is a life more intertwined with the street. Mostly, the buildings that lie back on the rocks are of this type.

2.2. Dwellings With Courtyard

We can divide the dwellings with courtyards into four groups: courtyards on four sides, courtyards on three sides, courtyards on both sides and courtyards on one side. Dwellings with one-side or two-side courtyards are more common in Ürgüp.

2.3. Dwellings With Courtyards On Four Sides

In this type of dwelling, you can enter the courtyard and then the building from the street. The courtyard provides a link between the building and the street. In some of these types of dwellings, the courtyard is large enough to accommodate areas to be planted and have trees. In the others, it is only enough to provide transition to the volumes in the courtyard.

2.4. Dwellings with courtyards on three sides

In this type of dwelling, the building is either a border to the street, and there are courtyards on the other three sides, or the back of the building lie on the rock, and a courtyard on the front and on the other sides. There is a door to enter the courtyard from both the street and the building [4]. There are service areas such as warehouse, barn, toilet, tandoori house in the courtyard.

2.5. Dwellings with courtyards on both sides

This type of dwelling is either built in an adjacent order, with a courtyard in front and behind it, or the building is on the street corner and the courtyard on two other sides.

2.6. Dwellings with courtyards on one side

This type of dwellings is built in an adjacent order, bordering the street. Their courtyards are behind the dwelling, between the dwelling and the rock. First of all, you go to the lower floor, and then to the courtyard with another door. There are also examples of the dwelling that first you go to the courtyard before the street and then to the dwelling of which back lie on the rock.

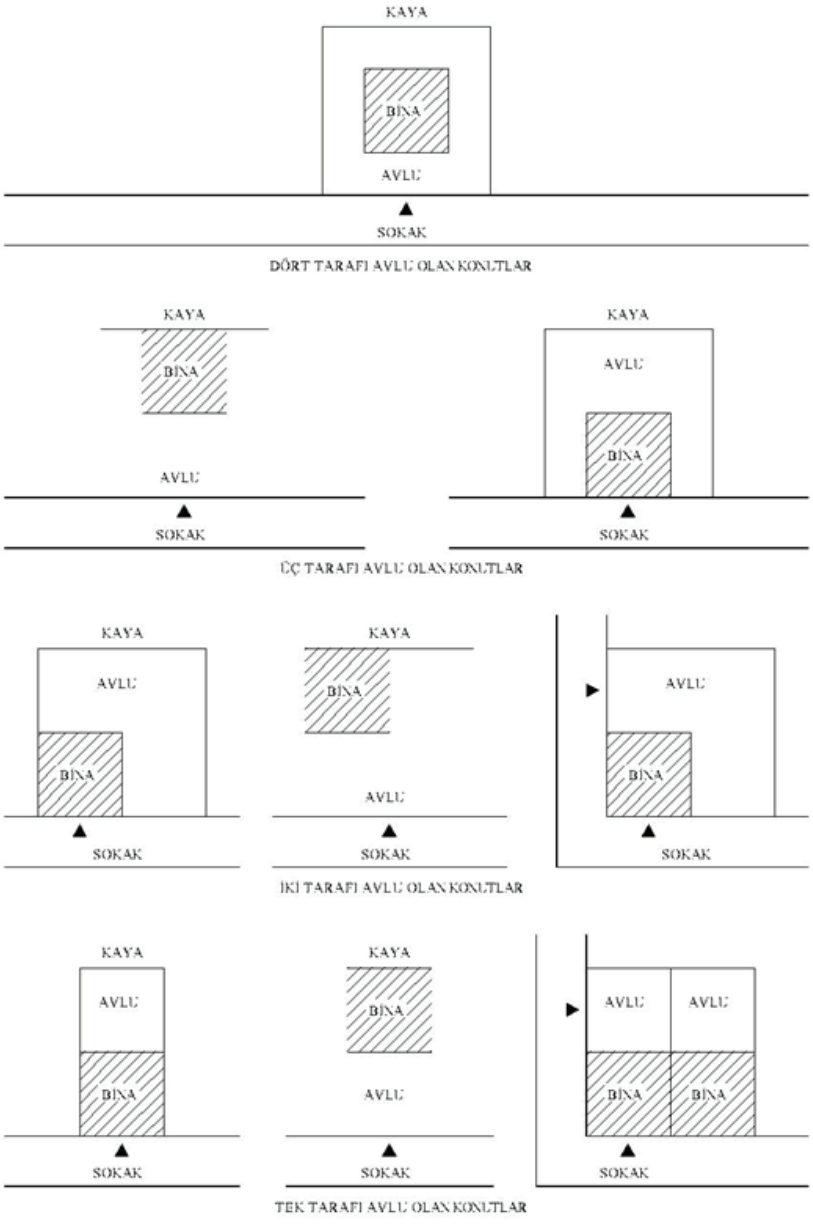


Figure 4. Courtyard-Street relationship (taken from M. G. Kalaycı, Traditional Ürgüp Houses and Dereler Neighborhood Conservation Development Suggestion Master Thesis).

3. PLAN FEATURES OF CAPPADOCIA HOUSES

In Ürgüp houses, which are divided into two groups as carving and semi-carving-half-mansonry according to their construction systems, the residences consist of three sections: dwelling, living and barn. In the living area, there are local tandoori, arbour and recording rooms [5]. Living section is the walled section with a toilet in one corner, which is used to do their works in front of the house. There are animal shelters and hayloft in the barn section (Figure 5).

Figure 5. Underground city interior photos (Author photo archive 2019/2020)

As a result, a traditional urban fabric, which is compatible with the topography, overlooking the landscape and closed to the north wind in general, was formed. The fact that new ones were added to the carved spaces behind the courtyards put the use of the land in an intricate and complex situation. Often these places have entered the streets or houses (on the lower levels) in the upper level. This situation has now put property rights into an insurmountable situation. It caused collapses due to occasional overlaps or external wear of the gully and caused deterioration in their superstructures. These constructions have developed from time to time with fairy chimneys and even overlapping them, fairy chimneys have been used as living and storage areas.

The skillful understanding of static and aesthetics of the stone masters in the region has developed very well and has created very good solutions. In addition to these solutions, the interior and exterior interiors and decoration of the building elements also feature. Although not many, unique stone carving decorations on the facades of some houses attract attention. Although not very precise, the plan scheme is usually 2 or 3 types. The fact that the land is steep and the masses are arranged along the length of the slope prevented the formation of a very standard plan scheme. Generally, they are 1 or 2-storey spaces formed on the courtyard and the surrounding rock-carved spaces. In general, the low single space constitutes the terrace of the 2nd floor.

In Cappadocia house, we see a plan type that covers each other, that is, it is formed by arranging the rooms around a sofa. In rooms that are generally square type, the room is in the form of a living unit with little variation in shape, size, and qualities. The rooms are built in proportional modules. These modules are formed as 4m. x 4m., 3m.x 3m.The rooms in Ürgüp houses are similar to Anatolian architecture in terms of structure and show the Safranbolu house type.

Many spatial features are similar, from sitting and resting actions on the cushions placed on the ridges on the flooring in the living spaces, to niche-shaped cabinets formed on the walls. In the area, in traditional dwellings mostly the upper floors were used as living area. On the ground floor, winter room, service and warehouse etc. areas were located [11]. The sofa, which we can call the space between the rooms, is variable with every single feature. In Ürgüp houses, sofas were determinant for the plan types of traditional dwellings [6]. Such that, the number of rooms was determined according to the condition of the sofa, in

the structures located on the slope areas where the slope is high, the sofas would merge with rock carvings and extend into the rocks.

The cooking or dining place called tandır, the barn and the toilet are located on the ground floor level and around the courtyard. On the upper floor, there is a vaulted room or an iwan, reached by a ladder, a room was built on both sides of the section with open-arched section called the divanhane. Generally, there are 2 rectangular windows on the facades facing the courtyard or the street. Window jambs are composed of lintels and windowsills of hard stone (black stone) and are secured with iron bars. The joinery is wooden and has wings. Room doors are wooden. It is generally close to the back wall, which is reached by a ladder. There are cabinet niches or stove between the two sides on the side walls where the arches sit. The floor covering is stone and some buildings are covered with wood. The roof cover is generally made of stone arches and is toned and the roof is made impermeable to water by compressing the clay soil in the area. In some buildings, both the 1st floor pavement and the top floor cover are lined with stones in a short direction on the stone walls in a short direction, and the trees are covered with wicker or dry branch leaves, and the top is filled with clay soils and made it impermeable to water. The water currents of the flat roof were thrown out of the building thanks to the buns.

3.1. Types With Internal Sofa

It came into focus in the 18th century, but it became widespread in the 19th century [10]. The crowding of the cities, reducing the land and its rise in value required more inward-oriented and tight planning. The desire to live more comfortably, to avoid dust, cold, and the need to use the sofa area all the time are among the social reasons for choosing this type. This ordered plan included more rooms, the walls were decreased in number and it gave an opportunity to reduce the cost thanks to the rooms next to each other. According to another point of view, the type of middle sofa plan is a house type that has been used since Central Asia, and it was applied in the types of buildings such as madrasahs, mosques and mansions in Anatolian Turkish architecture, and it has found a re-application area in big cities, in the houses of administrators. Symmetry in one direction can be seen in the internal sofa type.

An arched, vaulted architectural structure dominates the spaces. The material of both the courtyard and the house doors are wooden. The upper part of the arched doors is decorated with stylized ivy or rosette motifs. The consoles on stopes of the floors of the houses are sometimes filled with single and sometimes 2-3 rows of rosettes, stars, fan, pinwheel and stylized plant motifs. In addition, this type of woodworking can also be found on the ceilings [7]. The windows of the houses are double or triple and their surroundings are mostly decorated with stylized plant motifs. The windows are of two types, "winged" and "guillotine" style. There are many rooms, kitchens, warehouses, tandoori, cellars, wineries in the houses. In the niches in the guest rooms, there are adornments painted on plaster. Stone fireplaces, stone stairs, decorative niches, cedars, local carpets, pots, object are indispensable elements in decoration (Figure 6).

Figure 6. Elements in decoration (Author photo archive 2018/2019)

3.2. Type With Outer Sofa

The type of house known as Divanhaneli houses with its local name is called the type with outer sofa. The outer sofa plan types, which usually have a courtyard, are read in the plan in different ways. Divanhanes, some of which are open on three sides, their top is covered and easily readable from the front, can be reached by stone stairs from the garden [8]. These Divanhanes are surrounded by a guardrail in height of around 80 cm. We see that this guardrail is sometimes concrete, and sometimes iron. There are three or four rows, generally rounded, stone and arched columns among the guardrails of the divanhanes, which are open on both sides.

3.3. Plan Type Without a Sofa

This type of dwellings is designed in smaller sizes. The downstairs, which is entered through a stone road from the street, has service areas such as a toilet, kitchen and barn, and there is a staircase leading up to the upper floor rooms [9]. In the plan type without a sofa, there are generally two rooms and a small sofa on the upper floor or more rooms that are placed irregularly (Figure 7). This plan type is also found in semi-carved - half-masonry traditional dwellings. However, in these types of dwellings, the transitions between rooms are provided from the courtyard [8].

Figure 7. Two rooms and a small sofa on the upper floor or more rooms (Author photo archive 2019/2020)

4. CONCLUSION

Having a geological structure with a volcanic origin, Ürgüp was established in an area where there are frequent and typical examples of interesting natural formations defined as fairy chimney created by rain and wind erosion. The fairy chimneys rising between the crevices formed by the erosion of the rainwater flowing from the valley slopes and then by the erosion of winds have created a very interesting landscape image unique to this region. Today, Ürgüp in Cappadocia is regarded as Turkey's one of the most important regions in terms of tourism activities. The historical, topographic and architectural features of the region are among the remarkable elements. Especially the integrity of the topographic structure with the architectural structure is one of the fascinating features.

Today, on the contrary to the houses used while preserving their originality, Ürgüp houses appear with different functions. Although these functions have been evaluated especially in terms of tourism, the renovated buildings are renewed by making all the controls and sticking to their originality. Many of them maintain their lives as hotel, hostel, and restaurant-style touristic structures as a result of this renewal process.

The region, which has hosted many civilizations throughout the history, is still trying to preserve its origin. We can see that besides the fact that structures that provide compatibility with the geographical location are formed in accordance with the usage plan as well as the “U Type” - “L Type” - plan scheme. The Ürgüp houses, which are spatially dominated by the natural environment and open for recreation in the urban environment, also reveal their characteristic identity. When the plan scheme is examined, all the figural, dimensional, proportional and textural features of the spaces can be viewed as read-only.

REFERENCES

[1] Akgüç, A., Atuk, N., (1987). *Kültür ve Turizm Bakanlığı Taşınmaz Kültür ve Tabiat Varlıkları Yüksek Kurulu 3447,* Ankara*,* 1-14.

[2] Cimok, F., (1987). *Cappodocia*, *A Turizm Yayınları,* İstanbul, 5-21.

[3] Çelik, M., (1989). Bir Grup Geleneksel Avanos Evinin Sağlamlaştırılması ve Turizm Amaçlı Kullanım Projesi, Yüksek Lisans Tezi, *Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü,* Ankara, 27-32.

[4] Eravşar, O., (1996). Kapadokya'da Yerleşim Alanları ve Sorunları, *Kapadokya Vakfı Yayınları*, Nevşehir, 9-88.

[5] Esmer, M.A., (1992). Avanos'un Eski Türk Evleri, *Kültür Bakanlığı Yayınları*, Ankara, 13-58.

[6] Görmez, K., (2002). Kapadokya Mevcut Durum Raporu, *Kültür ve Turizm Bakanlığı Yayınları*, Ankara, 1-197.

[7] Kaya, M., (1994). Geçmişten Günümüze Ürgüp, *Mozaik Dizgi*, Ankara, 8-89.

[8] Kuban, D. (1982). *Türk ve İslâm sanatı üzerine denemeler* (Vol. 1). Arkeoloji ve Sanat Yayınları.

[9] Kuban, D. (1998). İstanbul Yazıları, Yapı Endüstri Merkezi.

[10] Özkan, S., Önür, S., (1974). Kalın Duvarlar Örüntüsü ve Kapadokya'da Mimarlık, *Mimarlık*, 5.

[11] Tekeli , İ., (1993). İcabında Plan... *İstanbul Dergisi, Tarih Vakfı Yayınları,* sayı:4, ss:26-38

[12] Tunçer, M. (2012). Nevşehir-Uçhisar Belediyesi Koruma Planlaması Çalışmaları, mehmet-urbanplanning.blogspot.com/2012/03/nevsehir-uchisar-belediyesi-koruma_18.html, last accessed on 16 April 2020

ARZU ERÇETİN, Assoc. Prof. Dr.

She completed her undergraduate education in 2005 at TC Haliç University, Department of Interior Architecture, her master's degree in 2007 at Istanbul Kültür University, Institute of Science and Technology, department of Interior Architecture and in 2010, she completed her proficiency in arts with the title of Dr. in MSGSU Institute of Science and Technology, Department of Interior Architecture. She continues her work on space organization, color, design and interdisciplinary studies. She also has design patents, national and international congress presentations, articles, book and book chapters and competition projects. Besides her academic identity, she has a number of applied interior design projects and is a member of the Board of Directors of the Istanbul Chamber of Interior Architects. Erçetin has been working at Istanbul Kültür University since 2007.

Semiotic Analysis in Space and Communication

Gamze Akbaş
İstanbul Kültür University
Department of Interior Architecture
g.akbas@iku.edu.tr

Abstract: *Semiotics, in its most general definition, is a way of understanding or interpretation of any concept, situation, or object. Semiotics is accepted as a discipline that helps us to communicate with the world we live in and helps us question messages that enable us to produce meaning. In this study, space reading is analyzed over semiotics concepts through the relationship established between architecture and semiotics. With this method, the concept to be defined is laid through "sign", "signifier" and "signified" elements; the examples of space, which constitute a meaningful whole in time, are discussed with an approach that proceeds on the terms "denotation" and "connotation". In this context, in the study, while focusing on the design elements through the terms "sign-signifier-signified", the answer to the references to the said design is searched with the term "connotation".*

Keywords: *Semiology, Architectural Design, Communication*

Mekân ve İletişimde Semiyotik Söylem

Öz: *Göstergebilim en genel tanımıyla herhangi bir kavramı, bir durumu ya da nesneyi anlama ya da anlamlandırma biçimidir. Göstergebilim, yaşadığımız dünya ile iletişim kurmamızı sağlayan ve anlam üretmemize olanak sağlayan mesajları sorgulamamıza yardımcı olan bir disiplin olarak kabul edilmektedir. Bu çalışmada, mimarlık ve göstergebilim arasında ilişki kurularak, mekân okuması göstergebilim kavramları üzerinden analiz edilmektedir. Bu metot ile tanımı yapılacak kavram "gösterge", "gösteren" ve "gösterilen" öğeleri üzerinden gerçekleşmektedir; ayını zamanda, anlamlı bir bütün oluşturan mekân örnekleri "düzanlam" ve "yananlam" terimleri üzerinden ilerleyen bir yaklaşımla ele alınmaktadır. Bu bağlamda çalışmada, "gösterge-gösteren-gösterilen" terimleri aracılığıyla tasarım öğelerine odaklanırken, "yananlam" terimiyle söz konusu tasarıma yapılan göndermelerin yanıtı aranmaktadır.*

Anahtar Kelimeler: *Göstergebilim, Mimari Tasarım, İletişim*

1. INTRODUCTION

In this study, using semiology, semiotics as a method, its place and importance in space and communication are questioned. Although, in the most general sense, semiotics is a method that "replaces" or "represents" an asset, it evolves with the meanings that the individual or society attributes to a certain concept (object, state, etc.). Every meaning is created through the "coding" and "grouping" of the concept. Conducting the message to be given to the receiver (reader) with "encoded" information is related to semiotic analysis. Semiotics, which enables us to produce meaning for all the assets around us, gives us opportunity to find messages that exist behind what is seen. For this reason, the basic concepts of semiotics (syntax, sequence, sign, signifier, signified, denotation, connotation) and field of application (architecture, art, literature, advertisement, caricature etc.) should be known and the meanings attributed to a visual culture should be re-evaluated (Figure 1).

Doi Num : 10.17932/IAU.ARCH.2015.017/arch_v05i2004

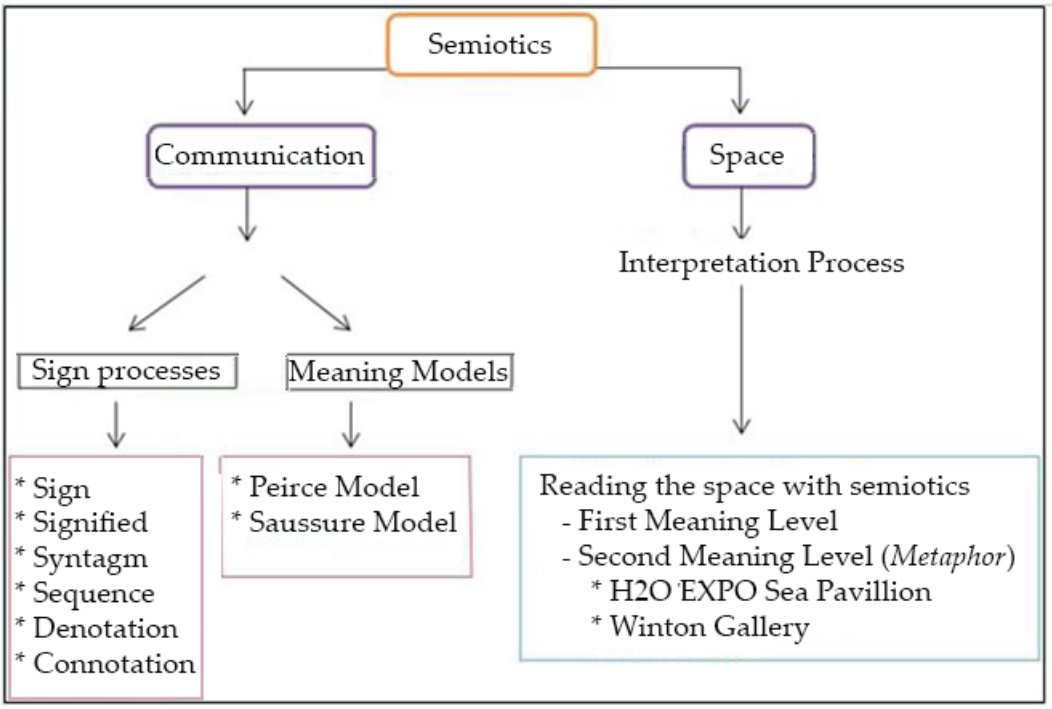


Figure 1. Scope of the research (created by the author)

"Sign" is at the focal point of semiotics and the state of "replacing" or "representing" something and it becomes an image that occurs in our minds. In other words, while the signs are not a concept or an asset itself, it is defined as a unit that evokes that thing [1, 2]. In order to interpret the message sent to the other party, the individual needs prior knowledge (*life experience*) to read and make sense of the sign in question. Therefore, "signs" are defined through "groups" that help connect concepts and organize information.

2. SEMIOTICS: BASIC CONCEPTS

Under this heading, the terms "sign-signifier-signified", "syntax-sequence", "denotation-connotation" that enables an asset to be analyzed by the semiotics method, are considered as subtitles.

2.1. Sign, Signifier and Signified

A sign is a communication operation that represents or implies a "thing" (*an object, a word, etc.*). This communication operation has three special features. These are;

- Having a physical form,
- Referencing to something other than itself,
- Being accepted and used by the individual as a sign [3].

As linguistic and non-linguistic, the sign is classified in two ways. The linguistic sign is a communal communication system and examines the functioning of the language by basing it on social systems. Non-linguistic signs, on the other hand, relate metaphor meaning concepts between the sender / receiver. If we give an example to this issue, *"envelope"* was considered as a sign of communication in ancient times. In this sense, the envelope format is used as the symbol of e-mail today, as its place in public life is to communicate / provide information. Pierre Guiraud (1994) clarifies this situation as follows:

"The sign is a stimulus - that is, an emotional essence -. The memory image it evokes is connected to the image of another stimulus in our head. The function of the sign is to revive this second image in the direction of communication."[4].

In the field of semiotics, the concept of sign is represented through "signifier" and "signified". In the basic analysis method of the sign, while "signifier" is a concrete entity; the thought to be conveyed is considered as "signified". In the interpretation process of the sign, "signifier" has a material (*concrete*) entity and is the state before it is given a meaning [3]. Signified is expressed as a message (*meaning or thought*) to be transmitted to the other party. Therefore, in semiotic analysis, signified is accepted as *"what the sign refers to"* and the signifier shows *"physical presence of the sign"* [5] [6] . In this process, the signifier (*an object, a word, etc.*) sends a number of messages to the recipient through the signified; in this context, since the signifier is accepted as the physical condition of the sign, it becomes meaningful with the signified. The sign works as a communication tool for the recipient to sense and interpret these messages. This process is regarded as the first level of sense-making (Figure 2).

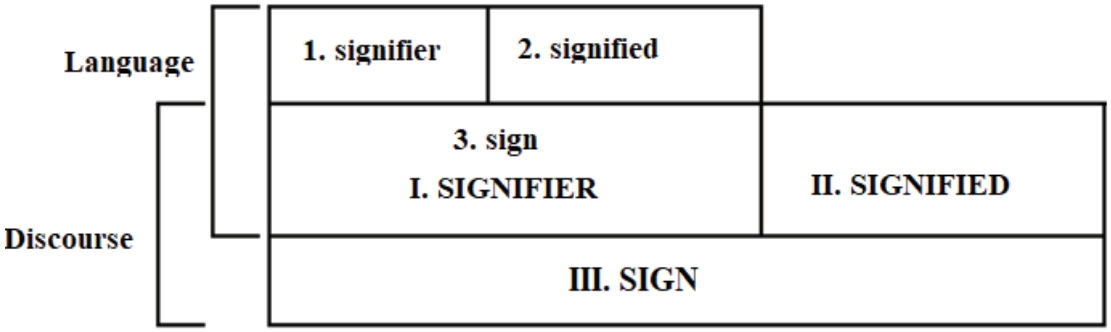


Figure 2. The process of sense-making [7]

2.2. Syntagm and Sequence

Syntagm, as Barthes stated (1979), is a process that takes place in the form of a sequence chain; in this context, the flow of the word is an example to the syntagm [8]. To create a meaningful whole, the connection of one unit to another is called syntagm. The following can be an example for syntagm (Fiske, 2014);

- a word formed by selecting the letters of the alphabet,
- choices made from paradigms such as hat, tie, shirt, jacket, socks made from clothes,
- a room designed by choosing from paradigms such as chair, table, carpet, wallpaper etc.
- a customer ordering an order by looking at the food list [9].

Therefore, it creates a set sequence composed of different architectural elements to define a space. It is possible for the sign to work in harmony with the help of a sequence. In other words, we can see that the sequence is exemplified through the "traffic lights paradigm" when the effect of the sequence on the interpretation process is taken into consideration (Figure 3).

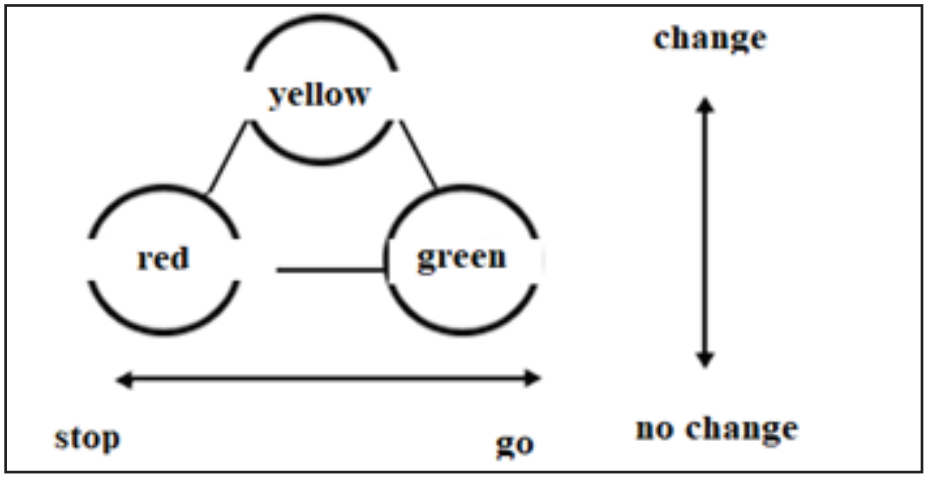


Figure 3. Sequence of traffic lights [9]

Red that signs danger means "*stop*" in the formal arrangement of traffic light. In the visual sign, we see that the color red has meanings such as danger, warning, threat, and anger; therefore, we can deduce that the "stop" sign is expressed in red light. Fiske (2014) says that the remaining colors will follow this flow in a logical order; Therefore, the author who draws attention to green, which is the opposite of red in the chromatic spectrum, defines the command "go" in this syntagm [9]. These features are important in terms of the roles given to concepts in communication. Since the harmony of red, yellow and green lights with each other has a meaning in itself and forms a sequence, it is also necessary to mention briefly the opposite colors in the chromatic spectrum: *"Red – Green", "Yellow – Purple", "Orange – Blue"*. In summary, the signs that enable us to communicate form a paradigmatic group through syntagm, and functionally compatible units come together to define the sequence. In order to clarify this definition more, examples of different paradigms are presented in Table 1 and the difference between syntax and string is tried to be explained.

Table 1. Syntagm and Sequence [10]

	Sequence	**Syntagm**
Clothe	Pieces, additional parts or groups of details that cannot be found at the same point of the body at the same time, and of which change leads to a change in clothing meaning: beret/hat, etc.	Having different items in the same clothing side by side: Skirt, blouse, jacket.
Food	A group of foods that offer similarities and differences and that a food is selected in relation to a particular meaning: Entree food, fries or deli products.	The real chain of dishes chosen throughout the meal: It is a menu.
Furniture	A group composed of stylistic changes of the same furniture (a bed).	Bringing different furniture items side by side in the same space (bed, wardrobe, table, etc.)
Architecture	The diversity of one of the elements in a structure in terms of style; different housetop, balcony, entrance, etc. formats.	The interconnection of details within the entire structure.

2.3. Denotation and Connotation

The denotation of the sign is the first level of communication we know from our life experiences; therefore, it is the first image that occurs in our minds. Considered as the first level of interpretation by Barthes (1979), the denotation represents the concepts we know thanks to our prior knowledge. Since this level is expressed as an unencrypted image in a sense, it becomes the first concept in our mind to evoke in the sender/receiver relationship. If the connotation solid is a metaphorized state of being; as it is considered as the encrypted image plane, it is defined as the level of meaning that refers to a concept. On the other hand, Barthes (1979) expresses connotation as the second level of interpretation [8]. Erkman Akerson (2005) approaches the place of connotation in semiotics analysis as follows:

"For the creation of the connotation, it should not be completely disconnected from the denotation but should refer to some features in the denotation. The phenomenon of connotation is especially important in works of art and literature, even we can say that those are what make art as art." [1].

This is also accepted as the main level at which and sign becomes meaningful. Connotation is, in a sense, "mental representations", cultural values and the level of communication that becomes meaningful in a society with its attitudes.

3. MEANING MODELS OF SEMIOTICS

We see that Charles Sanders Peirce, a philosopher from USA and Swiss linguist Ferdinand de Saussure are the two leading names in studies on semiotics' meaning models.

3.1. Charles Sanders Peirce Model

Peirce, which enabled semiotics to become an independent field of science, equates this field, which he defined as "formal teaching of signs", with "logic" [11]. According to Peirce, meaning models are built according to triple distinctions (Figure 4). When we consider the *sign / object / interpreter* relationship that Peirce approaches in three planes, we see that there is a clear link between the "sign" that represents something and the "object" that equals to it. Establishing this relationship is possible with *cognition* patterns that develop with individual and cultural knowledge and through behavior patterns that develop with knowledge. In other words, the interpretation of the connection between the "sign" (with the representative) and the "object" (represented) takes place through the use of information stored in the mind.

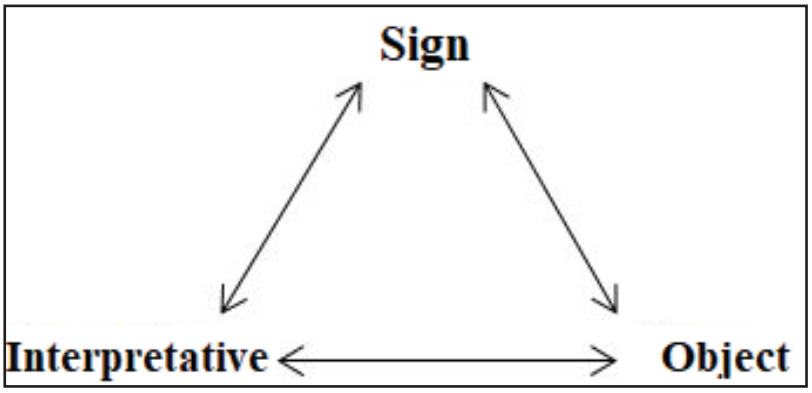


Figure 4. Peirce's semiotics elements [9]

The visual sign (icon) / indication / symbol are another important triple distinction of Peirce (Figure 5). Based on Peirce's expressions, we can explain the concept of this trio as follows;

- **Visual sign (icon);** directly representing something somebody states (photographs, pictures, etc.),
- **Indication;** a true association between the two elements (smoke evokes fire, that is, being a "indication" of fire)
- **Symbol;** when there is no accord process between people, the disappearance of the situation that makes itself a sign (words, formulas in the field of mathematics or chemistry, the scale figure symbolizing justice and etc.) [12].

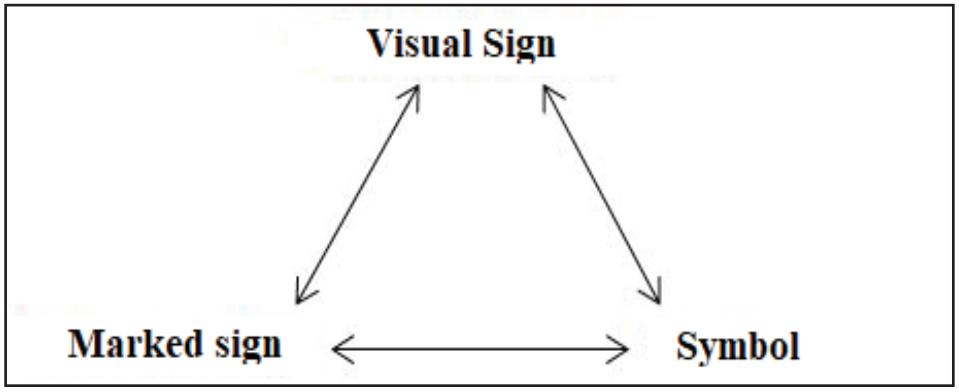


Figure 5. Peirce's sign types category [9]

3.2. Ferdinand de Saussure

"*General Linguistics Lessons*", which were published as a result of the gathering of students' lecture notes in general linguistics courses at the University of Geneva, of Saussure, is of great importance in the development of semiotics. Saussure (2001) bases the definition of language in semiotics on social sequences such as the alphabet, deaf-mute alphabet, sign of subtlety, and forms of behavior:
"… a science can be designed to examine the life of the signs in the community life: a science to be connected to social psychology, and consequently to general psychology. We will call it semiotics (Fr. semiologie <Yun. Semeion from 'sign'). Semiotics will teach us what the signs are and what laws they are connected to. There is no such science yet; so we can't say what semiotics will look like. But it needs to be established; its place is clear in advance. Linguistics is nothing more than part of this general quality science. Therefore, the laws that semiotics will find can be applied to linguistics. Thus, linguistics can be connected to a well-defined field within the whole of human facts." [13].

Saussure directly correlates the "concept" and "communication image", which he describes as a sign as a whole, because it treats the formation of a concept as a mental process. He evaluates this situation in a binary structure as "signifier" (image of hearing) and "signified" (concept). Mental phenomena called concepts are expressed abstractly; however, this abstract expression, which is intended to be transmitted to the other side, turns into sound waves and becomes a concrete (physical) state (Figure 6).

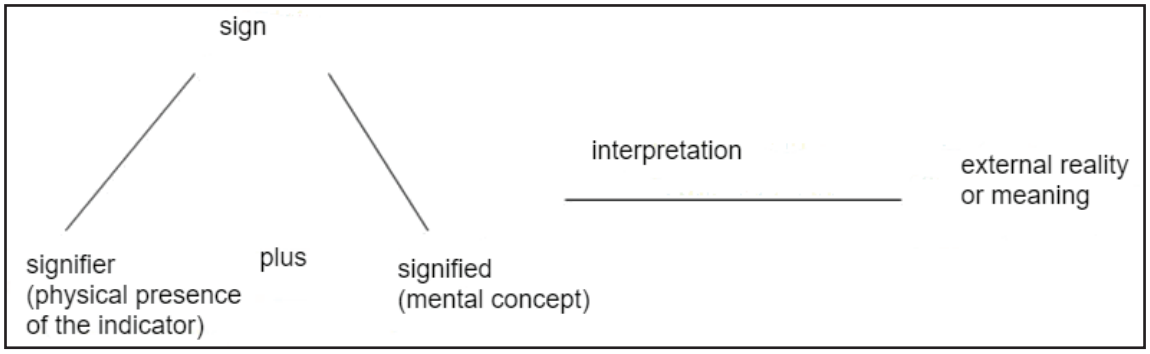


Figure 6. Saussure's signification elements [9]

In short, Saussure builds the linguistic sign on the receiver-transmitter:

- The sender expresses the concept in the mind by creating sound waves
- The receiver detects and responds to sound waves (sound chains) [1].

The ability of the buyer to understand and interpret a concept is closely related to cultural accumulation. The mother tongue and concept relationship of the individual pointed out by Saussure is handled through the tree. Saussure (2001), who searched for the meaning of the word "arbor" used to express the concept of tree in Latin, clarifies the subject as *"we only see that the approximations approved by the language are in line with reality and push any other approximation that can be designed aside."* (Figure 7) [13].

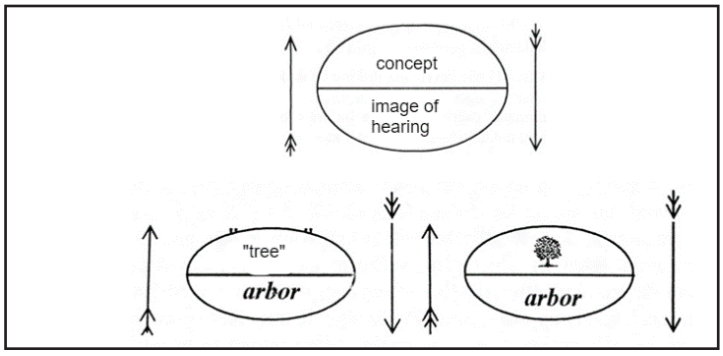


Figure 7. Hearing and concept image [13]

In other words, "cultural codes" that connect the concepts and are defined as mental representations that are met in a common denominator in a society have an effect on the buyer. Therefore, the "common values" of the people of the same culture create similarly thought and perceived "cultural codes" and provide a link between the concept and the image of hearing.

4. READING OF THE SPACE BY THE SEMIOTICS METHOD

Architectural products are used as a language tool in communication studies since they contain meanings and carry cultural values. In this part of the study, design studies are based on the semiotics method and space reading is done through the perception of form. Through this relationship, the architectural elements are separated as "sign", "signifier" and "signified", and the message that is intended to be given in the interior is interpreted.

Following a brief reading on the theoretical framework of semiotics, architectural approaches are handled with a number of examples. H2O Expo Water Pavilion is one of the best designs we will show as an example in this regard. H2O Expo Water Pavilion is a structure designed based on the concept of liquid architecture and has hybrid features. Since the form of the structure is compared to an organism and is associated with the sea (a whale hitting the shore), it is representative of an abstract concept (Figure 8). While it gives visitors the feeling of being a part of the water, it creates a contrast by creating a virtual environment in a remarkable interior.

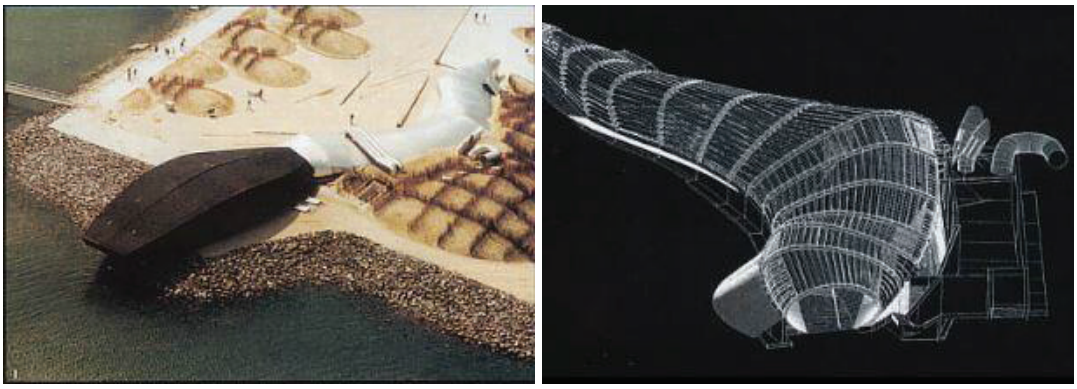


Figure 8. H2O Expo [14]

The first level of meaning of Figure 9 does not fit into the definition of a structure we know from our life experiences. For this first reading, it is necessary to know the starting point of the design and evaluate the concepts accordingly. The denotation level, which is an unencrypted visual message, refers to a *"hybrid structure"*. In the second level of interpretation, the connotation level, the meanings to be given are reached by reading the messages that exist behind the visible. The most important level that allows the sign to gain meaning is the level of the connotation in which the concept gains metaphorical meaning. In order to make this interpretation, it is necessary to discuss the image by taking it over the signifier and signified. The signifier of this structure is the *"shell form consisting of black and white forms"* because it is the tangible (material) presence of the sign in the process of interpretation. In this process, the signifier does not gain a certain meaning and remains in the state of the object. In order for the signifier to bear value, the signified must be involved in the interpretation process. Since water is used as an object in the design, the signified in this structure is *"liquid architecture"*. Thus, the signifier (shell form) gains expression with the help of the signifier and the structure gives the impression that it is part of the water. Based on all data, it is possible to evaluate the connotation level of this structure as *"the relationship of the structure compared to the organism with the sea"* (whale form).

Sign:	First Level of Meaning:	Second Level of Meaning:
H2O Expo Water Pavillion	↓	↓
Signifier: Shell form (forms of black and white colors)	*Unencrypted Image Plane*	*Encrypted Image Plane* *(Metaphoric Meaning)*
	↓	
Signified: Liquid architecture	* **Denotation Level:** Structure with hybrid features	* **Connotation Level:** Structure water piece that is likened to the organism

Figure 9. H2O Expo Space Design (Produced by Author)

When we look at Figure 10, we notice that the unencrypted image plane (denotation level) defines the space used by individuals for visiting. In this context, it is possible to define the arrangement of this space as *"social activity"*. Unlike the previous example, the boundaries between the virtual and the real environment disappear in the metaphorized interior. More specifically, in the design, the floors and walls come together to create wavy surfaces and the architectural elements are interacted and the space is liquefied. The connotation of the liquid architecture is reinforced in the encrypted image plane and a reference is made to the concept of *"travel in space"*.

Figure 10. H2O Expo Space Design [15]

Another place addressed is the visiting area in Figure 11. Due to the curvilinear forms and fluidity shown in this space, the denotation level reflects the pure view of the solid space. On the other hand, the message of this place gives the feeling of not being understood enough for an individual who does not know the concept of the building. Since water is the main element of the design, fluidity is provided in the space and

the natural environment is also felt inside. In order to be able to read the space by semiotic method, it is necessary to touch on the concept of syntax and system in this design. When we continue to read the image, the floor - wall - ceiling come together to reveal the syntax and these elements are located in a system and define the visit area.

Sign: Design Elements	**First Level of Meaning:** ↓ **Denotation Level:** Visit *(Social activity)*	**Second Level of Meaning:** *(Metaphoric Meaning)* ↓ **Connotation Level:** Travel in space *(contrast between virtual and world)*
Signifier: Curvilinear form		
Signified: Fluidity		
* **Syntax:** Architectural elements that come together like *"Flcor + Wall + Ceiling"*		
* **System:** Describes *"place of visit"*		

Figure 11. Denotation and Connotation Level of H2O Expo Space Design (Produced by Author)

Figure 12 shows the Winton Gallery designed by Zaha Hadid. The most important feature of the space, which is defined by emphasizing the importance of mathematics, is that it was designed by being inspired by the Handley Page plane. The interior of the building, which is defined as the exhibition hall, was designed with an approach based on change and technology. When using 3D curved forms, a perceptible space based on geometric forms has been created.

Figure 12. Winton Gallery [16]

In Figure 13, while curvilinear forms reflecting the Handley Page plane are the signs of this space, the architectural elements designed by being affected by the plane in question are the visual messages. As we continue to read the picture, the "mobility" that represents the aircraft and continues in the interior is the general setup of the design. Therefore, while the denotation of the space is defined as the exhibition space, a reference is made to the Handley plane in a fluidity based on connotation math. The important point here is to create a sense of space that interacts with the next generations. In this framework, architectural elements that redefine the environment and represent technology are designed with a mathematical logic.

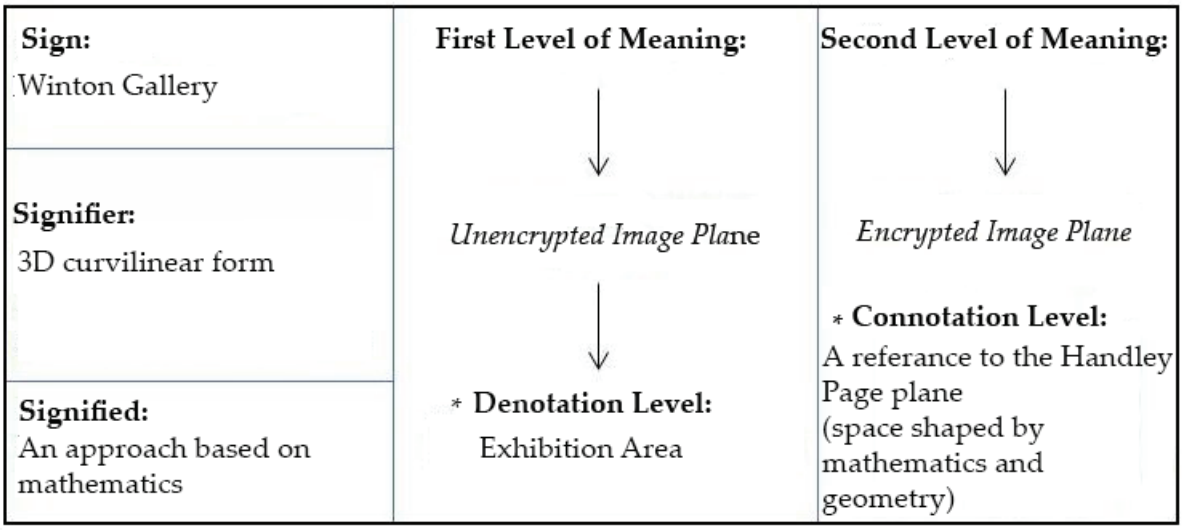


Figure 13. Winton Gallery denotation and connotation level (Produced by author)

Associating semiotics with architecture means taking the design process in a sense from a mental perspective. The fact that mental representations, attitudes that become behaviors by experience and individual and cultural information affect the design action by coding over time causes the concepts to be questioned from a different perspective. Especially when we examine the meaningful process of architectural products; the distinctive features of different periods and styles, different application prefixes reflecting the technological development of cultural differences, offer a wide range of work in semiotics.

5. CONCLUSION

In this study, a connection is established between architecture and semiotics and space reading is handled through semiotics concepts. Some determinations are made by examining two categories as signifier and signified. While basically the signifier is characterized as a concrete asset, the signified is defined as the meaning and thought desired to be given. Therefore, it is a message operation that an entity displayed in the semiotics method refers to. On the other hand, the clustering process created to create a whole from a paradigm is called system. For example, furniture such as *"bed-wardrobe-table"* combined to design a space characterizes a system and it is possible for this functionally compatible furniture to work in harmony. The first meaning (denotation) level and the second meaning level (connotation) that enable communication between the receiver and the sender have an important place in the basic reading principle of the space. While connotation is the first image of an entity to come to life in our minds, it is a state of metaphoric character. In other words, connotation is accepted as the basic level of the process of interpretation, since it refers to a solid entity.

When we examine the semantics model of meaning, we encounter leading names such as Charles Sanders Peirce and Ferdinand de Saussure. Considering the research of these names, Peirce semiotics builds up on the three-plane *"sign / object / interpreter"* relationship, while Saussure classifies this field in a binary structure as *"concept"* and *"communication image"*. The important point here is that Peirce examines the connection between the sign and the object in line with individual and cultural information; it is Saussure's evaluation of the emergence of a concept in a mental process. Therefore, Saussure builds the receiver-sender relationship on the linguistic sign. The sender creates sound waves to express the mental concept, while the receiver understands and responds to the sound waves.

Based on all these data, when we read the space with semiotics method, design is evaluated based on the perception of form. While the architectural elements are handled through the sign-signifier-signified, the message (reference made to an asset) desired in the interior is sought in the connotation level. For example, H2O Expo Water Pavilion and Winton Gallery produce a language tool in communication studies in terms of the meanings it contains. When both designs are based on semiotics, it is seen that their metaphorical meanings evoke different concepts. In line with this information, while H2O Expo Water Pavilion was a design based on the concept of liquid architecture, it was tried to be examined with the semiotics method, which is the reference made to Winton Gallery, which is shaped by mathematics and geometry, to an airplane.

REFERENCES

[1] Erkman Akerson, F. (2005). *Göstergebilime Giriş*. İstanbul: Multilingual. Erkman-Akerson, F. (2005). Göstergebilime Giriş. 1. Baskı. İstanbul: Multilingual. Günay, D.(2007). *Metin Bilgisi*, *3*.

[2] Barthes, R. (2014). *Göstergebilimsel Serüven*, (Mehmet Rıfat ve Sema Rıfat Çev.), İstanbul: YKY.

[3] Mutlu, E. (2017). İletişim Sözlüğü. Ankara: Ütopya Yayınevi.

[4] Guiraud, P. (1994). *Göstergebilim*. (2. Baskı). Çev. Mehmet Yalçın, Ankara: İmge Kitabevi Yayınları.

[5] Rıfat, M. (1986). *Genel Göstergebilim Sorunları Kuram ve Uygulama*, İstanbul: Sözce Yayınları.

[6] Atabek, G. Ş. ve Atabek, Ü. (2007). "Medya Metinlerini Çözümlemek". *İçerik, Göstergebilim ve Söylem Çözümleme Yöntemleri*, Ankara: Siyasal Kitabevi.

[7] Barthes, R. (2014). "Çağdaş Söylenler". *Günümüzde Söylen*. (4. Baskı). Çev. Tahsin Yücel, İstanbul: Metis Yayınları.

[8]. Barthes, R. (1979). *Göstergebilim İlkeleri*. Çev. Berke Vardar ve Mehmet Rifat, Ankara: Kültür Bakanlığı Yayınları.

[9] Fiske, J. (2014). *İletişim Çalışmalarına Giriş*. (3. Basım). Çev. Süleyman İrvan, Ankara: Pharmakon Yayınevi.

[10] Rıfat, M. (2005). *XX Yüzyılda Dilbilim ve Göstergebilim Kuramları 2 Temel Metinler*. (2. Baskı). İstanbul: YKY.

[11] Rıfat, M. (2009). *Göstergebilimin ABC'si*. (3. Baskı). İstanbul: Say Yayınları.

[12] Rıfat, M. (2000). *XX. Yüzyılda Dilbilim ve Göstergebilim Kuramları 1: Tarihçe ve Eleştirel Düşünceler*, (2. Baskı). İstanbul: OM Yayınevi.

[13] Saussure F. (2001). *Genel Dilbilim Dersleri*. Çev. Berke Vardar, İstanbul: Multilingual.

[14] http://spazioinwind.libero.it/nicolafariello/prog.arc.ass/www/esame/h2o.html, (last accessed on 08 July 2019)

[15] http://www.archilab.org/public/1999/artistes/noxa01en.htm#, (last accessed on 08 July 2019)

[16] https://www.arkitektuel.com/winton-galerisi/#jp-carousel-7785, (last accessed on 08 July 2019)

GAMZE AKBAŞ, Lecturer
She was born in 1987 in Ankara. She is working as a lecturer in the Department of Interior Architecture and Environmental Design at Istanbul Kültür University. Between 2007 and 2012, she studied at the European University of Lefke, Faculty of Architecture and Engineering, Department of Interior Architecture. In 2015, she completed her master's degree at Atılım University, Institute of Social Sciences, Department of Interior Architecture and Environmental Design. Her master thesis is on the "Traditional Construction Techniques and Space Relations: Uzungöl and Taşkıran Examples". She is currently a PhD candidate at Çankaya University, Architecture Programme.

Examining the Effects of the Industrial Revolution on Furniture

Lecturer Şerif Tolga ERDEM
İstanbul Kultur University
Department of Interior Architecture &Environmental Design
t.erdem@iku.edu.tr

Abstract: *Furniture is a phenomenon that takes place in human life as a design product. This phenomenon is located at the intersection of many fields of study that seem distant from each other, such as engineering, natural sciences, and art approaches in their historical process. When looking at the historical process of furniture, if the term furniture designer is used, it can be seen that these designers are sometimes an artist, architect, artisan, engineer, industrial product designer and interior designer. These disciplines and professional groups, which have differences in common as well as common aspects, can be considered as an indication of the extent of furniture occupying human life. This study was carried out to investigate the effects of the industrial revolution on furniture design.*

Keywords: *Furniture, The Industrial Revolution, Design*

Endüstri Devriminin Mobilya Üzerindeki Etkilerinin İncelenmesi

Öz: *Mobilya, bir tasarım ürünü olarak insanın yaşamında yer alan bir olgudur. Bu olgu, tarihsel sürecinde mühendislik, doğa bilimleri, sanat yaklaşımları gibi birbirinden uzak görünen birçok çalışma alanının kesiştiği bir noktada bulunmaktadır. Mobilyanın tarihi sürecine bakıldığında, genel olarak mobilya tasarımcısı ifadesi kullanılırsa, bu tasarımcıların bazen bir sanatçı, mimar, zanaatkâr, mühendis, endüstri ürünleri tasarımcısı ve iç mimar oldukları görülebilir. Ortak yönleri olduğu kadar birbirinden farklılıkları da olan bu disiplin ve meslek grupları, mobilyanın insan yaşantısında ne derecede yer kapladığının bir göstergesi olarak da düşünülebilir. Bu çalışma, endüstri devriminin mobilya tasarımı üzerindeki etkilerini araştırarak ortaya koymak amacıyla yapılmıştır.*

Anahtar Kelimeler: *Mobilya, Endüsrti Devrimi, Tasarım*

1. INTRODUCTION

Furniture is a concept that takes place in human life as a design product. This concept is located at the intersection of many fields of study that seem distant from each other, such as engineering, natural sciences, and artistic approaches in their historical process. When we look at the historical process of furniture, if the term furniture designer is used, we can be seen that these designers are sometimes an artist, architect, craftsman, engineer, industrial product designer, and interior designer. These disciplines and occupational groups, which have common aspects as well as differences, can be considered as an indicator of how important the furniture is in human life.

Furniture has been one of the main indicators of the cultural structures of societies that adopted settled life. With the establishment of the hierarchical order in societies over time, not only functionality but also prestige has become a necessity and attached to furniture. Furniture, which is limited to meeting needs such as sitting, eating, sleeping, has turned into tools that symbolize a privilege. The changes in the socio-cultural structures of societies based on the time have accelerated and diversified by being compatible with the

Doi Num : 10.17932/IAU.ARCH.2015.017/arch_v05i2005

innovations in the fields of the industrial revolution, materials, and production techniques. This study was carried out to investigate the effects of the industrial revolution on furniture design.

2. DEFINITION OF FURNITURE

Furniture is a product of societies that have adopted a settled life and that are developed. One of the basic elements of people's living spaces is furniture. Furniture is defined by common expressions not far from each other; Basic physical needs such as sitting, sleeping, working and storage [1]. Furniture is an item used to make human life easier and make the living space more comfortable [2]. There are many types of furniture, from the most well-known, such as chairs, tables, beds, cabinets, armchairs, to the least known, such as radiators, kitchen units, fireplaces and even door accessories. Furniture can also be fittings in a space. Fixed furniture can also be used as a dividing element in the space instead of walls [3].

Furniture is generally household goods made of materials such as wood, metal, plastic, glass, fabric. The word "furniture" in English is originally based on the word ""fourniture" in French. Fourniture; means equipment. In European languages other than English, instead of the word "fourniture", the adjective "mobile" (German: möble, French: meuble, Spanish: meuble and Italian: mobile), the Latin origin "mobilis", is used. The furniture experience of Continental Europe is considered more descriptive. Equipment must be mobile to be furniture [4]. Furniture is an item used to decorate the living places and to equip them for various purposes [5]. Ching does not make a different definition for furniture but expresses it as a covering element [6]. Depending on the function, Luice - Smith describe furniture as an item that develops and changes based on four basic elements; function, social status, technical developments and the needs of daily life [7]. Similarly, Boyla also describes these as items that provide practicality, assist in determining personal private areas, helps its owner to earn and provide information about social status and attitude as well as actions and needs [8]. According to Hoffman, space and furniture are parts of the same unit and they live in the same unit [9].

Looking at the definitions given above, some of the definitions; while it is seen that some of the definitions concentrates on objects such as tables, coffee tables and chairs, some people describe them through the functions of furniture. While Ching sees furniture as an element of the space, Hoffman shows a more plenary approach that indicates furniture is not a space-independent item but it is complementary to the space. Each definition addresses a different focus on furniture. If a general definition is tried to be made by concentrating on the focal points of the different definitions that have been transferred, it can be defined as with the fact that furniture is not a vital necessity, it can be defined as an interior item that provides practicality that is functional, symbolic, social as well as personal.

3. FURNITURE BEFORE THE INDUSTRIAL REVOLUTION

In the period until the Industrial Revolution, societies continued their lives with an agriculture-based production style in a feudal structure. In terms of technological and social changes made, the Industrial Revolution was a breaking point in furniture production and consumption. Küçükerman refers to the form of production in the period up to the Industrial Revolution as the production period with manpower [10]. During the period until the 19th century, the production of furniture was based on manpower. In this part of the study, the development of furniture until industrialization has been briefly examined at certain time intervals.

3.1. Primeval Era

The oldest known settlement of the Neolithic period when human beings adopted a settled lifestyle is considered Çatalhöyük. During this period when furniture had not been used yet; some needs were tried to be solved in terms of function as a part of the building with pits and elevations on the ground, coves and shelves on the walls, and the like [11]. The furniture samples of the primeval are seen in Ancient Egypt, Ancient Greece and Rome. Although it is mentioned that the furniture is a personal item, it can be observed that those people were not ordinary people, rather they were the palace seniors, noble or wealthy people. In this case, they are one of the first indications that furniture is a symbol of status and privilege (Figure 1).

No concrete example can be found in Ancient Egypt until the Pharaohs Period. However, through the hand tools, tablet and wall paintings, it is understood and accepted that there were furniture in Ancient Egypt [12].

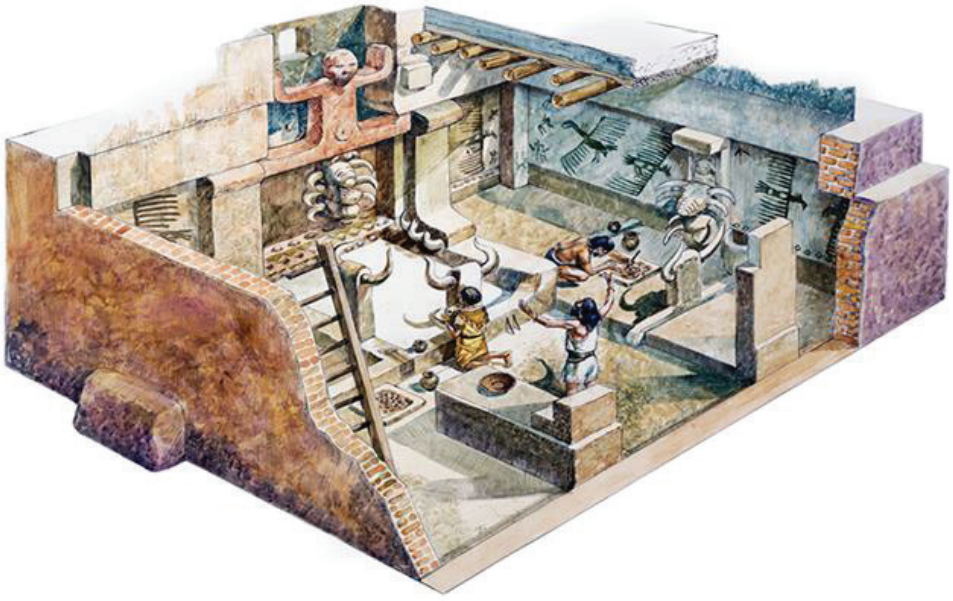


Figure 1. Çatalhöyük [13]

The majority of thrones in the found furniture can be considered as another indication that the people who had furniture were of a privileged segment of the society. It was detected that furniture in the Old and Middle Kingdom Periods was generally a chest and sitting element. In the New Kingdom Period, it is seen that especially the production of chairs was progressed considerably [14]. In addition to being a symbol of social status, it can be said that the furniture in Ancient Egypt was an element for the purpose of sitting and it caused some other functional developments in the sitting action. The improvement in the dimensions of the chair can be considered as the beginning of attributing a functional meaning to the furniture (Figure 2).

Figure 2. Throne of Queen I. Hetepheres [15]

An example of furniture from ancient Greece could not have been reached. However, stone reliefs, vase pictures and mural paintings give an idea about furniture of that time. The most mentioned of this furniture is the Klismos Chair. Klismos Chair, made in Ancient Greece, is seen as a masterpiece in terms of its simplicity, form and comfort. In the Iliad Epic, Homeros praised Klismos Chair as "Worthy of Goddesses" [15]. Dampierre says that the Klismos Chair has very modern lines and is highly compatible with human ergonomics. As it is stated in various sources, the class-related meaning that furniture carries is supported by the furniture from the ancient period (Figure 3).

Figure 3. Klismos chair, stone relief [16]

3.2. Medieval Ages

After the fall of the Roman Empire in the 4th century, Europe was buried in darkness for a thousand years. Until about 1100, no development was observed in any field of art. Re-activation in the field of art in Europe caused by the crusaders returning from the Middle East bringing Islamic ideas and influenced by Byzantine Architecture. This influence manifested itself most in France and led to the start of the Gothic Style, which lasted about 400 years. The Gothic Style was effective in almost everything, especially in architecture and furniture, but all these designs were limited to the cathedrals that were considered as the center of the social life of that time [17]. In Medieval Europe, it is observed that the transition to settled life turned into an urbanization process. The social changes that emerged with urbanization created a middle class that was not included in the clergy, but could own land thanks to the development of the property rights. That middle class would form the mass demanding furniture after the church and palace seniors.

3.3. Renaissance

Renaissance is considered as the period when the Western World underwent major cultural changes. As the main negative effects on the formation of this cultural change environment: the feudal order of the Middle Ages, its economic structure, and the social, strict, scholastic attitude of the churches can be counted. As opposed to these negative factors, invention of the printing press, the development of commerce, and the fact that wealthy groups formed in cities invested in non-religious areas can be counted as positive factors in the development of the Renaissance.

Renaissance Furniture is generally seen as rough, bulky furniture that is not very different from that of the previous periods. As a reflection of the progress in mathematics science and tool making, it is seen that fine workmanship such as carving and inlay increased in the furniture of the period. The increase of guilds in the 16th century was one of the factors that increased branching out and specializing in furniture. Some of the guilds among furnishers were: framer, upholsterer, platformer, veneerer, inlayer, painter, metal accessory maker [17] .

3.4. Baroque

Baroque style was born in Rome. It reached its brightest period in the middle of the 17th century. Towards the end of the 17th century, France became the unquestionable leader of Europe in the Baroque Style [18]. The structure and decorations used were taken from Ancient Roman Architecture in general, but the shapes became more curved and the surfaces more complex than the Ancient Roman Architecture (Figure 4). With the development of trade, it was observed that bourgeois class also competed each other to have furniture along with the wealthy nobles [18].

Figure 4. Baroque Style [19]

3.5. Rococo

Following the Baroque Style, in which form and decoration are important, Rococo was observed in France as of the beginning of the 18th century. In the emergence of Rococo, the aristocrats and the bourgeois class gradually approached each other in terms of wealth, and it can be said that the masters trained in the guilds, which started to become widespread with the Renaissance, were protected by the bourgeois class and there was a tendency for orders in accordance with the personal tastes. When we look at the first examples of the Rococo style, we see that there were abundant adornments and flourish, as in Baroque style. As the style progressed, we see that simpler products appeared. In the French Palace of the time, the emergence of private life, new forms of social behavior, such as coffee, tea, and morning coffee, five o'clock tea routines, which were learned as a result of overseas trade, also caused new and different searches [14]. The need for privacy and the disturbance caused by the fact that the servants were always around their masters led to a need for designing the spaces and tools in a way that they can be used without help. The fact that the room types became more distinctive brought an idea along with that rather than moving the furniture, furniture and architecture started to be considered together [8]. In line with these changes, it can be said that the furniture was more plain, light and useful in the period when furniture design was directed towards the search for function and elegance. Although ergonomics were not in question yet, the fact that the backs were made with a certain slope, not upright, can be interpreted as comfort and ergonomic concerns began at that time.

If we look at the change that the furniture went through since the early days and till the end of the primeval era, we can summarize it briefly as follows; In the prehistoric times, in the first ruins, it is seen that the furniture was used to meet the needs functionally and be a solution for the living space structurally. In ancient times, the furniture was built and used to symbolize the privilege, exclusivity and authority of a certain class. With the Middle Ages, a tendency towards more individual forms and purposes was observed. As a result of its reflection with the Renaissance, it is in question that there were more ergonomic designs compatible with the human in furniture compared to the previous periods.

4. THE INDUSTRIAL REVOLUTION

The Industrial Revolution or Technological Revolution began in 1765 with the invention of Scotsman James Watts' steam engine. The Industrial Revolution affected England firstly and then the rest of the world. As a result of this invention of Watts, great developments were made with mechanization in iron, steel processing, and coal mining. In addition, huge steps were taken in modern transportation tools and lines. The developments enabled many new designs works to emerge and provided opportunities to build railways, hotels, canals, led to growing cities and new architectural designs (Figure 5).

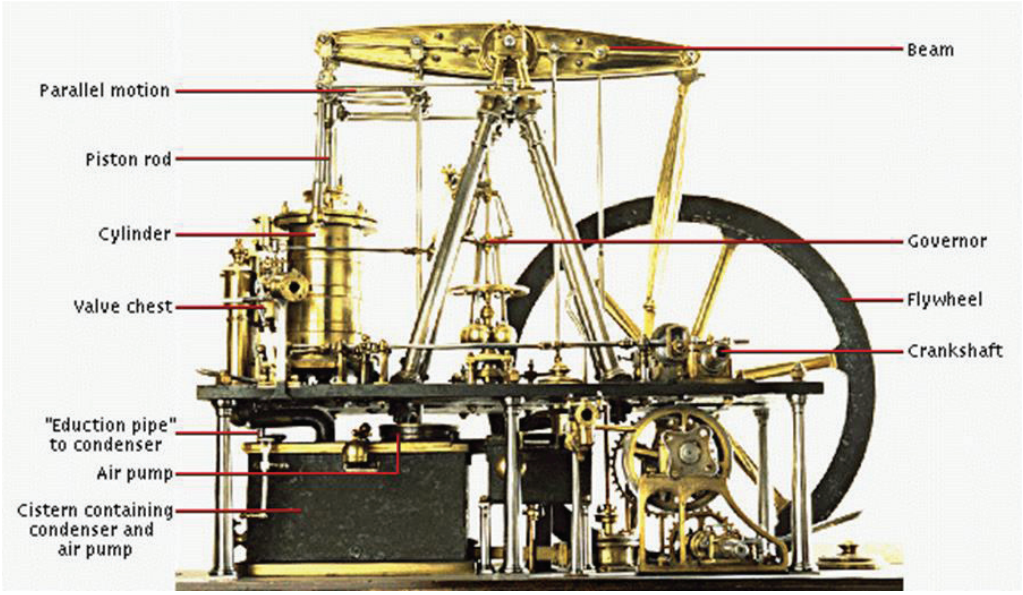


Figure 5. James Watt, Steam Engine 1765 [20]

The Industrial Revolution enabled the transition from expensive and time-consuming manual workmanship to a much faster and cheaper machine business, and thus many products began to reach larger masses of people. It can be said that the Industrial Revolution not only caused radical changes in production, but also important social changes. Although the Industrial Revolution was a European originated change, it caused large-scale changes both in the social structure and in the production forms all over the world. As a result of the changes in the means of production tools, the shift of the population to the cities, the emergence of new professions and the formation of classes in the society are the phenomenon associated with the Industrial Revolution in general. With the mechanization developed in parallel with industrialization, not only the production methods but also the products themselves changed. Although we say that Industrial Revolution started with James Watt's invention of the steam engine, the Industrial Revolution is a phenomenon that did not occur with a single invention or a social movement but occurred in the process gradually.

4.1. Industrialization

In human history, we can talk about two milestones. The first of these is the Agricultural Revolution, which started with the adoption of settled lifestyle and cultivation of the soil, and the second is the Industrial Revolution. The Industrial Revolution is also defined as the transformation of the agricultural population into a producer of goods and services [15]. Industrialization, in the narrow sense, can be defined as the use of machinery in production or the increase in the share of the industry segment in the national income, in a broad sense, it can be described as the changes that the countries underwent in economic, political and

social, etc. fields [17]. Arnold Toynbee used the term Industrial Revolution for the first time. He described it as a very rapid change that took place in England between 1750 and 1850 and spread to other western countries over time [18]. Küçükerman named the form of production in the period until the Industrial Revolution in the 19th century as manpower production period [10].

As can be seen in various sources, industrialization caused great variations in the structure of the society with changes in production forms. It can be said that society was reformed with new values such as new business lines and private property. These new values and new lines of business brought along concepts and ideologies that had not existed in the society or had not been so effective before. The technology was the basis of those social changes created by industrialization. The reflections of the changes in technology on the means of production inevitably changed the societies.

5. THE REFLECTIONS OF THE INDUSTRIAL REVOLUTION ON FURNITURE

In this part of the study, changes in furniture design and production methods came along with the Industrial Revolution will be discussed. A general chronology will be followed for this time period, which will be examined by the end of the 18th century. These chronological time intervals will be named in accordance with the changes and approaches in furniture design, with the names of the designers or art movements in which the time interval in question is generally mentioned with. The reason for choosing this method is the fact that the changes in the design conceptions did not occur with exact dates point by point and their effects on each other do not have precise distinctions.

5.1. Michael Thonet

Born in 1796, Austrian carpenter master Michael Thonet, developed a new technique at the end of the XIX century, and he started to make taborets out of beech tree and sell them. The taborets made by Michael Thonet by softening the beech tree in water vapor and bending it became famous first in Austria and then worldwide. The name “Thonet” became a brand. At the end of the XIX century, he made his first patented mass production in the field of chairs with the works as bending with mold by gluing laminated wooden strip first; and afterwards, bending solid woods (bended by vapor). In fact, the model named No: 14 sold about 50 million units from 1859 to 1930. In the same type of works, this was a record. This is the first work to use the production line system, so it formed the first steps in the evolution of modernity (Figure 6 and Figure 7). They were elegant and simple forms on which correct proportions were used [21].

Figure 6. Thonet Chair 1859 [22]

Figure 7. Thonet Chair No: 14 [23]

5.2. Arts and Crafts Movement

A group of named Pre-Raffaello people in England advocated the idea of that the nature should be delivered in a plain and honest way. English poetry and legends were taken as the subject. They paid attention to brightness and simplicity in details in pictures. The art of this group also affected the Arts and Crafts movement closely. The British government supported the collaboration of artists and craftsmen since the XVIII century. A public school was established in 1835 to raise the quality and standard in production. At school, John Ruskin and Pre-Raffaello artists worked as teachers. The artisans at the school learned their opinions and ideas. As a result of the industrial revolution, wider ateliers replaced the artisanal works in the workshops with traditional methods thanks to improvements in textile and machinery use. Efforts to combine art and crafts provided job opportunities for craftsmen. British craftsmen did not break from one-piece production, they brought artists from outside to increase production.

Arts and Crafts exhibition group was formed in 1888. In 1860, Morris moved to the Red House designed by his friend Philip Webb. The house resembled medieval buildings with its pointed roof, gothic arched windows and doors, fenced garden. The furniture was made in 1861 in Morris's company that worked like a medieval workshop. Morris was against the fact that the elements of the interior architecture were the result of factory production. He advocated for art to be for people and made by people themselves and wanted to appeal to the wider masses. Aesthetic concerns about daily use production and awareness of this issue arouse thanks to Morris. All kinds of items that could be used in daily life were designed in the workshop. The designers were Morris, Rosetti and Edvard Jones. It played an important role in raising the art appreciation of the public (Figure 8). They were influenced by the two-dimensional surface decoration, patterns and drawings of medieval miniatures [24].

Figure 8. Arts and Crafts Style Dining Table and Chairs [25]

5.3. Art Nouveau

After the Arts and Crafts movement, which opposed eclecticism and mechanization after the second half of the VIX century, Art Nouveau became widespread in Europe and America between 1895 and 1905. “The plainness and functionality of the furniture and arts of Arts and Crafts movement”gave clues to future movements. Especially in the USA, furniture design and interior design were greatly influenced by this movement in the end of the VIX century and in the beginning of the XX century. The ideal of hand-workmanship developed by Arts and Crafts was applied and developed by Art Nouvea, which was born after it and was an opposing movement to a certain extent. At the end of the VIX century, there was an opening to new worlds such as the Eastern world, Japan, and China. Examples of the Art Nouveau movement are seen all over the world. This trend was accepted as the first break with traditional art. The term “Art Nouveau" comes from S. Bings' shop in Paris. In Germany, the name Jugendstil, a newspaper that began to appear in 1896, is used [26]. This style, which is a movement influential in architecture and decoration, is called Liberstil in Italy and Style Liberty in England and Modern Style in America. “The movement, which brings a new understanding of form in Europe, will adopt the slogan “To every age its art, to every art its freedom”, which can be read at the entrance of the Secession building in Vienna. Belgian Henri Van De Velde, one of the theoreticians of this movement, mentioned that the British Arts and Crafts movement never got over the medieval influence in 1894 and he grounded on the beauty that found in the machines. Van De Velde, who sees a great future for iron, steel, aluminum, celluloid and cement, stated that he wants to see vivid, strong and clean colors, energetic and strong forms, reasonable constructions that we lost on household goods as well, he praised new British home household goods that got rid of adornments. [27]. Art Nouveau is based on neither plainness nor antiquity in architecture. It is a sort of transition style. Iron is used in herbal form both as a carrier and as a decoration item. Cast iron has a long-life carrier and decorative meaning. Carrier items are not covered by an additional decorative item. Art Nouveau was influenced by the botanical books from the far east. Floral motifs, flowing forms, curved

lines, linear quality, fine and elegant drawings, waving have become important. Pioneers of decorations with plant forms are William Morris, Arthur H. Machmurdo in England, Henri Van De Velde in Belgium, and Levis C. Tiffany in the USA. The school named Nancy in France also led this trend. The founder of the school, Emile Galle, did glass and metal works as well as furniture designs. S. Bing, who traded art and marketed furniture imported from the Far East in Paris, opened a new era in French furniture production. As he transformed his shop into an art center, he changed its name to Art Nouveau-New Art [28].

The most famous Art Nouveau designers are both architects and furniture designers. This is also same for Hector Guimart, Henry Van De Velde, Scottish architect and designer Charles Renni Mackintosh, Spanish Antonia Gaudi. German Richard Riemerschmid (1868-1957), who completed the Munich academy, draws attention to a plain, simple design and functionality in the Art Nouveau chair he designed for the music room in 1899. The curved iron bars on the diagonal side are sturdy and provide musicians an opportunity to move their arms freely. It is possible to see the Art Nouveau decoration features in the walnut buffet designed by Louis Majorelli (1859-1926) for the French company called Chicoreé. Plant and leaf motifs, curved lines and geometric shapes, which took place scarcely, draw attention (Figure 9).

Figure 9. Hector Guimard's Collet Mansion Designed for Dining Hall (1898-1900) [29]

5.4. De Stijl

Teo Van Doesburg and Piet Mondrian created a new style, aiming to get the art out of the individual consciousness and bring it to social consciousness. Geometric shapes such as basic round, square, rectangle, and primary colors such as blue, red and yellow were preferred in De Stijl movement. Doesburg "When you scrape the nature out of the outer appearances, the main structure will remain." he said. De Stijl scholars believed that an art that does not rely on the public could not come to life. In an article written by Doesborg in De Stijl magazine, he said that "We must understand that art and life are no longer separate domains. " [30]. Asymmetrical lacquered and wooden table produced in 1923 is an example of this. The table is a parallel work with the Red - Blue chair, which was Rietvelt's earlier work. Horizontal and vertical surfaces painted red, blue black, yellow and white are seen. Rietvelt also used De Stijl forms on this table. The table designed for the Schröder House has the asymmetrical style of the house (Figure 10). This style is separate from many modernist architectures of the 1920s [31].

Figure 10. Gerrit Rietvelt designed by Schröder House (1923) [32]

5.5. Bauhaus

The foundations of Bauhaus, one of the important milestones of the formation process of modern art and architecture, were created by the architect Walter Gropius in Weimar city, Germany. The movement was developed by new generations led by great artists such as Kandinsky and Klee.

Bauhaus School, which was one of the most important centers of the European avant-garde between the two World Wars, influenced the entire continent as the leading art center of the XX century until it was closed by the Nazis. Bauhaus tried to re-establish the link between art, architecture, and industry, which was broken since the Renaissance and left a legacy developing XX century contemporary art understanding. It ensured that this understanding was placed in a wide frame ranging from architecture to textile design, from graphics to furniture, from ceramics to sculpture, from painting to photography.

Members of the Bauhaus carried out their photography works in a documentary perspective rather than an artistic dimension. They tried to create a new and objective perspective with their unconventional approaches and compositions.

In the 1920s and 1930s, a German design school became the pioneer of a style that would later be called "Modern". Based on the philosophy of todays "Design comes after functionality." the Bauhaus style was quite plain and bright. The materials used are; steel pipes, plywood, leather, and plastic. Colors are mostly limited to black, white, brown, and gray. Famous designers who followed this style are; Mies Van Der Rohe, Marcel Bruer, Charles and Ray Eames, Alvar Alto and Aero Saarinen.

The furniture produced at the beginning of the XX century appeals to the middle class with rich and real art buyers. The designer had to take into account both groups. "A group of architects and artists influenced by Japanese art developed a new style in an Art School in Glasgow, a Scottish port city. They preferred little decoration and black and white colors. Charles Rennie Mackintosh, who was at the head of the group in the last periods of Art Nouveau, used forms created by fine, horizontal, and vertical lines."[33]. The chairs designed by Mackintosh in 1897 show Art Nouveau's late period examples with simple decoration elements. As an example of the Geometric Art Nouveau, the geometric forms on the chair made for the Hill House in Helensburgh draws attention to the emphasis of horizontal and vertical lines and plainness and little ornamentation (Figure 11).

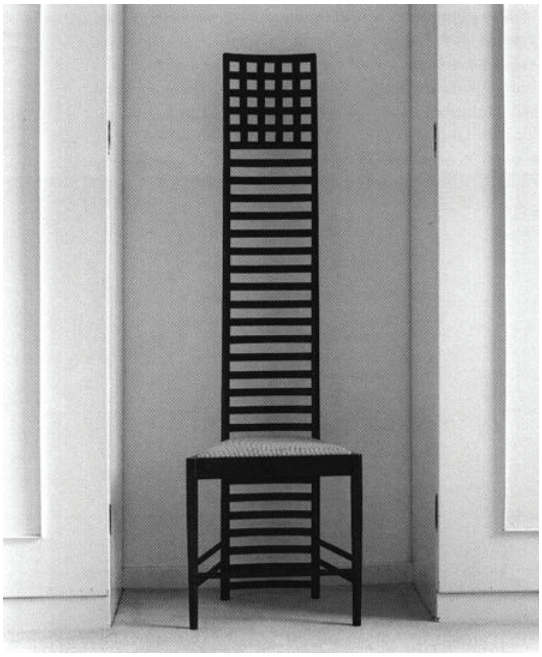


Figure 11. Mackintosh, Ladder Chair [34]

5.6. Post Modernizm

In the 1950s there were important Italian companies such as Zanotta, Cassino, Capellini, Molteni. Designers were designing furniture for these companies. Armchairs made of polyurethane foam, consumption and pop culture synthesis vacuum packaged armchairs, plastic armchairs were temporary but fantastic furniture of the period. Crazy examples and female figure designs of pop art are interesting. “Symbolist, expressionist, surrealist, pop, anti-design, low tech, high tech, postmodern, memphis, new design, brutalist, environmentalist, arabesque are the trends and fashion that shape the design of our century. ”

Post Modernism, which emerged as a reaction against the modern in the 1970s, also manifested itself in furniture. There was no retroactive and irony in modern art. Postmodernist furniture revitalizes historical trends. It creates new forms, inspired by old forms. There are designs goes back to Kitsch. They utilize all behaviors and trends, all forms, elements, and richness of form. “In the 1980s, Ettore Sottsass said “We use everything we do today. Our productions are devoted to life, not to future generations.' In 1981, he produced legendary symbols on the shelves he designed and he produced furniture made of colored plastic." [35]. In Hans Hollein's work named 'Marilyn Sofa' in 1981, it is seen that a rare wooden and old sofa fabric were used together. It has an unsymmetrical curved form. It is an organic design. It is realistic and comfortable thanks to the moldable artificial foam and flexible upholstery fabric. Hands and gloves, like the Lips, inspired furniture as they can grasp people or as they are a carrier element (Figure 12).

Figure 12. Hans Hollein, Marilyn Sofa, (1981) [36]

6. CONCLUSION AND DISCUSSION

The transition of people to the settled lifestyle has been an important step in the socialization process. While transitioning to settled lifestyle brought a life under one roof along with it, this situation cost many years in history. Being able to live comfortably after meeting the primary needs has brought new needs beyond just living under four walls and a roof. Thus, as well as the need for a place to live, the effort to make this place, house livable increased the use of furniture rapidly. The use of furniture started to gain importance in terms of functionality to comfort and then, as a next step, conformity with aesthetic understanding.

All these social developments were undoubtedly accompanied by artistic and architectural movements. Thus, Baroque, Art Noveau, Gothic and Art Deco styles came to life in the design and products of the furniture industry. The concept of furniture was transformed into a meta that reflect the lifestyle shaped by socio-cultural relations, rather than being a need figure.

In 1900s, the industrial revolution showed its effect within the framework of production relations of furniture sector, as in every sector. Small-scale enterprises started to be replaced by industrial enterprises utilizing mass production. Naturally, production increased by the increased competition brought about the constant renewal of the goods produced due to the fact that the markets could not be shared.

In light of all these developments, furniture manufacturers had a tendency to offer ergonomics and aesthetics in addition to functionality. With the increase of modular furniture production, the concept of individual usability gained value. At this point, not only a contract-based and fixed product was offered to the consumer, but also the manufacturers started to offer products that can be installed and used according to the consumers' wishes and desires.

REFERENCES

[1] Hasol, D. (2010). "Ansiklopedik Mimarlık Sözlüğü" (11. Basım), İstanbul. YEM Yayınları

[2] Acar, (1992). " Yapı-İç Mekan Bütünlüğü İçinde Sabit Mobilyanın Çözüm Örnekleri Üzerine Bir Araştırma." Yayınlanmamış Yüksek Lisans Tezi, İstanbul Üniversitesi

[3] Coates, M. Brooker, G. ve Stone, (2011), "Görsel İç Mimarlık Sözlüğü" İstanbul. (çev: N. Işık), İstanbul. Literatür.

[4] http://global.britannica.com/technology/furniture

[5] http://wikiwand.com/tr/mobilya

[6] Ching, Francis D.K. (2004). "Mimarlık: Biçim, Mekan ve Düzen (2.baskı), İstanbul: Yapı Yayınları

[7] Lucie-Smith, E. (1993)." Furniture: A Consice History", London, Thames and Hudson Ltd.

[8] Boyla, O. (2011). "Mobilya Tarihi", İstanbul.

[9] Colomina, B. (2011). "Mahremiyet ve Kamusallık Kitle İletişim Aracı Olarak Modern Mimari" (Çev: A. Ufuk Kılıç), İstanbul. Metis.

[10] Küçükerman, Ö. (1978). "Kişi-Çevre İlişkilerinde Çağdaş Gelişimler ve Oturma Eylemi, İstanbul: İstanbul Devlet Güzel Sanatlar Akademisi.

[11] Dinçel, K., Işık, Z. (1979). "Mobilya Sanatı Tarihi", İstanbul: Milli Eğitim Basımevi

[12] Burchell, S. (1991). "A History of Furniture" Newyork: Harry, N. Abrams Inc. Publishers.

[13] www.nationalgeographic.com.tr/makale/keşfet/çatışma-keşfedilmeden-önce/2625

[14] Blackmere, Robbie, G. (1997). "History of Interior Design and Furniture History",Toronto: Willey Publishers.

[15] https:// tr.pinterest.com

[15] Gürhan, T. (1990). "İktisat Tarihi". İstanbul: damla Ofset.

[16] www.wallswithstories.com/furniture

[17] İlkin, A. (1973). "Ak İktisat Ansiklopedisi", cilt:2, İstanbul: Ak Yayınları.

[18] Torun, T. (2003). "Endüstri Toplumunun Oluşmasında Etkili Olan İktisadi ve Sina-i Faktörler" C.Ü. İktisadi ve İdari Bilimler Dergisi, Cilt:4, sayı:1 s:181-195.

[19] www.fikirtv.com/barok-mobilya-sanati

[20] www.moderniste.cz

[21] www.antikalar.com

[22] www.bonluxat.com

[23] www.wolfsomian.fiu.edu.

[24] Küçükerman Ö. (1996). "Endüstri İçin Ürün Tasarımında Yaratıcılık", *YEM Yayınları,* İstanbul

[25] Charlotte & Fiell P. D. Of T. 20th. Century, Taschen. S.55

[26] www.vikipedia.org, (2006-01)

[27] www.evdose.com

[28] www.sandalye.infosss

[29] www.arch.colombia.edu

[30] www.arkitera.com

[31] Yaylalı H. (2000). "Tasarımda Modernizm", *AD 83,* İstanbul

[32] www.culture.gouv.fr

[23] www.berlin-turkish.com

[34] Charlotte & Fiell P. D. Of T. 20th. Century, Taschen. S.124

[35] Malcom H. "In The Nouveau Style", *Thomas & Hudson*

[36] www.robbrertluxuryhome.com

ŞERİF TOLGA ERDEM, Lecturer
He was born in 1975. He is working as a lecturer in the Department of Interior Architecture and Environmental Design at Istanbul Kültür University. He completed his undergraduate education in 2002 in MSGSU, Faculty of Architecture, Department of Industrial Design, and his master's degree in 2007 at Istanbul Kültür University, Institute of Science and Technology, department of Interior Architecture. He is currently a PhD candidate at MSGSU, Department of Interior Architecture. He has been involved in various design projects and has opened numerous painting and illustration exhibitions. He continues his academic studies at national and international level, specializing in interior design, product design, reinforcement design, furniture design.

Guide for Authors
A+ArchDesign

Submission of manuscripts: The language of the journal is English. The digital copy of the manuscript, prepared by Microsoft Word, together with original figures and tables must be submitted to the journal only via e-mail (aarchdesign@aydin.edu.tr). After the submission, the manuscripts will be edited according to the journal submission format and authors may be requested for some corrections or for addition of any missing information. All papers will be blind reviewed and assessed by two referees. During the publication process, camera-ready manuscripts will be sent to the authors for approval.

Page Design: Text body area is (195mm x 275mm). 25 mm margin from top, 25 mm from down and 25 mm margins should be left on right/left sides.

Title should be in 16 pt. bold with Times New Roman font in Microsoft Word format. Authors' names, affiliations, e-mail addresses should follow the title after three line spacing with authors' names in lower case and surnames in 11 pt. Photo should locate on the left of the author's names.

Abstract *should not exceed 200 words with the word "Abstract" in 11 pt. italic, bold, abstract text in 11 pt. italic, all in Times New Roman font in Microsoft Word format. Papers written in English should have an abstract in Turkish, or the other way round. Paper title should also be translated along with the abstract.*

Key Words not exceeding 5 should be in 11 pt. In addition, the designation of five keywords in both languages is essential.

Main Text: Maintitle should be in 11 pt. bold, capital letters and text body 11 pt. both with Times New Roman font in Microsoft Word format. The maintitle of the first section should start after double space following the keywords, the text will follow maintitles and subtitles with no space. There should also be single line spacing between the previous text and the subtitle.

Sections: Figures and Tables should be placed into the text body and captions for both should be 11 pt. Table numbers and captions should be placed before the Table. Formulas should be numbered sequentially. Referring to formulas should be as Eqn (.).

Conclusion section should have a title written in 11 pt. bold, capital letters and the text in 11 pt. all in Times New Roman font in Microsoft Word format. Conclusion should not be a version of the Abstract.

Reference numbers should be given in the main text as it is in the reference list in brackets as illustrated below:
Books:
[1] Siegesmund, S., Snethlage, R. (2014). Stone in Architecture: Properties, Durability. Springer; 5edition.
Papers:
[2] Sirel, A. (2013). An Urban Fabric mainly Based on Adobe: The old city of Van Kerpic, kerpic'13 – New Generation Earthern Architecture: Learning from Heritage International Conference Istanbul Aydın University, Turkey, 11-15 September 2013, 315-319.

Short Biography of the authors should follow references after a single line space, names in 11 pt. surnames in 11 pt. and the text in 11 pt. The text should not exceed 50 words.

Length of the Manuscript should not exceed 20 pages excluding Figures and Tables.

İSTANBUL AYDIN ÜNİVERSİTESİ

KÜTÜPHANE VE BİLGİ MERKEZİMİZ
7/24 HİZMET VERİYOR

56.000
Basılı Kaynak

1.000.000
E-Kaynak

Engelsiz
Kütüphane

Mobil
Uygulamalar

- Kütüphane 7/24/365 gün hep açık
- 75.000 aylık kullanıcı
- Mimarlık ve Mühendislik Fakültesi için çizim salonları
- **Galeri Aydın**
- **Kafeterya**

instagram: kutuphaneiau twitter.com/iaukutuphane facebook.com/iaukutuphane