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ARCHDESIGN '22

IX. INTERNATIONAL ARCHITECTURAL DESIGN CONFERENCE PROCEEDINGS

CONTENTS

THE CASE OF ARCHITECTURE IN TV PROGRAMS

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ABSTRACT

The world of television, along with digitalization, has the distinction of being the most popular mass media tool of the last century. Television broadcasts consist programs which classified under the headings of news, culture, health, entertainment, drama, education, real lives and children. Programs can also be grouped according to their subject, target audience, format and purpose. Today, television appeals to a very wide audience in terms of program type. Various program formats have emerged on many subjects for audiences of all ages in the target audience. Culture, health and entertainment programs have also taken place in the daytime zone in the news and drama-oriented broadcast stream. The fact that cultural programs are fed from disciplines such as theatre, radio, cinema, architecture, painting, photography and literature, which have an important place in the society, also contributes to the awareness of the society about these fields and their tendencies towards art.

The aim of the study is to determine the place of architecture in TV programs. The study is a qualitative research; content analysis was done. In line with the purpose of the study, first of all, local and foreign-sourced TV programs were determined on the field of architecture on television. Secondly, they were grouped according to their local and foreign origin. In the next step, the contents of the programs have discussed. In line with the content analysis, it has been determined what kind of scope the programs deal with architecture. Accordingly, groupings were made within the programs depending on their scope. As a result; It has been seen that foreign-sourced programs for architecture are much more than local TV programs. Local programs include interventions on wall surfaces and furniture decoration in residences rather than architectural practices. On the other hand, architectural practices are intense and consist of different scopes in foreign programs. These programs also progress through housing projects, but they have contents covering architecture, interior architecture or landscape practices. There are also versions of foreign programs performed in the same format in different cities or countries.

INTRODUCTION

Nowaday, mass media are needed to create both social existence and socialization and to maintain this partnership. The mass media is often referred to as a whole. However; There are work areas that fulfill different functions such as radio, television, print media, news agencies. The common feature of mass media is that it turns into a habit and a need in the society over time, causing a demand in the society (Soydan & Alpaslan, 2014). Television was developed from inventions in the field of electricity in the late 19th and early 20th centuries. In 1873, Irish telegrapher MAY made the first technical invention of television and found ways to convert light waves into electric current. Television broadcast trials were conducted by Alexanderson, Farnsworth, and Baird between 1926 and 1927. The transmission of the first television broadcasts was carried out by wire between Bell Telephone Laboratory New York and Washington in 1927 (Oskay, 1971).

The first television broadcasts started in England in the world in 1936. Television broadcasts that started one after another in other countries were delayed in arriving in Turkey. In our country, the public began to be interested in television after the 1960s, and the widespread use of television in the world caused this interest to increase. The Turkish Radio and Television Corporation (TRT) was established on May 01, 1964, with a private law, as an autonomous legal entity, in order to carry out radio and television broadcasts on behalf of the state. With the constitutional amendments in 1972, the institution was defined as an "impartial" public economic institution. The first state television broadcasts started in Ankara, Turkey on January 31, 1968, after the establishment of the Turkish Radio and Television Corporation. Ankara television, despite various deficiencies and disruptions, formed the basis of the first State Television broadcasting concept in Turkey. Studies on private television in our country date back to the mid-1980s. Many individuals and organizations have expressed their views on private television, and preparations have been made (TRT, 2022; Vedat, 1994). It can be said that the one-year period that has passed since May 1990, when private television broadcasts began in Turkey, made trial broadcasts as in the 1968-1969 broadcast period when TRT Ankara Television began broadcasting. With the start of the broadcasting of Star 1 Television, it was met with great interest by the audience, thanks to the producers and directors transferred from TRT, as well as sports events and some popular programs. This situation paved the way for many new private television channels such as Teleon, Show Tv, Cine 5, Atv, Kanal D, Kanal 6, Tgrt, Stv and Hbb Tv to start broadcasting one after the other in line with their broadcasting policies (Kuşkonmaz, 2008; Ozçağlayan, 2000).

With the millennium, many television channels have started to broadcast life. Therefore, the contents of the broadcasted programs have increased by diversifying and the interest of the society towards television has increased in this direction. In the research titled "The Guide to Understanding Turkey", which was conducted with 13,799 people in 34 provinces in Turkey in 2016, IPSOS presented striking data on how active individuals are in daily life, how much and how they participate in social life. The result of the research; showed that the most intense activity of people is watching television with a rate of 85% (IPSOS, 2016). All these data show that the society in Turkey makes a limited effort to participate in the cultural and artistic life. The way to overcome this requires a comprehensive mobilization from structural changes to individual efforts (İKSV, 2017).

The change in form and content affects the diversification of television programs as genres.

Today, television appeals to its audience in a very rich range in terms of program types. It is possible to reach many programs from education to entertainment, from promotion to news on television. While TV programs have the functions of informing, educating, informing and entertaining the public, they are productions prepared within the framework of technical equipment and content (Yıldırım, 2019). The proliferation of cable and satellite TV channels exposes the viewer to a enormous variety of contents requiring the hedge of substantial efforts in search of interesting programs (Goren-Bar & Glinansky, 2004). With more and more programs supplied

from cable and satellite television services, people have distress selecting their favourite programs (Dai & Cohen, 2003).

Television programs, which are presented to the audience in a different style and format every day, are classified in different ways by different broadcasting organizations. Various groupings are made in many countries for television program types. One of these organizations is the EBU European Broadcasting Union. The European Broadcasting Union has classified as follows: public issues, science and humanity, music-drama-fine arts, philosophy of life, sports, leisure and hobbies, entertainment-folklore and people-oriented programs, mixed subjects, other subjects (Kars, 2003). According to the television broadcasting system in Turkey, program types are classified according to the structure determined by TRT. News programs, Current programs, Cultural programs, Educational programs, Real life programs, Drama programs, Entertainment programs, Children's programs, Commercial communication and promotion are other programs (TRT General Broadcast Plan, 2017).

When looking at the content of culture-art programs, it informs the audience about the developments in the field of culture and arts in the country and in the world. Unfortunately, culture and arts programs are far behind compared to world standards in Turkey. In recent years, a development process, albeit very little, can be mentioned. In this development process, it is possible to say that the number of culture-arts news and culture-arts programs in the news bulletins increased, as well as the quality of culture-arts programs (MEB, 2013).

One of the varieties of culture-arts programs is the programs that describe the adventures of purchasing, construction or repair through housing projects. These programs, which became widespread especially with the millennium age, started to derive from each other by diversifying and differing in their content with the increase of interest. The discipline of architecture creates a unity with some parameters. In architectural practices, there are practices for architectural, that is, structural shell design, as well as practices for interior architecture or landscaping. The size of the construction or renovation changes in line with the scope of the project. In fact, when architecture is mentioned, an area that covers all these practices is mentioned. However, sub-disciplines have emerged in architectural design depending on the scales. Within the scope of the study, how architecture is handled in the program content in the television world has been examined within the framework of local and foreign television programs.

METHOD

The aim of the study is to determine the place of architecture in TV programs. The study was carried out on the contents of the programs that have a fiction specific to the discipline of architecture in the broadcast stream of television channels. Therefore, it is a qualitative research; content analysis was done. In line with the purpose of the study, first of all, local and foreign-sourced TV programs for the field of architecture on television were determined. Secondly, they were grouped according to their local and foreign origin. In the next step, the contents of the programs are discussed. In line with the content analysis, it has been determined what kind of scope the programs deal with architecture. The first parts of the programs were followed in order to determine the scope of the programs. While informing about the contents of the programs, only information about architecture is given. As a result of the examinations, the programs were grouped according to their scope. Program contents were interpreted in line with the groupings.

RESULTS AND DISCUSSION

The findings of the study consist of local and foreign programs on architecture broadcast on television channels in Turkey, which were determined as a result of the examinations. In order to determine the programs, the broadcast streams of the channels broadcasting on television were examined. Information on the content of the

determined programs was obtained from the websites. In addition, the first episodes of the programs were watched in order to obtain detailed information.

The channels that make local programs specifically for architecture are “TRT 2, Star Tv, Kanal D, TLC and Bein Home and Entertainment” (Url-1; Url-2; Url-3; Url-4). Of these channels, except for TRT 2, they are accessible to everyone and connected to the satellite. In the programs, changes are made in the design of a room of a different house in each department, either by the direction of the server who does not have any architectural identity, or in line with the ideas of an architect/interior architect. The chosen place usually is the living room. In TV programs with architects/interior architects, practices for interior architecture are made in spaces. However, in programs that are not architects/interior architects, furniture, curtains and accessories are renewed in the space. Apart from these programs, there are also programs in the form of interviews, moderated by the doyens in the field of architecture, in which important names from the field of architecture take part in the country (Table 1).

Program	**TV**	**Program Content**
Vahe ile Evdeki Mutluluk (Happiness at Home with Vahe)	Star Tv	One room of the houses is decorated under the coordination of the presenter Vahe Kılıçarslan in different cities.
Vahe ile Dekodizayn (Decodesign with Vahe)	Star Tv	One room of the selected houses is decorated under the coordination of the presenter Vahe Kılıçarslan.
Ekip Şahane (Team Awesome)	Kanal D	Architect Selim Yuhay and actress Nergis Kumbasar decorate the rooms they want in the homes of people from different cities in Turkey.
Evim Şahane (Home Awesome)	Kanal D	It is a program in which architect Selim Yuhay decorates their homes by evaluating the wishes of the homeowners.
Ne Güzel Evim (What a Beautiful Home)	Star Tv	One room of the house is decorated with the presentation of Melike Emiroğlu and the comments of architect Efe Kısakürek.
Bırak Ben Yapayım (Let Me Do It)	TLC	Hakan Kütahya is renovating one room of the houses with his designs.
Aykut Köksal ile Mimarlık Söyleşileri (Architecture Interviews with Aykut Köksal)	TRT 2	Architectural Theorist Aykut Köksal talks with the leading actors of the field of architecture on the past and present of architecture. The creation processes of architectural structures and the problems of architectural production are examined through examples.
Mim	TRT 2	The course of architecture in Turkey and the world and the guests' own architectural productions are discussed in the MIM prepared and presented by Architect Nevzat Sayın.
Eşik (Threshold)	TRT 2	The construction processes of the buildings, their sociological backgrounds and the meanings of the buildings are explained by the designers.
Ahu Yağtu ile Zamansız Stiller (Timeless Styles with Ahu Yagtu)	Bein Home and Entertainment	Ahu Yagtu, a model and actress, is a guest of the houses of names from different professional groups and has a pleasant conversation about her style preferences.

Table 1. Locally sourced architectural programs, channels and contents broadcast on TV

Architectural programs of foreign origin are presented to the audience by three channels, two of which are satellite and one is private. These channels are “TLC, Bloomberght and Bein Home and Entertainment” (Url-5; Url-6; Url-7; Url-8). Bein Home and Entertainment channel is a culture-arts channel where programs from many

kinds of content are broadcast; It is open to the use of Digiturk subscribers, a digital platform broadcasting digitally. When the programs are evaluated in terms of content, there are differences. In the programs, studies are carried out on housing as a building type. While progressing through real estate related to the sale of residences from many parts of the world in a group program; In a group of programs, practices are made on the architectural, interior architecture or landscape projects of the house. No one with an architect/designer identity is included in the programs on real estate. However, the programs built on practice projects progress under the management of an architect//interior architect/landscape architect. In real estate programs, a price offer is made by determining the house that fits the budgets of the customers and has the optimum conditions they want. In practice-based programs, old and depreciated properties are generally purchased and renovations are made in line with the wishes of the landlord. The extent of renovations varies depending on the structural and technical problems in the residence. The contents of TV programs for foreign-sourced architecture are given in Table 2.

Program	**TV**	**Program Content**
Fixer Upper	TLC	The couple Chip and Joanna Gaines are transforming houses that are in a good location but are unusable. The program progresses through the renovation of the selected house by offering customers 3 house and alternative projects.
Flip of Flop	TLC	The couple Tarek El Moussa and Christina Haack are carrying out the renovation of dilapidated houses, which were bought by auction. Then it is listed for sale.
Christina on the Coast	TLC	Christina Haack is doing the renovation of the desired spaces in the customers' homes. These places are usually halls and kitchens.
Flip or Flop Vegas	TLC	Bristol Marunde and his wife Aubrey are engaged in the renovation and subsequent sale of the houses they bought in Las Vegas.
Flip or Flop Atlanta	TLC	The couple Ken and Anita Corsini are struggling to make their abandoned and dilapidated Atlanta home habitable again.
Flip or Flop Nashville	TLC	The couple Page Turner and DeRon Jenkins are buying poorly maintained houses in Nashville, renovating them and putting them up for sale.
Love It or List It	TLC	Real estate agent David Visentin and designer Hilary Farr decide in each episode with a family whether their current home is the right home for them. They ask David and Hilary to meet their expectations with a list of what they want them to change in their current home and what they will need in a new home.
Love It or List It Vancouver	TLC	In each part of it, a family decides whether their current home is the right one for them. With a list of what they would like them to replace in their current home and what they would need in a new home, designer Jillian Harris and real estate agent Todd Talbot meet. The designer tries to win over homeowners by renovating their existing home, and the real estate agent tries to find them the home of their dreams.
Mediterranean Life	TLC	It deals with the processes of finding and renovating homes of couples exploring homes on the Mediterranean coast.
Windy City Rehab	TLC	In Illinois, contractor Donovan Eckhardt and Interior Designer Alison Victoria are renovating houses that have fallen into disrepair in Chicago.
Caribbean Life	TLC	In the Caribbean, families' search for a budget-friendly and beautiful home is coming to the screen.
Bahamas Life	TLC	In the program, we discover the tricks of owning a home on the islands for families who want to realize their dream of living in the Bahamas.
New York Life	TLC	In the New York real estate market, realtors are engaged in the sale of houses worth more than $ 2 million.

Mexico Life	TLC	In order to start a new life in Mexico, home seekers are offered 3 alternatives to choose from.
A Place in the Sun	TLC	Laura Hamilton is helping those trying to find a must-see sun-drenched property overseas.
Beach Hunters	TLC	Looking for their dream home for customers who want to live in houses located on exclusive beaches. They are shown 3 different alternatives and asked to make their choices.
My Lottery Dream Home	TLC	David Bromstad offers 3 different alternatives according to their wishes to bring lottery winners to their dream home.
Good Bones	TLC	Mother-daughter, Karen E. Laine and Mina Starsiak are buying and restoring destroyed homes in the historic Fountain Square neighborhood of Indiana.
Bargain Mansions	TLC	Tamara Day is engaged in renovation projects of fated abandoned manors.
Flipping 101	TLC	Tarek El Moussa teaches the intricacies of business by passing on his experience in renovation and sales to those who are just trying to enter the real estate market.
Property Brothers	TLC	Twin brothers Jonathan and Drew Scott find and renovate real estate that needs renovation and repair.
Property Brothers Forever Home	TLC	Brothers Drew and Jonathan Scott come to the aid of couples who want to get their dream home.
Buying & Selling with the Property Brothers	TLC	Brothers Jonathan and Drew Scott are renovating houses, this time competing against each other with teams of 5 people.
Celebrity IOU	TLC	Brothers Drew and Jonathan Scott are joining forces with famous Hollywood figures to renovate the homes of relatives who have touched their lives from head to toe.
Room Crashers	TLC	Todd Davis travels through furniture stores, looking for landlords who will invite him to their house and offers to renovate their house.
Amazing Water Homes	TLC	Alternatives are offered to those who want to own a house surrounded by water or with a pool running through it.
Tiny House Hunter	TLC	For those who are looking for a more economical, more environmentally friendly and more minimal lifestyle, a small offer of 3 houses is offered.
Tiny Luxury	TLC	The Spiess family is carrying out the construction taking into account the luxury design wishes of the customers who want to travel with their tiny houses.
Home Town	TLC	The couple Erin and Ben Napier are carrying out transformations by re-evaluating old materials in order to restore the forgotten, historic houses of the neighborhood to the neighborhood.
Home Town Takeover	TLC	A USA-wide call was made for a town in need of conversion; Wetumpka was chosen. Ben and Erin Napier are revitalizing the town of Wetumpka with 12 major renovations in 4 months.
Hidden Potential	TLC	Designer Jasmine Roth is making changes in the suburb, where there are similar houses, starting with the facades of ordinary and simple houses.
Help! I Wrecked My House	TLC	Designer Jasmine Roth comes to the rescue of homeowners who made a mistake when they wanted to renovate their homes themselves.
Fixer to Fabuous	TLC	Dave and Jenny Marrs are doing old house renovation projects for their clients in Bentonville, Arkansas.
100 Day Dream Home	TLC	The couple Mika and Brian Kleinschmidt help other couples build houses from scratch in Florida in 100 days or less.

Rock The Block	TLC	In the competition presented by Ty Pennington, teams defeat 4 empty houses located in the suburbs with a limited budget to win the grand prize.
$50K Three Ways	TLC	Tiffany Brooks helps homeowners make the best renovations for $50k. Brooks offers 3 different venue alternatives for changes to be made in their homes.
Color Splash	TLC	David Bromstad combines boring and ordinary spaces with his colorful, energetic designs.
Ugly House to Lovely House	Bloomberght	Architect George Clarke is redecorating houses that are unusable and in poor condition, together with famous architects, without completely demolishing them.
Treehouse Masters	TLC	Designer Pete Nelson and his team are building and decorating tree houses according to the wishes of people who want to realize their dreams.
Stone House Revival	TLC	Carpenter Jeff Devlin makes renovations to historic stone houses so that they can be restored to their former state.
Grand Designs	Bein Home and Entertainment / Bloomberght	Hosted by designer Kevin McCloud, it covers the design and construction processes of houses, each of which is a 'manual labor' for those who enjoy transformation and change, those who are curious about what can be done with existing materials, and those who like 'do it yourself' projects.
Grand Designs New Zealand	Bein Home and Entertainment	Architect Chris Moller is witnessing the individual journeys of beautiful house projects built in New Zealand, an island country famous for its nature.
Grand Designs Australia	Bein Home and Entertainment	The most beautiful and original houses in Australia are being explored with award-winning architect Peter Maddison.
Grand Designs Home of The Year	Bein Home and Entertainment	Every year, the Royal Institute of British Architects selects the best designed house of the year in the country, this time this competition is accompanied by a Large Design team.
The Outdoor Room	TLC	Landscape designer Jamie Durie designs the landscape of the backyard of a different house in each section.

Table 2. Foreign-sourced architectural programs, channels and contents broadcast on TV

CONCLUSIONS

The changes experienced in many areas with the millennium era have also had an impact on the television world. In addition to news programs and series broadcasts, daytime generation programs have been added to the broadcast stream. However, the fact that the time spent watching TV began to make up a large part of everyday life also allowed the program content to diversify. There are also programs that are broadcast in the prime time generation. These are the times when the most hours of television are watched dec In prime time, series, movies, reality shows, entertainment programs and matches are usually broadcast. There are also many programs aimed at housing sales, build-sell and housing renovation in this time period, where there are programs that appeal to people from all walks of life. These programs, which are grouped as culture and art programs, allow the audience to gain knowledge in areas such as real estate, construction, home renovation. It also supports increasing awareness of architecture, interior architecture and landscape arrangements. Programs from the discipline of architecture of local and foreign origin in Turkey have gained a lot of space on television channels. This study was conducted through the examination of the contents of these programs. In this direction, it is mentioned in what scope the programs cover architecture. In accordance with the studies, grouping was carried out. This grouping consists of the titles conversation, real estate and renovation. In accordance with the renovations made in the residences under the title of renovation, groupings have been made as architecture, interior

architecture, landscape architecture and decoration. The reason for the grouping of television programs is to determine in which context the programs related to architecture have an intensity in the broadcast stream.

When looking at locally sourced programs, it is seen that practices are made that can be qualified at the decoration level rather than architecture, interior architecture or landscape design. In this sense, there is a guidance on the use of decoration products for those who want to make small changes in their home rather than extensive changes. In addition, TRT 2's culture-art title ensures that architecture and architecture theory are more understandable by society; important designers of works in the field of architecture in the country also increase their recognition by society (Table 3).

Television programs of foreign origin usually progress through the dialogues of designers with customers and the contractor and the designer; programs based on their practices in housing projects. Fiction progresses with events such as discussing the economic appropriateness of the initially requested designs to the budget and determining the decisions of designs that cannot be applied due to changes in cost. As a designer, an architect, an interior designer and a landscape architect, as well as contractors and brokers, can carry out the program. Considering the content of the programs, almost all of them are carried out through housing projects. Since the Home Town Takeover program is based on the renovation of an American town, the practices process of different building types is also being processed. The most basic need of human beings is housing, which provides shelter and the structure in which they spend most of their lives. Since housing projects house the personal spaces of individuals as a building group, it is the only place where the user is contacted one-on-one during the construction process. In this context, it can be said that television programs are carried out through housing projects. In television programs, there are a lot of programs in which both architectural and interior architecture and landscape practices are carried out together from the point of view of the dec discipline. But there are also specialized programs in these areas. A new residence is being built in the 100 Day Dream Home and Treehouse Masters programs; In Grand Designs, the construction processes of residences are shown periodically with time lapses; the Color Splash colors the residential interior, The Outdoor Room program landscaping of residential gardens is being done. In addition to practice-intensive programs, programs on real estate are also being sold. In general, after visiting and evaluating three different alternatives in the programs, a price offer is made for the housing to be purchased. In addition, a number of activities are supervised in order for those who buy housing in purchased programs to settle in a different city to have information about social life in the city (Table 3).

Category		**Programs**
Conversation		Aykut Köksal ile Mimarlık Söyleşileri (Architecture Interviews with Aykut Köksal), Mim, Eşik (Threshold), Ahu Yağtu ile Zamansız Stiller (Timeless Styles with Ahu Yagtu)
Real Estate		Flip of Flop, Love It or List It, Love It or List It Canada, Mediterranean Life, Caribbean Life, Bahamas Life, New York Life, Mexico Life, A Place in the Sun, Beach Hunters, My Lottery Dream Home, Flipping 101, Amazing Water Homes, Tiny House Hunter
Renovation	Architecture	Fixer Upper, Love It or List It, Love It or List It Canada, Good Bones, Bargain Mansions, Tiny Luxury, Home Town, Home Town Takeover, Hidden Potential, Help! I Wrecked My House, Fixer to Fabuous, 100 Day Dream Home, Treehouse Masters, Grand Designs, Grand Designs New Zealand, Grand Designs Australia
	Interior Architecture	Fixer Upper, Flip of Flop, Christina on the Coast, Flip or Flop Vegas, Flip or Flop Atlanta, Flip or Flop Nashville, Love It or List It, Love It or List It Canada, Windy City Rehab, Good Bones, Bargain Mansions, Flipping 101, Property Brothers, Property Brothers Forever Home, Buying & Selling with the Property Brothers, Celebrity IOU, Room Crashers, Tiny Luxury, Home Town, Home Town Takeover, Hidden Potential, Help! I Wrecked My House, Fixer to Fabuous, Rock The Block, $50K Three Ways, Color Splash, Ugly House to Lovely House, Stone House Revival, Grand Designs, Grand Designs New Zealand, Grand Designs Australia

	Landscape Architecture	Fixer Upper, Flip of Flop, Flip or Flop Vegas, Flip or Flop Atlanta, Flip or Flop Nashville, Love It or List It, Love It or List It Canada, Flipping 101, Property Brothers, Property Brothers Forever Home, Buying & Selling with the Property Brothers, Home Town, Home Town Takeover, Grand Designs, Grand Designs New Zealand, Grand Designs Australia, The Outdoor Room
	Decoration	Vahe ile Evdeki Mutluluk (Happiness at Home with Vahe), Vahe ile Dekodizayn (Decodesign with Vahe), Ekip Şahane (Team Awesome), Evim Şahane (Home Awesome), Ne Güzel Evim (What a Beautiful Home)

Table 3. Categorization of TV programs in the field of architecture

As a result, the programs broadcast on television for the field of architecture are also diversified within themselves. In this context, it can be said that it supports the increase of the awareness and knowledge of individuals of all ages about the discipline of architecture. In addition, it has been observed that different variations of the programs that are considered to meet the expectation have been made in many countries. These programs also allow individuals to get ideas about the expectations of their homes and the renovations they want to make. As can be seen from the contents of the program, the expectations and requests of users from housing vary depending on the city and country. It is thought that programs published in the country in a local context can also be made more practice-based and architectural practices, such as foreign sources. In addition, it is dec that programs that bring together important figures from the field of architecture and create a discussion environment on various topics can also be offered as suggestions for the content of programs abroad.

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DETERMINATION OF EMERGENCY SERVICE ARTIFICIAL LIGHTING DESIGN CRITERIA AND EVALUATION METHODS

FİRDEVS KULAK TORUN, DAMLA ALTUNCU

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ABSTRACT

Emergency service units in hospitals are places that continue to serve uninterruptedly. In the communiqué prepared by the Ministry of Health in 2009, it was stated that every hospital should have an emergency service unit with facilities to provide treatment for emergencies. The interior design of the emergency services, which should be in every hospital and where continuous service continues, is very important. The space organizations created for the emergency service units were carried out by taking into account the needs of the health personnel and the action requirements of the services provided. However, another issue that is as important as space organization in emergency service designs is artificial lighting design. An effective artificial lighting design is necessary in order to meet user needs and action requirements efficiently.

The aim of the study is to determine the artificial lighting design criteria of the spaces in the emergency service units and the evaluation methods of the criteria. A literature review was conducted to determine the design criteria. The data obtained as a result of the researches were compared with each other. As a result of the comparisons, artificial lighting design criteria were determined as visual comfort conditions, lighting control systems and lighting elements. The evaluation methods of these criteria have been determined. Then, a proposal was developed for the criteria of artificial lighting designs of emergency service units and methods for evaluating the criteria.

KEYWORDS: Emergency Service, Lighting Design, Artificial Lighting, Interior Design.

INTRODUCTION

Emergency care has always been a part of history. From the days when wars raged on the battlefield to the times when cities were shaken by different diseases, people have always found ways to take care of those who need it most (URL-1, 2019). Emergency service units, dating back centuries, have shown rapid improvements in times of war. Since Roman times, chariots have been used to remove wounded soldiers from battlefields. 15. at the end of the century, ambulances named Ferdinand and Isabella of Spain and wounded soldiers were transported to special tents and surgical interventions were performed (Pozner et al., 2014). The provision of first aid to the injured with the use of ambulances constituted the first stage of the emergency department. However, the laying of the foundations of emergency services today was led by the United Kingdom and Germany, and important developments in this area were made during World War II. It took place in America after World War II (Orkun et al. 2017). Before the war, emergency department units were established in large hospitals that served in the form of small rooms called 'accident rooms'. In the years after the war, places for emergency care in hospitals began to be built (Kaba and Elçioğlu, 2013).

The development of emergency services in Turkey dates back to the Ottoman Period. in 1867, the Society for the Rescue and Assistance of the Wounded and Military Prisoners was established. in 1911, the Turkish Hilali Ahmer Society, which was the first emergency aid organization in the Aksaray fire in Istanbul, provided various services as well as medical services to the civilian population. The same society during the years of World War II and the War of Independence, it took care of the wounded together with the military medical organization (Kaba and Elçioğlu, 2013; Erdemir, 2006). Importance has been given to the development of emergency departments in Turkey since 1985. During this period, Hızır Emergency Department was opened in Ankara Numune Hospital. After that, emergency department departments were established in hospitals, university hospitals, Gülhane Military Medical Academy and SSK Hospitals serving under the Ministry of Health (Olgun et al., 1998).

In the communiqué published by the Ministry of Health in 2009, it was stated that it is a human and legal responsibility to deliver patients to the health institutions where they can be treated in the fastest way in case of emergency and to make the necessary interventions. It was also explained that each hospital should have an emergency department unit with facilities providing emergency treatment services for emergency events (Communiqué on the Procedures and Principles of Emergency Department Services in Inpatient Health Facilities, 2009). Minimum design standards for health structures in 2010 the Ministry of health of Turkey published in the guide that are required for the minimum emergency services sections; basic life support, advanced life support, basic life support cardiac outpatient care explained as. Emergency services are divided into classes according to the services provided and their capacity. This classification called as level I., II. and III (Turkey structures minimum Design Standards Manual for health, 2010).

In all emergency department units classified as levels I, II and III, patient flow is a different area from other parts of hospitals. Depending on the patient flow, group work is often required in the service provided. The flow of patients and the intensity of the service provided should be taken into account in the interior design of emergency department units (NHS, 2013). Considering these two factors, the concepts of observability, simplicity, privacy, privacy, flexibility should be provided in the interior design of emergency services (Ergüney, 2019). These three concepts were adopted in the design of the emergency department and different plan typologies were developed. Emergency room plan typologies that are often used today are balloons, pods, and liner (Zilm, 2010).

Lineer Model	Pads Model	Ballroom Model

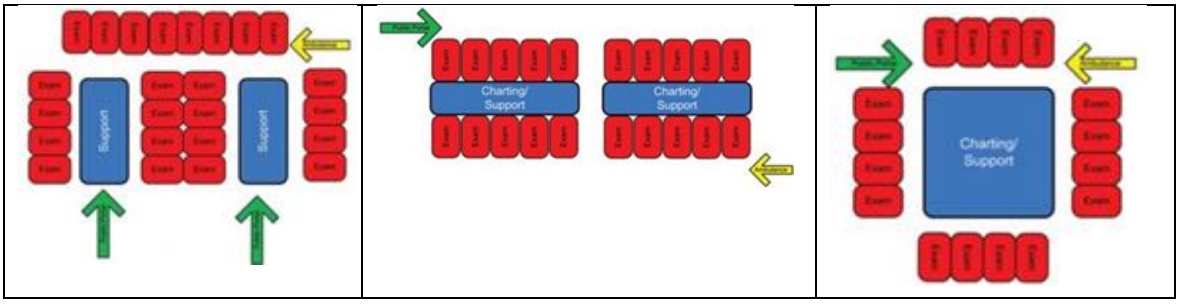

Table 1. Emergency Department Plan Typologies

When designing emergency department units, the choice of plan typology varies depending on the condition of the hospital. After the typology of the plan has been decided, the layout of the spaces becomes important. Located in an emergency department unit consist of many areas with different functions among themselves. Therefore, it is necessary to plan the spaces in such a way as to meet the expected needs. Places located in emergency departments; the entrance (ambulance entrance- pedestrian entrance), triage waiting, triage area, security and police room, green area, emergency room yesil clinic, yellow area, red area, special and administrative units, general emergency units are classified as. However, while the evaluation criteria of artificial lighting design were determined within the scope of the study, the spaces considered were limited. When limiting these areas, the places located in the emergency department unit of each level were taken into account. Corridors, triage areas, waiting areas and the doctor-nurse room were considered within the scope of places where there was no medical intervention.

Corridors should be used at least 200 centimeters in areas where one-way crossings are installed, and in cases where two-way crossings are planned, a minimum size of 350 centimeters should be used. Personnel and transported equipment should be considered next to the stretcher in calculating these widths. In addition, even if the angles of rotation of the corridors are 90 or 180 degrees, they should be designed so that two stretchers can pass through at the same time (Turkish Health Structures Minimum Design Standards 2010 Guide, 2010). If the triage areas are in the form of cabins, their size should be 16 square meters. Wheelchair accessible cabins should be designed (IAEM, 2007). If the triage is to be designed as an open area, its size should be calculated taking into account the maximum level of population in any time period. The triage area should have a spatial proximity to the ambulance and pedestrian entrance, waiting areas and application desk (ACEM, 2014). The waiting area is considered a clinical area. That is why it should be supervised by emergency service workers. Access to the toilet and babysitting rooms should be close. This field should be carried out taking into account the annual patient application (IAEM, 2007). There should be space in the seating arrangements for patients receiving wheelchair use and walking assistance. Ergonomic chairs or armchairs should be used. In order to prevent waiting patients from focusing on themselves and to relieve them, reading materials and screens should be included (GIG and NHS, 1995). In this area, lighting, access to food, an environment that can change the psychological state of the patient and the patient's relatives who are waiting using various works of art should be prepared (ACEM, 2007). The size of the bank registration desk should be adjusted depending on the flow of patients. This area should be within the triage areas and interactive with the waiting area (ACEM, 2007).

The areas where medical intervention is performed are the examination and observation rooms located in all triages, trauma-resuscitation and small intervention rooms located in the red areas. In addition, isolation rooms, dressing and injection rooms were also covered within the scope of medical intervention units. Examination and observation rooms have been defined as areas designed in the form of arenas where the privacy of patients is ensured by curtains in the Communiqué on the Procedures and Principles of Emergency Department Services in Inpatient Health Facilities (2009). The most important feature of trauma resuscitation rooms is to provide sufficient space to provide access to the patient from 360 degrees (IAEM, 2007). The area should be calculated taking into account that at least five personnel will work at the same time, and portable equipment will be used constantly. Visual privacy in the room is a must because intervention is performed for patients whose condition

is critical (GIG and NHS, 1995). The small intervention room is a 24-square-meter area where more general interventions and examinations can be performed. There should be a hand washing unit and medical gas equipment (Turkish Health Structures Minimum Design Standards 2010 Guide, 2010). The isolation room should be prepared as a single room. It should be at least 15 square meters. There must be a toilet with at least 6 square meters inside itself. Before entering this room, an anteroom of at least 4 square meters should be designed for hand washing, dressing and putting dirty materials in it. The walls surrounding this room should be effectively insulated so that the air inside does not leak out (Turkish Health Structures Minimum Design Standards 2010 Guide, 2010). ACEM (2007) stated that there should be materials in this room to be used in case of resuscitation for the inpatient patient. The dressing injection chamber is a room with at least 10 square meters of free floor for minor interventions and injections. There should be at least 150 centimeters of clearance on each side of the patient's table or stretcher (Turkish Health Structures Minimum Design Standards 2010 Guide, 2010).

The places examined are the areas common to the level I, II and III emergency department units. These places have been examined within the scope of the literature. In the examination, the criteria that should be considered in the design of spaces have been determined. However, the most important element to be considered in the design of the space is the lighting.

1.ARTIFICIAL LIGHTING DESIGN IN EMERGENCY DEPARTMENT UNITS

Lighting is the application of light to objects and their surroundings so that they can be seen in a region (Sirel, 2013). The applied light is provided from a natural or artificial source. Natural lighting and artificial lighting constitute the types of lighting (Altuncu, 2008). It is necessary to use natural and artificial lighting effectively in health structures. Because the health structure includes many functional elements. Therefore, the lighting design to be applied in health structures should be; it is necessary to meet the different and even conflicting visual needs of staff, patients, visitors (Foster, 2005).

Natural lighting in health facilities is provided by daylight coming from the windows. Sunlight offers a balanced december of colors in all parts of the visible wavelength range. In addition, the wavelengths of sunlight vary according to latitude, meteorological conditions, seasons and day. Lights from an artificial electrical source consist of alternating light fluctuations in limited areas of visible light specturum. Their spectral content does not change with time (Mehrotra et al., 2015).

Edwards and Torcellini (2002) stated in their study that daylight is not superior to artificial light in the performance of most visually oriented jobs. The main function of lighting systems in healthcare structures is to meet the task requirements in all areas (NHS, 2014). For these reasons, the use of artificial lighting in emergency departments that provide uninterrupted service is an important issue. Illuminations are of critical importance in emergency department units. Because carefully designed artificial lighting changes the way space is perceived by users. Depending on the effect created by artificial lighting design, spaces are made attractive, hospitable, relaxing or stimulating (NHS, 2014).

The tasks of lighting in emergency departments differ in terms of patients and health workers who are a user group. Patients should feel satisfaction and confidence with the help of lighting in the physical environment where they are being treated. The visual environment for employees should be well designed. It should help improve the morale of employees, make them feel fit. But there are situations when lighting designs cause visual discomfort. These;

Difficulty in seeing, lighting has been performed in such a way that the visual environment presents too much or too little information,

Distraction; attracting the attention of the observer to the wrong objects that do not contain the sought-after information,

Perceptual confusion; the luminous pattern can be confused with the reflection pattern in the visual environment (Mehrotra et al., 2015).

By providing visual comfort conditions in the space, it is ensured that the visual function continues for a long time and efficiently (Altuncu, 2008). Sufficient light and luminous uniformity should be ensured to ensure visual comfort. In addition, it is necessary to prevent glare and reflection, shadows that will make it difficult to detect (SLL, 2009). The selection of appropriate lighting means and the correct positioning of the selected lighting elements are an important factor in ensuring the required level of illumination. Visual comfort conditions will also be provided when the necessary level of illumination is achieved (Altuncu, 2008). Satisfaction levels increase when a sufficient level of illumination is provided in the working areas of personnel in health structures. (Joseph et al. 2016). The provision of visual comfort conditions in emergency department units should be evaluated within the scope of the requirements of each space in the unit.

For corridors, SLL and CIBSE (2009) have recommended a light level of 200 lux in case of heavy use and less than 50 lux in case of off-peak use at night. In the waiting area, the 2010 Guide to the Minimum Design Standards of Turkish Health Structures recommended a light level of about 161 lux. Artificial lighting of bank registration areas should be designed in a visually significant way (NHS, 2014).

Within the scope of medical intervention areas, inspection, observation, small intervention and isolation and dressing-injection rooms are places with similar needs regarding the lighting requirement. In these places, a uniform level of light should be provided when examining the patient. In addition to general lighting in these areas, fixed or portable inspection lighting should be used for special actions. Inspection lamps should be used 76 centimeters above the floor. The light level should be greater than 1/5 of the general illumination level (IESNA, 2006). CIE (2002) stated that the general light level of these places should be 500 lux, and the areas where examination and treatment should be 1000 lux. The overall light level in the trauma resuscitation room was determined as 1000 lux by SLL and CIBSE (2009). In this place, the use of a light level of 1614 lux in the 180-centimeter circle around the examination table and stretcher, and 807 lux in the rest of the room was recommended in the 2010 Guidelines on Minimum Design Standards of Health Structures of Turkey. The recommendations made by different institutions regarding the light levels of emergency department units are included in Table 2.

	SLL-CIBSE	CIE	Minimum Design Standards of Health Structures of Turkey
Spaces Located in Emergency Departments:	**Lüx**	**Lüx**	**Yaklaşık lüx Değeri**
Corridors	200	200	161
Triage Area	300	300	538
Examination and Observation Room	250-1000	1000	807
Inpatient Clinic	300	300	322
Trauma Resuscitation Room	1000	1000	Trauma:1614 Resuscitation:807
Small Intervention Room	250-1000	1000	807
Waiting Area	200	200	161
Registration	General:300 Task Area: 500		538
Dressing Injection	250-1000	1000	807

Table 2. The Light Levels of the Places Located in the Emergency Department Units

In emergency departments, the required level of Light should be provided for each place. However, lighting accounts for a large part of the energy costs in emergency departments where uninterrupted service continues. For this reason, it is becoming important to use artificial lighting control systems when designing lighting that will provide the necessary levels of light in emergency department units (Altuncu, 2008). Financial issues such as energy saving, maintenance and cleaning of luminaires, compatibility of lighting elements in other systems in the structure are important considerations when choosing a lighting control system (Kazanasmaz, 2003). The purpose of using lighting control systems is to provide efficiency, energy saving, aesthetics and flexibility (Kadirbeyoglu, 2002). Ensuring the required levels of illumination in the places of emergency services is also affected by efficiency and energy saving factors. It is becoming important to ensure flexibility in the performance of various actions in these places. In order to ensure the positive effect of artificial lighting on patients and staff, it is necessary to realize the aesthetic factor. Altuncu (2008) collected artificial lighting control systems under three headings in his study entitled 'The Use of Lighting Control Systems in a Hospital Sample and the Proposal of a Lighting System for Inpatient Floor Corridors'.

Control Systems	Explanation	The Method Used In the System
Manual Control Systems	In these systems controlled by users, it is ensured that the light level of the space is full light and dark. The current entering into the circuit is controlled by conventional electrical switches.	On-off Dimmer
Automatic Control Systems	Taking into account the daylight factor in accordance with the function of the space and user requests, it ensures that the necessary level of illumination of the lighting system is fully or partially protected by user intervention.	Photosensor Dimming Photosensor Switching
Automation Control Systems	They are systems in which lighting is controlled from a single center, completely or partially with the help of a computer. A lighting scenario is created and the desired level of illumination is created in accordance with the planned actions at the planned times of the day in the scenario.	Time Control Scene Control Occupancy Control

Table 3. The Artificial Lighting Control Systems that Can be Used in Emergency Services (Altuncu, 2008).

There are several questions that need to be answered when choosing an artificial lighting control system. The questions of how the system controls the lighting equipment, what should be the control process that decides how a certain group of inputs will affect the lighting, should be answered in accordance with the lighting requirements of the space. Within the scope of answering these questions, the criteria that lighting control systems should have are input devices, control operations and the selection of controlled lighting fixtures. Among these criteria, the most important criterion, which also affects design decisions, is the choice of the controlled lighting fixture. Because besides opening and closing the system fixtures in a simple way, they are more complex systems that will allow the lamp to darken, move and change color (SIl and Cibse, 2009).

Today, thanks to technology, various types of luminaires are produced. However, it is important to use the appropriate one in the emergency department units. In this regard, Cibse (1989) has made recommendations on the areas of use of lamp varieties in some parts of health structures. Some of the recommendations are as follows;

Tungsten stranded lamp and tungsten halogen stranded lamps for inspection and operation lighting,

Low pressure mercury lamps for clinical field lighting; triphosphorus lamps,

Low-pressure mercury lamps for waiting areas are low-compact lamps.

Along with the developing technology, energy efficiency and sustainability issues that have been raised, the development of lighting elements has shown parallels. During the literature review conducted on this topic, data were obtained on which lighting suggestions and solutions related to health structures belonging to various lighting companies were found. In these data, it has been determined that current lighting elements and LED technology are used taking into account energy efficiency. In addition, solutions that will adapt to automatic-automation control systems are also included in these data.

2.EMERGENCY DEPARTMENT ARTIFICIAL LIGHTING DESIGN EVALUATION CRITERIA

Lighting design in emergency departments should be done correctly so as not to cause visual discomfort. Şener Yılmaz and Köknel Yener (2013) stated in their study 'Visual Comfort in Lighting Design' that it is a necessity to be evaluated in order to meet the expectations intended in lighting design, and they determined the criteria of this evaluation from a sustainable point.

The criteria they set are shown in Figure 1.

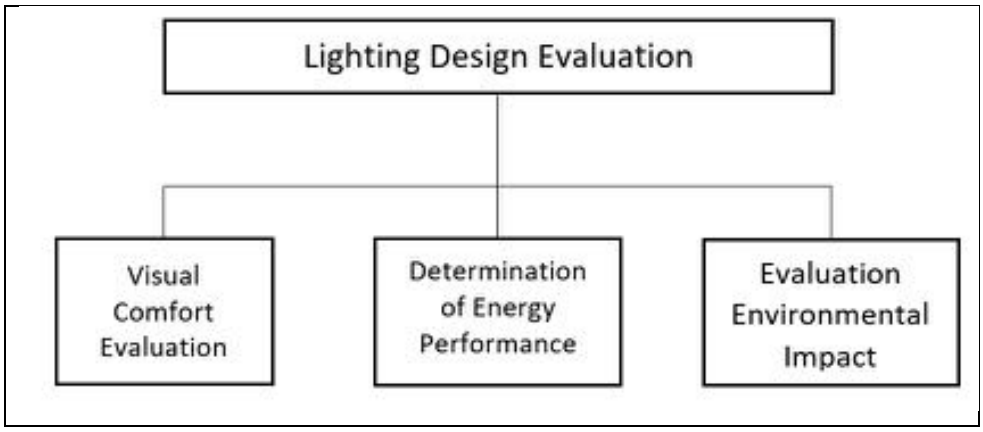

Figure 2. Evaluation of Lighting Design (Şener Yılmaz and Köknel Yener, 2013).

Visual comfort, energy performance and environmental impact assessment were taken into account in the evaluation of lighting design. Visual comfort positively affects work efficiency by increasing visual performance. The lighting energy performance is determined in proportion to the lighting energy consumed in order to realize the visual comfort conditions that should be in the spaces. Determination of energy performance is related to the development of energy-efficient lighting system designs by reducing lighting energy. It has become important to determine the environmental effects of the components that make up the lighting system and to carry out the next stages of lighting design taking into account these effects into consideration (Şener Yılmaz and Köknel Yener, 2013). The evaluation steps of the lighting design were determined by taking into account the studies of Şener Yılmaz and Köknel Yener (2013). However, the components of lighting design also become important in the evaluation of lighting design. The components that should be taken into account in the lighting design that will be evaluated were obtained from the report prepared by the NHS (2014).

NHS (2014); In its report titled 'Lighting and Color for Hospital Design", it has determined components design lighting in health structures appropriately.

The components of the lighting design are shown in Figure 3.

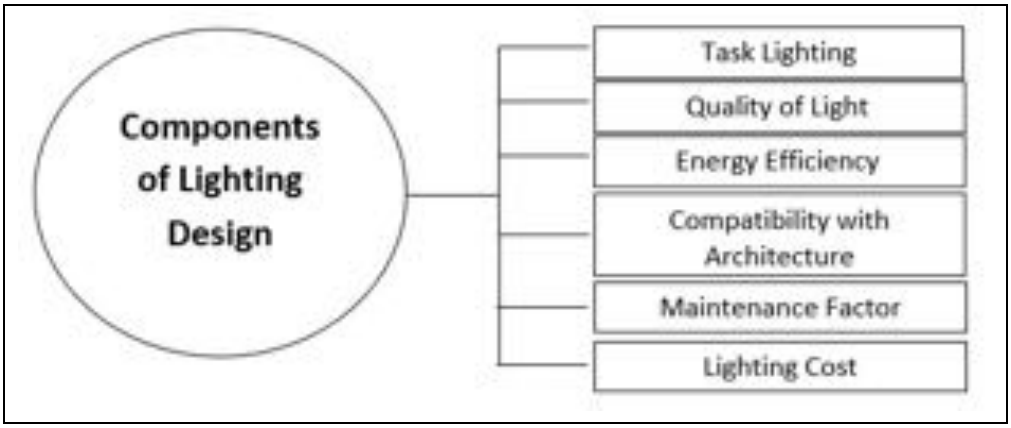

Figure 3 : Components of Lighting Design (NHS, 2014).

Task lighting is the planning of the lighting design taking into account the nature of the tasks and the visual abilities of the user up to a certain point (NHS, 2014). The lighting needs of patients and doctors are very different. The lighting design should be customizable. The lighting design, which creates a calm and relaxing atmosphere for the patients, should be bright and functional in the diagnosed environments where the examination is performed (Philips, 2016). In lighting design, the personalization of spaces is related to the lighting levels, the

color of the light used. In the report prepared by CIBSE (2002), the levels of illumination related to the areas of duty were determined.

The quality of light should be achieved by designing the light layout as a natural element in the architecture. Lighting design should be carried out taking into account the reflective properties of the surfaces and objects located in the space (NHS, 2014). Lighting design, made taking into account the characteristics of the environment, eliminates glare, increases positivity in the interior, minimizes energy consumption and maintenance of facilities (IESNA, 2006). Another element that affects the appearance of light is the color temperature. The color temperature is expressed in Kelvin units and is a scale from hot to cold (IES, 2011). In general, it is recommended to use lamps with a value of 4000 Kelvin in healthcare structures (NHS, 2014).

Energy efficiency is measured in terms of the light provided in the lighting and the energy consumed. The energy expended by the light from the artificial lighting source depends on the light power. The type of light power of the lighting element is the lumen. The lumen is equal to the level of illumination per square meter. The choice of lighting element to be used while obtaining the level of illumination necessary to ensure visual performance should be made taking into account the lumen (NHS, 2014). Molony (2002) stated in his study 'Hospital Lighting: A National Disgrace" that replacing all T12 fluorescents with T8 fluorescents in a hospital eventually saves $27,000 in energy annually.

It is possible to make lighting design compatible with architecture by considering technical and aesthetic solutions together. Designing lighting analytically in accordance with the principles and rules does not provide an adequate solution for users. For a successful lighting design, analytical and aesthetic rules should be combined to create solutions. In this context, cooperation between architects, interior designers and engineers should be ensured (IES, 2011). The main purpose of this cooperation is to complete the lighting design as part of the architecture, not as an element serving the building (NHS, 2014).

When the maintenance dec is ignored in the lighting installation, visual comfort conditions will deteriorate over time. The desired luminous level is not achieved when the light-emitting surface of the luminaire is contaminated. In addition, the maintenance of indoor surfaces also contributes to the maintenance of lighting installations. Because surfaces reflect light, they are considered as artificial lighting elements (NHS, 2014). SSL (2009) stated that the necessary solutions for ensuring maintenance in lighting design should be considered by the designer. It has established a maintenance program for indoor lighting installation. There are four important factors in the provision of the program. These factors are; lamp lumen maintenance, lamp survival time, lighting fixture maintenance, room surface maintenance.

The cost of lighting includes installation, equipment, cleaning maintenance costs, as well as electricity unit costs. In order to reduce the overall cost during the construction phase, trying to minimize the costs of the lighting project will result in more costs for the future. The fact that the lighting quality of the interior does not provide the expected efficiency due to the poor lighting system may worsen the recovery rates of patients and adversely affect the performance of employees (NHS, 2014). The impact of artificial lighting systems on energy requirements should be taken into account when creating lighting design alternatives in projects. Annual-monthly-daily lighting energy requirements should be calculated (Şener Yılmaz and Köknel Yener, 2013).

As a result of the literature review conducted with lighting design in emergency departments, Şener Yılmaz and Köknel Yener (2013) examined the evaluation of visual comfort under three headings in their study titled 'Visual Comfort in Lighting Design'. Artificial lighting design component in healthcare structures have been covered under six headings by the NHS (2014). Within the scope of the study, the titles of the lighting design assessment were considered as the main title, and the titles of artificial lighting design component in health structures were considered as subheadings, and the two topics were related to each other. The association is given in Table 4.

Viusal Comfort Evaluation	Determination of Energy Performance	Evaluation Environmental Impact
Task Lighting	Energy Efficiency	Task Lighting
Quality of Light	Lighting Cost	Quality of Light
Compatibility with Architecture	Maintenance Factor	Compatibility with Architecture

Table 4. The Relationship between Lighting Design Evaluation Criteria and Artificial Lighting Design Components in Health Structures

As part of the assessment of visual comfort and environmental impact, task lighting, the nature of lighting, components of harmony with architecture were considered as subheadings. Then, energy efficiency, lighting cost and maintenance factor components were determined as evaluation factors in the evaluation of energy performance.

3. CONCLUSION

As part of the literature review, the interior designs of emergency department units were examined. As a result of the examination, many studies on the organization of space have been identified. It has been determined that the studies conducted on the artificial lighting design of emergency departments are within the scope of certain limitations. In the first, studies in which visual comfort conditions are examined within the scope of artificial lighting of emergency department units have been discussed. In these studies, research has been found on the light levels of spaces within the scope of visual comfort conditions. In the SLL-CIBSE(2009), CIE (2002) and Turkish Health Structures Minimum Design Standards (2010) studies, the required light levels have been determined within the scope of visual comfort conditions of the places located in emergency departments. The selection of lighting control systems and lighting elements in order to provide the necessary levels of light within the spaces has also been examined within the scope of the studies. Three important criteria have been determined for ensuring visual comfort conditions in emergency department units. These are the provision of the necessary levels of illumination, the selection of lighting control systems and the lighting element.

Different studies were used to evaluate the three criteria determined to ensure visual comfort conditions. In this context, three subjects have been identified in the study on the evaluation of lighting design. These areas are the evaluation of visual comfort, the determination of energy performance and the environmental impact assessment. These three evaluations were associationed to the components of lighting design in the NHS's (2014) Lighting and Color for Hospital Design report. The aim of this association is to determine the lighting component that will be used during the evaluation stages of lighting design. After determining the three headings to be considered in the evaluation of the lighting design and the contents of these headings, the measurable data of this grouping were determined. The determined data are presented in Figure 4.

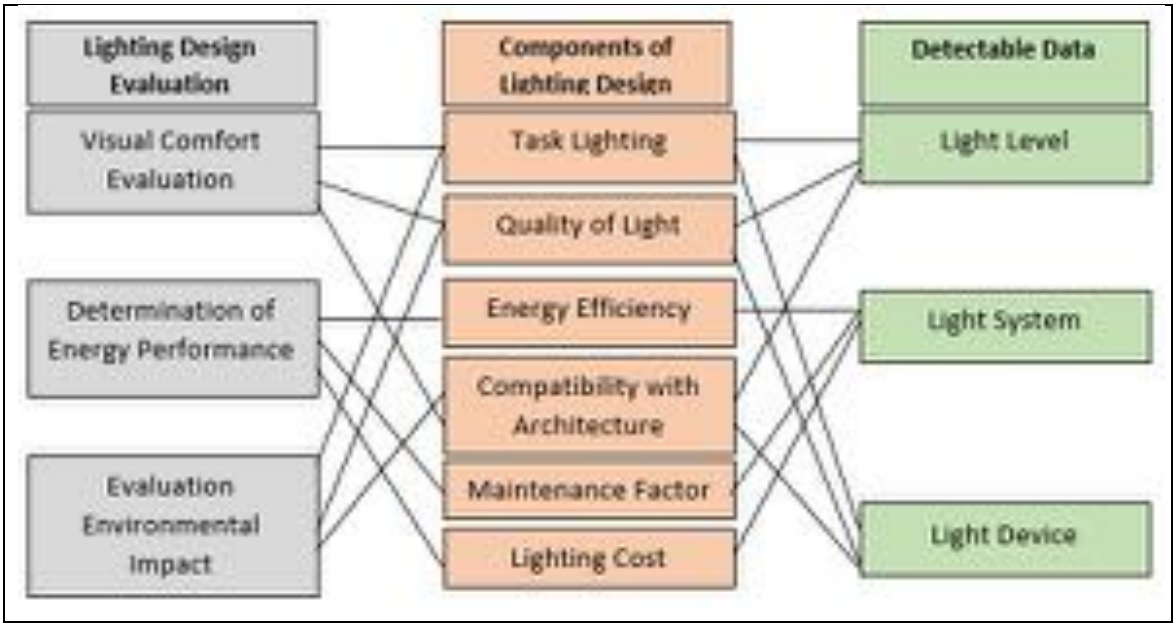

Figure 4. The Relationship of Emergency Department Lighting Assessment Headings and Lighting Component with Detectable Data Headings

The method of obtaining data is to measure the level of illumination, to determine the lighting system and the lighting element. The measurement of the light level should be carried out by measuring both the overall light level of the space and the light levels of the task areas. Thus, the compliance of the lighting levels of the spaces with the data contained in the regulations will be determined. In addition, by measuring the level of illumination, the illumination of the task area, the quality of the light and its compatibility with the space will also be determined. Then, the compatibility of the lighting system and the lighting element used in the space should be determined. İn accordance with the use and function of the space, the energy efficiency of the lighting system, the maintenance factor and lighting costs should be evaluated within the scope. The compatibility of the lighting element used in the space with the architectural and technical system should be evaluated within the scope of light quality. The evaluation titles, the components to be evaluated and the evaluation methods of the artificial lighting designs used in the emergency department units are listed in Table 5.

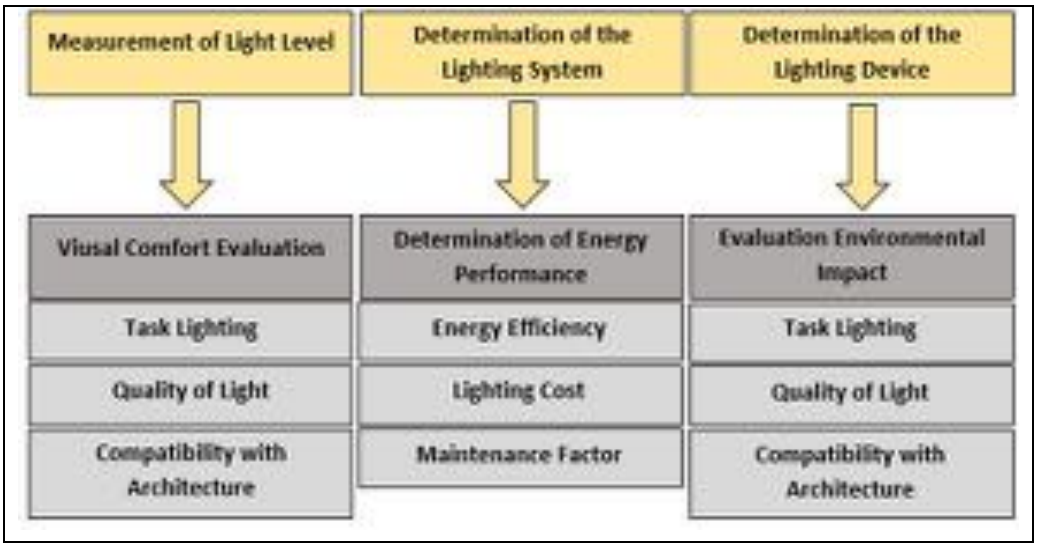

Table 5. Emergency Department Artificial Lighting Design Evaluation Methods

The data encountered in the research conducted within the scope of the evaluation of the emergency department lighting design are various criteria related to the level of light. However, lighting is a design that

contains many different details in itself. In this context, it is also important which stages should be taken as criteria for evaluating lighting design and what lighting components are. In the evaluation of these issues, it is necessary to determine the methods to be used to obtain data. Within the scope of the study, while the evaluation titles and lighting contents of the lighting design were related to each other, the evaluation methods of these contents were determined by establishing a relationship with these contents. It is thought that the methods presented can be used within the scope of many studies in order to make a multifaceted evaluation of lighting design.

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TRANSFORMATION OF THE FORM: AN EVALUATION ON BODY AND SPACE REPRESENTATIONS IN PAINTINGS

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ABSTRACT

Since the human body generates its own representation in the history of art, the representation of the body can be clearly observed through examples in this field. When Giorgio Vasari's work "The Origin of Painting", in which he draws his own shadow, is considered as an example of the attempt to shape the body, it explains why body representations should be explained through works of art history. The body is related to the space it occupies. The main principles of design and representation of space in architecture are built on the mathematical systems created by Vitruvius and Leonardo da Vinci based on proportion and measurement of the human body.

The main focus of the study is to indicate the transformation of the concept of form through various methods used to represent the body and space. The form, which represents the objects visually by defining their boundaries in the figure-ground relationship, plays a key role in terms of visual communication. This term provides for understanding the linear characteristics of the elements at the stage of the drawing in which ideas are transferred from mind to surface at the beginning of the painting or architectural design. Hence, the drawings representing space and the body on a two-dimensional surface in paintings are explained by associating them with the concept of form. In this context, the term "form" has been considered as a common term symbolizing both space and body in the paper. The "form" has been used to explain the transformation of space and body in works of Ancient art, Medieval icons, Ottoman miniatures, Renaissance painting, Baroque murals, Impressionist painting, Cubist painting, and Suprematist painting from the primaeval era to the 1950s. The optical illusions of depth for a volumetric view created on two-dimensional surfaces were evaluated as a method of depicting space and the body, such as perspectival representations.

Research findings show that the holistic viewpoint was dominant in Renaissance painting, while fragmented forms stand out in paintings, murals, and frescoes from other periods. This shows that the standardized forms of the body and space may change as a result of the artist's vision and representation methods.

This paper also aims to demonstrate how wall paintings alter the perception of spatial form. The relationship between interior and exterior in architecture will be examined and how this relationship is destroyed through wall paintings that change the perception of architectural form by creating an illusionist effect in the interior.

KEYWORDS: Representation, drawing, space, body, form.

INTRODUCTION

Since the human body generates its own representation in the history of art, the representation of the body can be clearly observed through examples in this field. When Giorgio Vasari's work "The Origin of Painting", in which he draws his own shadow, is considered as an example of the attempt to shape the body, it explains why body representations should be explained through works of art history. (Öğdül, 2021). (Figure .1)

Figure 1. The Origin of painting by Giorgio Vasari, 1573.

The body is related to the space it occupies. The mathematical systems developed by Vitruvius and Leonardo Da Vinci based on proportion and measurement of the human body serve as the foundation for the primary principles of design and representation of space in architecture. This shows that the human body is an essential design element in architecture. The human body's ratios and measurements are used to organize the spatial organization.

In philosophy, the term "form" means *"The formal cause of physical things."* (Url-1, 2022).

"*Form is one of the triad of terms (space and design are the other two) through which architectural modernism exists. In its dependency on "form" architecture is not alone – in every other art practice, and in culture general, "form" has become an indispensable category, without which whole territories of analysis would remain unknown and unapproachable."* (Forty, 2000)

On the basis of these definitions, form is considered to be a concept that defines the formal characteristics of objects in visual disciplines, including architecture. Since form is a term perceived with the sense of sight, it can be interpreted as a tool to express the representations of all disciplines based on visual communication. The term "form" is used in this study to describe the linear characteristics of objects in visual disciplines.

Space is what contains forms. It might be actual and three-dimensional, such as architecture, or it can be fictional, portrayed illusively in two dimensions utilizing different perspective methods (Stokstad, 2015). It also pertains to depictions of the body. In terms of visual communication, the form, which visually portrays the objects by defining their boundaries in the figure-ground relationship, is fundamental. This term provides for understanding the linear characteristics of elements during the stage of sketching, when ideas are transferred from the imagination to the surface at the beginning of a painting or architectural design. Hence, the drawings representing space and body on a two-dimensional surface on paintings are explained by associating with the concept of form. In this context, the form has been considered as a common term symbolizing both space and body in the paper. Perspectival representations by used various artists from different cultures and periods, as a depicting method for volumetric effect on a two-dimensional surface, will be evaluated on space and body in art history work.

REPRESENTATION OF BODY AND SPACE IN ANCIENT CIVILIZATIONS

In this section, ancient civilizations have been investigated in terms of space and body representations. During this time, the standardized human figure has been developed. In this context, the term "canon" represents the proportion and measurement of the standard human body. Stokstad (2015) states that the canon included a system of tratios between a basic unit and the length of the figure's index finger or the width of its hand across the knusckles. This situation shows that the body has been represented according to the canons.

Bawden et al. (2016) state that, multiple modes of perspective were presented in antiquity. They express that perspective, which is typically used as a synonym for linear perspective, deserves a new discussion in the context of different visual cultures. In related to using perspective rules, Bawden et al. (2016), also state that, although many important nation to fine art in the sense of using perspective rules as directions for the projection of a three-dimensional space onto a two-dimensional surface aren't be anticipated and played a minor role. Rendering orthogonals which diverge towards the centre of a picture was a skill which Roman painters practised. From the second Pompeian style onwards they had been creating architecturally complex, if not spatially coherent wall paintings. In Greece from the 5th century onwards, cubic objects were depicted in oblique axonometry particularly when their supporting character was to be emphasised. (Figure 2)

Vase paintings have also been popular during this era. It is clear that bodies were depicted in such a canonical style throughout antiquity. It demonstrates that bodily forms are not deformed. It is remarkable that within the framework of scientific and rational rules, no systematized representation method exists. Without using a specific, technical perspective method, many perspective methods have been used to depict the space.

Table 2. Orest sitting on an altar, vase-painting, 2nd half 5th century BC.

REPRESENTATION OF BODY AND SPACE IN MEDIEVAL ICONS

The Middle Age has been known for being a period dominated by religious oppression and scholastic thought. In this period, since the central perspective has not been discovered yet, volumetric view observed in the artworks in relation to the prevailing spiritual view was created according to the vision of the artist. According to the Galloway (2008), before the Renaissance, medieval artists were not so much interested in naturalistic representation but in the expression of religious themes. As a result much medieval art appears two-dimensional, flat and unrealistic.

Murals, icons, and frescoes were the most common types of artwork in the Middle Ages. The volumetric view was depicted in icons different manner than the central perspective rules. The method called "reverse perspective" by Florenski (2021) was used in Orthodox Christian Icons. According to Avcı (2015), Florenski defines the perspective in the icons as reverse perspective because the perspective is the inverse version of the Renaissance central perspective. In reverse perspective, the viewer may take different positions in order to create his/her own way of seeing the drawing in reverse perspective. The ability to create a dynamic connection between the artwork and the body is another vital aspect of reverse perspective. The dimensions and shapes of the objects are rendered differently in reverse perspective than they should be in order to display more than the parts of an object that are visible in only two dimension on a plane. Therefore, it is seen that the form of the body and the space have been deformed. (Figure 3 and Figure 4)

Figure 3. Notre Dame de Grace by Cambrai, icon, 1340.

Figure 4. The Annunciation from Ohrid, icon, beginning of the 14th century.

REPRESENTATION OF BODY AND SPACE IN OTTOMAN MINIATURES

Body and space representation methods are similar in Ottoman miniatures and icons. Space and body representations in Ottoman miniature do not conform to standard perspective criteria. In miniature, the sense of depth is seen from the bottom of the plane to the top of the plane. The volumetric view of the compositional elements is drawn from the bottom up, reducing their size.

The Ottoman miniature has an unfamiliar optical illusion that creates three-dimensionality on a two-dimensional surface. Another unique feature of Ottoman miniatures is the lack of expression on human faces. Because of their inexpressive style, they all look the same and resemble puppets (And, 2021). Body and space are not transferred to paper as they appear to the human eye in miniature. As the artist transfers his or her own imagination (or point of view) to the paper, proportions, dimensions, and figures are drawn in ways that are not correct. In this regard, we can see that the representations of the body and space in Ottoman miniature have a subjective character. The representation of the body is distinguished from canonical figures, and space has been

represented using non-standard methods. This situation demonstrates how standardized forms have been deformed. (Figure. 5)

Figure 5. Enthronement of Sultan Selim II, miniature, 1568-69.

REPRESENTATION OF BODY AND SPACE IN RENAISSANCE PERIOD

Renaissance ideals and principles featuring idealization based on observation of the material world. Renaissance thought based on "rationalism" and discovery and mastery of linear perspective. In order to create the appearance of deep space on a two-dimensional surface, Renaissance artists used the geometric tools of linear perspective, such as foreshortening, orthogonal lines, and vanishing points (Stokstad, 2015).

Linear perspective makes pictorial spaces seem almost like extensions of the viewer's real space, creating a compelling, even exaggerated sense of depth. In atmospheric perspective, for example, variations in color and clarity convey the feeling of distance when objects and landscape are portrayed less clearly, and colors become grayer, in the background, imitating the natural effects of a loss of clarity and color when viewing things in the distance through an atmospheric haze (Stokstad, 2015).

The Vitruvian Man, the proportions of the human body according to Vitruvius is a drawing made by Leonardo da Vinci in about 1490. It is accompanied by notes based on the work of the Roman architect Vitruvius. The drawing, which is in ink on paper, depicts a man in two superimposed positions with his arms and legs apart and inscribed in a circle and square. The drawing represents Leonardo's concept of the "ideal human body proportions". Its inscription in a square and a circle comes from a description by the ancient Roman architect Vitruvius in Book III of his treatise De architectura (Url-2, 2022). This work reflects the Renaissance style clearly. Canonical bodies and realistic space representations have been dominant in this period.

A holistic viewpoint is dominant in Renaissance forms. In this period, the body and space is portrayed with a gaze that aims to attain the ideal and is dominated by mathematical rules. Vitruvian Man, is the clearest example of the desire to reach the ideal and holistic view in this period. This period is also significant in terms of being a transitional time from mural to painting in art history. The methods of visual representation of space and body have evolved a different character with the beginning of canvas painting in Western art starting from the

Renaissance. One well-known example from this period is Raffaello Sanzio's The School of Athens (1509-1511) His work is located in the Raphael rooms in Apostolic Palace in Italy. On this fresco, the Renaissance's hierarchical structure is clearly visible. The artist has created a spatial composition in this work that reflects the Renaissance view by employing Renaissance central perspective rules. All of the elements in this work are as real as a photograph. (Figure 6)

Figure 6. School of Athens by Raffaello Sanzio, fresco, 1511 (left). Raphael Rooms, the Apostolic Palace, 1508, (right).

The depicted bodies clearly reflect the Renaissance's holistic viewpoint and idealistic manner. All body parts are transferred into the paper plane exactly as they are, with no deformation. In general, the painting has a holistic composition, and all of the elements are in harmony with one another. The bodily forms show no signs of deformation. The spatial form is deformed in terms of the inner-outer relationship in architecture. The interior space of the School of Athens differs from the façade of the building. Because of the wall painting, the perception of space in the interior is open, free, and broad, in contrast to the building, which is closed and bounded. The Renaissance is also notable as a transitional period between fresco and painting. The mobility of the artworks might be considered as a turning point in terms of spatial perception. Paintings on canvas have become popular following this period.

REPRESENTATION OF BODY AND SPACE IN BAROQUE PERIOD

The emphasis on light and shadow is the most important feature that distinguishes Baroque painting from other styles. In the paintings created during this era, the difference between "light and shadow" is employed to determine the borders of the body rather than "lines," and as a consequence, the sense of depth in the representation of space and body is portrayed with contrasts between light and shadow. The Bridesmaids (Las Meninas) by Spanish painter Diego Velázquez is one of the most debated paintings from the Baroque Period. By placing a mirror into the canvas, Velazquez creates a dynamic interaction with the viewer in this painting.

According to the Arte (2021), The Bridesmaids, is one of the most analyzed paintings in Western art due to its complex and mysterious composition in which reality and illusion are intertwined. The mirror in the painting has a deep meaning and is strategically placed on the canvas. In a sense, those who look at the painting believe they can see their own illusions in the mirror instead of the king and queen, and as a result, the viewers become both spectators and participants.

The bodies of the bridesmaids are depicted in the Renaissance perspective style. Nearby objects are drawn larger, farther away objects are drawn smaller, and parts of the bodies are transferred to the surface as seen by the human eye. Space is represented in this work using Renaissance perspective rules, and it is also used for volumetric effects of "light" and "shadow." In the representation of the body and space, no form-based deformation is observed. (Figure 7)

Figure 7. The Bridesmaids (Las Meninas) by Diego Velázquez, painting, 1656.

The work of Saint Ignatius, by Andrea Pozzo, is important in terms of being an example of the deformation of the perception of spatial form in the wall paintings created during this period. Pozzo has differentiated the perception of interior space by creating illusions in the interior space that extend to emptiness and infinity. In this way, the building, which has a closed form with definite borders, creates an impression of infinity, directionlessness, and openness in the interior.

Space is illustrated in accordance with the Renaissance perspective methods, within the framework of rational rules and mathematical proportions, but the illusions created in the interior cause a separation between the interior and the exterior, deforming the perception of spatial form. The exterior and interior of the building are completely different. This demonstrates how changes in spatial perception caused by frescoes disrupted the relationship of interior and exterior in architecture. (Figure 8)

Figure 8. The Triumph of Sant'ignazio of Loyola by Andrea Pozzo, fresco, 1694, (left). Church Sant'Ignazio, 1650, (right).

REPRESENTATION OF BODY AND SPACE IN IMPRESSIONISM

In Impressionism, unconventional techniques have been used to represent space and the body. The sense of depth has been created in this style using methods other than standard perspective. Paul Cezanne, for example, has designed a pictural composition with his own perspective view, titled "The Large Batters." (Figure 9)

Figure 9. The Large Bathers by Paul Cézanne, painting, 1906.

The composition of the painting has been designed using the triangular axis as a reference. When we examine the space and body representation methods used in this work, we can see that the illusion of depth is created by drawing the objects in the front big and the objects in the back small. In contrast to the Renaissance perspective, the volumetric effect is yielded using a subjective perspective style that reflects the artist's own

vision. This means that the spatial form is deformed. Gombrich (1999) stated that, he took the risk of abandoning the usual accuracy of the contours in order to reach a regular composition in Cézanne's geometric paintings.

Deformation can also be seen in the bodily form, as the bodies in the work are portrayed in an abstract-like attitude that differs from how they actually appear. According to Gombrich's statements, Cézanne has deformed the form with a perception of reality that extended beyond the central perspective rules. We can see how Eduard Manet's creation of space differs from the norms of standard perspective in his work "Luncheon on the Grass." The fact that Manet has drawn the woman in the background larger than she should be in this work demonstrates that he disregards Renaissance perspective doctrines.

Édouard Manet's method of representing the body and space in his work differs from standard perspective rules. Although the balance of shadow and light in this work gives the impression of depth, the proportions and measures of the elements in the composition, as well as their disproportion in their places on the page, invalidate Renaissance perspective doctrines. (Figure 10)

Figure 10. The Picnic on the grass by Édouard Manet, painting, 1862.

REPRESENTATION OF BODY AND SPACE IN CUBISM

According to Antmen (2000), Cubism, one of the most radical art movements of the twentieth century, has distinguished itself from others by offering a new way of seeing or representing the universe in which we live. The Cubist movement asks how to create a composition other than traditional perspective methods, and in doing so, it challenges the past doctrines of visual representation. This technique of multi-layered reflection on a single plane in the representation of space and body in cubism has achieved an abstraction level.

The representation of space and body in cubism can be seen in the works of Picasso and Georges Braque. Picasso, for example, has gone beyond three-dimensionality in his work "Female Nude" by combining various images of female body figures. The borders and limits of compositional elements become blurry in this painting. (Figure 11)

"In the Female Nude the effect is hardly sculptural at all any longer, for it is quite massless, a configuration of floating, overlapping and eliding palnes open to space and suggesting a flimsy tower built of pieces of cardboard

leaning against of propped on top of each other. The tilting of these planes, combined with the lines, which sometimes form their edges and sometimes do not, creates a delicately poised spiral of ambiguities." (Honour and Fleming, 2005)

Figure 11. The Female Nude by Pablo Picasso, painting, 1910.

Pablo Picasso has reinterpreted Diego Velazquez's Bridesmaids (Las Meninas) painting it in a cubist style. When compared to Velazquez's original painting, this work is significant in demonstrating the differences in representation styles between the Baroque and Cubist periods. While all of the elements in The Maids of Honour (Las Meninas) are placed with harmony and unity, elements in Picasso's artwork are fragmented, distorted, and separated within the composition in contrast to conventional perspective rules. He has deformed the form by drawing the spaces and bodies in different sizes and shapes from what they should be. Based on the representation style used in the Cubism, this movement may be described as having a multi-layered approach. Pictures have depth and meaning that go beyond what really is visible. The fragmentation of the form clearly shows the deformations in cubist works. (Figure 12)

Figure 12. The Maids of Honour (Las Meninas) by Pablo Picasso, painting, 1957.

REPRESENTATION OF BODY AND SPACE IN SUPREMATISM

Kazimir Malevich's suprematist work The Black Square, in which covers a black square with a white frame, is essential in exemplifying formlessness. This work can be interpreted as the final point of the form's transformation, and in this context, the painting recalls concepts beyond time and space, such as "nothingness" and "infinity." Because no body or space form can be mentioned here, the form's deformation has reached its peak. (Figure 13)

Figure 13. The Black Square by Kazimir Malevich, painting, 1915.

CONCLUSION

In this paper, in which the works in the period from antiquity up to the 1950s are analyzed, the evolution of the concept of form has been explained through space and body representations. In different eras, the effort to put the human body and space into form in different ways has been observed and examples from the art history are explained through the relationship between the concept of form and the sense of sight. The term "canon," which depicts the ideal human body figure, was discovered in antiquity. The body is depicted in accordance with the canons in this period. Various modes of representation has been presented during this time period. There is no such thought as a definite, clear, and scientific method.

The form has been deformed by the reverse perspective method used in the representation of the body and space observed in the Middle Ages frescoes. The depiction of pictorial elements in Ottoman miniatures in a manner different from how they are seen in reality indicated that the form was deformed. The Renaissance Period has been characterized by the dominance of holistic, ideal, rational, and scientific thought. These characteristics, which gave the period its character, is also reflected in works of art of the time, and with the discovery of central perspective, the body and space forms is represented according to the reality of an eye-centred and scientific viewpoint. The holistic Renaissance viewpoint has been preserved in bodily forms during the Baroque period.

Through spatial and bodily deformations, the traces of fragmentation, which will come to the fore in the Modern Period in the Impressionist style, have been observed. In contrast to the traditional Renaissance perspective used in Impressionism's space representation methods, it has been determined that the pictorial composition has been created by the artists in accordance with their own perspectives.

The unusual forms that emerged as a result of the gaze attempting to overcome the perception of depth on the two-dimensional surface in the Cubist samples examined in the study has showed that deformation of the form has increased when compared to the other periods. When the representation techniques of Velazquez and Picasso, as well as the resulting images, are compared in Bridesmaids, the deformation of the form is clearly visible in the cubism. The work named The Black Square, on the other hand, as an example of "formlessness" in suprematism, shows at the highest level of form deformation and evokes concepts such as "nothingness" and "infinity." Except for the Renaissance and Baroque periods, representations of the body and space have a subjective character that differs from classical mathematical rules. It also demonstrates how the Renaissance period distinguished itself from the other periods by having its own rational, objective and scientific character.

The other result of the study is concern about interior-exterior relationship in architecture. In this paper, it is seen that the interior-exterior relationship in architecture is destroyed due to wall paintings and frescoes. In Baroque and Renaissance Periods, in the examples of analyzed in the study shows that spatial form is deformed due to the wall paintings.

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Figure 4. (Florenski, 2021)

Figure 5. (And, 2021)

Figure 6. https://tr.wikipedia.org/wiki/Atina_Okulu#/media/Dosya:Raphael_School_of_Athens.jpg (Left) https://www.flickr.com/photos/bomba08/5722329558 (Right) 20.03.2022

Figure 7. https://tr.wikipedia.org/wiki/Dosya:Las_Meninas,_by_Diego_Velázquez,_from_Prado_in_Google_Earth.jpg

Figure 8. https://en.wikipedia.org/wiki/File:Triumph_St_Ignatius_Pozzo.jpg

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Figure 9. (Arte, 2021)

Figure 10. https://tr.m.wikipedia.org/wiki/Dosya:Manet,_Edouard_-_Le_Déjeuner_sur_l%27Herbe_(The_Picnic)_(1).jpg 20.03.2022

Figure 11. (Honour and Fleming, 2005)

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CAN WE USE DIGITAL TWIN TECHNOLOGY IN THE DESIGN PROCESS? A THEORETICAL FRAMEWORK

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ABSTRACT

The Digital Twin (DT) is a tryadic system as a digital representation or a mirror of a physical process or its twin and the intelligence, which connects them. Digital twin technology has many uses, from aerospace to infrastructure and manufacturing. However, when it is looked at the design process, it is seen the digital twin does not impact ways of design thinking. 'If a digital twin is a mirror image, then how can the digital twin be used to feedforward and feedback that does not yet exist, because it is being designed' is the question to answer in this research. From the literature review, some ways are called fetal, child, and adult digital twins and probably come closest to the design process with the digital twin. As the digital twins of the fetal and child digital twin have not been operationalized yet, it is needed to put this idea into the theoretical framework. To be meaningful for design, the framework should unite the activities of the design process with the technologies and products of the digital twin. By combining two approaches (the Basic Design Cycle (BDC) activities and the digital twin technologies from Digital Twin Technology Development (DTTD) layers at the city and building levels, we can highlight where and how digital twin technology can be used in the design process. The method is systematized in a descriptive framework, which highlights the use of digital twins in the design process.

KEYWORDS*:* Digital Twin, Technology, Design, Design Process.

INTRODUCTION

The subject of this paper is related to Digital Twin (DT) technology and design. In the design process, where there are not yet existing worlds, things are different. In the beginning, there is nothing to evaluate or observe (Roozenburg & Eekels, 1995, pp. 118). It is good for design because there is still a lot of potential behind the process. When thinking about good or ideal design, which initiates with an approach to understanding psychology and technology, designers need to consider understanding the process properly. The new industries, new phenomena such as digital twin technology are evolving day by day. When each new evolution needs to learn from the previous experiences, mistakes, failures, etc., there must be adoptions to achieve a good or ideal design (Norman, 2013, pp. 8). As opposed to the increasing interest in digital twins, there is little research that fully explores the digital twin and design (Tekinerdogan & Verdouw, 2020, pp. 1). In this case, we assume that digital twin technology has many abilities to support the design. Therefore, we hypothesize the question of how we can use digital twin technology in the design process. To do that, this paper presents the exploration of the design process using digital twin technology, including a prologue to digital twin technology, linking digital twin and design process, evaluation of the theoretical framework mapping between Basic Design Cycle (BDC) (Roozenburg & Eekels, 1995, pp. 88) and Digital Twin Technology Development (DTTD) layers (Lu et al., 2020, pp. 5), and conclusion. Figure 1 shows the structure of the research.

THEORETICAL BACKGROUND

This section looks into the key related three main areas related to this paper: digital twin as technology; digital twin and design process; digital twin technology development, and digital twin technology development layers.

DIGITAL TWIN AS TECHNOLOGY

The digital twin has been practiced since the 1960s and has attracted more and more interest. The term “digital twin” has been used to denominate a mirror of a physical process or its twin by NASA researchers (Glaessgen & Stargel, 2012, pp. 7). The digital twin was foreseen in various predictions in a book called “Mirror Worlds” by computer scientist David Gelernter (Gelernter, 1991). Afterward, Michael Grieves has devised the definition of the digital twin as a tryadic system (physical-virtual-link) as a digital representation of a physical process and the intelligence, which connects them (Grieves & Vickers, 2017, pp. 92).

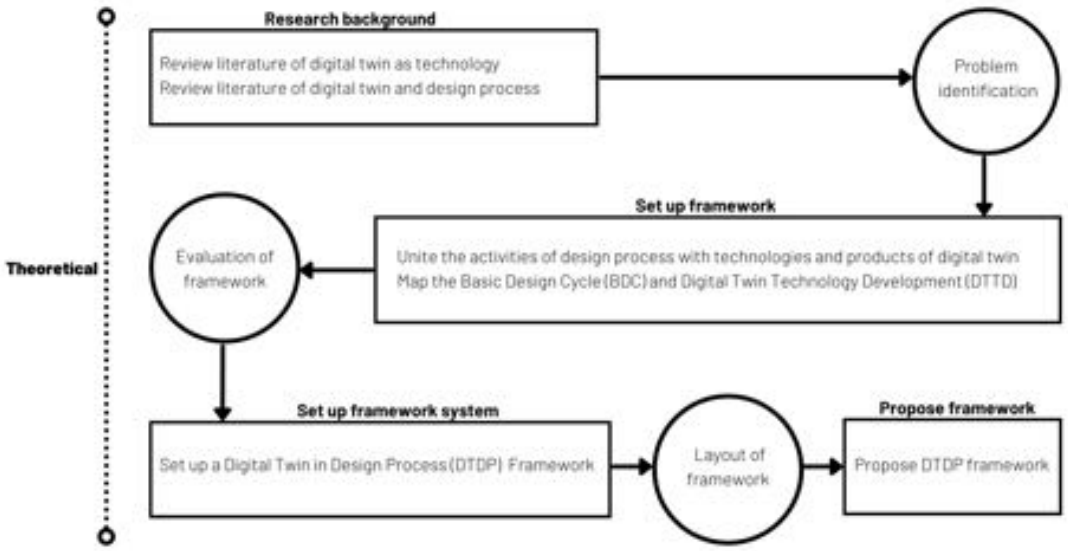

Figure 1. Structure of the research

The digital twin has many application areas, from aerospace to infrastructure and manufacturing. Some examples of the digital twin applications in architecture are Shanghai East Hospital China affiliated with Tongji University (Peng et al., 2020), and West Cambridge Campus by the UK Centre for Digital Built Britain at the University of Cambridge (Lu et al., 2020). The present findings of these two instances state a background to involve digital twins through the design, construction, operation, and management phases.

As shown in Table 1 based on some descriptions of the digital twins in several use areas, the design is mostly included as a term that defines the place in the life cycle phases of things. It can also be that none of the sources describe the impact on the design process itself – which mainly remains unchanged.

References	Digital twin descriptions that include "design"
Lee et al. (2013, pp. 154)	a coupled model first constructs a digital image of a machine from the early design stage
Grieves (2014)	a virtual representation of what was produced versus what was designed
Rios et al. (2015, pp. 658)	an equivalent digital counterpart exists along the product life cycle from conception and design
Grieves & Vickers (2017, pp. 86)	able to design, test, manufacture, and use the virtual version of the systems
Schleich et al. (2017, pp. 142)	a bidirectional relation between a physical artefact and the set of its virtual models, enabling the execution of product design
Söderberg et al. (2017, pp. 138)	a digital copy of a product or a production system, going across the design
Tao et al. (2018, pp. 3567)	a real-time transmission data-based product mapping for design and client communication
Arup (2019, pp. 111)	a virtual model is used to tighten the feedback loop between design and execution
Sacks et al. (2020, pp. 10)	used to design and plan production systems and to generate new knowledge
Savian (2020, pp. 7)	a data resource that can improve the design of assets

Table 1. Selected digital twin descriptions that include "design"

Digital Twin and Design Process?

The designer should answer the question what the design process means. The design is a process of objective and subjective reasoning ranging from function to form and from modeling and testing to design. In this case, design is related to how things work, are controlled (Norman, 2013, pp. 5), and are designed with digital twin technology for designers. Design theorists Roozenburg and Eekels articulate the Basic Design Cycle (BDC) as the phase set of a most theoretical model for designing. As presented in Figure 2, their BDC is a functional scheme that helps sort out the design process methods (Roozenburg & Eekels, 1995, pp. 88).

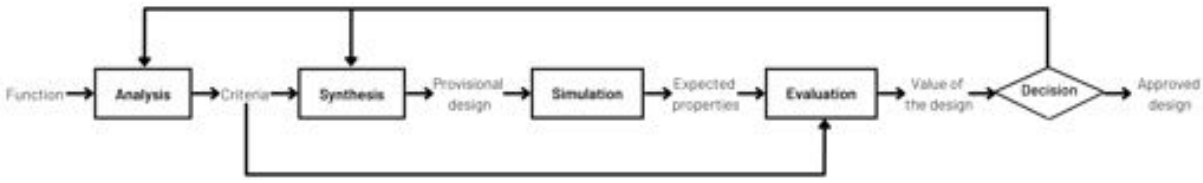

Figure 2. Basic Design Cycle (BDC) (Roozenburg & Eekels, 1995, pp. 88)

The BDC makes a distinction between activities (analysis, synthesis, simulation, evaluation, and decision) and products (function, criteria, provisional design, expected properties, value of the design, and approved design). There is no prescribed order of the activities; in any design process, activities can be cycled through many times. Currently, we see that the digital twin does have a place in such a model of design thinking. Michael Batty asks

that if a digital twin is a mirror image, then how can the digital twin be used to evaluate and feed something that does not exist yet, because it is being designed (Batty, 2018, pp. 818). This is the question that we aim to answer in our research.

From the literature review, it appears that Sacks et al. (2020, pp. 16) point to some ways called the fetal, child, and adult digital twin and probably comes closest to the design process with the digital twin. While the fetal and child digital twin is a type of incomplete model or working process digital twin, the adult digital twin is a complete model or constructed process of the digital twin. As Sacks does not operationalize the fetal and child digital twin further, it is needed to put this idea in the theoretical framework.

DIGITAL TWIN TECHNOLOGY DEVELOPMENT (DTTD)

The basic element of digital twin technology is data. The National Academies of Science in Chapter 1 writes data as "…facts, numbers, letters, and symbols that describe an object, idea, condition, situation, or other factors" (National Research Council, 1999, pp. 15). Considering digital twin in a design context, data is anything, which can be used to define anything to accomplish DT in the design process. There are several static and dynamic data related to the building and city level of the DTTD such as sensor data, weather data, energy data, transport data, terrain data, land use data, spatial data, material data, geometrical data (Petrova et al., 2019). When DT is fed with this data, DT is able to tell the story (such as history and experiences) over the lifecycle of its physical twin (PT) (Madni et al., 2019, pp. 4). In parallel with their assumption, we are assuming that we can use this data to narrate the story of the design process of its physical twin.

As stated by Lu et al. (2020, pp. 5), DTTD is adapted in Figure 3. The digital twin as technology is developed into five layers which we can summarize their functions as (1) data acquisition layer for determining which data can obtain; (2) transmission layer for getting the data to the DT system; (3) digital modeling layer for making all the necessary models; (4) data/model integration layer for combining the "intelligence" with the transmission layer and digital modeling layer, and (5) service layer for management, advice, and decisions.

DIGITAL TWIN TECHNOLOGY DEVELOPMENT (DTTD) LAYERS

This section includes general descriptions of each DTTD layer as follows:

(DTTD1) DATA ACQUISITION LAYER (DETERMINING WHICH DATA CAN OBTAIN)

Data is obtained from the built environment by using many sensor types, smart networks, Internet of Things (IoT) devices, quick response (QR) codes, electronic location and distance measurements, global positioning systems, communication networks, tag identification systems, and communication networks in this DTTD1 layer. Data are achieved using the building, asset, and space management systems in the case of West Cambridge DT (Lu et al., 2020, pp. 4-7; Sacks et al., 2020, pp. 5). This layer functions as a kind of sensory organ of a human containing perceived data, which is interpreted and collected for the information process (Ozturk, 2021, pp. 76).

(DTTD2) TRANSMISSION LAYER (GETTING THE DATA TO THE DT SYSTEM)

Data is gotten to the DT system through various network technologies such as Wi-Fi, 3G, 4G, 5G, LTE in this DTTD2 layer. This layer acts as a connection bridge between the related DTTD layers (Lu et al., 2020, pp. 4; Ozturk, 2021, pp. 76).

(DTTD3) DIGITAL MODELING LAYER (MAKING ALL THE NECESSARY MODELS)

All necessary models (city, building energy, asset information, weather, agent-based model, etc.) are created in this DTTD3 layer for design purposes to feed the upper layers of DTTD.

(DTTD4) DATA/MODEL INTEGRATION LAYER (COMBINING THE "INTELLIGENCE" WITH THE DTTD2 AND THE DTTD3)

The DTTD2 and DTTD3 are combined by the power of "intelligence" in this DTTD4 layer. DTTD4 provides more advanced decision-making supporting the intelligent function of the system DTTD4 through data analysis, simulations, and artificial intelligence (AI) knowledge learning (Glaessgen & Stargel 2012).

(DTTD5) SERVICE LAYER (MANAGEMENT, ADVICE, AND DECISIONS)

The DTTD5 layer is the last step of DTTD, which has different knowledge from the engines. DTTD5 mostly serves facility managers, end-users who have the ability to manage, advise, and take action. The issues range from security, health, transportation, energy, space, assets which are decided at the beginning of DT. In the case of Shanghai East Hospital, China (Peng et al., 2020), the DT Consulting group orchestrated the life cycle process of the building. Also, the team manages the DTTD5 layer through the main dashboard supported by three stations.

When a DT is created, imagine a constructed building design as an example, the physical twin refers to sensible (seen, heard, touched, smelled, etc.) that every moment all users such as staff, visitors, etc. A digital twin of this building is the digital version, obtaining data simultaneously with the real building. With the ability of the DTTD5 layer, facility managers can monitor, operate, and optimize according to the current situation.

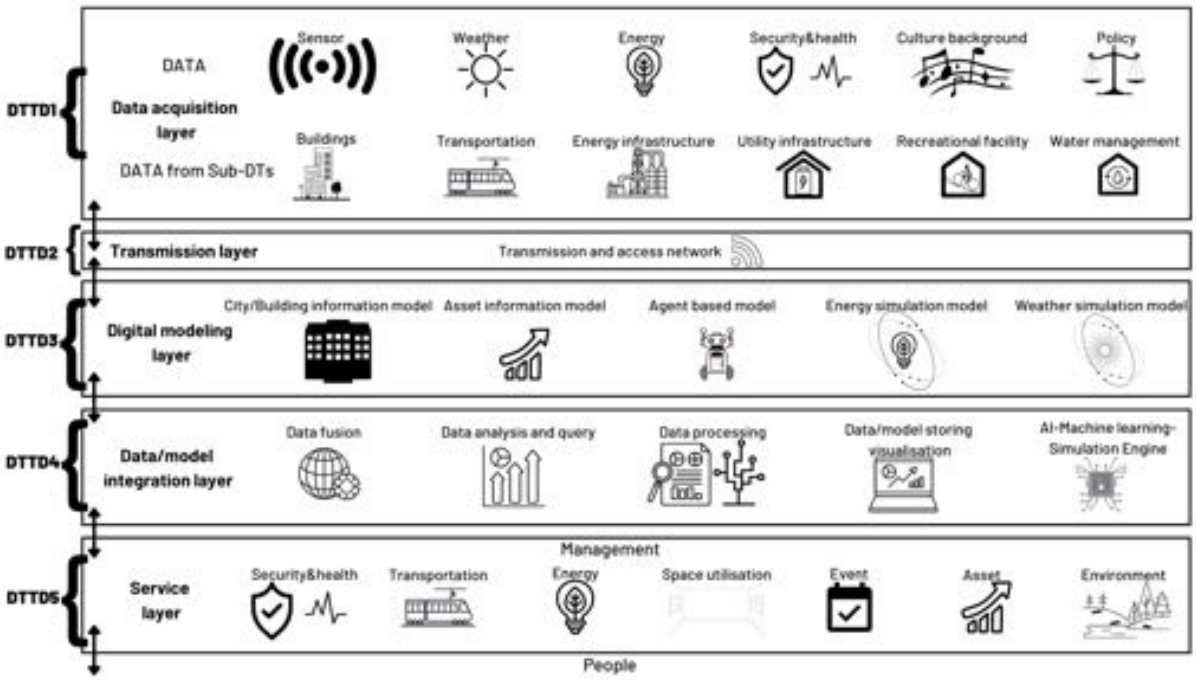

Figure 3. Digital twin technology development layers (DTTD) (adopted from Lu et al., 2020, pp. 5)

THEORETICAL FRAMEWORK

This chapter provides a theoretical framework developed to support the digital twin in the design process, referred to as BDC and DTTD. The processes and subprocesses of this framework are explained in detail and presented in Figure 4. The entire assessment of the framework is done using theoretical aspects.

To be meaningful for design, the framework should unite the activities of the design process with the technologies and products of the digital twin. The activities we derive from the Roozenburg & Eekels (1995, pp. 88) basic design cycle (BDC). The digital twin technologies we derive DTTD from Lu et al. (2020, pp. 5). The BDC emerges from several (A) activities ((A1) analysis, (A2) synthesis, (A3) simulation, (A4) evaluation, and (A5) decision), and (P) products ((P1) function, (P2) criteria, (P3) provisional design, (P4) expected properties, (P5)

design value, and (P6) approved design) (Roozenburg & Eekels, 1995, pp. 88). Lu states that the digital twin as technology evolves in five parts at the city and building levels (Lu et al., 2020, pp. 5): (DTTD1) data acquisition layer; (DTTD2) transmission layer; (DTTD3) digital modeling layer; (DTTD4) data/model integration layer; and (DTTD5) service layer. By combining these two approaches, we can highlight where and how DT technology can be used in the design process.

	FRAMEWORK	GENERAL QUESTION	SUB-	QUESTION
DTDP1	(P1) + (A1) ∗ (DTTD1) + (DTTD2)	What do designers want to accomplish by DT?	What	DT should monitor? DT should track? DT should register? kind of data can I get? kind of data do I need?
DTDP2	(P2) + (A2) ∗ (DTTD3)	What are the alternatives of DT?	What	kind of model do I need to build?
DTDP3	(P3) + (A3) ∗ (DTTD4)	What action can DT do now? How does DT do it?	What	DT_1, DT_2, DT_3, ...DTİ ...DTFINAL D_1, D_2, D_3, ...Dİ ...DFINAL. .
DTDP4	(P4) + (A4) ∗ (DTTD5a)	What happened with DT?	Who Where	targets what in DT? needs to be read for specific data in DT?
DTDP5	(P5) + (A5) ∗ (DTTD5b)	What does DT mean, or what is the value of DT? Is DT okay, have I accomplished the DT goal?	How	is it still useful for us or should I change something?
DTD	(P6) Approved design of the digital twin			

Figure 4. The processes and subprocesses of the framework

DIGITAL TWIN IN DESIGN PROCESS (DTDP) FRAMEWORK SYSTEM

The theoretical framework maps between BDC and DTTD. As can be seen above, the Digital Twin in Design Process (DTDP) framework is divided and equated into five stages:

Stage DTDP1 = (P1) Function + (A1) Analysis ∗ (DTTD1) Data acquisition layer + (DTTD2) Transmission layer

Stage DTDP2 = (P2) Criteria + (A2) Synthesis ∗ (DTTD3) Digital modeling layer

Stage DTDP3 = (P3) Provisional DT + (A3) Simulation ∗ (DTTD4) Data/model integration layer

Stage DTDP4 = (P4) Expected Properties + (A4) Design and Process Evaluation ∗ (DTTD5a) Service layer

Stage DTDP5 = (P5) Value of DT (P5) + (A5) Action ∗ (DTTD5b) Service layer.

As shown in Figure 4 each stage starts with a “general question”, which is inspired by design principles in Table 2 (Norman, 2013, pp. 71) to orchestrate how DT works in the design process. Then, it includes the “description(s)” of the stage. Followingly, the stage inquires about “sub-question(s)”. Furthermore, some “example(s)” related to the subject is given.

1-What do I want to accomplish?
2-What are the alternative action sequences?
3-What action can I do now?
4-How do I do it?
5-What happened?
6-What does it mean?
7-Is this okay? Have I accomplished my goal?

Table 2. Design principles (Norman, 2013, pp. 71)

Next following sections are five stages to be considered.

STAGE DTDP1 = (P1) FUNCTION + (A1) ANALYSIS ∗ (DTTD1) DATA ACQUISITION LAYER + (DTTD2) TRANSMISSION LAYER

This is the initial stage of each DTDP, which mainly can argue that "what do designers want to accomplish (Norman, 2013, pp. 71) by DT?". Roozenburg & Eekels (1995, pp. 57) generally used the term P1 to refer to the lead of the design process. In this framework, P1 is referred to as the purpose of the digital twin. In addition to DTDP, the content for P1 can be built around the sub-questions of (P1) "what DT should monitor?"; (P1) "what DT should track?"; or (P1) "what DT should register?". During A1, the formulation and reasoning of P2 begin to be determined by the designer (Roozenburg & Eekels, 1995, pp. 90). The designer can guide the A1 of DTDP by answering the following sub-questions: (DTTD1) "what kind of data can I get?"; (DTTD1) "what kind of data do I need?". Additionally, A1 continues with (DTTD2) the setting of the data that I want to track in DT.

For instance, the designer does background research and A1 for design environments collecting the data sets such as a survey of existing conditions, determining zoning and land use requirements, programming (what is needed), and data (sun, climate, wind, soil, directions, natural physical features, topography, utilities, electric, gas, and circulation).

STAGE DTDP2 = (P2) CRITERIA + (A2) SYNTHESIS ∗ (DTTD3) DIGITAL MODELING LAYER

This stage starts by considering "what are the alternatives (Norman, 2013, pp. 71) of DT?". The DT design P2 needs to be formulated as reliable, fast, relevant, helpful, productive, or risk management, etc. Then, the A2 contains the separate things into a whole (Roozenburg & Eekels, 1995, pp. 90). In the A2, the model(s) of the building is realized (DTTD3). In this stage, the designer sub-questions and decides (DTTD3) "what kind of model do I need to build?".

As stated by Encarnacao et al. (2021, pp. 43), synthesis needs intelligence, which requires essential abilities in situations such as responsive flexibility, creativity in incidental circumstances, extracting meanings of ambiguity, recognition of the importance of different elements, finding similarities despite differences that decouple them, drawing distinctions despite similarities can connect them, synthesizing new concepts through old concepts, generating new ideas. For example, the designer synthesizes sketching, drawings, models; and tests ideas, concepts, relationships (preliminary floor plans, site plans, and exterior main concepts).

STAGE DTDP3 = (P3) PROVISIONAL DT + (A3) SIMULATION ∗ (DTTD4) DATA/MODEL INTEGRATION LAYER

In this stage, the designer asks (Norman, 2013, pp. 71) "what action can DT do now?"; "how does DT do it?". It follows P3 by DT_1, DT_2, DT_3, …DT_i …DT_{FINAL}. At this phase, it is important to note that DT is dynamic because of the P2 reasons. So, each design has A2 and the design follows as D_1, D_2, D_3, …D_i …D_{FINAL}. A3, which plays a valuable role in the design, is the imitation of the behavior of a design system.

For example, the designer creates simulations (energy (heating, cooling, light, equipment, etc.); daylight availability (sun, etc.); comfort (CO2 levels, air rates, humidity, radiant, etc.); load profile (electricity, water, etc.); occupation; room layouts; temperature (surfaces, zones, construction, facade issue, etc.); acoustical; fire safety; fire escape scenarios; and user activities (patient, doctor, ER, service, etc.)).

Wright & Davidson (2020, pp. 3) gives the fact that the main strength of the digital twin is to accurately describe objects changing over time using developing data. The validated model gives an overview of the behavior at a particular time. However, by using digital twins, you can extend objects and behaviors that change significantly over time. The main component of these facts is that, as we agree with them, a digital twin needs a physical twin to become a digital twin. They argue that the idea of human twins, which has a similarity with DT in meanings, becomes alive at the same time and age at the same time. However, Batty (2018, pp. 818) advocates that digital twins should be disconnected from the real system to use them in the design process. With DTDP, imagine that the designer is designing a building, while the physical twins take the form of fetal (physical models) and child (physical prototypes, mockups, or prefabrication) in the real world through the design process; these fetal and child physical twins are twinning their fetal and child digital twins. In the end, all the types of digital or physical twins have a design influence on adult digital and physical twins.

STAGE DTDP4 = (P4) EXPECTED PROPERTIES + (A4) DESIGN AND PROCESS EVALUATION ∗ (DTTD5A) SERVICE LAYER

At the end of this stage, the designer can answer "what happened (Norman, 2013, pp. 71) with DT?". In this stage, the expected factual information can be provided in the design while evaluating and taking decisions (Roozenburg & Eekels, 1995, pp. 236). In his groundbreaking book, Gelernter (1991) uses the term "dashboard" that someone can read to obtain information about the current status of every element, or someone can see the details of the decisions made in the Mirror World. Thus, he used the dashboard to refer to the Mirror World, which can be referred to as the digital twin today. In addition, the dashboard can be used to look back in time or find any missing points. Following this idea, we use a dashboard approach for getting the results of the DT as P4 of the design. In DTDP4, the dashboard can be controlled by anyone (Gelernter, 1991), the sub-questions in this stage are as follows (P4+DTTD5a) "who targets what in DT?"; or (P4+DTTD5a) "where needs to be read for specific data in DT?". DT could be a supportable resource for designers by combining it with physical data that can be customized by dashboards (Madni et al., 2019, pp. 11). The designer should check that the properties of DT are still visible, accessible, or understandable to the design team. The fourth step of the adaptation is followed by A4 of the design and process, which is a testing process that establishes the value or quality of the design (Roozenburg & Eekels, 1995, pp. 92). In this stage, DT gives information about the design as such, but can also include many other things.

STAGE DTDP5 = (P5) VALUE OF DT + (A5) ACTION ∗ (DTTD5B) SERVICE LAYER

At this stage, there needs to be a question to answer: "what does DT mean, or what is the value of DT?"; "is DT okay, have I accomplished the DT goal?" (Norman, 2013, pp. 71). The designer does P5 by subsequently asking "how is it still useful for us or should I change something?". A5 and DTTD5b is the action (decision) step is related to the knowledge from DT. And the latest is achieved with the approved design (P6) of the digital twin.

DIGITAL TWIN DESIGN PROCESS (DTDP) FRAMEWORK

The DTDP framework mentioned above identifies the digital twin and design process from stages 1 to 5. DTDP framework is shown in Figure 5. The method is systematized in this descriptive framework, which highlights the use of digital twins in the design process. Particular (A) activities such as (A2) synthesis in stage DTDP2, and (A3) simulation in stage DTDP3, and (P) products such as (P3) provisional design in stage DTDP3, and (P4) expected properties combined with (DTTD1) data acquisition in stage DTDP1, (DTTD3) a digital modeling layer in stage DTDP3, and (DTTD4) data/model integration layer in DTDP4 have the highest impact for the design process.

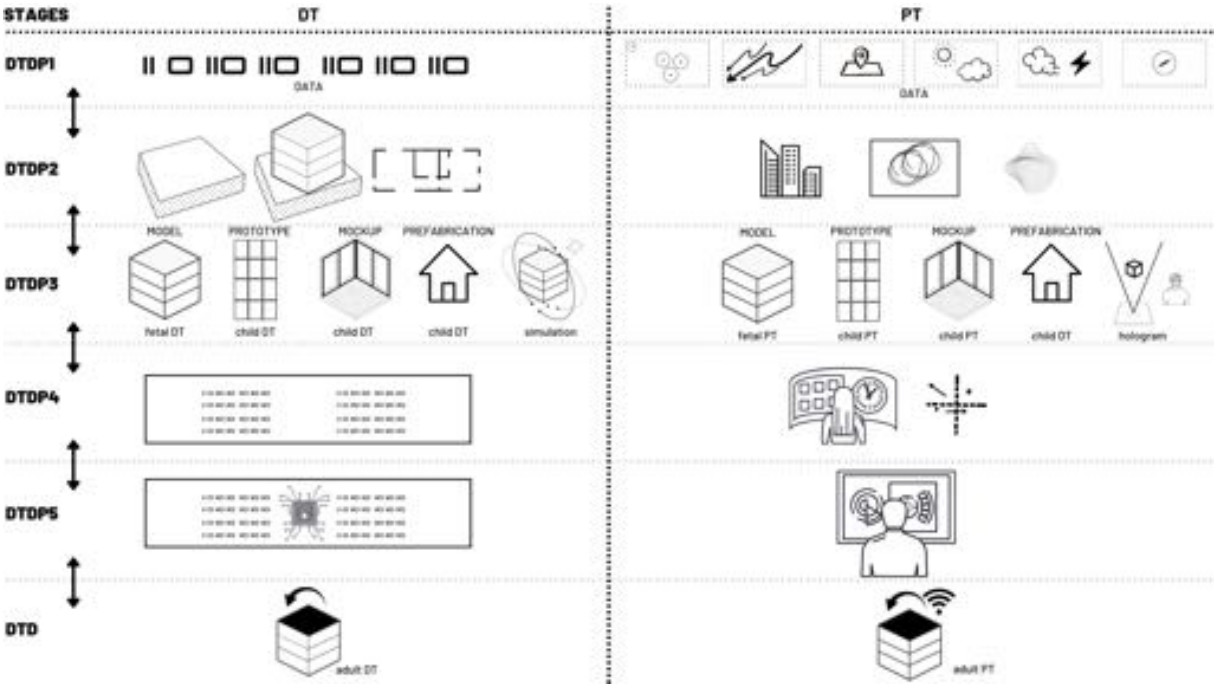

Figure 5. Digital Twin in Design Process (DTDP) Framework

CONCLUSION

In the paper, it is argued that digital twin technology has potential for design support, but it needs to transform to suit the characteristics of the design process. The framework is the first step towards achieving the ground methodology for the digital twin in the design process. With the descriptive approach, the framework may lead the designers to superior designs with the digital twin. Thus, this mapped framework can help the new design processes to be more optimized to integrate digital twin technology.

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ALMOND SHELL REUSE: A VIABLE NON-CONVENTIONAL AGGREGATE FOR SUSTAINABLE BUILDING MATERIALS

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ABSTRACT

Bio-based or green architecture is a new way of designing and building in line with the European Green Deal and in light of the Circular Economy principles. The main green approach directs the whole construction life cycle to be eco-sustainable and environmentally friendly from the beginning to the end of the building process. Beyond the use of eco sustainable and highly performing structural materials, new technologies able of reduce the environmental impact of buildings must be used. This paper is aimed at reviewing the possible reuse of bio-wastes of agricultural origin whose massive production generates a number of issues for their treatment and disposal. In particular, this study will focus on the possible reuse of almond shell, one of the major productions in the Mediterranean area. The scientific literature appears quite sensible to the topic with many solutions to reuse such bio-wastes in architecture and civil engineering to improve the sustainability of the construction sector, give new life to waste materials, and granting a financial surplus to the manufacturing industry.

KEYWORDS: Building and construction material, bio-waste reuse, almond shell, natural fibre, sustainability.

INTRODUCTION

The ongoing risk of over-pollution, depletion of natural resources, alteration of natural environments, rising temperature, etc., is very well known worldwide. That is mainly caused by an unsustainable mass industrial system primarily aimed at profit, especially in the construction sector whose activities are massive and highly polluting. Actually, it is acknowledged that the present industrial system yearly generates a brutal quantity of wastes of various origin whose treatment and disposal often produce several difficulties [1] and cause a brutal loss of financial resources, not considering the environmental impact. Moreover, the amount of greenhouse gas emissions conflicts with the recent Sustainable Development Goals [2] and the European regulations [3].

Therefore, a smarter waste management has become compelling and unavoidable, beyond assuring a more sustainable cost-effective way to valorise and reuse these low-quality by-products can be efficiently reused to manufacture novel high-value products, and improve quality and sustainability. Moreover, finding alternative reuse to usual landfill might generate a significant surplus of financial resources [4] and a consequent reduction in environmental impact associated with human activities in the perspective of improving the Circular Economy [5, 6]. Indeed, environmental sustainability, associated to the concept of sustainable development, is the basis of the current economic model, namely the circular economy. That has radically replaced the obsolete linear economic model, which has characterized the global industrial development of the last 150 years, based on the dynamic "take-produce-dispose" (figure 1, left). On the other hand, purpose of the circular economy (figure 1 right) is to extend the life cycle of products, reducing the use of raw materials and the production of wastes, giving a new life by reinserting in the cycle of production, generating additional value [7].

Construction is recognised to be highly unsustainable for its massive non-renewable raw materials and energy consumption while generating enormous GHG and wastes volumes [8, 9]. The world of construction consumes a great quantity of raw materials, which around the 50% are non-renewable natural resources. In Europe only, it is estimated that over the 40% of the total produced energy is consumed by the building industry. Nevertheless, building activities are unavoidable and estimated to rise globally, especially in the developing countries, for the absolute need of new structure and infrastructure. An immediate consequence of such massive exploitation is a great deprivation of the environmental resources together with an equally massive production of wastes. Fatal disposal in landfill and serious pollution problems result consequently.

Hence, there is an urgent need to reduce the unsustainability associated with the construction industry by developing alternative greener materials, improving the use of secondary cementitious resources, fostering wastes incorporation, and implementing sustainable cost-effective manufacture processes [10].

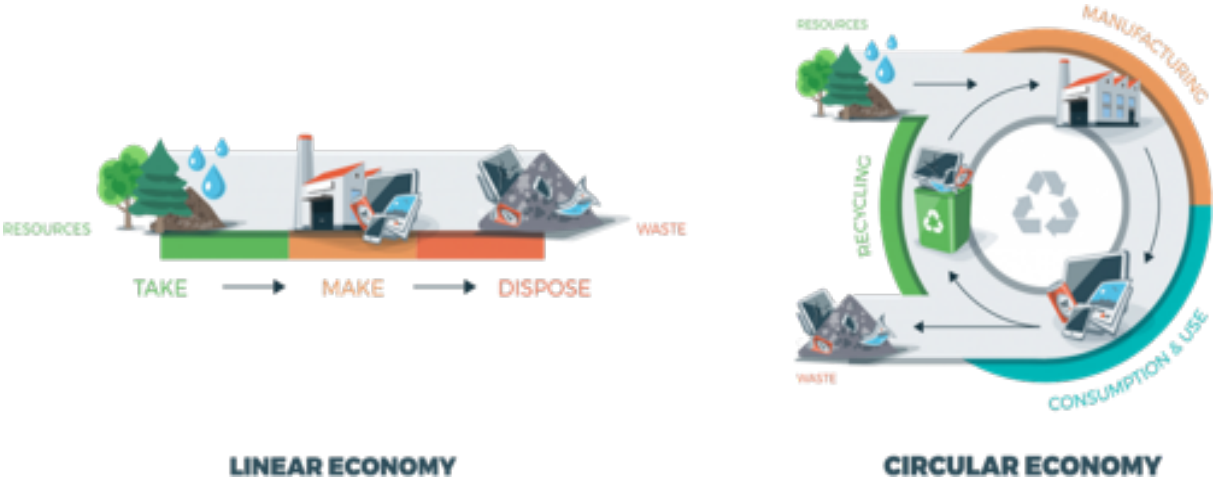

Figure 1. *Economic models: linear (left) and circular (right)*

With this in mind, the use of natural materials, especially from organic waste, could lead to an innovative and more sustainable approach in construction. That will enable a number of advantages that, compared to traditional materials, could be summarised in a lower CO_2 emission, a recyclable and compostable product to its end, low risks for health and environment, innovative performance, and lower cost [11]. More specifically, it is well acknowledged that the present construction and building products are real poison generators for the human health, due to the high concentration of chemicals used in their production. On the other hand, the most modern approach of production involves the use of traditional materials that are re-proposed with high quality standards of sustainability. Thus, eco-friendly materials have increased in quantity and quality and are constantly diffusing into the global market. Hence, bio-composite materials seem a viable alternative to manufacture sustainable products for architecture and design. With this term, a product partially, or totally, made of natural origin raw materials intended. The natural source is renewable and is naturally reintegrated in a human time scale, without compromising the heritage for future generations. Renewable natural materials can be of mineral, plant or animal origin. Moreover, the greatest advantage is the possibility to use organic wastes. It was estimated that about 2.6 billion tons of wastes are produced yearly in Europe, of those around 43.4 million tons are of natural origin. Organic wastes are extensively accessible, being their generation constantly increasing worldwide, and can be easily used in novel applications in construction.

This paper analyses the reuse of almond shells as natural waste in construction and building materials. From a general literary review (Scopus), it was observed that from 2000 onwards, with a total amount of about 980 scientific papers, there is an increasing interest of the scientific community for almond shell reuse (figure 2A). Nevertheless, in the sectors of engineering and architecture there are less than 100 publications. Also, limiting the research to the keywords “almond shell materials”, the outcoming documents resulted 281 only, whom about the 10% are related to engineering topics, while the most investigated applications are in agricultural, environmental, and chemistry sciences (figure 2B). Consequently, it could be affirmed that the exploration of the possible uses of almond shells in building materials is quite low. Finally, researcher affiliation are mostly Spain, United States, Turkey, and Iran - areas where large almond production is performed (figure 1C).

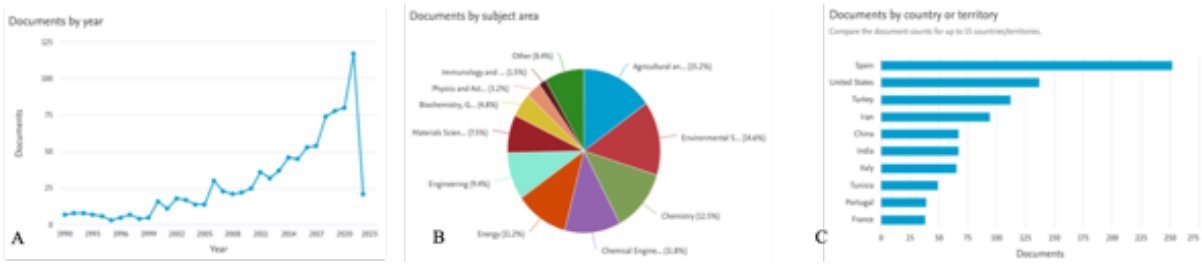

Figure 2. *Scientific literature publications on almond shell reuse: A – number of published papers; B – explored topics; C – researchers’ affiliation (source: Scopus)*

ALMOND: FROM FOOD TO WASTE

The product of the agricultural cultivation is the almond, the fruit of the tree *Prunus amygdalus* (figure 3), that is widely cultivated worldwide. That is often eaten alone, raw or toasted, but is also a component of various dishes, especially the sweet ones in the Mediterranean area. Almonds are available in many forms, such as whole, slivered, and ground into flour. Before being marketed, the almonds are subjected to a) hulling, the elimination of the external green part of the fruit, also to avoid the blackening of the shell, b) washing, to eliminate any residue of the husk, and c) whitening with sulfur dioxide to improve their appearance. Subsequently, they are gradually dried, to lower the humidity content to 4-5%; finally, they are selected, calibrated and packed, before

being distributed to the market. From such processes, the main derived wastes are the exocarp, a thick, leathery, grey-green coat, and the endocarp, that is the woody, reticulated, hard shell (figure 4).

Figure 3. *Almond tree in the Sicilian countryside (source: E. Pulvirenti).*

Figure 4. *Exocarp (left), shell (centre), almond (right).*

Table 1 shows the main producers of almond in the world, with US leading the market, especially in California where the yearly mild temperatures are particularly suitable for this farming. Figure 5 shows the production in Italy, where it is observed that the largest is conducted in Apulia and Sicily.

Country	Production [ton]
United States	1,936,840
Spain	340,420
Iran	177,015

Turkey	150,000
Morocco	102,185
Italy	77,300
world	3,497,148

Table 1. *Worldwide production of almond in 2019 (United Nations, Food and Agriculture Organisation Corporate Statistical Database)*

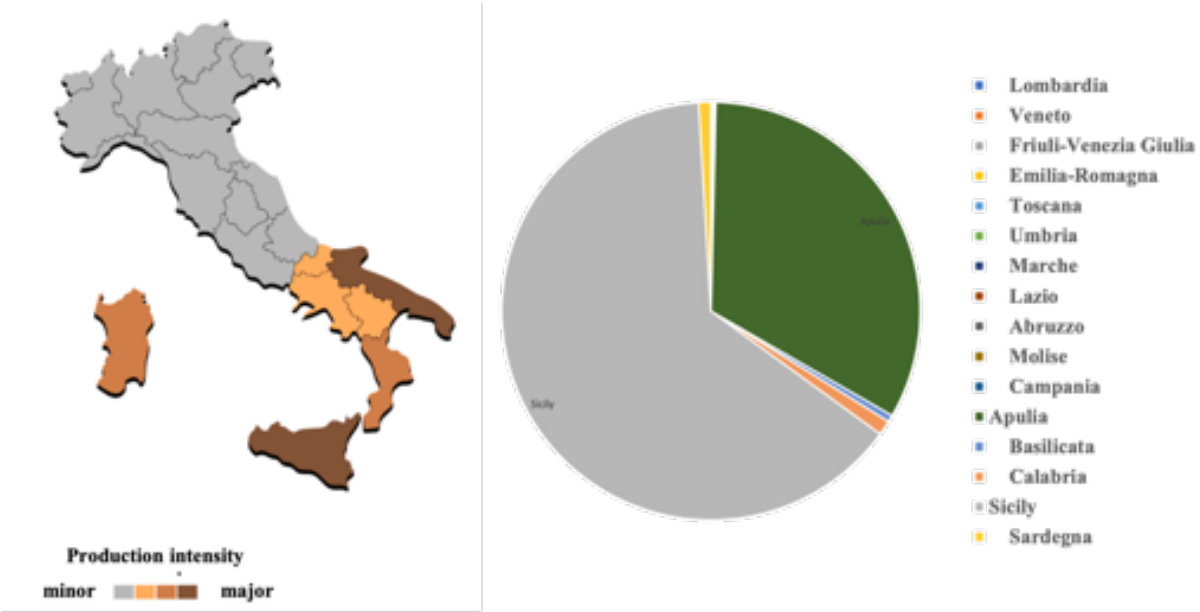

Figure 5. *Almond production in Italy with "intensity of production" (source: ISTAT) and regional quantities (%) (source: Office for agricultural and food resources of the Sicilia Region).*

From the scientific literature on almond shell, it could be affirmed that the shell wall is characterized by a stratification of layers, averagely thick of 20–40 µm. Structural pores diameter is 300–500 µm. The maximum weight per shell varies between 6 g and 14 g, the average dimensions between 36.7 and 40.7mm long, 24.5 - 27.3 mm width and 17.3 – 23 mm thick.

REUSE OF ALMOND SHELLS IN TRADITIONAL BINDERS OF MINERAL ORIGIN

In this section, the scientific literature that focused on the traditional mineral binders combined with the almond shell is reviewed. Following there is a list of the considered paper. What emerge at first glance is the very little number of papers dedicated to the topic, as already spot (cf. figure 1B). That was quite surprising being some binder materials, i.e. ordinary Portland cement, highly diffused object of the international scientific studies.

Paper	**Bio Waste**
Mohammad R.A., Application of almond shell as a lightweight coarse aggregate in structural concrete, LJMU 10th Annual Int. Conference on 'Sustainable Construction Materials & Pavement Engineering" At: Liverpool, UK (2011).	Almond shell

Matos A.M., Ramos T., Sousa-Coutinho J., Non-conventional additions from agricultural waste, Sustainable Construction Materials and Technologies 2013 (2013), e523.	Almond ash, bagasse ash
Pirayesh H., Saadatnia M.A., Effects of accelerating agent and SiO_2 nano-powder on the mechanical and physical characteristics of nut shell–cement based composites, Materials and Structures/Materiaux et Constructions 49 (2016), 3435-3443.	Almond and nuts shell
Nwaobakata C., Eme B.D., Effect of Almond Ash as Partial Replacement of Lime Filler on the Performance of HMA, International Research Journal of Advanced Engineering and Science 2018, 2455-9024.	Almondo ash
Soriano L., Font A., Tashima M.M., Monzó J., Borrachero M.V., Payá J., One-part blast furnace slag mortars activated with almond-shell biomass ash: A new 100% waste-based material, Materials Letters 272 (2020), 127882.	Almond ash shell
Terrones-Saeta J., Suàrez-Macìas J., Iglesias-Godino F.J., Corpas-Iglesias F.A., Development of Geopolymers as Substitutes for TraditionalCeramics for Bricks with Chamotte and Biomass Bottom Ash, Materials 14 (2021), 199.	Almond shell, Chamotte
Selim C., Onur O., Mehmet K., Serkan E., Effect of waste textile dye adsorbed almond shell on self-compacting mortar, Construction and building materials 300 (2021), 123978.	Almond shell

Matos et al. (2013) [12] studied the partial replacement of ordinary Portland cement (OPC) with ashes derived from different agri-food wastes (almond shells, olive bagasse, chestnut peel, grape bagasse, etc.) from Portuguese industries. Produced formulations consisted of a mix of OPC and 10 wt.% agricultural waste ash, previously ground to achieve a suitable grain size. The compressive strength test (CS) showed a sharp drop in resistance with the addition of almond shell ash, from 52.10 MPa to 32 MPa. While the drop in flexural strength was less, going from 7.20 MPa to 5.50 MPa. So, the addition of the almond waste to the OPC mortar caused an overall decrease in the bio-composite mechanical resistance.

The use of almond and walnut shells has been further investigated, for the production of cement-based bio-composite products, namely panels, by Pirayesh & Saadatnia (2016) [13]. The investigation aimed to study the effects that nano-silica and calcium chloride on the properties of the produced panels. Prior to the panel production stage, almond and walnut shells were cleaned from the dirt and impurities; ground and sieved to obtain a particle size less than 0.8 mm; and finally dried in an ordinary oven at 100 °C to achieve a final moisture content of 3%. The produced panels were obtained by combining different quantities of cement, nutshells (30, 40, and 50 wt.%), nano-SiO_2 (3, 4, and 5 wt.% t), and calcium chloride (5 and 7 wt.%). The raw materials were mixed manually, poured into 450x450x15 mm moulds, and pressed (30 kg/cm^2 for 24 h). Finally, after 28 days of curing at ambient conditions (20°C, 65 RH), they were reduced to the final size of 420x420x15 mm. The results of the mechanical tests showed that the addition of the almond and walnut shells had negative effects on the strength of the panel, both in terms of break modulus of resistance (MOR) and elastic modulus (MOE). Both resulted lower than those of the reference, equal to 18.3 MPa and 4.437 MPa, respectively. The best formulation was constituted by 30 wt.% of shells, 7% $CaCl_2$ and 3% nano-SiO_2, with values of 16.99 MPa (MOR) and 3.809 MPa (MOE). While the lowest recorded strengths were 13.63 MPa (MOR) and 2.980 MPa (MOE), for the 50 wt.% shells, 7% $CaCl_2$ and 3% nano-SiO_2 and 50 wt.% shells, 5% $CaCl_2$ and 2% nano-SiO_2, respectively. Comparing the results, it is noted that increasing the waste content, the material strength tends to. That is probable a direct consequence of a less cementitious binder, thus weaker bonds at the binder-shell interface and a stress concentration around the filler particles are generated. In addition, the mechanical strength is mainly due to the binder that decreasing causes an overall decrease in specimens' strength. That was in line with the analysis of the internal adhesion forces, that tended to decrease in proportion to the amount of waste, reaching results between 0.39 and 0.54 N/mm^2. An improvement in bond strength was found after increasing the calcium chloride content, implying that it improved the compatibility between the ligno-cellulose material and the

cement itself. Water imbibition tests showed a clear increase in values proportional to the content of shells. Compared to the reference imbibition (20.22%), values between 24.75% and 35.01% were measured. This is obviously explained by the lignin and hemicellulose content of the shells which promoted a higher water absorption. There was also an increasement in the swelling/thickness values, from 0.88% to 1.06% and 1.88% (again related to the presence of the ligno-cellulosic waste). Nano-SiO_2, even in modest amounts (up to 3%), seemed to reduce such swelling, while higher amounts (5%) caused a particles agglomeration, which increased the voids and, therefore, facilitated the water adsorption. $CaCl_2$ also showed some improvements in water absorption values, improving the interface between the particles and the binder, thus decreasing the number of voids in the composite. All considering, the use of shells resulted in significant changes on the mechanical and water absorption properties of the produced bio-composite. The best results were obtained for the formulations with 30 wt.% shells. The presence of nano-SiO_2, up to 3%, significantly improved the physical and mechanical properties of the panel, and the incorporation of calcium chloride up to 7% significantly improved the compatibility of the ligno-cellulosic materials with cement. In conclusion, the study showed that it is possible to produce cementitious composite panels by exploiting almond and walnut shells as fillers, leading to socio-economic benefits such as avoiding the disposal of agri-food waste, with a more environmentally friendly product, easier to be recycled at the end of the cycle.

Among other studies that consider the use of mineral-derived materials for the production of bio-composites, Soriano et al. (2020) [14] studied biomass ashes obtained from almond shells and verified their use for the production of mortars based on blast furnace slag, comparing them with mortars activated through alkaline solutions and potassium hydroxide. Prior to production, almond shell ashes were grounded to decrease their particle size. The ashes were then dried, mixed with blast furnace slag, and subsequently mixed with natural water following two different ratios (80:20 and 100:20). From the obtained mortar, standard 160x40x40 mm samples were produced. Two other formulations yielding potassium hydroxide and blast furnace slag were produced for comparison during laboratory testing. From the mechanical test resulted that the CS of the mortar composed of the 80:20 biomass was 32.60 MPa, while the 100:20 mortar was 36.40 MPa. Comparing them with the two test samples (derived from the use of potassium hydroxide), whose resistance was 14.50 MPa and 21.20 MPa, respectively, showed the actual potential of biomass residues for the production of bio-composite materials.

The research of Nwaobakata C. (2018) [15] is another example of a study that examined the effects of reusing wastes such as almond ash (ALA) as a partial replacement for quick lime (QL) conventionally used as fillers in hot mix asphalt (HMA). First, HMA samples were prepared in the laboratory with proportions ranging from 0.5% to 4.5% quick lime following design mixtures according to the Marshall method and the results were compared with the control mixture prepared using 7% QL. The performance of those mix was investigated by Marshall's test. The results showed a better performance of HMA with the addition of ALA and QL in a ratio of 1.8 (i.e., 4.5% almond ash and 2.5% quicklime) being the mix ratio meeting the marshal criteria for medium and light traffic. All considering, almond shell ash resulted a viable substitute for the normal reagents currently available on the market intended for the preparation of blast furnace slag mortars. Moreover, the same used as a partial substitute for lime did not improve the properties of the asphalt mixture compared to the reference. But an excellent stability and the Marshal criteria are met with a partial substitution (1.8 ratio) of almond ash/lime.

Mohammad R.A. (2011) [16], determined that almond shell met the required standards to be used as aggregate in lightweight structural concrete. By incorporating this waste material into concrete mixtures, they not only reduced the density but also the cost of concrete production, plus the added benefit that the ecological cyclic system was preserved. This paper presented part of the test results of an ongoing study in an attempt to use the low-cost solid waste almond shell (AS), as a coarse aggregate in the production of lightweight concrete structures. Laboratory investigations shown satisfactory performance of AS concrete under the BS 8100-1:1986 code and it was concluded that almond shell can be efficaciously used as coarse aggregate in light weight concrete. The study showed that the workability evaluation of fresh AS concrete by slump test was between 6

and 8 cm, meaning a medium degree of workability. The air content in AS concrete was within the allowable range of 4-8% recommended by ACI 213R-87. The 28 days compressive strength was 32.5 MPa, which met the requirement for lightweight structural concrete. Although AS concrete has a low elastic modulus of 6.73 GPa, full-scale testing on beams showed that deflection under the expected design service loads was quite acceptable. The ratios of the effective span length to the maximum deflection of the median span ranged from 252 to 263 mm. This is in accordance with the acceptable ranges specified in BS 8110. It was also demonstrated that the experimental values of ultimate moments for the test beams were 22% to 31% higher than those specified in BS 8110.

Another contribution relating almond shells to mortar is that of Selim C. (2021) [17]. Here, the effect of waste textile dye absorbed by almond shell on the mechanical properties of self-compacting mortar (SCM) was investigated. In this context, various mixes were designed by substituting almond shell adsorbed in Violet Dye Solution (VDSA) at the rate of 0%, 2.5%, 5.0%, 7.5%, 10.0%, 12.5%, 15.0% and 17.5% as cement on weight basis including control mix. Experimental results indicated that increasing the content of VDSA, a significant improvement in flexural strength appeared in both early and 28-days of curing. However, VDSA increase resulted in a significant decrease in compressive strength of more than 5%.

In the work of Terrones A. et al. (2021) [18], substitute geopolymers for traditional ceramics were developed for brick processing, using as raw materials: chamotte, as a source of aluminosilicate, and biomass bottom ash from almond shell combustion and *alpeorujo* as an alkaline activator. Samples were taken of all possible combinations of both residues from 100% chamotte to 100% biomass bottom ash. The tests performed on these sample were the usual physical tests for ceramic materials, in particular the compressive strength test, as well as colorimetric tests. The possibility of producing geopolymers with biomass chamotte and bottom ash as a replacement for conventional ceramics was confirmed, developing a material that is economical, sustainable, without major equipment modifications, and of similar quality to those traditionally used for bricks. Mechanical tests reflected a perfect quadratic curve, with a maximum of about 60% biomass bottom ash in the mixture. However, almost all the specimens showed an adequate strength behaviour according to current standards. Geopolymers with acceptable results are formed with 40% BBA and 60% chamotte up to 70% BBA and 30% chamotte, the optimal combination being 60% BBA and 40% chamotte. Based on this study, it can be concluded that it is possible to produce green bio-geopolymers with physical, mechanical and aesthetic characteristics similar to those of traditional ceramics. Also, it is observed that also in GP technology the reuse of waste from the agricultural production of almonds is a viable solution to manufacture novel, more sustainable materials, also reusing a number of industrial by-products and low gas emissions of the production process, with appropriate characteristics and composed entirely of waste.

REUSE OF ALMOND SHELLS WITH NATURAL FIBRES

In this section, the scientific literature that focused on the reuse of almond shells combined with different fibres typologies is presented. Once again, it is underlined the few studies focusing on the topic.

Paper	**Bio Waste**
Chaudhary A. K., Gope P. C., Singh V. K., Water absorption and thickness swelling behavior of almond (Prunus amygdalus L.) shell particles and coconut (Cocos nucifera) fiber hybrid epoxy-based biocomposito, Science and Engineering of Composite Materials 22 (2015), 375-382.	Almond shell, coconut fiber
Singh V.K., Bansal G., Negi P., Bisht A., Characterization of flexural and impact strength of jute/almond hybrid biocomposite, Journal of Testing and Evaluation 45 (2016),763-772.	Almond shell, jute fiber

Ramraji K., Rajkumar K., Sabarinathan P., Tailoring of tensile and dynamic thermomechanical properties of interleaved chemical-treated fine almond shell particulate flax fiber stacked vinyl ester polymeric composites, Proceedings of the institution of mechanical engineers 233 (2019), 375-382.	Almond shell, woven flax fiber
Durowaye, S.I., Lawal, G.I., Sekunowo, O.I., Okonkwo, E.G., Synthesis and characterisation of hybrid polyethylene terephthalate matrix composites reinforced with Entada Mannii fibre particles and almond shell particles, Journal of King Saud University - Engineering Sciences 31(4) (2019), 305-313.	Almond shell

Based on the experimental results of Durowaye et al. (2020) [19] it can be stated that the mechanical properties of hybrid composites are superior to mono-reinforced composites, thus demonstrating the effectiveness of hybridization and synergy between tropical almond shell ash and Entada Mannii fibre particles. Environmentally friendly and biodegradable hybrid polyethylene terephthalate matrix composites - reinforced with Entada Mannii fibre particles and almond shell particles - could be a suitable replacement for non-biodegradable synthetic fibre composites and are suitable for non-structural applications without polluting the environment. Laboratory steps began with water maceration to separate the fibres from other components of the bark. The fibres were then soaked in water for 2 weeks during which the comb-like substances. that bound the fibres with other plant tissues, were softened and degraded by microorganisms. Subsequently, the fibres were washed with clean water and dried under the sun for 2 days. Surface modification of the fibres was performed using sodium hydroxide (NaOH) of different concentrations. Alkali treatment (mercerization) is one of the most widely used chemical treatments for natural fibres useful to reinforce thermoplastics and thermosets. In alkaline treatment, the fibres are immersed in a NaOH solution for about half an hour. That caused the disruption of hydrogen bonding in the network structure, thus increasing the surface roughness. The samples were washed in acetic acid and then with distilled water. Acetic acid was used in order to dilute the effect of NaOH. The ratio of NaOH used to fibre was 1:20 (w/v). Almond shells were washed in clean water to remove dirt, dried in the sun for one day, and ground into fine powder. The powder was packed in a graphite crucible and baked in a controlled atmosphere using an electric muffle furnace at a temperature of 600 °C for 5 h. They were then sieved and placed in a sealed bag to avoid any undesired absorption of moisture before use. In composite production, treated and untreated Entada Mannii fibre were dried in an oven at 65 °C and cut into an average length of 0.5 mm. The weighed amount of matrix (made of polyethylene terephthalate pellets) was placed in a crucible, loaded into an oven, and heated at 750 °C until a molten form was obtained. Measured proportions of the mixture of charred tropical almond shell ash (TASA) and treated Entada Mannii fibers were added to the molten matrix and stirred thoroughly for 10 min using a long stainless-steel tongs to avoid clumping and achieve faster distribution of the matrix reinforcement. The composite suspension was constantly poured into the wooden mould. They were allowed to solidify by cooling, demoulded. Such experimental procedure was repeated in the manufacture of the untreated Entada Mannii fibre composite specimens.

Chaudhary A.K. et al. (2015) [20] carried out another study aimed at the production of panels composed of almond shells, coconut fibre and epoxy resin (in different weight ratios). Main objects of the study were the water absorption and the swelling of the material. Almond (P. amygdalus L.) shells, coconut fibre (C. nucifera) purchased from the local market in Jammu (India), supplied tricresyl phosphate and epoxy resin were used for this research. During the preparation step, the almond shells were firstly cleaned of any residues and impurities by running water, then crushed and dried in an oven at 70 °C for 2 h to remove all traces of moisture. The waste shells were crushed and reduced to powder, using a Wiley mill, to a size of 1.18 ± 0.06 µm. The coconut fibre was also dried in an oven at 70 °C and cut to the size of 2 and 3 mm, with an average diameter of 21 ± 4 µm. A hardener (branded HY-951) was mixed with a 10 wt.% ratio with the resin (CY-230) along with 0.5 wt.% of tricresyl phosphate, used as a plasticizer, flame retardant, and waterproofing agent. The resulting solution was

kept in an electric oven at a temperature of 90 ± 10 °C for a total time of 2 h. Every 30 min the compound was kept out of the oven and stirred using a high-speed mechanical stirrer. After 2 h, the entire solution was removed from the oven and allowed to cool to a temperature of 45 °C, subsequently 10 wt.% of HY-951 hardener was added. Finally, the material was poured into 400x400x10 mm sized moulds for sample preparation. With regard to mechanical tests, opposite results were obtained (as already seen in the previous study), showing how a higher amount of agri-food waste negatively affects the breaking strength. The addition of coconut fibres, however, made the material more ductile without reducing its stiffness. It was also noted that the addition of tricresyl phosphate significantly increased the fracture toughness of the material, achieving better results than the other samples.

Regarding the use of plant fibres used to produce composite materials, another study by Singh V.K. et al. (2016) [21] aimed at manufacturing a hybrid composite consisting of almond shell and jute fiber, reinforced with epoxy resin modified with 1 wt.% of depolymerized natural rubber (DNR), using the hand lamination technique. Locally sourced almond shells and jute fibre, previously cleaned to remove impurities, were used during process. The fibres were cut in order to have three different lengths (5, 10, and 15 mm); the almond shells were crushed and ground in order to obtain a very fine powder, with a granulometry of 125 m or more. They were then treated with an alkaline solution containing 5% NaOH for 8 h at 30 °C, then washed thoroughly with distilled water and placed in an oven at 70 °C for about 4 h to remove the moisture present. The epoxy resin (CY-230) was kept in the oven at a temperature of 90 ± 10 °C for about 1 h and allowed to cool to a temperature of 45 °C, and 10 wt.% of hardener (HY-951) was subsequently added. Almond shells and jute fibres were added in various percentages by weight, stirring the solution manually or by using a mechanical stirrer. Finally, it was poured into moulds sized 220x200x20 mm, that were sealed by bolts and pressed with a weight of 25 kg for 2-3 days. Finally, the samples were removed from the moulds and left at room temperature for another 2-3 days, obtaining the various samples for laboratory tests. Observing the morphology, it can be noted that an increase in the percentage of almond shells and jute fibres causes a weak bond between the fibres themselves and the matrix, causing failure and even breakage. At the same time, the flexural strength tends to decrease with increasing fibre quantity. Moreover, such decrease tended to improve further with excessively long fibres (15 mm), due to the greater presence of defects contained in the fibre itself, making it easier to break. The best results were obtained for fibres of 10 mm in length. The alkaline treatment affected the properties of the composite, removing natural wax, hemicellulose, pectin, lignin and other impurities. Therefore, the surface of the samples appears less smooth and rougher. The properties of the alkaline-treated fibre composite are therefore better than those of the untreated fibre composite, improving adhesion and strength. The addition of rubber, which has excellent toughness, also resulted in an increase in the impact strength of the composite. From investigations, the best ratio appears to be 15 wt.% of almond shells and 5 wt.% of jute fibre. Of particular relevance is the length of the fibre, which would tend to positively influence the flexural strength, provided that a proper ratio can be found between the length and the defects present, which may develop the opposite reaction (decreasing the flexural strength). Natural fibres have several impurities on the surface, but if these were removed, they made the surface rougher, improving adhesion strength and leading to better mechanical, thermal and physical properties. Therefore, it seems that if the fibres are treated with alkaline substances the properties of the materials improved, moreover the length of the fibres would tend to positively influence the mechanical strength of the specimens.

Laboratory tests by Chaudhary A. K. et al. (2015) [22. showed that water absorption and swelling are closely related to the amount of agri-food waste present in the mix, which increase in relation to the weight percentage of almond shells or coconut fibre. In particular, it was observed that samples containing coconut fibre waste had higher values due to the higher amount of cellulose contained in them. On the other hand, the impact strength tended to be higher for samples with a lower presence of fibres (since they decrease the internal adhesion force) and with a higher content of almond shells, since they prevent dislocations and cracks in the material. So, the incorporation of jute fibre and almond shell particles to the epoxy resin resulted in a consistent decrease in the

flexural strength for the samples with a higher amount of fibres, as already shown in other studies, while the impact strength is improved with the presence of almond shells.

An interesting result is found in the contribution of Ramraji K. Et al. (2019) [23]. In this study, the treated almond shell and flax fibre composite showed significantly superior damping characteristics. This could be due to the improved adhesion between the matrix and the reinforcements. An addition of almond shell particulate positively increased the strength and stiffness of the composites. Natural fibre and particulate have been exploited to obtain eco-friendly products for the construction and automotive sectors. In this work, woven flax fibres (0° and 90°) and almond shell particles were used. They were treated separately with an alkaline and acetylene chemical solution. Polymer composite laminates were prepared by using a vinylester resin as a matrix and stacking interleaved flax fibres and almond particles in an alternative sequence using the manual layering technique. The composite laminates were fabricated by varying the weight fraction of almond shell particulate by 0%, 5%, 10%, and 15%. Dynamic thermomechanical analysis was conducted on the treated and untreated composites at different frequencies for evaluation of damping characteristics.

CONCLUSIONS

Worldwide, the issue of sustainability should be pursued through the experimentation and application of biomaterials and components specifically designed and tested with the aim of producing new products that might improve the quality of human life and generate a novel way of living and intending the buildings. A deep knowledge of the problems related to the various biomaterials and components, intended for architecture, are fundamental in order to understand the problems inherent the production, implementation and the related construction methodologies, with particular reference to the sustainability of the intervention, the compatibility of the new biomaterials with the components of the traditional or more advanced building organism, as well as the expected performance and the improvement of the construction quality. Furthermore, particular attention must be paid to the methods of implementation as well as to the evaluation of the qualitative and economic aspects of the architectural and executive project which can evaluate the results obtainable with optimum reliability based on the criteria for choosing the various solutions.

In this paper we have preliminary investigated the scientific community interests towards the reuse of almond shell that seems promising and highly innovative. Literary review has shown that the reuse of such waste is not very well investigated for applications in construction, moreover the use of organic fibre waste, along with the shell, is very poor. Hence, there is a strong need in boosting the research towards this direction, not only to find novel technological solutions and alternatives to usual disposal and/or incineration but also to improve the sustainability of the construction sector.

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EUROPEAN ACTIONS TO IMPROVE THE BUILDING ENERGY EFFICIENCY: STATE OF THE ART OF THE TECHNICAL STANDARDS

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ABSTRACT

This paper is aimed at reviewing the state of the art of the European technical normative implementation during the last decades concerning the building energy efficiency. Indeed, it is well acknowledged that the present building stock is largely obsolete and inefficient: in the European context alone, around 75% of the buildings is not energy efficient and most are expected to be in use until 2050. Consequently, buildings require not only a general rehabilitation, to extend, or even avoid, its end-of-life time, but also a complete afterthought of their energy performance. That is extremely urgent to improve the overall sustainability of the construction sector that, alone, is one of the main energy consumers. Improving the building energy efficiency means decreasing the overall energy requirement that, in turn, will generate less pollution connected to electrical production, thus a more sustainable society in line with the European Green Deal and the Agenda 2030.

KEYWORDS: Energy efficiency & improvement, green deal, building rehabilitation, technical normative & classification.

1. INTRODUCTION

The construction sector in Europe shows a great number of activities, and economical drawbacks, to improve the present built stock [1]. Many are the factors influencing this trend: the presence of many historical and monumental buildings, the aging of the housing stock, the absolute need to improve the energy buildings efficiency, the increasing social demand for a better accessibility and comfort, the boost of the circular economy, the possible impact due to the rehabilitation on people life, social cohesion and inclusion, etc.

Focusing on the building energy efficiency, the building sector is one of the largest consumers of energy in Europe. The use of buildings accounts for 36% of CO_2 emissions while 75% of the park built is highly inefficient, as it was built before the introduction of the energy regulations, and most of them will be in service at least till 2050 [2-4].

In accordance with the main goals of the United Nations 2030 Agenda is the global urban regeneration aimed at making cities safer, more inclusive, resilient and sustainable [5,6]. At the same time, fostering the existing buildings renovation has become of primary importance to reduce the overall energy consumptions and to reach a sustainable, competitive and de-carbonized energetic system for the planet. Then, a number of international agreements, such as the Climate Summit COP21 (Paris, 2015) [7-9] or the recent European Directive on energy efficiency of buildings (2018/844) [10-12], have been issued.

In any case, nowadays the building renovation is a preeminent priority of the "Renovation Wave" and the "Green Deal", flagship initiatives under the European Union (EU) (figure 1) for the construction sector, supported with about 600 trillion Euro investments [13]. The Member States are strongly encouraged to boost the building renovation as a top priority in their national Recovery and Resilience Plans, aiming at rehabilitating millions of buildings in Europe over the next decade. The objectives are pretty clear: boost the EU economy, improve the quality of life in citizens' homes and move towards the climate neutrality by 2050, in accordance with the international trends and recommendations. Thus, national directives are oriented towards the mobilization of private and public investment, supporting the green and digital recovery, and a clean energy (and environmental) transition (figure 2).

This paper is aimed at reviewing the evolution of the technical normative, and the main recommendations, across the EU. A special focus will be directed towards the Italian and Spanish present situation as case studies.

Figure 1. *The European Green Deal.*

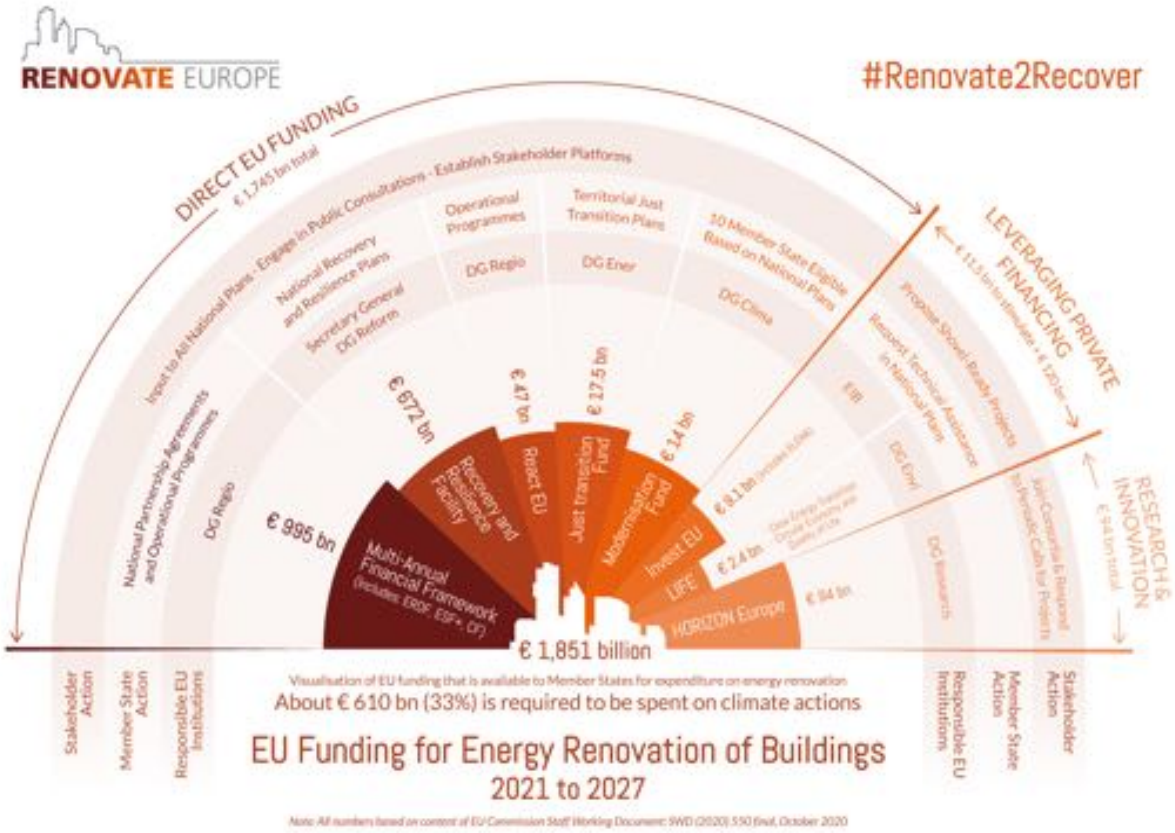

Figure 2. *EU funding for energy renovation of buildings (2021-2027).*

2. TOWARDS NZEB BUILDING: EVOLUTION OF THE EUROPEAN FRAMEWORKS

This section is aimed at reviewing the major normative at European level to improve the efficiency of buildings for a better society and, boosting the exploitation of renewable resources vs. non-renewable ones, for a more sustainable development (figure 3).

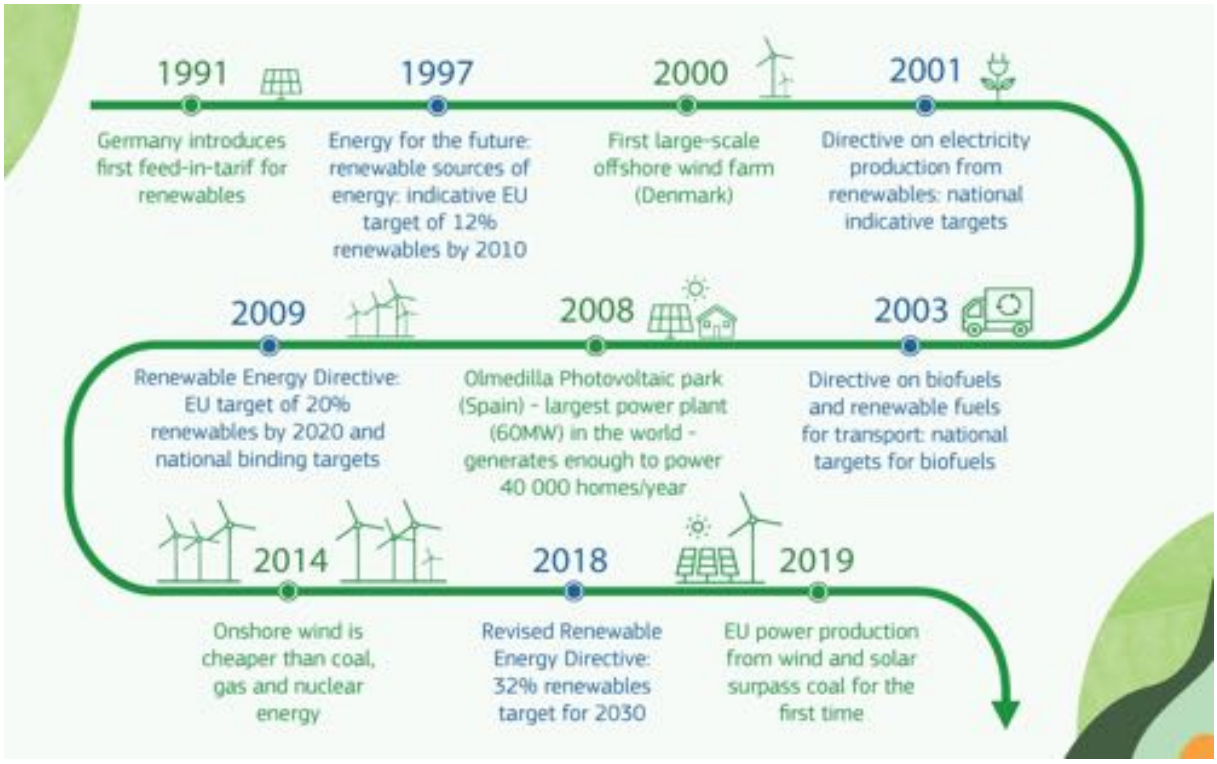

Figure 3. *Renewable energy milestones in EU.*

2.1 DIRECTIVE 2009/28/EC ON THE PROMOTION OF THE USE OF ENERGY FROM RENEWABLE SOURCES [14]

Also known as directive RES (Renewable Energy Sources – figure 4), it demands to each Member State to adopt a National Action Plan (NAP) to set the shares of consumption of energy from renewable sources for 2020 by sector, in accordance with the national targets set for that date (17% for Italy).

Figure 4. *Renewable energy sources.*

2.2 DIRECTIVE 2009/125/EC FOR THE ECO-DESIGN OF ENERGY-RELATED PRODUCTS [15]

establishes requirements for products design and manufacture in order to reduce the overall energy consumption (eco-design).

provides specifications for the energy-related products, object to the measures of implementation, that must comply with in order to be placed on the market and/or for their commissioning.

contributes to the sustainable development by increasing the energy efficiency and the level of environmental protection, while - at the same time - improving the security of energy supply.

still does not apply to transport for passengers or goods.

is aimed at the entire life cycle of the product (figure 5).

Figure 5. *Life cycle of the product EU Commission on Life Cycle)*

This Directive, and the related adopted implementing measures, does not affect the Community legislation on waste management and the Community legislation on chemicals, including the one on fluorinated greenhouse gases. Also, by directly affecting the market and the manufacturing companies, appeared to be effective from both an environmental protection and an energy efficiency points of view.

2.3 DIRECTIVE 2010/31/EU ON THE ENERGY PERFORMANCE OF BUILDINGS [16]

Substituted the Directive 2002/91/EC of the European Parliament and of the Council of 16-12-2002 on the energy performance of buildings, better known as *Energy Performance Building Directive* (EPBD) (figure 6). The normative introduced provisions on nearly zero energy buildings, called Nearly Zero Energy Building (NZEB), NZEB buildings, that are built according to the principles of sustainable and bioclimatic design, integrated into the context, able to make the most of the natural renewable resources - such as the sun and wind - adequately insulated, powered by renewable energy sources and equipped with technologically advanced systems; and provisions on forms of tax incentives.

This directive promoted:

a methodology to calculate the energy performance of buildings;

the minimum energy performance requirements, differentiated by:

Newly built buildings, where the minimum requirements mainly concern high efficiency alternative systems, such as: decentralized energy supply systems based on energy from renewable sources, cogeneration, district heating and urban or collective district cooling, heat pumps;

Existing buildings, where the necessary measures are taken to ensure that their energy performance, or parts of them, intended to undergo major renovations is improved in order to meet the minimum energy performance requirements set to be technically, functionally and economically feasible.

Technical building systems, where the requirements consider: heating systems, hot water production systems, air conditioning systems, large ventilation systems.

Nearly zero energy buildings.

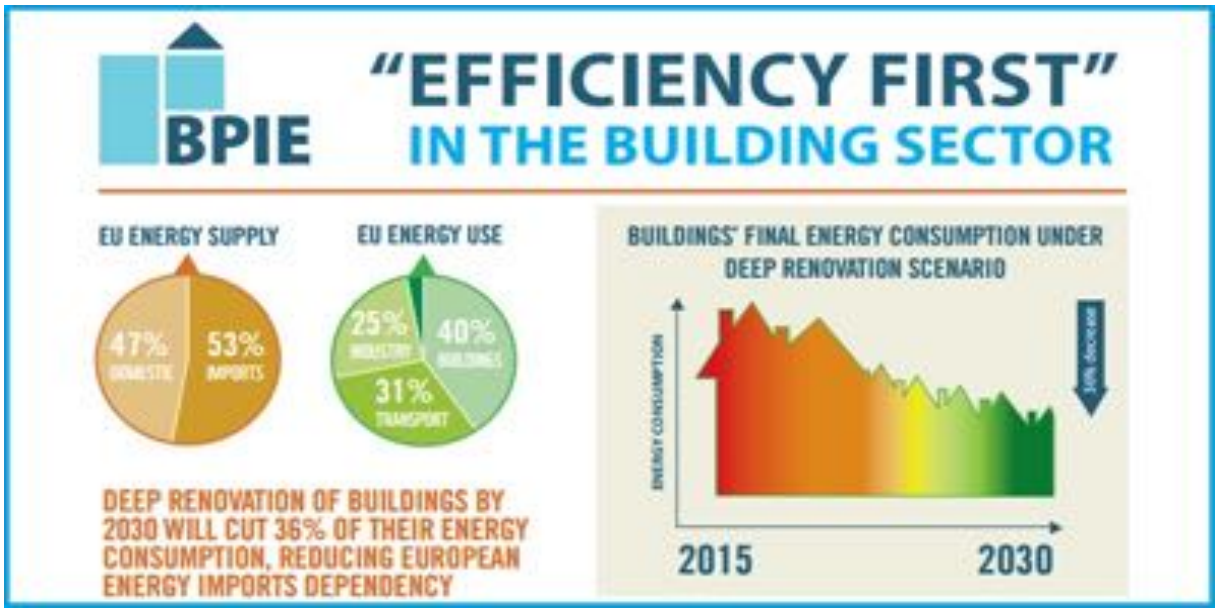

Figure 6. *Energy Performance Building Directive "Efficiency first in the building sector".*

The normative provided guidelines for:

issuing an energy certification of buildings;

annual inspection of the facilities.

In addition, it signs provisions on the energy labeling (figure 7):

Substituted and subsequently updated by the 2017/1369 / EU standard.

Established how virtuous products from an energetic point of view must be presented to consumers to encourage their purchase, through:

advertising of specific product models related to energy and governed by specific acts provided by the directive itself;

products promotion describing specific technical parameters and providing the users with the necessary information on the energy consumption;

disclosure of information relating to the possibility of using forms of alternative energy.

Energy labelling applies to insulating panels and windows.

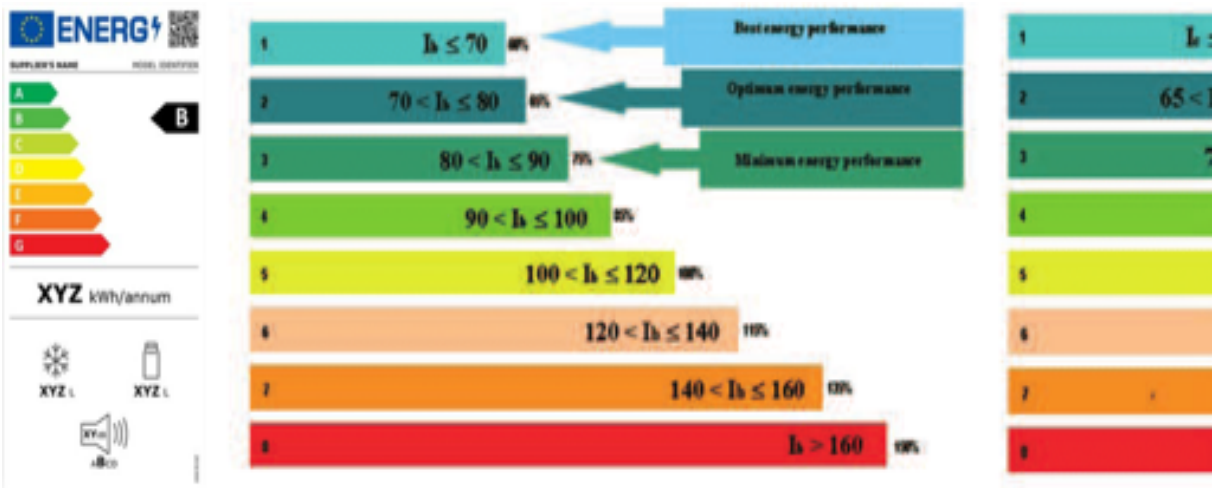

Figure 7. *EU energy labelling scheme.*

2.4 DIRECTIVE 2012/27/EU ON ENERGY EFFICIENCY [17]

This directive:

specifies that the States Member must provide an overview of each national building stock;

assigns a fundamental role to public buildings or to private ones if used by public bodies;

encourages central governments to purchase only energy-efficient products, services and buildings.

2.5 UNI/TS 11300-1:2014 ON ENERGY PERFORMANCE OF BUILDINGS, DETERMINATION OF THERMAL ENERGY NEEDS [18]

This technical specification provided data and methods (figure 8) useful to determine the buildings' thermal energy requirements in summer and winter, with a special regard to the air conditioning need.

Figure 8. *Building improvements as foreseen by UNI/TS 11300-1:2014.*

The norm defines the methods to be followed for the application of the standard UNI EN ISO 13790:2008 "Energy performance of buildings - Calculation of energy needs for heating and cooling", subsequently replaced by UNI

EN ISO 52016-1:2018 “Energy performance of buildings - Energy requirements for heating and cooling, internal temperatures and sensitive and latent thermal loads”, which updates the methodology to be followed for calculating the thermal energy needs as follow:

revision of the method for calculating the monthly energy needs of buildings, where the seasonal approach was eliminated, i.e. the identification of the heating and cooling periods on the basis of a balance between energy loss and contribution of the envelope;

replacement of the simplified time method with a more detailed time approach;

novel and more articulated criteria for thermal zoning.

The normative is aimed at considering and analysing all the possible applications envisaged by UNI EN ISO 13790:2008 which were evaluated through different types of calculation energy assessment, such as:

design rating: project calculation;

asset rating: building energy assessment through calculation under standard conditions;

tailored rating: building energy assessment through calculation under climatic and operating conditions.

2.6 DIRECTIVE 2018/2002/EU ON ENERGY EFFICIENCY [19]

The directive aims at removing any barriers on the energy market and overcoming the market failures that hinder efficiency in the supply and use of energy. It also provides national energy efficiency targets and contributions for the years 2020 and 2030 (figure 9). It also aims at implementing an information plan on the consumption for heating and cooling in order to promote the active role of consumers and increase the frequency of information by introducing the obligation of remote readability of heat meters.

Moreover, amending the directive 2012/27/2002, it:

updates the Union's headline energy efficiency targets: 20% by 2020 and at least 32.5% by 2030;

Member States must guarantee annual savings of 1.5% in volume of average annual energy sales to final customers up to 31-12-2020 (data not yet updated). this new directive extends the scope of this rule until 2030;

annual savings must also be made for 10-year periods after 2030 unless the European Commission (based on reviews that will be done by 2027, and every 10 years thereafter) observes that it is not necessary “to achieve the Union's long-term objectives on energy and climate for 2050”.

Figure 9. *2020-2030 targets.*

2.7 DIRECTIVE 2018/844/2002 ON ENERGY PERFORMANCE IN BUILDINGS AND DIRECTIVE 2012/27/EU ON EFFICIENCY [20]

The goal of this directive is continuing "the development of a sustainable, competitive, safe and de-carbonised energy system", considering that about the 36% of all CO_2 emissions of the EU are attributable to the building stock.

Figure 10. *#EUGreenDeal*

To achieve the objectives, some innovations are therefore introduced, among the most important:

interventions, to be effective, should provide an average rate of renovation of buildings equal to 3% per year. considering that each percentage point of improvement in energy saving allows a reduction in gas imports by 2.6%, the planned intervention would speed up the energy independence of the Union.

introduces an "indicator of readiness of buildings to intelligence" that should measure the buildings ability to use information and communication technologies as well as electronic systems to adapt their functioning to the occupants needs, to the network, and to improve the energy efficiency and the overall performance of buildings.

the indicator of the readiness of buildings to intelligence should raise the awareness of owners and occupants of the value of the building automation and electronic monitoring of technical building systems and should reassure occupants about the real savings of these new improved features.

intervention to foster the sustainable mobility, providing measures to promote electric mobility, envisaging forms of incentives available for the construction of infrastructures in order to facilitate the recharge of electric cars in both new constructions and building object to major renovations.

2.8 UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS [21]

Following a series of negotiations, on 25 September 2015, the 193 countries of the United Nations General Assembly adopted the 2030 Development Agenda titled "Transforming our world: the 2030 Agenda for Sustainable Development" intended as a blueprint to achieve a better and more sustainable future for all people and the world by 2030". That document outlines the 17 Sustainable Development Goals, associated to 169 targets and 232 indicators. The Sustainable Development Goals (SDG) is a collection of 17 interlinked global

goals intended to be a blueprint to achieve a better and more sustainable future for the entire planet (figure 11). The 17 SDGs are: 1) No Poverty, 2) Zero Hunger, 3) Good Health and Well-being, 4) Quality Education, 5) Gender Equality, 6) Clean Water and Sanitation, 7) Affordable and Clean Energy, 8) Decent Work and Economic Growth, 9) Industry, Innovation and Infrastructure, 10) Reduced Inequality, 11) Sustainable Cities and Communities, 12) Responsible Consumption and Production, 13) Climate Action, 14) Life Below Water, 15) Life On Land, 16) Peace, Justice, and Strong Institutions, 17) Partnerships for the Goals. On 6 July 2017a novel resolution was adopted in order to boost the action, identifying specific targets for each goal, along with indicators that are used to measure the progress toward each target, that should be achieved is between 2020 and 2030.

Figure 11. *UN Sustainable Development Goals.*

Among the various SDGs, the most interesting for our porpoises are:

Goal 7: Affordable and clean energy. "Ensure access to affordable, reliable, sustainable and modern energy for all". The idea is granting access to affordable and reliable energy while increasing the share of renewable energy in the global energy mix. In particular, by 2030 five targets need to be achieved: 1) universal access to modern energy, 2) increase global percentage of renewable energy, 3) double the improvement in energy efficiency, 4) promote access to research, technology and investments in clean energy, and 5) expand and upgrade energy services for developing countries. All of that will involve improving the energy efficiency and enhancing the international cooperation to facilitate more open access to clean energy technology and more investment in clean energy infrastructure.

Goal 9: Industry, Innovation and Infrastructure. "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation". SDG 9 is implemented with eight targets: 1) develop sustainable, resilient and inclusive infrastructures, 2) promote inclusive and sustainable industrialization, 3) increase access to financial services and markets, 4) upgrade all industries and infrastructures for sustainability, 5) enhance research and upgrade industrial technologies, 6) facilitate sustainable infrastructure development for

developing countries, 7) support domestic technology development and industrial diversification, 8) universal access to information and communications technology.

Goal 11: Sustainable cities and communities. "Make cities and human settlements inclusive, safe, resilient, and sustainable". The idea is decreasing the number of people living in (urban) slum dwellers whose number, it was calculated, reached more than 1 billion in 2018, which is about the 24% of the entire urban population. Moreover, giving a convenient access to public transport and improve the transport system more sustainable and resilient. SDG11 is divided into 10 targets and 14 indicators: 1) adequate, safe, and affordable housing and basic services and upgrade slums, 2) safe, affordable, accessible, and sustainable transport systems, 3) enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries, 4) strengthen efforts to protect and safeguard the world's cultural and natural heritage, 5) reduce the number of deaths and the number of people affected by disasters and decrease the direct economic losses relative to global gross domestic product caused by disasters, 6) reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management, 7) provide universal access to safe, inclusive and accessible, green and public spaces, 8) support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning, 9) increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk managements at all levels, 10) support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.

Goal 12: Responsible consumption and production. "Ensure sustainable consumption and production patterns". This SDG has 11 targets: 1) implement the 10-Year Framework of Programs on Sustainable Consumption and Production Patterns; achieve the sustainable management and efficient use of natural resources, 2) reducing by half the per capita global food waste at the retail and consumer levels and the reduction of food losses along production and supply chains, including post-harvest losses, 3) achieving the environmentally sound management of chemicals and all wastes throughout their life cycle, 4) reducing waste generation through prevention, reduction, recycling and reuse, 5) encourage companies to adopt sustainable practices, 6) promote public procurement practices that are sustainable, 7) ensure that people everywhere have the relevant information and awareness for sustainable development, 8) support developing countries to strengthen their scientific and technological capacity, 9) develop and implement tools to monitor sustainable development impacts, 10) remove market distortions, like fossil fuel subsidies, that encourage wasteful consumption. All of that means promoting national policies for sustainable consumption and production patterns, reduction of global fossil fuel exploitation, of carbon dioxide emissions, and waste generation by increasing the circularity in economy.

Goal 13: Climate action. "Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy". It has 5 targets: 1) strengthen resilience and adaptive capacity to climate-related disasters, 2) integrate climate change measures into policies and planning, 3) build knowledge and capacity to meet climate change, 4) implement the UN Framework Convention on Climate Change, 5) promote mechanisms to raise capacity for planning and management. All of that to decrease the climate change and its impact in the national economies and, consequently, in human lives, especially those in vulnerable conditions.

3. ITALIAN NORMATIVE FRAMEWORK

In Italy, a number of normative useful to improve the energy efficiency in buildings have been issued since the 1970s also in line with the evolutions of the European Directives. Recently, to cope with the epidemiological

emergency from Covid-19 and try to make the national economy start to grow again, the “Relaunch decree” was issued [22]. That was recently prolonged till 2025 with the 2022 “Budget Law”, providing different deadlines, with constant reduction every year, depending on the subjects who support the eligible expenses. This framework allows a “super bonus”, a tax relief consisting of a 110% deduction of the expenses incurred - starting from 1 July 2020 - for the implementation of specific interventions aimed at energy efficiency and static consolidation or the reduction of the seismic risk of buildings. The facilitated interventions also include the installation of photovoltaic systems and infrastructures for charging electric vehicles in buildings. The subsidy goes alongside the deductions, already in force for many years, due for the energy requalification of buildings (eco-bonus) and for those for the recovery of the building heritage, including anti-seismic ones (sismabonus), currently governed, respectively, by the articles 14 and 16 of the Decree-Law n. 63/2013. The Superbonus divides the interventions into two macro-categories [23]: main or leading and additional or towed. Among the first category, the bonus is due for 1) thermal insulation interventions, 2) replacement of the air conditioning systems on the common parts of multi-storey buildings, 3) replacement of air conditioning systems in single-family apartment or property units that are functionally independent, and 4) anti-seismic interventions. Among the towed interventions: 1) energy efficiency interventions, 2) installation of photovoltaic solar systems and storage systems, 3) infrastructure for charging electric vehicles, and 4) elimination of architectural barriers [24]. The effects of such Superbonus widespread application, resulted in an immediate recovery of the construction sector by a proliferation of professional firms, construction companies, and construction sites across all the territory. At the same time, there is a consequent impact on the affiliated secondary sectors. On the other hand, that has led to a progressive increase of raw materials and commercial products costs, that – moreover - are increasingly less available on the market. While this is evidently contributing to the economic recovery, conversely, it has generated an anomalous situation that will necessarily terminate in the short term. It is expected that, with the end of such incentives, a rapid recession may happen with a consequent excess of specialized workforce (engineers, architects, technicians, hand workers, etc.) who will not be able to find an easy relocation. The solution could be an institutionalization of these funds, maybe of a smaller entity but spread over a longer period.

4. SPANISH NORMATIVE FRAMEWORK

In the last decades, professionals in Spain had to cope with a confusing regulation framework arisen from the existence of many administration bodies with similar competencies in the energy retrofitting sector along with an unclear refurbishment policy [25, 26]. Moreover, despite the availability of some public financial support, such state of confusion caused a very few requests. According to data from the latest Population and Housing Census of the National Institute of Statistics, more than half of the Spanish residential building stock is dated before 1980, that is prior to the first regulation on the building energy requirement. Actually, that affects about 5.5 million residential buildings and about 9.7 million primary residencies [27]. In 2015, the Law on Land and Urban Rehabilitation (Royal Legislative Decree 7/2015) was issued to strengthen the powers of owners with full legal capacity for credit operations, related to building maintenance, renovation, and improvement. Recently, the Government of Spain approved the novel Royal Decree-Law 19/2021 and the Royal Decree 853/2021, to set the normative framework for Recovery, Transformation and Resilience Plan. The first Decree-Law establishes a series of urgent measures to promote building rehabilitation and incorporates tax deductions for works of energy improvement, ranging between 20% and 60% deduction, depending on the level of reduction in energy demand acquired. The latter regulates the aid programs for residential rehabilitation and social housing derived from the ambitious Next Generation EU Recovery Fund, focused on promoting rehabilitation and improvement actions for the building stock, both in urban and rural areas. Finally, with the purpose of increase the rate of rehabilitation works, under the Ministry of Transport, Mobility and Urban Agenda rule, a line of guarantees was created to partially cover the expenses for works of renovation aimed at the energy efficiency improvement in residential buildings. All of that, along with the strategic framework of the Spanish Urban Agenda, shows an

extreme ambitious in the field of energy and sustainability, while promoting comprehensive actions that contribute to improving the quality, state of conservation, accessibility, and digitization of the buildings.

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IMPACT ASSESSMENT OF DESIGNED OBJECTS

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Abstract

We live in a designed world, surrounded by a multitude of objects, the origin of which we know almost nothing about. The study examines the mechanism of action of these designed objects, with the aim of analysing this system and attempting to understand and explore it. It seeks an answer to how these products affect the recipient through visual perception, and what corner points can influence this process. The analysis is based on the basic principles of visual analysis and the eye tracking technology. The article focuses on how different variations can modify the complex, multi-component process of visual inclusion through a few simple image sequences. It is looking for the essential relationships between the material use of the object and its plastic complexity. Understanding and making this process measurable can be a huge advantage, it can make evaluation systems more focused and can help the designers and students in their everyday works.

KEYWORDS: Design, evaluation, visual perception, eye tracking, product design, material, form, preference

INTRODUCTION

We have filled the world around us with objects that accompany us everywhere. Many objects are useful, many are less, and there are some that we keep only out of habit. What is their real, objective value? How can we evaluate them? And especially on what basis should we design new objects? One of the keys to the process is to put object creation on a new footing, where the designer is not only a professional but also a "correlator" who sees through the relationships and interactions and connects the concrete with the abstraction, approaching both from both directions. (Katavolos, 1961) To more accurately capture this process, the subjective system used so far needs to be examined. It is necessary to look for the points where the effect of the change is most intense and to make it measurable and descriptive if possible. To begin this process, the article focuses on the following issues:

- With what intensity and awareness do we observe our objects in our everyday visual perceptions?
- How does the plastic complexity of objects affect the process?
- How does the material use of objects affect the process?
- Where can the process of plastic inclusion be chosen in several directions and how does this affect our opinion-making and preference?

LITERATURE

Numerous summaries of visual perception and the fundamental factors in the functioning of the human eye have been published (Rayner 1983; Carpenter – Robson 1998; Radach et al. 2004; Van Gompel et al. 2007). Although the results obtained in eye tracking research have broken down the development of the field into several eras (Rayner 1998), the terminology used is still problematic. In fact, the less commonly used "gaze tracking" better expresses this phenomenon than the more common "eye tracking" (Steklács, 2014).

Although eye tracking has long been used in advertising, web, and marketing researches (Duchowski, 2007), relatively few studies have been conducted to date on the analytical use of this technique in product design. The most of the research does not focus on the product itself, but on its success or the impact it produces (Kieran, 1997; Postrel, 2001). Many have already tried to find a usable and objective tool to measure this (Zain and Tey, 2008). One reason for the relatively few results is that evaluation requires a combination of art, engineering, and psychology, which are inherently different (Khalid and Helander, 2006). Another reason is that it is also difficult to judge aesthetic value because of emotional and rational considerations (Bloch, 1995; Khalid and Helander, 2006).

Research identifies beauty, appropriateness, and novelty as the most important factors in aesthetics. These concepts have been clarified one after the other: the definition of "beauty" (Kostellow, 2002; Coates, 2003; Norman, 2004) was followed by the definition of "appropriateness" (Chang et al., 2006, 2007) and then the definition of "novelty" (Hung and Chen, 2012). The relationship between these latter two factors is, according to the researchers, the main attraction of the product (Lubart and Sternberg, 1995; Christiaans, 2010). To determine beauty, three more components must be considered: contrast, proportions, and (form) purity (Khalighy et al. 2015). Overall, their optimal use and proportions determine the aesthetic value of an object. Despite research, the visual outcome to this day is still subjective. This is shown by the title of the closing conference of the European Design Innovation Initiative launched by the European Commission in 2011: EuroDesign - Results of Measuring Design (Brussels, 26 June 2014).

THEORETICAL BACKGROUND

The first step in inclusion is visual attention, so the most obvious way to measure the mechanism of action is to examine visual perception. At the first meeting of the recipient and the object, the dominant forms play a major role, as the dominant form first catches the viewer's attention. The form of an object can be analyzed according to its information content at the level of recognition, visuality, or smaller details (Tringali, 1989).

Vision plays a major role in our perception. However, the human eye only sees sharply at a 2-degree angle, so for full sharpness, our eyes must be in constant motion. These jumping movements are the fixations called saccades, and where the movements of the eye stops for 250-500 milliseconds are the fixations. This process is the fastest movement of the human body. (Steklács, 2014). The processing of the visual stimulus has an effect on the observer, which is usually judged by the recipient in the first 10-15 seconds and the like or dislike develops. Our accelerated world is delivering stimuli faster and faster, leaving us with less and less time to reevaluate or consciously shape them. The capacity for stimulus processing is therefore aided by one of the most important functions of visual attention which is the selection. This helps us choose from a lot of stimuli what to pay attention to and where we move our eyes. This process is independent of our consciousness, so we can learn from our eye movement about the process of internal selection and the preference that emerges from it. Visual attention can be measured by eye movement tracking, which can be combined with a simple assessment test. During the procedure, the client sees images on a monitor for a short time, which must be reviewed by the tested person. During the process, a measuring instrument tracks and stores the parameters and paths of the eye movement. The results obtained from the data recorded during the measurement are shown by the analysis software with a color map similar to the heat map, based on the frequency of viewing, with blue and then green areas with fewer, yellow and red areas with the most fixations. Of course, the data can be displayed in tables and in other ways, too (Steklács, 2014).

Experience shows that the result is mainly determined by the image material presented, but the pattern of eye movement is also greatly influenced by the “task” that the client receives. This ensures that valuable information can be obtained from a relatively simple series of images, reflecting the conscious preference of the tested person.

RESEARCH MATERIALS AND METHODS

Several series of tests were developed to measure visual attention, with simplicity and speed. It is not advisable to count more than 5 minutes to measure a person because the attention will also wane and the client will start to get tired, which will affect the result. The focus of the studies is on:

- Basic attention and preference test
- Examination of materials and their preferences
- Examination of materials and selection

During the tests, the clients see images related to the test on a screen, for which they receive simple tasks from the person performing the test. (Eg: the client has to choose from several variations). The images displayed are targeted to these tests and are computer-generated 2D and 3D illustrations.

BASIC ATTENTION AND PREFERENCE TESTING

For the basic attention and preference test, a simple black-and-white illustration divided into four parts (like an equator) was made. Graphics built on a vertical and horizontal axis include four different motifs: a regular circle (West), a regular and solid square (East), a large "gestalt" triangle of three small triangles (North), and an irregular set of three regular circles (South). (Figure 1)

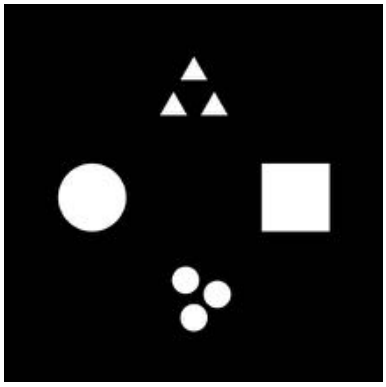

Figure 1

EXAMINATION OF MATERIALS AND THEIR PREFERENCES

The sets consist of spheres reminiscent of four types of material: metal, wood, glass, and plastic, in alternating order. By multiplying the spheres, we increase the effect of plastic complexity, thus providing an opportunity to compare material characters. (Figure 2)

Figure 2

EXAMINATION OF MATERIALS AND SELECTION

For the following series of images, you need to find a hidden cube in sets of spheres and indicate if you have one. Here, too, the four sets are made up of four different materials. Here we seek an answer to the question of the extent to which different materials influence the process of recognition and selection. (Figure 3)

Figure 3

In the second part of the series, you have to find and show three hidden cubes in the sets of spheres. Here again, the four sets are made up of four different materials, but the layout already runs beyond the screen, allowing the measured person to enter the study space, making the task even more complex. (Figure 4)

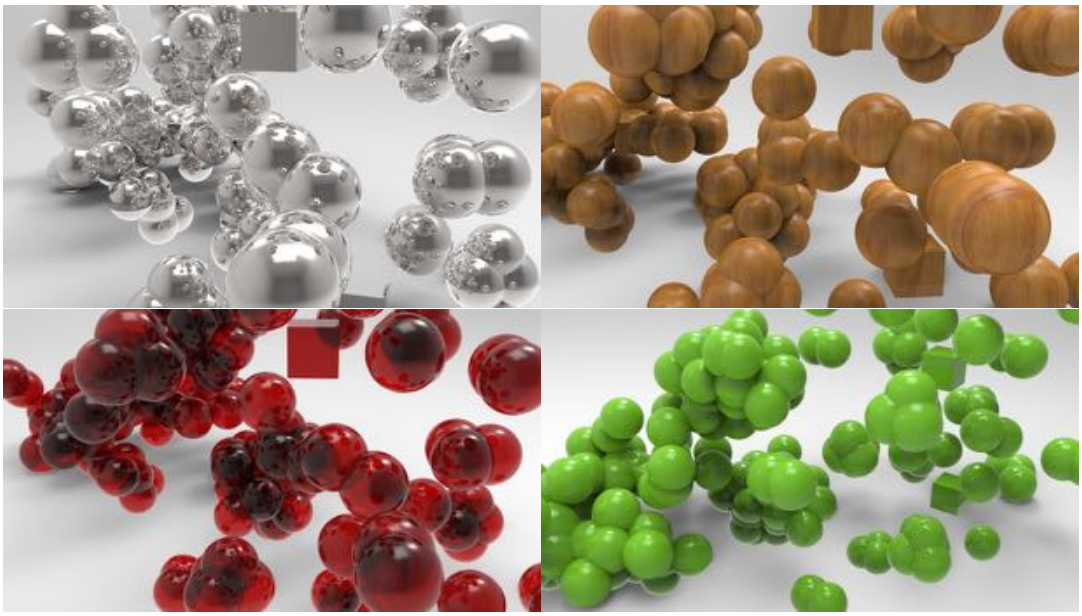

Figure 4

EVALUATION

The low number of tests performed so far is not yet sufficient to show representative results. Nevertheless, it may be interesting to see the trends in the statistics from these measurements:

Distribution of the total measurement by age:

Under 20: 21%, 20-30: 67%, over 30: 12%

Distribution of the total measurement according to the orientation of the right hand and the left hand:

Right handed: 79%, Left handed: 21%

The distribution of hand orientation, on the other hand, is double the official world average (10.6%), which is not special but interesting.

Here are some results from the basic attention and preference test measurements (percentages show the verbal preference distribution, while the figures show eye movement tracking results).

Distribution of the measurement result of the complete sample:

North: 38%, South: 38%, East: 12%, West: 12%

The significant dominance of the preference measured on the vertical axis (North-South) is evident in the whole sample, which is also supported by the pattern of eye movement. (Figure 5)

In contrast, for example, the group of men shows a more homogeneous pattern of preference and attention: North: 34%, South: 24%, East: 20%, West: 22% (Figure 6)

The north orientation of left-handers is interesting, which is particularly high:

North: 71%, South: 0%, East: 29%, West: 0% (Figure 7)

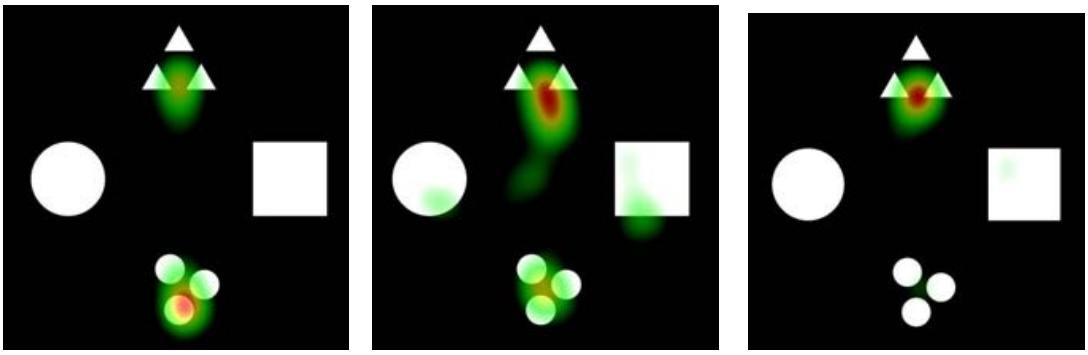

Figure 5-6-7

When examining the materials and their preferences for the simplest plastic complexity, the result of the oral preference was according to the selected raw materials: wood: 75%, glass: 25%, which is also supported by the measurement. (Figure 8)

In the case of a medium-complexity plastic design, the order is unchanged. The result of the oral preference: wood: 85%, glass: 15%, this is confirmed by the measurement. (Figure 9)

In the case of high-complexity plastic design, the situation is reversed, with wood losing its leading position in both verbal and measured preferences. The result of verbal preference: wood: 30%, glass: 60%, plastic: 10%, the measurements already show some variance compared to verbal preferences. (Figure 10)

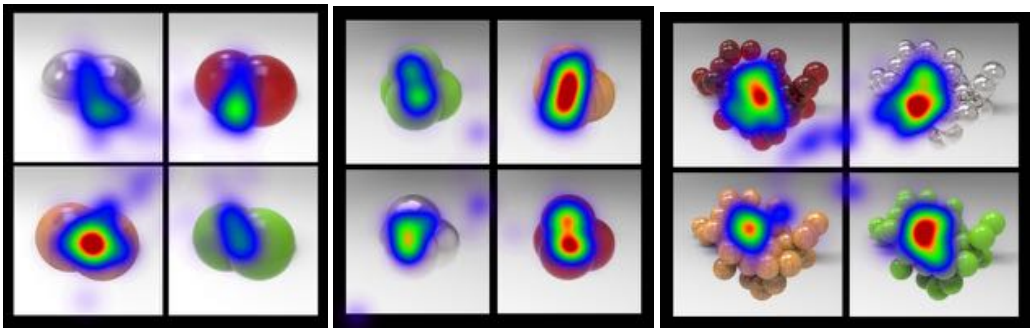

Figure 8-9-10

In the third series, unlike the previous ones, we examined how quickly we find the object we are looking for (i.e., the cube between the spheres). The best results were obtained with the plastic texture, it was followed by glass and metal and only the last place was given to the wood raw material. As we have seen with the increase in plastic complexity: the wood raw material has degraded the time required for the solution. (Figure 11)

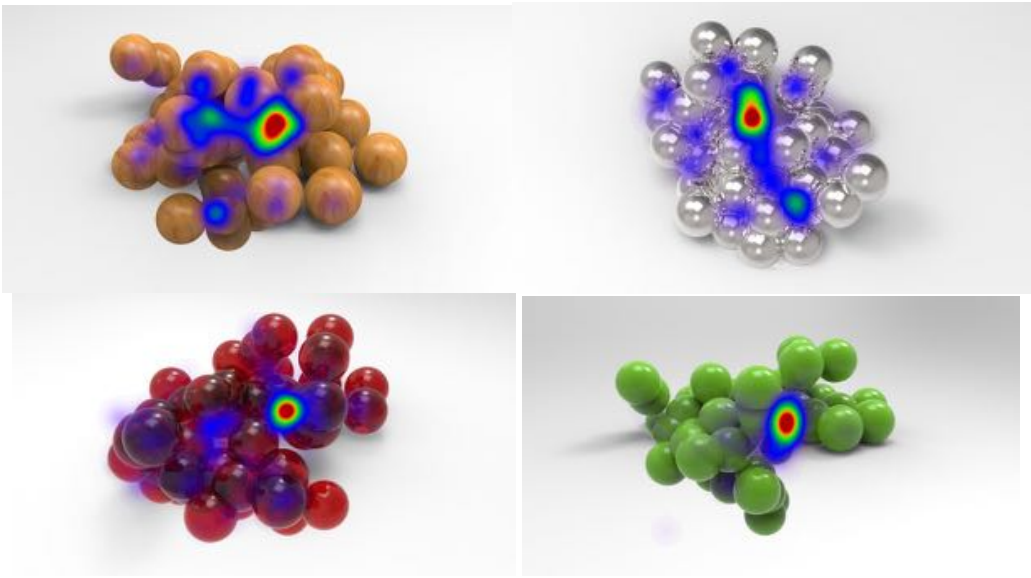

Figure 11

The same structure generated similar results with three hidden cubes and broadening the perspective. (Figure 12)

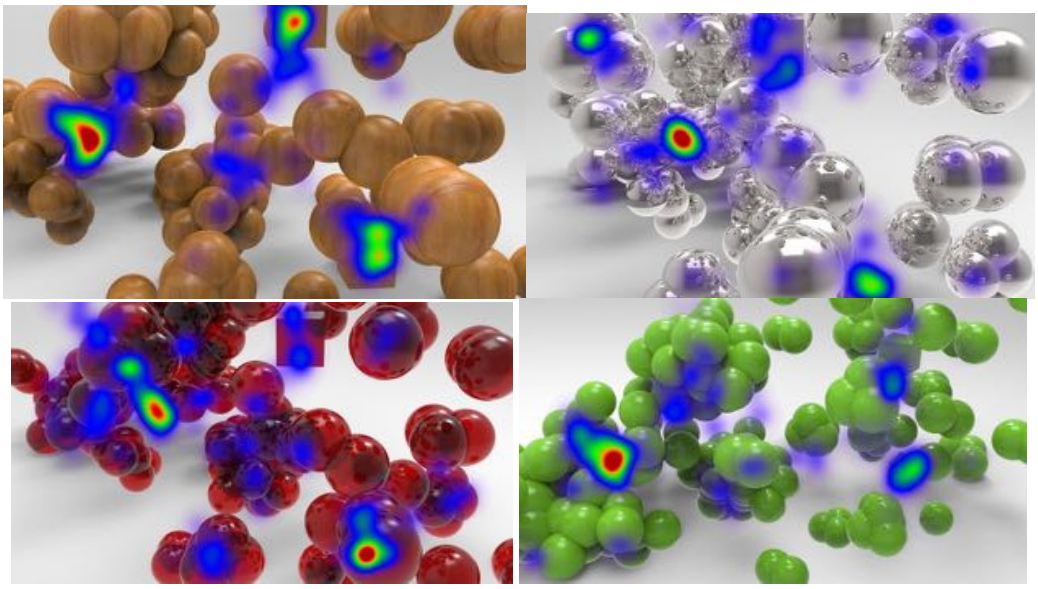

Figure 12

SUMMARY

After the first practical applications of the test series, the first and most important experience is that the measurements give very interesting feedback, which gives encouragement to continue the experiments. As the number of surveys so far is still low and the group of people surveyed is not heterogeneous enough, it would be risky to draw very far-reaching conclusions from the results. However, some striking experiences can still be filtered out, the validity of which is also supported by the fact that the literature is rich in the results of small, experimental measurements:

• Visual attention and the resulting preference are related to the characteristics of the measured persons, so it is worth further research with targeted measurements.

• At low plastic complexity, wood-textured materials are more preferred

• At higher plastic complexity, this advantage is reversed in favor of more homogeneous materials

• When selected, more homogeneous textures can speed up reaction time and improve concentration and resolution

• The plastic complexity and material use of objects correlate with the development of subjective preference

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THE ROLE OF THE ARCHITECTURAL AND URBAN PLANNING COMMUNITY IN THE STRUGGLE FOR THE HASTAHANA PARK SPACE

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ABSTRACT

The area called "Hastahana" is located in the central part of Sarajevo. At this location, in the last years of Ottoman rule, the building of the military hospital was built in 1866, which is why it is called *Hastahana*. The building suffered considerable damage during the last war in 1992-95, after which it was not reconstructed. The site has since been the subject of a number of new construction initiatives that have not been implemented. Since the space has been free of construction for over two decades since 1995, people use it and recognize it as an unorganized municipal park.

The initiative to build the Central Bank of Bosnia and Herzegovina on part of the plot, launched in 2017, provoked reactions from citizens. Civic action for the preservation of Hastahana Park is according to its duration, the number of citizens and civic organizations involved, the presence in the media, etc. the largest organised civil struggle for urban space in Sarajevo from 1995 to the present. In the space decision-making process, the struggle for the Hastahana Park space, the following stakeholders are recognized: citizens, political options in power, investors and the professional architectural and urban community. The paper investigates the role of the urban planning and the architectural community in these processes. An event and stakeholder analysis methodology was used.

INTRODUCTION

Hastahana Park is situated in the central part of the city of Sarajevo, near the main administrative bodies of the State, the Presidency and the Parliament of Bosnia and Herzegovina (Figure 1). The plot extends over 1.2 hectares. A military hospital was built on this site in 1866 during the last years of Ottoman rule in Bosnia-Hercegovina (Figure 2). For this reason, the park bears the name Hastahana (hastane tur. – hospital). By launching the procedure to amend the urban regulation plan for the Hastahana site in 2017, civil action to preserve the park began. Based on duration, number of citizens and civic organisations involved, media presence, etc. it is the largest civil struggle for public space in Sarajevo since Bosnia and Herzegovina became an independent state. In the decision-making process relating to the Hastahana Park, the following stakeholders are identified: citizens, ruling political option, investors/ entrepreneurs and the professional community of urban planners and architects. The role of the architectural-urban community in these processes is examined by the method of analysis of events and the participation of the different stakeholders. Events, attendees and research findings are presented in chronological order.

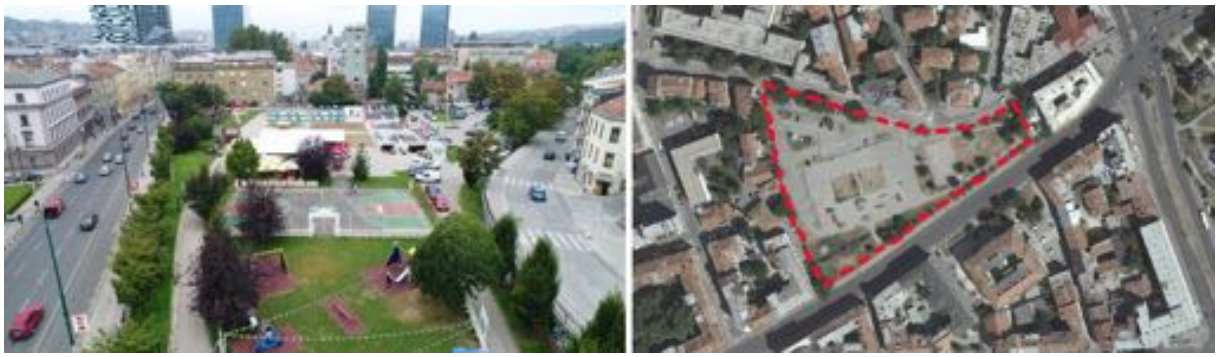

Figure 1. Area of Hastahana Park in the central part of Sarajevo

EVENTS BETWEEN 1995 AND 2017

The building of the military hospital from the Ottoman period, called Hastahana, suffered significant destruction during the 1992-1995 war. The remains of the building were demolished during the war and till the end of the war the location was used as a green area where citizens planted vegetables (Figure 2).

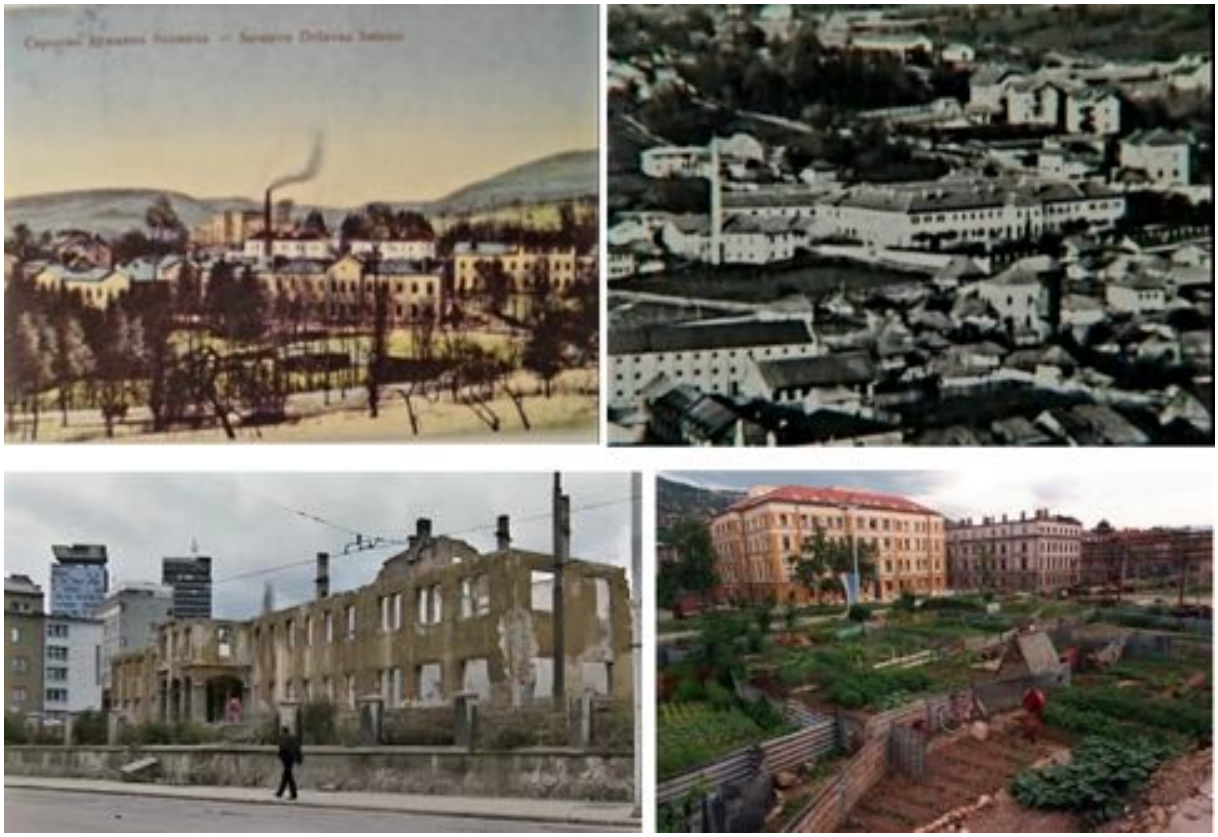

Figure 2. Historic photos of the Hastahana area from the early twentieth century (above) and during the 1992-1995 war when the building was devastated, demolished and when the citizens used the land to grow vegetables (below)

After the war, there was no reconstruction of the military hospital building, but there were several construction initiatives for new designs, which were not implemented. One of them was the project for a concert hall by the famous Bosnian architect Ivan Štraus in 1995 (Figure 3).

Figure 3. Project of a concert hall in the area of Hastahana by architect Ivan Štraus from 1995

The urban regulation plan for the Hastahane site after 1995 envisaged the construction of a cultural facility in the same dimensions and at the same site of an old historic building with the surrounding park arrangement (Figure 6 to the left). According to this regulation plan the museum designed to house the Fama collection,

signed by a group of architects Studio Zec + ahA + Filter was introduced to the public in April 2012 (Furuto, 2012)(Figure 4). The Museum's project came up against several obstacles and was not implemented.

Figure 4. The Siege of Sarajevo Museum - The Art of Living 1992-1996 Fama Collection by Studio Zec + ahA + Filter from 2012

Since the area has remained empty since 1995, citizens have used and recognized it as an undeveloped urban park. The space was used for different events. In 2016, part of the transnational project called Actopolis of the Goethe-Institute of Bosnia and Herzegovina and the Association Crvena took place here. The Municipality of the Centre Sarajevo took part in this project, and municipality Mayor Nedžad Bećirević from the left Social Democratic Party of Bosnia and Herzegovina said: "Today, I am pleased that the Municipality of the Centre Sarajevo is a partner in this project with the Goethe Institute, that the citizens were given the opportunity to express their wishes and visions of space, urban planning and create their own environment." (Klix, Sarajevo dobilo Actopolis, mjesto gdje će se "baviti gradom i misliti o gradu", 2016).

The architects supported this event, participated in different programs, construction of the pavilion, participation in discussions, etc. (Figure 5). The Sarajevo Cloud project created by the Filter studio for the event was designed as a multimedia facility, the participatory project which animates and involves citizens in the process of creation and development of the Hastahana space.

Figure 5. Lana Čmajčanin and Bojan Stojčić's Green Pavilion in Hastahana presented in 2016 as part of the Actopolis event

Between 1995 and 2017, architects participated in the design of new buildings in the Hastahana site, as well as in the joint involvement of citizens, NGOs, architects and authorities in the affirmation of the use of the Hastahana site as a public urban space. The urban regulation plan preserved the memory of the place by foreseeing a building on the site within the dimensions of the historical building of the military hospital, but for cultural purposes. It can be concluded that at that time, the architectural community did not have a unified and

clear position on the issue of this space and the attitude towards it. This is supported by the fact that the members of the Filter architecture studio appear as one of the designers of the new building in this place and like the initiators of a participative project of civic participation in the creation of the Hastahana space only a few years later.

EVENTS BETWEEN 2017 AND 2020

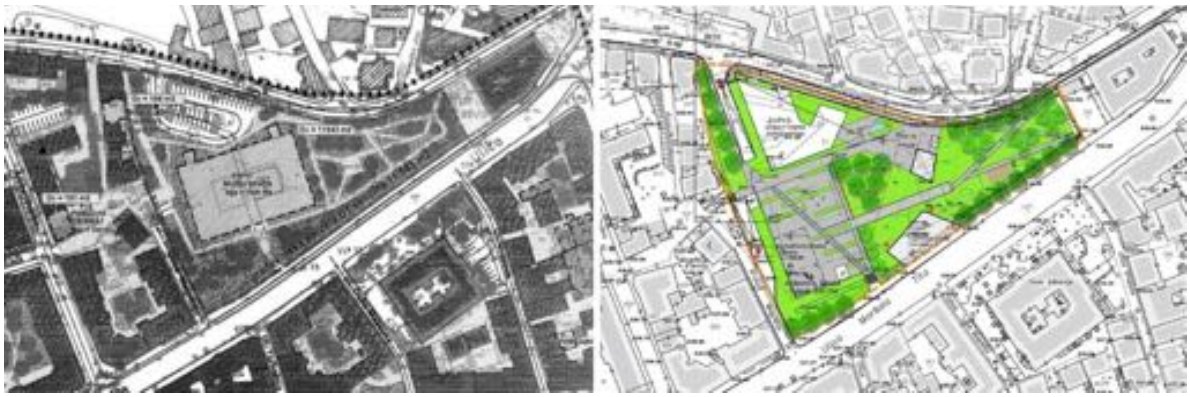

Figure 6. City Centre "Marijin Dvor" urban regulation plan - Hastahana site before 2017 (left) and after 2019 (right)

At the local elections of October 2016, Nedžad Ajnadžić was elected municipality mayor on behalf of the coalition of the conservative Party of Democratic Action (SDA) and the Alliance for a Better Future (SBB) as a moderate centre-right party. During his tenure the events related to the Hastahana Park began with the decision of the Municipal Council on September 29, 2017, to start amendments to the urban regulation plan of City Centre "Marijin Dvor" for the Hastahana site. The main change was the conversion of the planned cultural content facility into a facility for "accommodation of administrative, business, cultural, artistic, hospitality or some other non-residential facilities" (Općinsko vijeće Centar Sarajevo, Odluka o pristupanju izradi izmjena i dopuna RP Gradski centar "Marijin Dvor" za lokalitet Hastahana, 2017). The authorities have begun the entire procedure in order to create the preconditions for the construction of the Central Bank of Bosnia and Herzegovina on Hastahana site. The citizens have been clear from the beginning that they want Hastahana Park as a green area of the city without new buildings. This led to a conflict of interest between the two stakeholders, the authorities in conjunction with a potential investor - the Central Bank of Bosnia and Hercegovina and the citizens.

The process of amending the urban regulation plan for the Hastahana Park site by the municipal authorities and the sale of part of the plot to the Central Bank of Bosnia and Herzegovina took place in several steps:

• September 29, 2017 - Decision of the Municipal Council of Centre Sarajevo to amend the "Marijin Dvor" urban regulation plan for the Hastahana site. (Općinsko vijeće Centar Sarajevo, Odluka o pristupanju izradi izmjena i dopuna RP Gradski centar "Marijin Dvor" za lokalitet Hastahana, 2017)

• August 30, 2018 – Announcement of an open call for proposals to develop an urbanistic- architectural concept design for this site (Općina Centar Sarajevo, Konkurs za izradu idejnog urbanističko-arhitektonskog rješenja Hastahane, 2018)

• July 25, 2019 - Decision of the Municipal Council of Centre Sarajevo on amendments to the urban regulation plan (Općinsko vijeće Centar Sarajevo, Odluka o provođenju izmjena i dopuna regulacionog plana Gradski centar "Marijin Dvor" - lokalitet Hastahana, 2019)

• November 18, 2019 - Consent of the Municipal Council of Centre Sarajevo on the sale of undeveloped-construction land to the Central Bank of Bosnia and Herzegovina (Općina Centar Sarajevo, Održana 45. redovna sjednica Općinskog vijeća Centar, 2019)

• December 31, 2019 - Sale of part of the land of Hastahana Park to the Central Bank of Bosnia and Herzegovina (Općina Centar Sarajevo, Potpisan ugovor o kupoprodaji neizgrađenog gradskog građevinskog zemljišta u Hastahani, 2019)

The initiative to amendments to the urban regulation plan prepared by the Municipal Service for Spatial Planning and Investments provoked reactions from the citizens since the very begging in 2017, including architects and urban planners. Various citizen associations have participated in civic events. The Crvena Association has been proactively involved in the whole process following municipal procedures, municipal council sessions, informing citizens about the conclusions, inviting them to react, participating in public debates and so on. They published a handbook for citizens in 2017 entitled Guidelines for Self-Government: Citizen Participation and Space Management in the Canton Sarajevo (Midžić, 2017). The second part of this manual was released in 2019 under the title Guidelines for Self-Government - Part II: How to Participate in Spatial Planning in the Canton Sarajevo (Dugandžić, Midžić, & Mraović, 2019), on which Professor, PhD Nihad Čengić from the Faculty of Architecture in Sarajevo took part. An informal citizens' group Hastahana Park was established, as they say "in order to save Hastahana Park and awaken the reaction of the citizens of Sarajevo in its defence" (Hastahana Park, Hastahana Park, 2020).

Changes to the urban regulation plan, after the initial decision, continued with the implementation of a public contest for the development of an urbanistic- architectural concept design for this site. The public has been assured by the municipal authorities that the public contest will express the expert opinion concerning the necessary facilities and their spatial organization. However, based on the text of the tender, participants were asked to consider a building with three floors above the ground on the site. This contradicted the stated purpose of the competition. The Association of Architects in B&H has responded to such commitments of municipal services by surveying citizens and members of the association about construction in the Hastahana area. The survey showed that out of 970 respondents, when asked: "Do you agree with the decision of the Municipal Council to allow the construction of " business, cultural, artistic, hospitality and some other non-residential facilities" at the Hastahana site", 940 or 96.9% answered that they do not agree with the decision. As a result, the Association of Architects has called on members not to participate in this contest. The Association of Architects in B&H invited the municipal department to provide information about the construction possibilities in Hastahana concerning the number of green areas, free and public spaces, the coefficient of construction, the percentage of construction on the micro-site and the need for accommodation of "business, cultural, artistic, hospitality and some other non-residential contents". They also asked from authorities to explain to the public based on which planning documentation and legal regulations the Municipal Council of Centre Sarajevo was able to decide on changes and amendments to the existing urban regulation plan (Asocijacija arhitekata u Bosni i Hercegovini, Hastahana: Rezultati ankete, 2017).

However, the contest was based on five entries and the jury did not award the first prize. Based on three purchased entries, the Institute for Planning of Development of Canton Sarajevo has developed the Concept of amendments to the urban regulation plan of the City Centre Marijin Dvor, Hastahana site. It was presented at the Public Tribune on November 12, 2018 (Nikšić, Javna tribina: Hastahana, 2018). The citizens expressed their categorical position against any construction in this area, both during the debate and in writing. The municipal authorities ignored the citizens' comments, and the final draft of the regulation plan was submitted for public discussion on May 29, 2019. (Klix, Burna javna rasprava o regulacionom planu za Hastahanu, 2019) (Crvena, 2020). Municipal Council approved amendments to the regulation plan on July 25, 2019 (Općinsko vijeće Centar Sarajevo, Odluka o provođenju izmjena i dopuna regulacionog plana Gradski centar "Marijin Dvor" - lokalitet Hastahana, 2019)(Figure 6). As a result, the land was divided into two sections, one for the construction of an administration facility and the other for the construction of an underground garage with landscaping of the park. On November 18, 2019, the Council of the Municipality of Centre Sarajevo approved the sale of the construction plot to the Central Bank of Bosnia and Herzegovina (Općina Centar Sarajevo, Održana 45. redovna sjednica

Općinskog vijeća Centar, 2019). The sale was done on the last day of 2019 (Općina Centar Sarajevo, Potpisan ugovor o kupoprodaji neizgrađenog gradskog građevinskog zemljišta u Hastahani, 2019).

Architects and planners took part in each of these steps in a variety of ways. While the Association of Architects of B&H has called on the municipal urban planning services to behave responsibly, the procedure for amending the regulation plan has continued without an expert explanation of such procedures. The preservation of the historic building, its eventual reconstruction or preservation of the ambience and memory of the place was completely neglected. The new regulation plan deleted all the above. Architects and urban planners were not united and appeared in different roles. In the roles of those who changed the urban regulation plan and those who disagreed with it. As a result, the independence and interest of the urban planning and architecture sector has been lost.

EVENTS BETWEEN 2020 AND 2022

By selling part of the land, the Hastahana area was broken into two parts. The citizens lost part of Hastahana Park as a result of that process, but they did not give up the fight. The fighting certainly continued for the remainder of the ground belonging to the municipality of Centre Sarajevo. The planning documentation for this part envisages the construction of an underground garage with a green public space above the garage. The citizens persisted in their position, they did not agree with any construction, and they only wanted a green park zone. For that purpose, on February 26, 2020, they organized a panel discussion entitled "Whose is Marijin Dvor", and on July 1, 2020, they promoted the music video for the song "Hastahana", by Damir Nikšić. (Nikšić, Hastahana, 2020).

The authorities' final action in Mayor Nedžad Ajnadžić's mandate regarding Hastahana Park took place on August 5, 2020, when the dismantling of the sculpture "Star Trek" by Helmut Lutz started in the framework of the preparatory work for the construction of an underground garage (Hastahana Park, Radnici na vandalskom zadatku u ime Općine Centar, 2020). The citizens immediately informed the public about this action through their Facebook page Hastahana Park (Hastahana Park, Radnici na vandalskom zadatku u ime Općine Centar, 2020) (Figure 7).

Figure 7. Dismantling of Helmut Lutz's "Star Trek" sculpture in 2020

Support to the citizens in their struggle for Hastahana Park was part of the pre-election campaign of Srđan Mandić for municipality Mayor of Centre Sarajevo in front of a coalition of left-wing SDP and Our Party (NS), and

parties of centre, People and Justice (NIP) and the Independent List of Bosnia and Herzegovina (NBL). The change of government took place in the local elections in 2020, when Srđan Mandić was elected municipality mayor.

To promote the concept of a green park, the citizens with the assistance of a group of young architects, surveyors and designers, demonstrated "what would the park look like to serve the wishes and needs of citizens" (Hastahana Park, Hastahana - park po mjeri građana, 2020). The Hastahana Park development project known as "Citizen Friendly Park" was released to the public on November 9, 2020 (Figure 9, on the left).

Parallel to these developments, the Central Bank of Bosnia and Herzegovina, as the legal owner of the site, proceeded to choose an architectural design for their administrative building on the site. After the first unsuccessful contest in which no solution was chosen, on December 5, 2020, they announced the competition again. Prominent Bosnian architects took part in this process both as contest participants and as members of the Commission for the selection of the best proposal, including the distinguished faculty member professor emeritus Ognjenka Finci. On March 9, 2021, the Competition Commission unanimously decided on the concept of the participant GRUPA ARH. On the opinion of the members of the Commission the proposed project was designed on the best path of so-called "green architecture", which is not common in the case of buildings of this purpose (Centralna banka BiH, 2021)(Figure 8). The concept of winning proposal showed that architects had respect for the citizens by wanting to fit into the atmosphere of the park with "green" architectural concept. Moreover, the building has a contemporary expression, and if it is to be realized, it would complement modern Sarajevo. The vision of the Central Bank building with the Hastahana Park arrangement was publicly presented on March 22, 2021 (Centralna banka Bosne i Hercegovine, Idejno rješenje poslovnog objekta za potrebe Centralne banke Bosne i Hercegovine - GJ Sarajevo, 2021) (Figure 9, on the right).

Figure 8. Winning design proposal for the contest for the Central Bank of B&H by Grupa ARH – arch. design studio in Sarajevo

Figure 9. Project made by the request of citizens in 2020 (left) and awarded project solution of the Central Bank of B&H from 2021 (right)

In addition to the two mentioned park landscaping projects, the project by architect Edin Zoletić was also presented to the public at the Collegium Artisticum exhibition in April 2021, organized by the Association of Architects in B&H (Asocijacija arhitekata u Bosni i Hercegovini, CA 2021 – Hastahana, Edin Zoletić, 2021).

Regardless of the indisputable quality of the offered architectural proposal of the building of the Central Bank of B&H, mayor of the municipality, Srđan Mandić, sent a letter to the governor on March 29, 2021, in which he offered another location for the construction of an administration facility (Softić, 2021). Following the Central Bank's request for urban consent, the mayor addressed the Commission for Preservation of National Monuments in B&H on May 21, 2021, with a request to declare compliance of the Central Bank of B&H's conceptual design with the provisions of the Commission Decision declaring the Sarajevo Historic Landscape a National Monument of B&H (Službeni glasnik BiH, No: 1/21 and 10/21). At a meeting held on June 10, 2021, the Commission concluded that both constructions of an administrative facility in the area of Hastahana and the urban solution of Hastahana Park are not in accordance with the provisions of the Decision (Kapidžić, 2021). Based on this opinion, on October 6, 2021, the Municipality of Centre issued a Decision rejecting the request for the issuance of an urban permit to the Central Bank B&H, which was appealed. The appeal of the Central Bank of Bosnia and Herzegovina against the decision of the Municipality of Centre was accepted on January 19, 2022, and the procedure was returned to the Municipality of Centre for reconsideration (Centralna banka Bosne i Hercegovine, Prihvaćena žalba Centralne banke Bosne i Hercegovine protiv rješenja Općine Centar, 2022).

In the process of issuing urban consent to the Central Bank of Bosnia and Herzegovina mayor Srđan Mandić convened a themed session of Municiplity Council on September 16, 2021, on the theme of Hastahana Park. He stressed at the session that the future of the Hastahana site will be decided by citizens, the professionals and councillors. And that, if necessary, he will seek the support of the Council for convening a referendum, as the ultimate expression of the democratic will of the citizens (Naša stranka, 2021).

Architects Nermina Zagora and Dina Šamić published the book in March 2021 „Urban Rooms of Sarajevo“ (Zagora & Šamić, 2021), on the basis of which, as part of the event called "Hastahana summer break" organized by the Association of Young Artists and the Tourist Board of Canton Sarajevo on September 25, 2021, an interactive workshop Urban Lab workshop Hastahana was held. During the workshop, citizens helped shape the future appearance of Hastahana's public space, and the host of the workshop was Srđan Mandić (Asocijacija arhitekata u Bosni i Hercegovini, Urban Lab Hastahana, 2021).

As a continuation of these activities, UNDP Accelerator Lab launched the digital platform "Urban Lab" within the Initiative "My Street is My Imagination", in partnership with the Municipality of Centre Sarajevo, the University of Sarajevo and the City of Sarajevo. The aim of the platform is to become an innovative virtual tool that citizens can use to support the urban transformation of public spaces in Bosnia and Herzegovina, and to help local authorities organize interactive public consultations and collect ideas from citizens to rebuild public spaces such as streets, parks, squares or neglected location. Through the platform, the citizens of Sarajevo, as well as other interested parties, had the opportunity in the period from January 26 until February 28 to participate in the survey and express their views on future content and functions in the Hastahana area (Figure 10). The survey questions did not refer to the part of the plot owned by the Central Bank of B&H. The survey covered topics that are in the domain of the urban planning and architectural profession and should not exclusively depend on the will of the citizens. These were questions like e.g., whether it is necessary to provide parking for vehicles in that area, whether it is necessary to build facilities, in what form, etc. (UrbanLab, Rezultati javnih konsultacija za redizajn prostora Hastahane, 2022). After the survey, on February 28, 2022, UNDP and the Municipality of Centre announced an international competition for the design of the public space "Hastahana" in Sarajevo, which closed on April 6, 2022 (UrbanLab, “Hastahana” Public Space for Everyone - Call for Ideas, 2022). The results are not yet known. Two scenarios exist for the use of the survey results in the following procedure. One is that they will be respected when making decisions about space. If the results refer to issues that are exclusively of the urban-planning and architectural profession, it will de facto, and de jure degrade the urban-planning and architectural profession. And the second scenario is in which the results will not be respected, but the profession will decide

based on the relevant urban parameters. This scenario creates the illusion of citizen participation in the decision-making process, which reduces citizen participation to the first level of Arnstein's scale - which is manipulation (Arnstein, 1969).

Figure 10. Graphic attachments to the survey on the Urban Lab platform

Between 2020 and today, architects and planners have been involved in various ways in the events around Hastahana Park. The architects contributed to the development and selection of the design projects of the Central Bank of B&H administration building, in presenting the views and wishes of citizens about what Hastahana Park should be designed and helped to create and implement the Urban Lab project for citizen participation in the Hastahana area, even on matters on which citizens are not competent to decide.

CONCLUSION

Based on review of events related to Hastahana Park from 1995 until today, it can be concluded that the state of society and the process of spatial decision-making have been described with precision as follows: „In comparison with European practice, advanced methods of planning and civic engagement have been developed in B&H. However, it is argued that the authorities have lost their wisdom, planning institutions and expertise since 1995, and that there is no accountability for the development of plans. … As was the case 100 years ago, the government and the trapped profession are relentlessly abandoning the public interest for the private interest. … Distrust and fear describe the relations between participants in planning. The gap between government, the profession and citizens has never been larger and continues to grow. “ (Dugandžić, Midžić, & Mraović, 2019 pp. 10-11)

Although urban-planning and architectural profession is constantly mentioned and invited to decide in the decision process about the Hastahana Park area, all those who were invited and who took part in those processes have become accomplices in favouring the public over the private interest or in promoting populist ideas that are not rooted in the profession. That is why the term, trapped profession is used with good reason in the preceding quotation. Urban planners and architects have been actively engaged but creating solutions that articulate the interests of other stakeholders, not always in accordance with their professional interests. Expressing the opinions and interests of other stakeholders aside urban-planning and architectural profession in the Hastahana case had begun with the abandonment of preservation of the historic Hastahana building and continued to this day. Urban and architectural profession have been lost as stakeholder. Research shows how citizens are acknowledged on one side and investors/entrepreneurs on the other, while the ruling political options and the trapped urban-planning and architectural profession favour citizens will or put private interests over the public interests.

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A PROBE INTO THE WAYS AND STRATEGIES OF RENEWAL AND DEVELOPMENT OF THE WATERFRONT SPACE OF THE OLD CITY UNDER THE GUIDANCE OF DOUBLE CULTIVATION——TAKING THE RENEWAL DESIGN OF THE CHENGNAN RIVER IN PUKOU, NANJING AS AN EXAMPLE

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ABSTRACT

As an important part of the built environment, the waterfront space of the old city involves many factors such as ecology, space, context, and transportation. It is a content that needs to be focused on during the double repair process of the city. Taking the renewal design of Chengnan River in Pukou, Nanjing as an example, this paper puts forward the consideration of renewal development strategies for the problems of construction mode, ecological environment, spatial form, cultural inheritance and other issues that have emerged during its long-term development. It is expected that this will provide a meaningful reference and inspiration for the renewal and development of the waterfront space in the old city of China under the background of urban double cultivation.

1 RESEARCH BACKGROUND AND RESEARCH GOALS

1.1 The policy background of "double repairs in cities"

In April 2015, the Ministry of Housing and Urban-Rural Development put forward the concept of "double repair in cities" for the first time, and many cities in my country have successively carried out the pilot work of double repair in cities. Nanjing, as one of them, has carried out a lot of meaningful practice. This process not only improves the urban ecological environment and vitality, but also continuously improves and supplements the concept in practice.(Luqi Gu)

"Urban dual repair" refers to ecological restoration and urban repair. The key point is to restore the built environment ecological system on the basis of the urban ecological background, continuously improve the quality of urban public services, improve the municipal infrastructure, explore and protect the urban historical culture and social network, and make the urban functional system and its carrying space. The site is fully and systematically repaired, compensated and improved.(Xuemei Gao)

1.2 The economic background of the development of Nanjing Jiangbei New Area

On June 27, 2015, the State Council issued the "Approval for the Establishment of Nanjing Jiangbei New Area", which officially approved the establishment of Nanjing Jiangbei New Area. Since then, the construction of Nanjing Jiangbei New Area has become a national strategy, becoming the thirteenth in China and the only state-level new area in Jiangsu Province. Pukou District is closely related to the core area of Jiangbei New District. The entire core area of Jiangbei New District is dominated by the urban environment that has yet to be developed. The surrounding landscapes, forests, fields, lakes and other urban ecological backgrounds and densely populated old city areas are mostly still under the jurisdiction of Pukou District. Under the economic background of high-quality construction of Jiangbei New Area, coordinating the coordinated development of the two regions has become the top priority of the current development of Jiangbei in Nanjing.

1.3 Research objectives

This paper hopes to provide a meaningful reference and inspiration for the renewal and development of the waterfront space of the old city in my country through the analysis and research of the renovation design scheme of the Chengnan River in Pukou, Nanjing, under the background of urban double repair.

2 ANALYSIS OF THE CURRENT SITUATION OF THE CHENGNAN RIVER IN PUKOU, NANJING

The Chengnan River passes through the city in Jiangpu Street, with a total length of about 8 kilometers and a drainage area of 50 square kilometers, in the shape of a Y (Figure 1). It is the Chengnan River. Its main stream flows out from the foot of Laoshan, and then it reaches the Yangtze River.

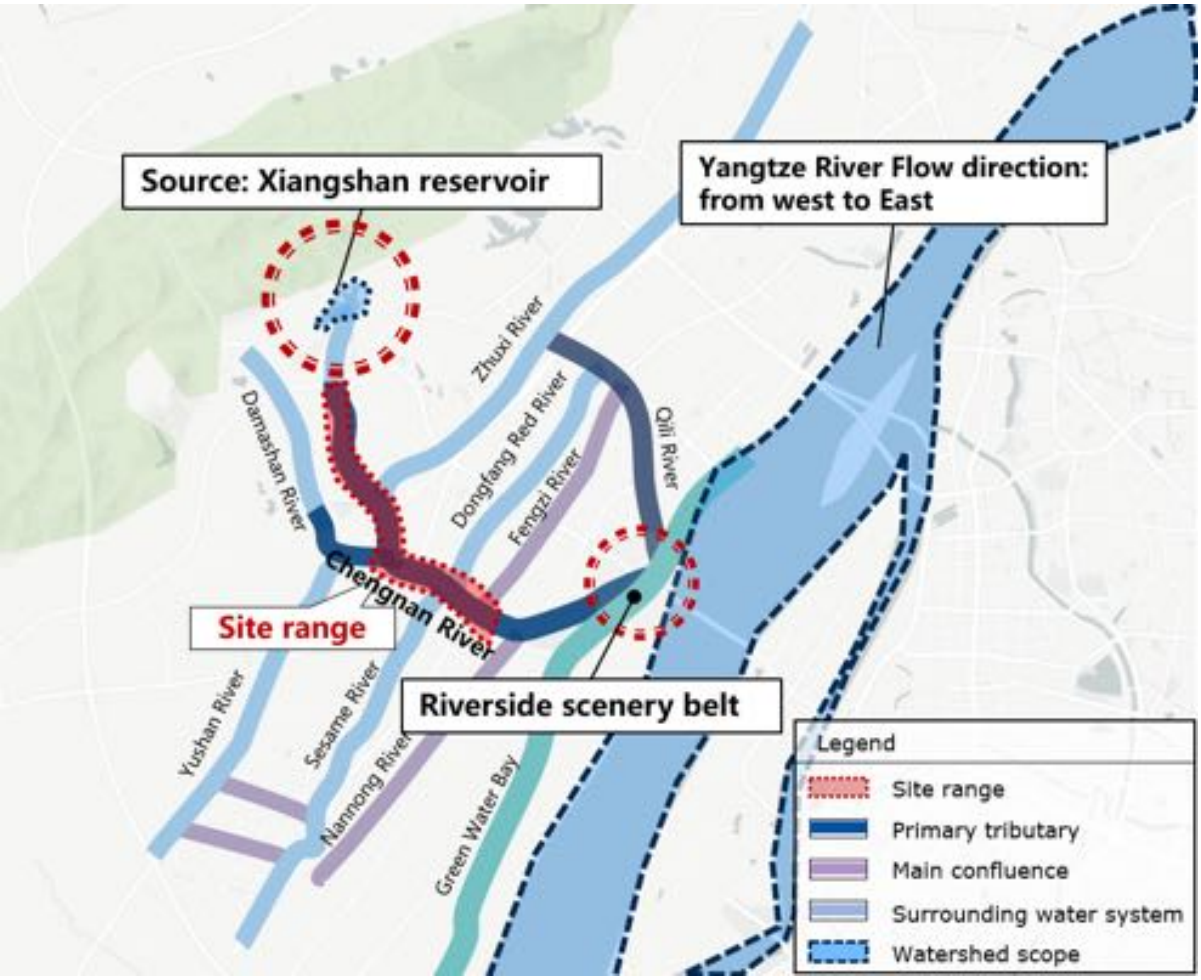

Figure 1. The overall situation of the Chengnan River Basin (picture source: the author's own drawing)

2.1 Construction problems: fast pace of development, high update frequency, and many departments involved

As the moat of Jiangpu County since the Ming Dynasty, the Chengnan River has played a very important role since ancient times. With the construction and development of the city, the Chengnan River has gradually become an urban river that passes through the city, and various urban functions since the founding of the city have been gradually developed along the banks of the river. From north to south, it passes through the middle and high-end residential areas, the old urban area with dense population and complex space, and the new urban area to be constructed.

Because it is located in an important part of the city, the improvement of the quality of the Chengnan River has naturally become the starting point for the government's livelihood work. In the 10 years since 2010, there have been three large-scale construction projects on both sides of the Chengnan River, and the frequency of construction is not too high. As a result, the current situation on both sides of the Chengnan River is diverse, complex in space, and chaotic in style.

2.2 Ecological problems: there are defects in the water quality control path of the river

As an urban river, Chengnan River has a small amount of water in dry season, insufficient hydrodynamic force, water re-oxygenation and mass transfer capacity, and low water environment carrying capacity.(Fei Zheng) With the construction and development of Pukou District, a large amount of surrounding production and domestic sewage has been discharged into the river, causing serious water pollution in the water area, damage to the

structure of the water ecosystem, and decline of water ecological functions. After the government has promoted the improvement of the inferior five types of water since 2017, through a series of physical and chemical methods, the water quality problem of the Chengnan River has been improved to a certain extent, but the solution measures only focus on the water body of the river itself and the urban water supply in the blocked river. Sewage pipes in drainage systems. This move has no effect on the discharge of non-point source pollution in the urban interface above the riverbed to the river, so there is still room for optimization in the improvement of the water quality of the river in the landscape engineering.

2.3 Space problem: fragmentation of urban space caused by excessive greening

As an urban waterfront space, the existing urban interface, that is, the water body itself, urban roads and buildings, defines its spatial characteristics such as scale, boundary, and direction. Once it is fixed, it will basically not change. Therefore, plants will affect the shape of the old city waterfront space. The most important factor. In the past, because of the existence of administrative quantitative assessment indicators in the concept of urban greening, decision makers blindly pursued the amount of greenery and the multi-layered structure of vegetation to form a so-called rich plant landscaping model.

The initial effect of this plant configuration mode may be good, but over time, tall trees form a top interface with high canopy closure, while middle-level shrubs and some poorly growing trees form an overly closed side interface. To a large extent, the urban waterfront space is divided, which makes the waterfront space fragmented and the permeability of the space interface decreased, and the original important waterfront landscape of the city is "isolated" from the urban landscape. (figure 2)

Figure 2: The overly dense plant interface isolates the connectivity of the "city-waterfront" landscape space (Image source: author's own photo)

2.4 Cultural issues: neglect of the old city context and lack of characteristics

The surrounding area of Chengnan River has a strong cultural heritage, not only the market culture in the alleys of the old city echoes the beautiful legend of Phoenix Mountain, but also the rich calligraphy and painting culture and the famous calligraphers "Four Elders of Jinling". However, such cultural characteristics have not been

properly displayed in the landscape of the Chengnan River. The waterfront landscape is still a state of Chinese cities, especially in small and medium-sized towns.

2.5 Traffic problems: Fragmentation of waterfront slow-moving systems

In Nanjing's greenway system planning, there is a clear positioning for the slow-moving system along the Chengnan River. However, in the actual investigation process, it was found that although there are pedestrian paths on both sides of the Chengnan River, many of them were interrupted by crossing bridges, which led to the intersection and conflict between the pedestrian system and the urban vehicle roads. It not only brings safety hazards to pedestrians, but also aggravates the chaos of urban traffic in the area.

3 EXPLORATION ON THE DEVELOPMENT APPROACHES AND STRATEGIES FOR THE REGENERATION OF THE CHENGNAN RIVER IN PUKOU, NANJING

3.1 Combined with the construction of sponge city, help improve the quality of water environment

The water source of the Chengnan River comes from the supplement of seven tributaries in the Chengnan River Basin (81.6km2). The improvement of water quality should not be a local event, but a systematic project of the entire basin. However, due to the limitations of this landscape renewal project, we can only focus on the mainstream of the Chengnan River. At the same time, the Chengnan River from Gongyuan North Road downstream to Pubin Road is all hard concrete revetments, and it is difficult to change the flood control regulations in water conservancy, so we focus on ecological transformation. The upper reaches of the river, that is, from Yanshan Avenue to Park North Road. This section is a natural revetment mainly composed of rubble and concrete piles, and most of the riversides enter the water with gentle slopes, which provides conditions for our renovation design.

China has put forward the five-character concept of "stagnation, infiltration, purification, storage, and drainage" for the practice of sponge city. This article will combine the above five points to introduce the ecological measures of the Chengnan River.

(1) Stagnation - setting of grass-planting ditch

A grass-planting ditch is set between the sidewalk and the green space along the river, and the interception road faces the surface runoff in the river. Part of the rainwater flowing into the grass-planting ditch is injected into the ground, and part of it replenishes the moisture in the vegetation layer, reducing the urban greening water. At the same time, it also prevents surface runoff pollution from directly entering the river water body.

(2) Seepage - the use of permeable pavement

The existing impervious concrete surface of the walk along the river is uniformly replaced with a colored permeable concrete surface, which increases the water permeability coefficient of the pavement surface and further reduces the non-point source pollution caused by surface runoff.

(3) Purification - give full play to the purification effect of plants

The design uses different plant community zones constructed by waterfront trees, shrubs, and herbs, as well as waterfront soil, sand and gravel and other permeable materials for rainwater management. Set up a secondary purification area on the conditional water-facing slope (Figure 3) to ensure that the rainwater runoff can be decelerated, rainwater infiltration reduction, and rainwater filtration and purification before it finally merges into the Chengnan River.

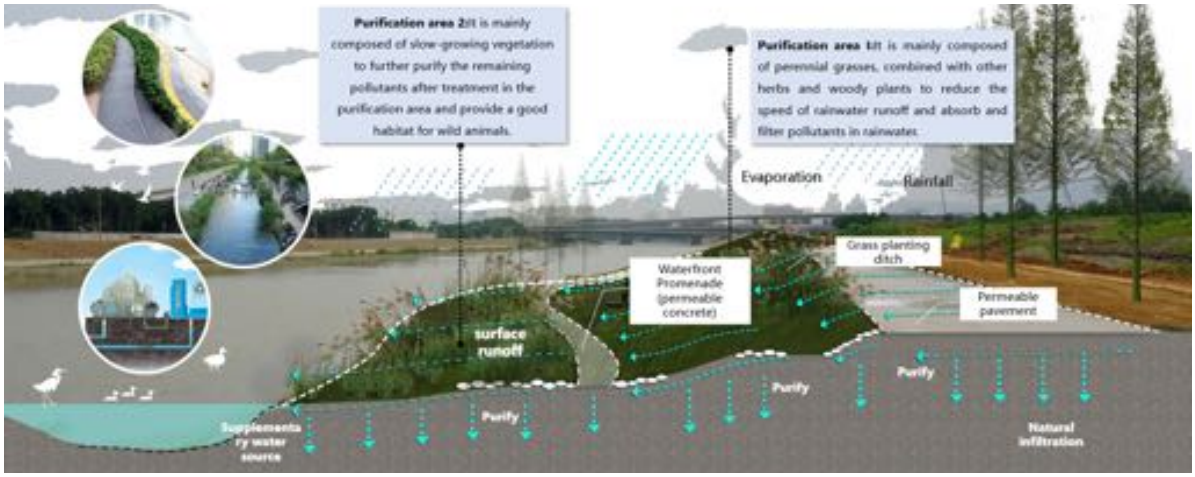

Figure 3 Setting of secondary water purification area on yingshuipo (picture source: self drawn by the author)

(4) Storage and Discharge - Setting of Ecological Retention Ponds

Ecological retention ponds will be set up in the green space along the river where conditions permit, to give full play to its functions of absorbing runoff and reducing peaks, so as to achieve the functions of rainwater retention and comprehensive discharge. In the early stage of rainfall, the rainwater on the underlying surface of the ecological retention pond is discharged into the Chengnan River after being adjusted and stored by the retention pond and purified by the internal aquatic plants, and the heavy rain is directly discharged through the overflow of the retention pond. The ecological retention pond can effectively reduce the external pollution load entering the water body and improve the water body quality.

The above four measures, under the path of sponge city construction, not only provide a better guarantee for the improvement of the water quality of the Chengnan River, but also integrate more ecological elements into the creation of the waterfront landscape.

3.2 Integrate green space and connect the urban landscape interface

The renewal and reconstruction of the old city is different from the new project. Its existing built environment is deeply imprinted by the long-term social behavior of builders and users. The plant landscape along the Chengnan River has undergone long-term and multi-batch construction. , has formed a situation of diverse styles, fragmented spaces, and chaotic management. The focus of this renovation is to sort out and integrate the urban green space accumulated over the years, open the waterfront interface, and integrate it into the urban landscape.

Specifically, different plant allocation strategies are adopted according to the different greening characteristics of the northern, middle and southern sections of the Chengnan River.

Although there is a large amount of greenery in the northern section, the construction quality at that time was not high and the management and maintenance were lacking, thus resulting in the current situation of cluttered vegetation. Therefore, the principle of "adapting measures to local conditions, sorting out and optimizing" is proposed to open up the visual corridor of Laoshan to the outside, and connect the waterfront and the city interface internally. Sort out and optimize the vegetation that is cluttered, crowded, and improperly configured, and appropriately fill in different types of tree species to build a reasonable vegetation structure. (Figure 4)

Figure 4 North section - "adjusting measures to local conditions, combing and optimizing"

The middle section is located in the old city, the space is relatively cramped, and the greening density is high, but better management and maintenance ensure the good growth of plants. Therefore, the strategy of "removing redundant and impurity, and appropriate subtraction" was adopted, and the existing plants were basically retained, and large shrubs were appropriately removed, and the spatial structure was sorted out to create a landscape space of sparse forest and grassland. (Image 5)

Figure 5 Middle section - "eliminate redundancy and miscellaneous, and subtract appropriately"

The southern section, as the new city section, currently has garden roads and simple greening, but the functionality and sense of form of the landscape are weak, and it needs to be integrated into the landscape. Therefore, the vegetation adopts the strategy of "focusing on building and highlighting the characteristics", and cooperates with the construction of the street park and the current riverside trail to create a plant landscape with the theme of "waterside cherry blossom viewing". (Figure 6)

Figure 6 South section - "focus on building and highlighting characteristics"

The vegetation in the entire project is suggested to follow the principle of "merging the same kind and digesting internally". While ensuring the landscape effect, the exchange of seedlings inside and outside is as little as possible, and the seedlings inside the site are used as much as possible for self-digestion. This not only reduces engineering costs, but also achieves sustainable utilization of seedlings.

3.3 Introduce light commercial facilities, update lifestyles, and highlight regional culture

The urban repair in the double repair of the city should not only focus on the renewal and restoration of the physical space and business format, but also should pay attention to the renewal of the inner life style, industrial mode and even the development mechanism of the city. In the past, the construction mode of waterfront green space mostly focused on creating landscape, creating space for outdoor sports, sightseeing and recreation, but it lacked consideration for users' indoor appeals such as conversation, tea tasting, and gathering. The waterfront space of the old city is different from the waterfront space of other areas. High population density, complex urban functions, the need to continue the historical context, and the need to activate the vitality of the old city are all proposed for the renewal of the waterfront space of the old city. different requirements.

The current Chengnan River, as a linear waterfront space that traverses the city, has a large number of people passing through every day, but there is almost no place to stop along the entire line, and naturally it loses its function of providing an endogenous driving force for urban development. In this update design, it is planned to set up 4 light commercial facilities along the 5.5km long line in combination with local culture and residents' needs, covering functions such as tea bar, coffee house, book bar, fitness and leisure, public toilets and management. These so-called "light commercial" facilities (Fig. 7 and Fig. 8) not only provide supporting management functions of waterfront green space, but also provide a place to display local culture and provide a new way of life for citizens in a limited space.

SET UP FOUR FUNCTIONAL BUILDINGS TO GUIDE COMMERCIAL FORMATS AND ACTIVATE THE VITALITY OF THE SITE

In this plan, four functional facilities are set up in each area - four old book houses, old stories in the south of the city, south bank cafes and cheer hall

序号	名称	面积	地点
1	Four old bookstore	480㎡	A lane in the garden
2	Old stories in the south of the city	300㎡	In chengnanhe square (combined with the current toilet reconstruction)
3	South bank Cafe	300㎡	West of Zhujiang Church
4	Cheer hall	400㎡	East side of Urban Construction Group

Figure 7 Functional building layout and site selection (picture source: self drawn by the author)

Figure 8 Architectural design renderings of the fourth old bookstore (picture source: self drawn by the author)

3.4 Open up the waterfront slow-moving system according to local conditions and improve the humanization degree of urban waterfront space

As a linear waterfront space, the slow-moving system along the river is undoubtedly an important part of it. The design uses a "darning" concept to connect existing waterfront walks along the river. Following the principle of "respecting the status quo and appropriate heights", a three-dimensional waterfront transportation system is organized. According to the cross-sectional height difference of the riverbed, the design sets a hydrophilic plank road to open up the footpath broken by the bridge, enhance the independence of the slow-moving system, reduce its impact on urban traffic, and also increase the safety of the urban pedestrian interface. (Figure 9)

Figure 9 The waterfront steel plank road set under the Rainbow Bridge, the use of steel material reduces the impact on the flooding of the river (Image source: the author's own drawing)

4 CONCLUSION

The renewal of the waterfront space in the old city under the direction of dual urban cultivation requires the joint participation of multiple disciplines, and also needs to take into account the demands of ecology, space, cultural context, and transportation. The renewal plan should not only consider the current landscape effect, but also need to consider many factors of long-term ecological, cultural and social development. The implementation of specific measures will enable the site to achieve the expected goals to a certain extent, but the complexity of the built environment will make it continue to ferment with the development of the local social economy and the growth of life elements in the site, presenting many unexpected possibilities. sex. Although the periodicity of urban renewal projects determines that it is impossible to adjust and improve in real time according to changes in the site, designers should constantly pay attention to such changes and summarize the laws to provide support for better prediction and design of the future.

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POEMS AND CITIES: READING ANTALYA IN THE POEMS OF THE TARIK AKILTOPU PERIOD

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Abstract

The consequences of modernisation on the city are investigated in this study by reading poems written by Tarık Akıltopu, Antalya's first architect, in the last 15 years of his life, about his love for the city. Having witnessed the changes that the city has gone through in the historical process, both as an architect and as a city user, Tarık Akıltopu is one of the first architects to sign the buildings built in Antalya after the Republic throughout his professional life. Referring to the changes he saw in the city throughout his life before and after the republic in his poems, he mentioned the city-street, city-landscape, city-house relations. Therefore, the poet provides an important reference for interpreting the city of Antalya and its relationship with places. When the descriptions of urban spaces in his poems are examined, he conveys his relationship with spaces as the place of concretion, sadness and longing created by the modernization process in the city. Also he defines the times when green and blue colors, which are represented as architectural spaces in the city, integrate with the city as a place of happiness. In this way, he conveys physical, sensory and emotional spaces in the context of the city through poems. These changes that the city has experienced in the process have led to the feeling of longing for the previous living spaces and the effort to approach the future with hope. In this context, the poems of Tarık Akıltopu, which are thought to best describe the urban changes, were analysed only by referring to emotional space, physical space and qualitatively defined space and its sub-components. As a result of the study, Akıltopu reveals the relationships he has established on urban spaces and users, which are affected by the changes that the city has experienced throughout the process, in the context of architecture-literature relationship. The poems written with a love for the city by Tarık Akıltopu, the first architect of Antalya, have been an important source for reading and examining the change of urban spaces by describing the period lived in and after the Republic period. The study consists of four parts: the first part includes a literature review about the subject and Akıltopu's life and poems, as well as information about the study. In order to reach the results of the study, the poems of Akıltopu and the analysis method of the poems are explained under the title of Materials and Methods in the second part. Under the title of Findings and Discussion, evaluations were made on the titles and concepts obtained from the analysis of the poems in the third part. In the fourth chapter, the results and recommendations of the study are presented.

Key Words: Architecture, Antalya, Poems, Space, Tarık Akıltopu.

Introduction

Tarık Akıltopu was born in 1918 in "Antalya, a warm city with lots of green and few people, where lizards roam its castles, crickets sing in its trees, and pilgrim storks fly in its skies". Akıltopu who states that he opened his eyes to life in a one-story house with a stone cut on a basement in a narrow street, is the first architect of Antalya (Taş, 1999). Akıltopu who continued his education in Antalya until university, graduated from today's Mimar Sinan University, Faculty of Fine Arts, Department of Architecture in 1949. After completing his university

education, he returned to Antalya. He had difficulties in introducing the profession of architecture to the public, whose lifestyle was agriculture and who were not aware of an architectural environment. In the following years, when the obligation to make plans for construction was imposed by the municipalities, he as an architect became known more in Antalya. Then he designed the first buildings built in the city after the Republic (Çimrin, 2011). Over the years, he had struggled to preserve Antalya's urban identity and has become the symbol of Antalya with its love for the city. Until the age of 70, he discussed the love of Antalya and the changes that the city went through during the modernization process in his poems. Afterwards, he expressed with his poems that he longed for Antalya before and after the Republic, which became a place in his memory. These poems have enabled the reading of the change of urban spaces as well as observing the change of urban identity. With the concretization process of Antalya, the buildings that have become symbols in the minds of the citizens, residences reflecting the urban identity and socialization areas have been demolished. After all, the balance of positive and negative areas in the city began to deteriorate. In fact, he mentioned that the house in which he was born a single-story house was a huge apartment at the end of the 1990s and he added that these changes were unimaginable. For this reason, he brought together the memories and experiences of himself discussed in his poems in places of different scales. Thus, he expressed the effect of the modernization process on the city, its reflections on the space and the user, with symbols and images. His poems, which are thought to explain the living and changing city well, have been an important reference in reading the physical, sensory and emotional spaces of Antalya.

As human beings spatialize their environment in a social, cultural, and literary sense with imagination and image; the place has also affected people in social, cultural, and literary terms. Man has turned to various expressions in an effort to transfer his achievements to future generations. Thus, with these transfers, it has managed to leave a mark on society through five basic fine arts branches – architecture, literature, sculpture, painting, music – on a universal scale (Sazyek, 2013: 1128). Art, which leaves a trace in life and is an important necessity in human life, is in every moment of the individual and there are works of art or design wherever people look (Mercin ve Alakuş, 2007: 15). Art forms, which are present in almost every moment of our lives, are seen everywhere we encounter on different scales of daily life. Thus, in everything we encounter in daily life, the individual can find the values that he is influenced by or finds in himself in a work of art and identify them with himself. Values that people find in a city, in a poem, in a novel, or a painting leave a place in their memories. People have an innate power to remember the places they have lived and experienced and the power to imagine the places they have felt. Therefore, in a society where perception, memory, and imagination are in constant interaction, contemporary spaces are merged with images of memory and imagination. For this reason, if people could not perceive the moments they have recorded in their memory or a city they have imagined through art, art would not have the power to influence so many people (Pallasmaa, 2021: 81-82). Expressing that art is a universal communication tool, Castells (2001: 4) thinks that art enables people to experience their ability to live in a society with each other (Mercin ve Alakuş, 2007: 17). The spaces that bring the ability to experience life to the society and the people in the field of literature, which are integrated into the emotions, thoughts, dreams, and events that exist in human life, have a common denominator. Therefore, poetry and architecture, which are branches of art, are intertwined with people, so both the architect and the poet exist within the society (Bektaş, 2019). Bektaş (2019) expressed his thought within the scope of architecture, which includes poetry that requires a reader to exist, and art works that can live with the user, with the sentence "Architecture and poetry are both created for other people, they cannot exist without perceiving them." To be perceived by both branches of art, it must reflect reality by producing feelings and thoughts (Bektaş 2019). For this reason, the poet conveys the city, which is full of memories and longing, which he mentions in the poem, by collecting the houses or landscape elements in memory and spatializing them in an objective, symbolic and imaginary way. Based on these explanations, it can be said that while space is a place that always bears human traces, man has been an entity that contributes to the formation of space and keeps it alive. For this reason, the impact of poetry on society and human life and therefore on physical spaces is inevitable. Scott (1914: 226) stated that the reality of architectural art is that the three-dimensional space we live in is perceived with architecture, and that architecture has dominance over the space. He also emphasized that all arts have common functions, but only

architecture has its own unique and pleasing qualities, and that only architecture gives real value to the space among the arts. Transferring the relationship between architecture and space in his book "The Architecture of Humanism", Scott (1914: 226) stated that this pleasure taken from the places surrounding the living environment is the work of architecture and that while painting can display the space, poetry can describe the image or music is similar to it. However, he stated that architecture is directly related to the space and uses the space as a material and places the human in the middle. All creatures with the instinct of protection have felt the need to protect themselves, to take shelter or hide in an area with borders since their existence. Kuban (2002: 14) stated that architecture begins with the formation of a special space in which people can separate from the natural environment and live in so that living things can adapt to environmental conditions and continue their lives, and this special space has been named the concept of space. Thus, the physical existence of space has been going on since the existence of the world, even before architecture, of which the concept of space is the main subject, was determined as a profession. This shows that architectural space exists together with human life (Kahvecioğlu, 1998: 35).

Since architecture is directly related to space compared to other disciplines, architectural space is defined by physical and visual boundaries (Ersoy, 2010: 11). In the architectural dictionary prepared by Doğan Hasol, space has been defined as “a space that separates people from the environment to a certain extent and is suitable for continuing their activities in it.” (Hasol, 1979: 344). On the other hand, Doğan Kuban stated that architecture started with the emergence of a special void that separates and protects people from the natural environment, and that this special void is called 'space' distinguishes architecture from other building actions (Kuban, 2002: 14). This fact is expressed in the Chinese philosopher Lao Tzu's book Tao Te King: "The truth of a building is not in its floors and walls, but in the spaces within it." (Kuban, 2002: 15). Space is a phenomenon for the whole of architecture. Therefore, knowing how to capture and see the space is the basic way of grasping and understanding the building. Unless words such as rhythm, balance and proportion are put into place in the space that defines architecture, they will remain incomprehensible concepts. The reality of architecture is to evaluate the space created between the walls, not the limits of spatial freedom in planar representation (Zevi, 1990, aktaran Demirkaya, 1999: 5). However, Kuban, who argues that it is not possible to define the space only with the values of space (dimensions such as depth, length, or direction of movement or luminosity, etc.) or only with its borders, states that the space is determined by movement. The space delimited in the building space is a distinctive element of the architecture and this is the expression of the most real life value of the space; because a living being is in motion, and movement only takes place in a void (Kuban, 2002: 15). Schulz (1971: 37) explained that architectural space is a void that meets the psychological, physiological and social needs of human beings created by interacting with the environment. Aydınlı (1986: 16), on the other hand, describes space in general as a conceptual entity in which people can move and act, and which is obtained by combining plane elements or playing with the volume of three-dimensional masses. However, it is gaining importance day by day that well-designed spaces in architecture are not a problem of creating aesthetically, and that there should be spaces with sensory effects; because a sensory space brings with it other dimensions besides its physical properties – depth, width, height. For this reason, the architectural space, which people perceive and live in their daily life with all its dimensions and its features, finds meaning in the existence of the human dimension (Aydınlı, 1986: 17).

While space is a place that carries human traces, humans are an entity that contributes to the formation of space and keep it alive. It is thought that this relationship is well reflected in the poems in which the feelings and thoughts from the branches of art are conveyed in a short and concise manner. Because the poet brings together his memories and experiences in the urban space and expresses the effect of the modernization process on the city and its reflections on the space and the user with symbols and images. In this context, the study aims to analyze the architectural concepts, architectural components, and therefore spaces of the period, in the poems of Akıltopu about Antalya, aiming to show that the relationship between space and humans is also reflected in the city in the process. The study is limited to the poems he wrote about the city of Antalya, where he was born and grew up, returned to the city after his education, and practiced his profession as an architect. It is thought

that the sample group will contribute to the reading of urban spaces by observing the changes in the city and to the development of the urban identity throughout the process in the following studies.

Materials and Methods

In this study, the poems of the architect Tarık Akıltopu, which describe the period in which the poet is in the relationship between architecture and literature, are analyzed and the city is read through places. It has been discussed in this study because Akıltopu put a great deal of effort in protecting the city and its identity, the constructions protecting the greenery of Antalya without disturbing the green areas, giving architectural products suitable for the city and writing poems describing the identity of the city. A relationship between poetry and architecture is established under the link of architecture and literature, and urban-scale spaces, types of spaces and the relations that all establish on users are revealed with the method of discourse analysis. Because in the world of architecture and poetry, the way to find the place of architecture is to recognize it. The way to know it is to be able to analyze it and the best way to express semantic analyzes is the verbal method. For this reason, the sample determined by the qualitative approach, the collected data and the verbal approach constituted the limit of the data used in this study. In this study, which started with the method of perceiving, comprehending, understanding and thinking (The Oxford English Dictionary, 2022) these relations by establishing a connection with the concepts, it was preferred to evaluate the data from a rational and holistic point of view, and to limit it to the theoretical point of view. For this reason, it was decided to choose the poems of Tarık Akıltopu, who has become the symbol of the city of Antalya, with strong descriptions of space, able to read the space on the scale of the city, and more often including architectural concepts. Sensory spaces were not evaluated in the study because the poems selected in the study indicate the senses of the period in which they were written by the poet and the readers do not feel those senses exactly. The poems of Tarık Akıltopu, which are thought to best describe the urban changes, have been analyzed by referring to the sensory space, the physical space and the qualitatively defined space and its sub-components. In the classification, words describing physical spaces are shown in table. Expressions showing the change of positive and negative spaces in the city are classified as physical spaces. Expressions conveyed by the poet to the poem, perceived by the reader, and making people feel the emotions such as longing, happiness and hope for the changes in space over time are also classified as sensory space. The architectural concepts in the selected poems were checked in *the Ansiklopedik Mimarlık Sözlüğü* (Encyclopedic Dictionary of Architecture) written by Doğan Hasol and their existence in the type of physical space was determined. Thus, the architectural concepts in the selected poems were checked from the architectural dictionary by Hasol and their existence was determined and limited. A table indicating the positive and negative reactions was prepared for the characterizations defined in each poem selected in the study with the concepts that were checked from Hasol's dictionary and discussed in the poems. Therefore, the table also includes some emotional reactions of the poet to the physical space as he describes the cities he lived in and lived in in the past. For this reason, as another method, the “Emotional Adjective Pairs List (DDSÇ)” prepared by Er (2006) was used for readings in emotional space. This list consists of a total of 72 adjective pairs, each of which contains positive and negative emotional content together, so that the current emotional state of the person can be evaluated by himself. Each adjective pair in the list consists of opposite words (eg, happy - unhappy) containing both positive and negative emotional content (Er et al., 2008: 4). The five poems discussed in the study were evaluated based on five adjective pairs, "happy-unhappy", "cheerful-cheerless", "carefree-anxious", “relaxed-nervous” and "excited-sour", determined from the table prepared by Er.

In this study, in which qualitative research method was applied, the concept of semantics of discourse analysis was used. Thus, it is aimed to reveal the architectural concepts in the poems, and then the emotional reactions of the architectural space and concepts in the poems by making use of the Emotional Adjective Pair analysis. Thus, the messages of the changes in the urban and architectural environments between 1980-2000, when the poems were written, and the emotional reactions on the poet were analyzed.

Findings and Discussion

5 poems describing the city and containing the most space concept were selected in Tarık Akıltopu's poems, and all analyzes were made on these 5 poems. The poems selected in the study are “Yet Beautiful Antalya” (Table 1), “So that” (Table 2), “Former Customs House and Port” (Table 3), “Heave a Sigh” (Table 4), “Smelling Antalya” (Table 5). The concepts that make up and characterize the physical space in the poems, the emotional reactions of the poet to the spaces of his period, and the adjective pairs that make up the sensory spaces are given. In these tables, the adjective pairs determined in all poems and the positive or negative reactions of the poet to the places in his period are revealed. Thus, spaces characterized with the help of physical space concepts describing the period, and the feelings of space as a result of emotional reactions were revealed.

YET BEAUTİFUL ANTALYA																
CONCEPTS AND REACTIONS THAT QUALIFYING PHYSICAL SPACE																
	Concepts Qualifying Physical Space	**Concepts Forming Physical Space**	**Included Lines**	**Happy**	**Unhappy**	**Cheerful**	**Cheerless**	**Carefree**	**Anxious**	**Relaxed**	**Nervous**	**Excited**	**Sour**	**Positive Reaction**	**Negative Reaction**
Current Situation	Diminishing Green	Green Field	*Greens are diminished (…)* *Living has become so hard*		x		x		x		x		x		X x x x x
	Increasing Concrete	Building	*Concrete has outgrow (…)* *Living has become so hard*		x		x		x		x		x		X x x x x
	Shrinker Square	Square	*The squares have shrunk (…)* *Living has become so hard*		x		x		x		x		x		X x x x x
	Narrowing Streets	Streets	*Streets narrowed (…)* *Living has become so hard*		x		x		x		x		x		X x x x x

Table 1. Concepts and Reactions in The Poem “Yet Beautiful Antalya”

In Table 1, titled “Yet Beautiful Antalya”, the concepts of space are stated as “greenfield, building, square, street, beach, seaside cliff, city”. As a result of the concepts characterizing the physical space and his reactions, it is observed that the poet reacted to the rapid construction and negative space changes in the architectural environment after the Republic. Going back to the period he lived in, he longs for the city he lived in before the Republic and praises the features that give Antalya its identities, such as green spaces, squares, and beaches. However, he also states that he was not satisfied with the conditions of the city during the period he wrote the poem and that these values decreased drastically at that time.

Greens are diminished

Concrete has outgrow

The squares have shrunk

streets narrowed

Traffic disrupted

Living has become so hard

(…)”

it has been stated that the quality of life of the citizens has decreased as a result of the changes in the place in the city. As the poet states in the poem, while the city becomes beautiful with the values that create Antalya, the decrease in these values reveals the negative features of the changes in the city. Although the poet uses the phrase "The Cliffs for now standing" in the poem, he expresses his concern for the future by emphasizing the time. The diminishing of the urban identity that he saw in his childhood and youth with the deteriorating construction dragged the poet into a state of anxiety. Likewise, although the poet uses the phrase "Yet beautiful Antalya" as an expression of consolation, the fact is that real Antalya existed in the past and had a city identity at that time. The reflection of the mentioned city today is negative.

SO THAT															
CONCEPTS AND REACTIONS THAT QUALIFYING PHYSICAL SPACE															
	Concepts Qualifying Physical Space	**Concepts Forming Physical Space**	**Included Lines**	**Happy**	**Unhappy**	**Cheerful**	**Cheerless**	**Carefree**	**Anxious**	**Relaxed**	**Nervous**	**Excited**	**Sour**	**Positive Reaction**	**Negative Reaction**
Past	Stone Castles	Castle	*Romans on the shores,* *Built stone castles,* *So that* *Do not let the enemies enter*	x		x		x		x		x		X x x x x	
Current Situation	Concrete Castles	Building	*To in front of it we also* *built concrete castles,* *so that* *the wind does not enter*		x		x		x		x		x		X x x x x
	Narrow Street	Street	Narrow streets We built *(…)* So that Causing traffic jams		x		x		x		x		x		X x x x x
	Small Square	Square	We made small squares, So that Causing traffic jams		x		x		x		x		x		X x x x x

Table 2. Concepts and Reactions in The Poem “So That”

The concepts of space in Table 2 titled “So that” are indicated as “castle, building, street, square, greenfield, neighborhood, hotel, and garden”. As a result of the concepts characterizing the physical space and his reactions, the poet reflected a positive reaction while describing the urban identity he lived and knew in the past. However, he also talked negatively about the buildings that they actually caused great damage to the city, thinking that after the urban development, the users of the city added function to the city. The lines "Romans on the shores built stone castles, so that do not let the enemies enter" gave this historical information that formed the identity of Antalya, and talked about the reason for the construction of the castles that protected the city. All the

following lines, on the other hand, describe the deterioration of the urban identity as a negative reaction, “To in front of it we also built concrete castles, so that, the wind does not enter”. He referred to high reinforced concrete buildings by describing the stone, which is one of the materials in the first settlement of Antalya, and the castle built for the purpose of defending the city, with the expression "concrete castle" that prevents the winds. Thus, he allusively stated that those “concrete castles” damaged the urban climate and identity. He described the changes in urban spaces with the lines " Narrow streets, we made small squares, So that, Causing traffic jams ". With the lines " We cut, The trees one by one, So that, The city overwhelms ", he stated that the green areas decreased and the adaptation of the city to climate changes, the structure and integrity of the city, and all these had a negative effect on the users. In addition, Old Town, the first settlement of Antalya, is the city symbol of Antalya and has a positive value as a historical reference to the city users. However, due to the settlement disorders in the city after the Republic, it attributed a negative value to the building by qualifying it with the phrase of “We filled the Old Town with hotels” which affected its historical identity. The "Düden" mentioned in the poem is a waterfall and an important city symbol of Antalya. The branches leaving the source of the Düden waterfall are the source of irrigation to the gardens through streams or canals in the city when the construction didn’t increase that much and it fell into the Düden waterfall. With the sentence “Concrete for the gardens, we built, so that, Düden can be plugged” he stated that the branches leading to the Düden Waterfall disappeared and those concrete buildings took the place of the irrigated gardens as a negative situation. The poet conveyed the change process of the city, which he observed during his lifetime, to the readers with these lines and created a time tunnel for the different users of the city in different periods.

FORMER CUSTOMS HOUSE AND PORT																
CONCEPTS AND REACTIONS THAT QUALIFYING PHYSICAL SPACE																
	Concepts Qualifying Physical Space	**Concepts Forming Physical Space**	**Included Lines**	**Happy**	**Unhappy**	**Cheerful**	**Cheerless**	**Carefree**	**Anxious**	**Relaxed**	**Nervous**	**Excited**	**Sour**	**Positive Reaction**	**Negative Reaction**
Past	Two-Storey Stone Structure	Historical Structure	*Seventy years ago* *At the port* *Two-storey stone structure customs* *Building* *in square shape* *Four corners with a courtyard in the middle*	x		x		x		x		x		X x x x x	
	Customs Building in Square Shape	Building	*Two-storey stone structure customs* *Building* *in square shape* *Four corners with a courtyard in the middle* *Where* *the current amp is*	X		x		x		x		x		X x x x x	

	Courtyard with Four Corners	Courtyard	*Two-storey stone structure customs* *Building* *in square shape* *Four corners with a courtyard in the middle*	x		x		x		x		x		X x x x x	
Current Situation	Amphitheater	Amphitheater	*Two-storey stone structure customs* *Building* *in square shape* *Four corners with a courtyard in the middle* *Where* *the current amp is*		x		x		x		x		x		X x x x x
Past	Wooden Pole	Pole	On wooden poles *Year nine hundred twentyfives*	x		x		x		x		x		X x x x x	
	Wooden Corridors	Corridor	*Wooden corridors* *lined up around Stone building rooms, offices* *(…)* *Year nine hundred twentyfives*	x		x		x		x		x		X x x x x	
	Stone Building Room	Room	*Wooden corridors* *lined up around Stone building rooms, offices* *(…)* *Year nine hundred twentyfives*	x		x		x		x		x		X x x x x	
	Huge Castles	Castle	Huge castles At the port *(…)* *and more!* *at the pier*	x		x		x		x		x		X x x x x	
	Narrow Street	Street	*Narrow streets stone building* *shops (…)* *and more!* *at the pier*	x		x		x		x		x		X x x x x	

Table 3. Concepts and Reactions in The Poem “Former Customs House and Port”

The spatial concepts in Table 3 titled “Former Customs House and Port” are indicated in the table “historical structure, building, courtyard, pole, corridor, room, street, castle”. The poet said that he happily remembers the building that he described as " Two-storey stone structure customs, house, in square shape, four corners with a courtyard in the middle" seventy years before the year he wrote the poem. However, he expressed with a

negative reaction with the lines “where the current amp is” that this historical building was demolished and another building was built in its place. In this poem, Akıltopu took his readers to 1925 and expressed those times with a longing. The poet takes the readers to the past not only on the scale of the city, but also at the scale of the building, with the lines On wooden poles, wooden corridors, lined up around, Stone building rooms, offices, Storages at the downstairs”. He expressed his longing for the space not only in terms of city scale, but also in terms of material on building scale, emphasizing wooden corridors and stone structures. In the poem, he explained how the *İskele* (Port) is important, one of the most important places of Antalya, was for the city user and that it was a commercial center, and therefore people spent time here, with the lines of "Narrow streets, stone-building stops, tanneries, tandoori shops, dessert shops". While describing the events of the 1925s with a positive reaction with the phrases "Donkeys carrying water to the city, rats roaming the streets, and more", he actually expressed his longing for the past and the bitterness of today's modern age.

HEAVE A SIGH															
CONCEPTS AND REACTIONS THAT QUALIFYING PHYSICAL SPACE															
	Concepts Qualifying Physical Space	**Concepts Forming Physical Space**	**Included Lines**	**Happy**	**Unhappy**	**Cheerful**	**Cheerless**	**Carefree**	**Anxious**	**Relaxed**	**Nervous**	**Excited**	**Sour**	**Positive Reaction**	**Negative Reaction**
Past	Red Roofs	Roof	*Red roofs* *of Old Town* *behind* *concrete castles*		x		x		x		x		x		X x x x x
Past	Concrete Castle	Building	*Concrete castles* *As you look from the front* *Splits my heart*		x		x		x		x		x		X x x x x
Current Situation	Green Antalya	Green Field	Can’t stand and cry As heave a sigh, I miss My green Antalya		x		x		x		x		x		X x x x x

Table 4. Concepts and Reactions in The Poem “Heave a Sigh”

The space concepts in Table 4 titled “Heave a Sigh” are indicated in the table “traditional neighborhood, roof, building, greenfield”. With the expression "the red roofs of Old Town", the poet talks about the red appearance of the tile material, which is the identity of Old Town, one of the first settlements of Antalya. With the following statement "concrete castles, as you look from the front, splits my heart”, he expresses his sadness for the high-rise reinforced concrete buildings that remain in the silhouette of Old Town. In the first lines, he talked about the architectural components that protect the identity of the city and expressed a positive emotion. However, in the following lines, he expressed his sadness by mentioning that this silhouette was destroyed as a result of bad construction. He stated that the green areas in the city are gradually disappearing with the line “greens, trees, where are they”. The poet creates a negative reaction by expressing sadness that Antalya once had green areas, but now green areas have been replaced by buildings, with the sentence “as heave a sigh, I miss, My green Antalya”.

SMELLING ANTALYA																
CONCEPTS AND REACTIONS THAT QUALIFYING PHYSICAL SPACE																
	Concepts Qualifying Physical Space	**Concepts Forming Physical Space**	**Included Lines**	**Happy**	**Unhappy**	**Cheerful**	**Cheerless**	**Carefree**	**Anxious**	**Relaxed**	**Nervous**	**Excited**	**Sour**	**Positive Reaction**	**Negative Reaction**
Current Situation	Two-Doors Inn	Inn	*I smell Antalya* *In the Two Doors Inn (…)* *In dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x
	Jewellery Bazaar	Bazaar	*In the jewelers' bazaar* *I smell Antalya (…)* *In dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x
	Ottoman Bazaar of Shoemakers	Ottoman Bazaar	Among the shoemakers *I smell Antalya (…)* *In dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x
	Broken Minaret	Minaret	*I smell Antalya* *At the Broken Minaret in Port (…)* *In dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x

	Old Building	Building	in Tophane weather same weather yet faces new buildings same building yet people new *(…)* *I smell Antalya* *In dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x
	Musty-Smelling Narrow Streets	Street	I smell Antalya Which smells musty in its narrow streets by wandering in Oldtown *in dreamland* *reminiscing the old days* *in sadness*		x		x		x		x		x		X x x x x

Table 5. Concepts and Reactions in The Poem “Smelling Antalya”

The space concepts in Table 5 titled “Smelling Antalya” are indicated in the table “inn, bazaar, minaret, Ottoman bazaar, building, street”. Although the stated concepts and the qualifying physical space concepts are given as concepts for the present, they are written with a longing for the past. With the phrase “I Smell Antalya”, the meanings are deduced that I smell the past, I smell the history. The lines of " I smell Antalya, in dreamland, reminiscing the old days, in sadness", which the poet clearly stated, describe his great longing for the past and his inability to live in the present. The places mentioned by the poet, “Two-Door Inn, shoemakers, Jewelers Bazaar, Port, Broken Minaret, Mermerli (Beach), Tophane” indicate the period in which the poet lived when there was an identity in the city. The poet stated that while he wanted to find those places with the same feelings, he could not find the feelings of the past when the time he wrote the poem, but only imagined it. While the smell of mold in the sentences "I smell Antalya, which smells musty, in its narrow streets, by wandering, in Old Town" is a negative effect on human life. However, due to the poet's nostalgia, even this musty smell is a positive effect as it resembles the smell of wood holding water to him. As the poet's longing for the past was intense, these emotional states caused a negative reaction.

Conclusion and Suggestion

People's daily life experiences, urban experiences, and urban quality are closely related to each other and have a direct impact on human life. For this reason, the human being, the common denominator of the art branches of literature and architecture, is an indispensable element for space. While space is a place that always has human traces, man has been an entity that contributes to the formation of space and keeps it alive. This dual relationship has been observed on different scales, starting from the urban scale, with the poet's experiences in the space, and reflected in the poems. Although the places depicted in the poems are the spaces that the poet describes in imagination or reality, various emotional spaces have been formed, including the poet's feelings. Thus, the poems became an important architectural reference regarding the importance they were written.

Periodic readings were made with the poems of Tarık Akıltopu, which were chosen to read the architectural spaces through poems. While the poems written by Akıltopu belong to the period between 1980 and 2000 after the Republic, the years when the poet felt the urban identity and thought that he lived in the real city were the years when modernization did not affect the urban spaces yet. In this study, the effects of the changes that the individual has undergone by affecting the spatial and social identity with the modernization in the society in which he lives are examined. The results obtained in the study, in which the poetic image and symbol told by the poet are evaluated through space, refer to the emotional relationship between the effects of the modern age, urban life on a spatial scale, and human and space. With these readings, emotional information was obtained about the readability of the change of urban spaces that changed with the modernization age, the relations of individuals with the space, the ratio change of positive-negative spaces in physical spaces, and the space traces of the poet on himself. The five adjective pairs determined in the five poems selected in the study give the feel of the space concepts they describe. As a positive reaction, the poet happily and enthusiastically describes the city he remembers in the past, the urban identity of the places he lived in during his childhood and youth was analysed. The unhappiness, cheerlessness, anxiety, tension, and sourness he experienced when he could not see the same city identity during the time he wrote poetry was analyzed as a negative reaction. When the poet saw the changes in the spaces he experienced throughout his life to such a large extent, he dealt with the spatial concepts with the spiritual changes he experienced and described the elements of the space and its components. While he talks about the unique history of the city before modernization, he describes the components of the space and the enthusiasm and happiness he experienced in the space belonging to that period. He also sadly talks about the effects of the concretization that emerged after modernization in the city. The poet is generally unhappy, cheerless, anxious, tense, and sour when he talks about the period when he wrote poetry. However, while he claims to have an urban identity in the periods he mentions, he takes the opposite mood of these adjectives and has a positive reaction in a happy, cheerful, carefree, relaxed, and excited manner. After the great changes in the city, Akıltopu, who was in love with the city of Antalya, still tried to see the city positively, even with such a negative concept.

This study is aimed to contribute to the reading of urban spaces and the development of urban identity throughout the process by observing the changes in the city of poetic space analyses which are created depending on human life and imagination.

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EK: Tablo 1

TURKISH		ENGLISH	
Gine De Güzeldir Antalya		**Yet Beautiful Antalya**	
Yeşiller azaldı		Greens are diminished	That dries the Mediterranean
Betonlar çoğaldı	Yok	Concrete has outgrow	No
Meydanlar ufaldı	Torosları deviren	The squares have shrunk	Overthrowing the Taurus
Caddeler daraldı	Yok	streets narrowed	No
Trafik aksadı	Plajları götüren	Traffic disrupted	taking the beaches
Yaşamak çok zorlaştı	Yok Falezler şimdilik	Living has become so hard	No
Amma	Ayakta	However,	Cliffs for now
Gine de güzeldir	Gine de güzeldir	Yet beautiful Antalya	Standing
Antalya	Antalya	Antalya	Yet beautiful Antalya
Akdeniz'i kurutan			Antalya

EK: Tablo 2

Diye		So That	
Romalılar kıyılara,	Ağaçları bir, bir	Romans on the shores,	We cut,

Taş kaleler yapmışlar, Düşmanlar girmesin, Diye Biz de karşısına, Beton kaleler diktik, Rüzgar girmesin, Diye Dar caddeler, Küçük meydanlar yaptık, Trafik sıkışsın, Diye	Kestik Şehir bunalsın Diye Kaleiçini, Otellerle doldurduk, Tarih utansın diye, Bahçelere beton Diktik, Düden tıkansın Diye	Built stone castles, So that Do not let the enemies enter, To in front of it we also built concrete castles, so that the wind does not enter Narrow streets We made small squares, So that Causing traffic jams	The trees one by one So that The city overwhelms, We filled the Old Town with hotels So that For the shame of history Concrete for the gardens we built so that Düden can be plugged

EK: Tablo 3

Eski Gümük Binası ve İskele		**Former Customs House and Port**	
Yetmiş sene önce İskele'de İki katlı taş yapı gümrük binası Kare biçiminde Ortası avlulu dört köşe Şimdiki amfinin olduğu yerde Ahşap direkleri üzerinde Ahşap koridorlar Etrafında sıralanmış Taş yapı odalar, bürolar Alt katta depolar Fareler, koca koca Kalın kağıtlar Üzerinde Arap harfli Matbu yazılar, konşimentolar sene dokuzyüzyirmibeşler Antalya'da gümrükçüler	Tarblugarplı Mahmut El Braşalar Yani yaşmaklı hocalar Muhasebeci Beşir efendiler Kayıkçılar, gemiciler Hepsi Arap kökenliler Rıhtımda koca koca kaleler Dar sokaklar taş yapı mağazalar Tabakhaneler, tandırcılar, tatlıcılar, Şehre su taşıyan eşekler Sokaklarda cirit atan fareler Daha neler neler İskelede Dokuzyüzyirmibeşli seneler	Seventy years ago At the port Two-storey stone structure customs Building in square shape Four corners with a courtyard in the middle Where the current amp is On wooden poles wooden corridors lined up around Stone building rooms, offices Storages at the downstairs Big big mouses thick papers Arabic letters on it Printed letters, bills of ladings year	Antalya Mahmut El from Tarblugarp Brashas So old teachers Sir Accountant Bashir Boatmen, sailors All of Arab descent Huge castles At the port narrow streets stone building shops Tanneries, tandoori shops, dessert shops, Donkeys carrying water to the city Rats roaming the streets and more! at the pier year

	nine hundred twentyfives Customs officers in	nine hundred twentyfives

EK: Tablo 4

Ah Çeke Çeke		**Heave a Sigh**	
Kaleiçi'nin		Red roofs	
Kırmızı damları	Hani nerdeler	of Old Town	where are they
Ardında	Bakar, bakar	behind	While watching and watching
Beton kaleler	Dayanamam ağlarım	concrete castles	I can't stand my tears
Karşıdan baktıkca	Ah çeke, çeke	As you look from the front	Can’t stand and cry
Yüreğimi pareler	Yeşil Antalya'mı	splits my heart	As heave a sigh,
Yeşiller, ağaçlar	Ararım	greens, trees	I miss
			My green Antalya

Ek: Tablo 5

Antalya’yı Kokluyorum		**Smelling Antalya**	
Antalya'yı kokluyorum	Binalar eski bina	I smell Antalya	buildings same building
İki Kapılı Han'da	İnsanlar yeni	In the Two Doors Inn	yet people new
Pabuçcular arastasında	Antalya'yı kokluyorum	Among the shoemakers	I smell Antalya
Kuyumcular çarşısında	Küf kokan	In the jewelers' bazaar	Which smells musty
Antalya'yı kokluyorum	Dar sokaklarında	I smell Antalya	in its narrow streets
İskele'de Kesik Minare'de	Dolaşarak	At the Broken Minaret in Port	by wandering
Mermerli'de, Tophane'de	Kaleiçi'nde		in Old Town
	Antalya'yı kokluyorum	In Mermerli, in Tophane	I smell Antalya
Hava eski hava	Hayal aleminde	weather same weather	in dreamland
Simalar yeni	Eski günleri anarak	yet faces new	reminiscing the old days
	Hüzün içinde		in sadness

UNIVERSAL ACCESSIBILITY: TOWARDS THE CONSTRUCTION OF A HETERARCHICAL ARCHITECTURE

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ABTRACT

Heterarchy is a concept little discussed because of its distant relationship with the prevailing paradigms, dominated by ideas of single hierarchy, hegemony and pyramidal-based control that little enables a healthy interaction between the different spheres or sectors of society.

By heterarchy we mean the coexistence of a great variety of simultaneous hierarchies, in a complex social framework where the construction of interdependent and complementary relationships is possible. In heterarchy, the power of one sector over another is not recognized, although there are powerful bidirectional relationships between them, influences all in a horizontal scheme, and not a pyramidal one. The first thinker to develop the concept in the social field was Carole Crumley (1995) who published "Heterarchy and the Analysis of Complex Societies", bringing to this context a concept born within cybernetics. This concept is particularly useful for the construction of a change of paradigms in architecture, especially those related to universal accessibility, which is still seen as a complementary and desirable, but not obligatory, element. As a consequence, adjustments are made with condescending approaches that are still immersed in ideas of power of "able" vs. "unable" sectors.

The objective of this work is to analyze the concepts that prevail in the teaching and practice of architecture, versus Capacitating Architecture, Standardized Architecture, and to contrast them with proposals that make possible the reconception of architecture from heterarchy, such as the Urban Commons and Participatory Architecture, taking as models the discourses arising from the design scenario.The study is supported by a qualitative method that considers and analyzes specific cases with desirable indicators such as:

a) Information (access, means, adapted media, adapted supports).

b) Relevance of the projects (feasible, realistic, results of consensus).

c) Diversity of stakeholders (sectors involved)

d) Externalization of the project (participation of other stakeholders, associations, politicians)

e) Degree of knowledge of the subject matter of the sectors involved.

f) Dynamization of the process (motivation, exchange, forums, alliances)

g) Quality of communication (between sectors, with external stakeholders).

The result intends to contribute to unveil the oligarchic conditions prevailing in architecture, as a generator of public and private spaces, where, without distinction, principles of Universal Accessibility are neither observed nor attended, nor the different sectors, groups or people who make use of architectural spaces are considered.

It is concluded the importance of reconfiguring architecture, from new democratizing, participative and inclusive views, which allow the consolidation of a heterarchical architecture.

KEYWORDS: Architecture, Universal Accessibility, Heterarchy

INTRODUCTION

Rethinking architecture implies a deconstruction of the paradigms that underlie the relationships that are promoted through architectural designs. The existence of exclusionary relationships promoted by architectural proposals is not casual, but is rooted in ideological discourses that are sometimes imperceptible to architecture professionals, and that are perpetuated both in the practice and in the teaching processes.

This work seeks to unravel these precepts, and to base its analysis on exclusionary and socially innovative positions. Its methodology proposes 7 different indicators that allow understanding the scope and implications of each position or paradigm of design and thus promote those whose social value is relevant to the crisis currently experienced in architectural spaces, especially from the approach of universal accessibility.

Being universal accessibility the result of proposals for inclusion, equity, and other social precepts, it is antagonistic to hierarchical organization schemes, which mark differences and strata, which is why this work aims to subtract itself from this pyramidal position, to oppose, from heterarchy, a horizontal and inclusive conception of architectural spaces.

METHODOLOGY

The methodology for the present study is supported by a qualitative method that aims to support an analysis of the prevailing schemes in the teaching and practice of architecture, namely the Capacitating Architecture, the Standardized Architecture and contrast it with proposals that enable the reconception of architecture from the heterarchy, such as the Urban Commons and the Participatory Architecture, taking as models the discourses arising from the design scenario.

For this purpose, the methodology will be guided by desirable indicators such as:

a) Information (access, media, adapted supports).

b) Relevance of projects (feasibility, realism, results of consensus).

c) Diversity of the groups involved (sectors concerned)

d) Project outsourcing (participation of other stakeholders, associations, politicians)

e) Degree of knowledge of the subject matter of the sectors involved.

f) Process dynamization (motivation, exchange, forums, alliances)

g) Quality of communication (between sectors, with external stakeholders).

It will be under the light of these indicators that a contrast of paradigms on which the teaching and practice of design is based and those that offer the possibility of eliminating the excluding and unsocial qualities of the spaces produced today will be made possible.

DEVELOPMENT

Towards heterarchy as an architectural concept

Heterarchy is understood as an organizational system that moves away from hierarchical concepts, which allude to concentrations of power and exclusion (Maldonado, 2021). Heterarchy implies the presence of elements of the organization that are not classified or where there is the possibility of being classified in different non-oligarchic ways.

The closest form to heterarchy are networks, where each element shares the same "horizontal" position, with equal importance and equity.

The starting point of such concepts is nature itself, which emphasizes that oligarchic and hierarchic ideas are human constructions, since the natural system is heterarchic. In this regard, Maturana (2010) points out that the order of nature is often confused with hierarchy, but in fact hierarchy does not exist in this context.

Considering that heterarchy allows coexistence, while hierarchy alludes to a rigid and static form of organization, a spatial understanding is possible from the ideological support, which allows to connote spaces of disagreement, without dialogue or participation in the hierarchical structure, and an important range of possibilities of divergent, collective and inclusive posture in the heterarchical structures.

HETERARCHY AND UNIVERSAL ACCESSIBILITY

Universal Accessibility is understood as an inclusive vision, concerning but not limiting design and architecture, in which environments, goods and products must be safe and comfortable for all people, and their use must be conceived in the most autonomous and intuitive way possible (Alonso, 2007). This is why Universal Accessibility is opposed to hierarchical paradigms in which there are privileges and disadvantages for the different groups involved.

Heterarchy, on the contrary, under a horizontal, equitable and inclusive vision, is more directly linked to positions that respect and promote diversity, so it is considered that, if we start from a heterarchical paradigm, and promote the discourses that are based on its principles, the scenario where Universal Accessibility and the consequent inclusion is possible is generated.

PARADIGMS ALIGNED WITH HIERARCHICAL ORGANIZATIONS

There are paradigms within architecture that continue to persist to this day and are based on pyramidal structures that are not very participatory. As a result, architects have tried to provide spatial solutions to certain groups of people, without understanding that not looking towards diversity affects the inclusion of minority groups that do not fit the predominant model.

Among these paradigms it is possible to highlight:

Enabling Architecture

Enabling architecture is that which is based on concepts in which the body and its conventional functions are overvalued, through which discrimination is exercised due to disability in architectural environments (Otaola Barranquero & Huete García, 2019). Enabling architecture excludes by omission, by orienting design concepts towards functions or ways of behaving of a normalized body. The natural consequence is the invisibilization of barriers, which, because they do not affect a statistical majority, are not considered, translating into a mechanism that delegates and excludes.

The system of architectural projection is based on idealized processes of space-function, in which the analysis of the areas necessary for the space to fulfill its function obeys a mathematical calculation that adds the static spaces (occupied by the furniture) added to the dynamic spaces (the space required for the use of that furniture or functions according to the destination of that space), but always considering standard measures, of bodies conceived with innate and universal characteristics, which is completely wrong.

This systematization of the architectural project, together with an interest in economic speculation, has led to a conception of space as a usable and profitable good, and therefore not thought of as non-producing bodies.

In Figure 1, this thinking is translated into a scheme that establishes functions based on bodies without disabilities, young, slim and of average height, without the possibility of including a person who does not meet these standards. Based on these bodies, the scheme determines measures for attention at a counter and subsequent circulation in a study of areas of a reception, which does not consider the diversity of bodies, such as people of short stature, with obesity, or any type of disability.

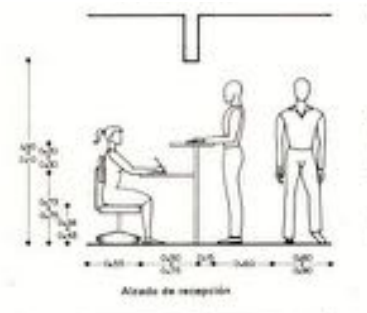

Figure 1 Systematization of architectural spaces
(Taken from https://co.pinterest.com/pin/531213718539808572/

Standardized Architecture

Normalized architecture is understood as that which is governed by standards that are based on standardized functions and uses of spaces (Casado Galván, 2009), without considering particular conditions, such as culture, climate, users, functions and dimensions necessary for particular cases, etc. so that these are assimilated to a prototype or model; it is a highly developed practice in the teaching of architecture and in the execution of housing.

This standardization is accentuated in the analysis of prototypes or analysis of analogous cases, which constitutes a stage in the design process that presents as a disadvantage the perpetuation of functionalist models, which seek to optimize spaces without consideration of diversity.

Although standardization was based on the intention of generating decent spaces for the majority of people due to economic conditions, other vulnerable groups, such as people with disabilities or the elderly, have not been taken into account in their designs because they do not represent a "significant" number, thus ignoring the rights approach. (Figure 2)

Figure 2 Example of normalization (standardization) in the exclusionary architecture (Taken from https://www.pinterest.com.mx/pin/2462974785233256/)

Paradigms aligned with heterarchical organizations

There are paradigms that, starting from collaborative and horizontal organizations, clearly become allies because they support the same social positions of equity and inclusion that are embodied in the proposals for universal accessibility. Such is the case of the discourses that support the Urban Commons and Participatory Architecture.

Urban Commons

The Urban Commons proposal is a response to today's spatial crisis, whose spirit of equity, solidarity and inclusion contributes to a construction towards Universal Accessibility. What has been considered as "the public" is in crisis, as public services are punished by austerity policies, public space is increasingly limited and a

neoliberal conception of the city prevails: private and privative spaces that seek to dilute in an interstice between public and private, public spaces that charge for access, and so on and so forth. In a relentlessly neoliberal climate, the Urban Commons (a conception of the commons) seems to offer an alternative of inclusion and is intended to foster the strength of a participatory and equitable citizenship (Mc Guirk, 2015).

The Foundations of the Urban Commons presents a freshly sustained new approach to the organization of collectivity in which the use of the city does not diminish its value, but rather enhances it. It establishes perspectives that can enrich diverse discourses ranging from sustainable development in cities to issues of urban governance, collaboration, co-production equity and inclusion (Borch & Kornberger, 2016).

The emergence of the "Urban Commons" presents a response to the problems of "exclusion" in modern cities, which are involved in mechanisms that exclude due to economic conditions or functional paradigms. For that reason, these spaces can constitute a refuge in which the excluded are protected by overcoming the limits of the State and the market. (Figure 3)

Figure 3 The Urban Commons as an inclusive view of the city (Taken from http://www.urban.arch.chula.ac.th/archive/sukhumvit-urban-commons/)

Participatory Architecture or Co architecture

This paradigm is derived from participatory design, taking its principles and transferring them to this discipline, framed in the idea of the Social Production of Habitat.

For Gustavo Romero, the Social Production of Habitat is a set of programs, projects and activities carried out "in an organized, planned and continuous manner, under structured operation schemes, where the inhabitants are the protagonists" (Universidad Pontificia de Chile, 2022). This is the importance of its implementation from the early stages of the housing production process with the intention of integrating users through the implementation of participatory design or co-design methodologies so that end users can raise their concerns and needs to be considered in the project. In this way, the final housing will be able to respond to the requirements of the families that will inhabit it.

The most important element of this participatory architecture is that people have the power to define the conception of the project, to participate in the fundamental decisions, moving from the role of passive participant to a dynamic and creative one (Moreno Kopp, 2017). (Figure 4).

Figure 4 Participatory Architecture, a new participatory and inclusive role (Taken from https://www.archdaily.mx/mx/758820/fundacion-mi-parque-avanzando-hacia-un-diseno-participativo-de-areas-verdes)

RESULTS

Once the different paradigms of architecture have been analyzed under the lens of organizational and power approaches underlying design and its teaching processes, such as a) hierarchy (conceived as a hierarchical order subject to subordination), b) oligarchy (concentration of power in closed groups of people with privileges) and c) heterarchy (organizational relationship based on horizontal interactions), a contrast is made to measure their relevance to universal accessibility and try to understand the social constructions that constitute the reproducers of barriers of all kinds. - Heterarchy (organizational relationship based on horizontal interactions), a contrast is made to measure its relevance with universal accessibility and to try to understand the social constructions that constitute the reproducers of barriers of all kinds: physical, sensory and cognitive in architecture.

The indicators will show the relevance of the paradigms, as they are defined as desirable aspects in architectural practice:

Information

The spaces that are designed strengthen the information of users through adapted signage (electronic and physical supports considering the functional diversity of people) as well as a layout of the spaces to be interpreted in an intuitive way by all people, even in emergency situations.

Figure 5 Accessible signage in heterarchical organizations (Taken from https://puntodis.com/featured_item/senaletica-informativa/)

Relevance of projects

Feasibility is directly related to relevance, which stems from a participatory approach, where users have decision-making power and participate actively during each stage of the project.

Figure 6 Relevance as a result of stakeholder and sector participation (Taken from https://www.archdaily.mx/mx/tag/diseno-participativo)

Diversity of groups involved

The intervention of a wide range of groups ensures the representativeness of the groups involved, which contributes to the inclusion and active intervention of the diversity of approaches and visibility of their particular needs.

Figure 7 Stakeholder representativeness in heterarchical organizations (Taken from https://www.archdaily.mx/mx/967672/los-procesos-participativos-y-la-resistencia-al-cambio-implementacion-de-las-supermanzanas-en-barcelona)

Project outsourcing

The dissemination and information of ideas, as well as the participation of other actors, associations and politicians strengthens and socializes decisions, contributing to the synergy generated by the sum of joint efforts.

Figure 8 Socialization of decisions and tasks of heterarchical organizations (Taken from https://cocoso.tuxtla.gob.mx/2017/12/08/redobla-esfuerzos-

ayuntamiento-tuxtla-la-limpieza-espacios-publicos/espacios-publicos-3-3/)

Degree of knowledge of the subject matter of the sectors involved

In addition to the participation of the various sectors and stakeholders involved in the project, the level of mastery of the subject matter of each participant is fundamental, as it enhances the relevance of the decisions made by the group as a whole.

Figure 9 Involving stakeholders to enhance the relevance of projects (Taken from https://humanidadescomunicacion.wordpress.com/2014/01/19/informe-final-para-comunicacion-i-2013/)

Process dynamization

The type of interactions generated during the process strengthen the achievement and give rise to constructions in the social fabric that transcend into new actions; therefore, it is important to promote motivation, exchange and alliances among the different actors.

Figure 10 Dynamization generated by the exchange and alliances (Taken from https://fahho.mx/reconstruir-el-tejido-social/)

Quality of communication

Communication has to fulfill the primary objective of strengthening the levels of understanding and rapprochement between the stakeholders, whether internal or external, through persuasion, intelligibility, objectivity and relevance.

Figure 11 Communication is fundamental for overcoming hierarchical structures (Taken from https://www.newsmillenium.com/index.php/2021/10/06/gobierno-apoya-proyectos-de-acnur-para-el-ano-2022/)

RELEVANCE OF THE PARADIGMS TO UNIVERSAL ACCESSIBILITY

The following is an analysis and comparison of the various paradigms considering the 7 indicators (Figure 5), describing their particular qualities and assessing their relevance to the principles of Universal Accessibility:

	Paradigms aligned with hierarchical organizations		**Paradigms aligned with heterarchical organizations**	
INDICATORS	**Enabling Architecture**	**Standardized Architecture**	**Urban Commons**	**Participatory Architecture**
Information	Little existing signage in non-adapted supports given the scarce value given to the functional diversity of people. Functional layout of spaces favoring criteria for optimizing circulation, materials and facilities without intuitive proposals for spaces. Proposals for solutions to emergency situations that adhere only to the existing rules, provided they are binding (sanctions are imposed).	Existing signage derived from non-inclusive conventional language. Standardized layout of spaces derived from industrial efficiency criteria. Proposed solutions for typical or associated users in segments. Proposed solutions for emergency situations that are limited to existing standards, as long as they are binding (sanctions).	The strength of the information comes from the construction of a collective, where the concept transcends communication and is reciprocal. The layout of the spaces is familiar, as they are common spaces that still have to take care of the accessibility for all people.	The spaces that are designed contain the information required by users during the design process. The existing signage corresponds to adapted supports demanding attention to the diversity that participates in the process. The layout of the spaces has to be interpreted in an intuitive way by all people.
Relevance of projects	The lack of a participatory approach results in projects that are of little or no relevance. Prevalence of hierarchical structures that encourage arbitrary decisions.	Regular or non-relevance of projects, as a consequence of a depersonalized and decontextualized approach to the denial of particularities in order to legitimize universalities.	The pertinence of the spaces is a consequence of the fact that they are generated by the users themselves without an idea of ownership, but rather of collectivity.	Feasibility is directly related to relevance, which stems from a participatory approach, where users have decision-making power and participate actively during each stage of the project.

		Prevalence of hierarchical structures that favor arbitrary decisions.		
Diversity of groups involved	The intervention of groups is not present, so inclusion is not encouraged and particular needs are not addressed.	The intervention of groups is not present, so inclusion is not encouraged and particular needs are not addressed.	The involvement of a wide range of groups ensures the representativeness of the groups involved, which contributes to the inclusion and active intervention of the diversity of approaches and visibility of their particular needs.	The intervention of users ensures their representativeness, which contributes to the inclusion and active intervention of the diversity of approaches and visibility of their particular needs.
Project outsourcing	The dissemination and information of ideas is not promoted, as a result of which the needs of the majority and privileged sectors are addressed.	The dissemination and information of ideas is not promoted among the different sectors, but as a strategy to optimize the same processes among those responsible for production.	Dissemination, information, as well as the participation of other actors is diluted as they are groups of collectives independent from public institutions. The socialization of decisions occurs only internally, contributing to the synergy generated by the sum of the joint efforts of the immersed group.	The dissemination and information of ideas, as well as the participation of other actors, associations and politicians strengthens and socializes decisions, contributing to the synergy generated by the sum of joint efforts.
Degree of knowledge of the subject matter of the sectors involved	Without the participation of sectors and actors involved in the project, the level of mastery of the subject matter of each participant is	No participation of sectors and actors involved in the project, who only see themselves as subjects of the law of supply and demand.	In addition to the participation of the groups of collectives involved in the project, the level of mastery is fundamental, as it enhances the	In addition to the participation of the various sectors and stakeholders involved in the project, the level of mastery of the subject matter of

	low, which also determines the low degree of identification with the projects.	Their level of knowledge is only transactional.	relevance of the decisions made by the group as a whole.	each participant is fundamental, as it enhances the relevance of the decisions made by the group as a whole.
Process dynamization	No interactions are generated during the process since there is no participation of the sectors involved. Decisions are made from the top of the pyramid and do not contribute to the construction of the social fabric.	There are no interactions during the process, which is alien to the main user. There is no participation of productive sectors. Decisions are made under commercial strategy approaches and do not contribute to the construction of the social fabric.	The type of interactions generated during the process between the collectives strengthen the achievement and give rise to constructions within them. It is important to promote motivation and exchange within and outside the collectives.	The type of interactions generated during the process strengthen the achievement and give rise to constructions in the social fabric that transcend into new actions; therefore, it is important to promote motivation, exchange and alliances among the different actors.
Quality of communication	There is no communication among the stakeholders, which results in projects that are not relevant and far from a specific context.	Communication does not meet the primary objective of strengthening the levels of understanding and rapprochement among the stakeholders, most of whom appear to be alien to the project's processes.	The communication fulfills to narrow levels of understanding and rapprochement between the members of the collective or collectives, through persuasion, intelligibility, objectivity and pertinence.	Communication has to fulfill the primary objective of strengthening the levels of understanding and rapprochement between the stakeholders, whether internal or external, through persuasion, intelligibility, objectivity and relevance.

Figure 12 Analysis and contrast between the different paradigms and their relevance to Universal Accessibility (Solano, 2022).

CONCLUSIONS

The results clearly show the strong distance that separates the hierarchical paradigms that are conceptualized from pyramidal, undemocratic and inclusive structures, since, as a result of the scarce participation and representativeness of the different sectors, many of them are excluded and consequently their needs are not met.

Thus, paradigms such as the Enabling Architecture and the Standardized Architecture show, to a greater or lesser extent, their distance from the desirable characteristics mentioned in the indicators in relation to Universal Accessibility, resulting in incipient achievements in terms of access to information and the means and supports with which this information is disseminated. Likewise, in both cases, relevance is not achieved, because this concept is built with the immersion of the actors, or groups involved, or in other words, relevance is not built by decree, but requires an immersion in the context and the obligatory presence of the actors involved.

It goes without saying that the indicator referring to the diversity of groups or sectors involved is not characteristic of an architectural proposal that values some sectors and depreciates others, or that ignores their needs by placing economic benefit as the main condition. Regarding the participation of other actors, whether associations or political agents, such participation loses meaning when the main users or actors are excluded, which also has repercussions on the lack of knowledge of the subject matter of the sectors involved, since they are absent. Without the main actors in the process, dynamization, motivation, exchange and alliances that can only be generated under participation criteria are inhibited. The quality of communication between the sectors and external actors is systematically violated. It can be categorically stated that there is no possibility of generating Universal Accessibility conditions from excluding concepts, with concentration of power and decision making of only certain sectors, since imbalance, injustice and displacements are generated.

On the other hand, the same analysis showed that there is a greater possibility of building towards Universal Accessibility in heterarchical contexts, as is the case of Urban Commons and Participatory Architecture, although the concept of ownership is different between them. In both cases, by eliminating distances between sectors or actors, information, relevance and communication are strengthened. Likewise, the level of immersion or knowledge in the subject matter is generated in a natural way, being the participants themselves the ones who design and determine how to solve their own needs, resolving aspects such as the diversity of groups involved and the dynamization of the process.

It is concluded that it is the paradigms that generate and legitimize the discourses on which Universal Accessibility can be based. That a heterarchical architecture, exemplified by the Urban Commons and Participatory Architecture, opens the way for democratic decisions, for inclusive, participatory, equitable and accessible models.

Relevant is that which is appropriate or opportune at a given time or occasion, and this essence is only known to the user, actor or sector involved, so a response cannot be relevant if they do not have the power to decide. Universal Accessibility demands relevant responses, overcoming power schemes that previously made it invisible.

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THE BECOMING OF BODY-SPACE: TUĞÇE TUNA'S 'VERTIGO' PERFORMANCE

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ABSTRACT

Defining the concept of space is among the responsibilities of an architect as well as designing the space. Because designing space can decipher the definition of the concept of space, while the definition of the concept of space can lead to designing space. There are many concepts and phenomena that are in interaction with the concept of space. Space is a living dynamic that emerges with relations (Lefebvre, 1974). The most important element that reveals the network of relations of the space (that it carries it in itself) is the body. Body shapes the space that it is in contact with in visible or invisible ways, thanks to the possibility of movement. Thus, the living body creates new and unexpected spaces with its fluid and irregular movements (Tschumi, 2001). Body and space are shaped as living, changing and transforming structures through their dialogues with each other. Dialogue refers to the concept of "becoming" in terms of its existence. This study is shaped through the concept of "becoming", which is full of potentials, within the scope of the relationship between body and space. Within the scope of this study, space, which can also be defined by the movements of the body, has been tried to be deciphered with its unfinished state of being.

The idea that the space itself is a living phenomenon involves seeing all the bodies that haunt the space as an 'other'. This view is not one-sided, as can be seen in the concept of dialogue. It has the possibility to be reversed by the double-sidedness of the relationship. While the body is the other for the space, the space is the other for the body. In the study, besides the transformation of space with the body, the body's own transformation with space has not been ignored. As this transformation gets revealed, the relationship that bodies establish with each other as the "other" becomes visible. The contemporary dancer Tuğçe Tuna's performance entitled 'Vertigo' was chosen as the sample case of the research, as a performance that includes and makes the relationship visible. Tuna realized the performance in four parts, making it specific to the venue. On the other hand, in this study, the performance is conceptually divided over into six breaking points. These breaks are not only a means of reading the performance, but also of reading the state of becoming of the space. The aim of the study is to discuss the potentials that emerge in the space with the movement of the body, by freeing the space and the body from a static viewpoint.

KEYWORDS: body and space relations, becoming, other, performance, 'Vertigo'

VISIBLE THINGS

The study aims to discuss the potentials created in the space by the movement of the body by freeing the space and the body from a static viewpoint, based on the choreographer and modern dance artist Tuğçe Tuna's performance named “Vertigo”, that she designed for her proficiency in art in 2002 at Proje 4L-Istanbul Contemporary Art Museum. The expression ‘vertigo’, which gives the performance its name, means dizziness. This performance, which lets the audience be active enables the becoming between the viewer and the thing being looked at viewed, it also includes the awareness that the place that it takes place in is also included in this becoming. By enabling the transformation of body and space into each other and making their repositioning according to each other's position visible, the performance reveals that these dual structures (body-space) define each other, thus forming a holistic but unfinished structure. Performance discussion started with an inquiry; “Who is dizzy?” and “What is dizzying?” During the review process, it was accepted that dizziness may occur in unusual situations. The breaking points of the performance were determined with the “other” in an unusual and dizzying position. Tuna's performance, which she constructed in four parts as intro solo, quartet dance, solo, quartet dance-solo, was discussed in six breaking points as encounter, switch roles, reprise, superpose, transformation, climbing fall-falling climb. (Figure 1) In the discussion, the concepts of Maurice Merleau-Ponty, who body is at the center of his philosophy, and the body-space discourses of architect Juhani Pallasmaa and architect Bernard Tschumi were also included.

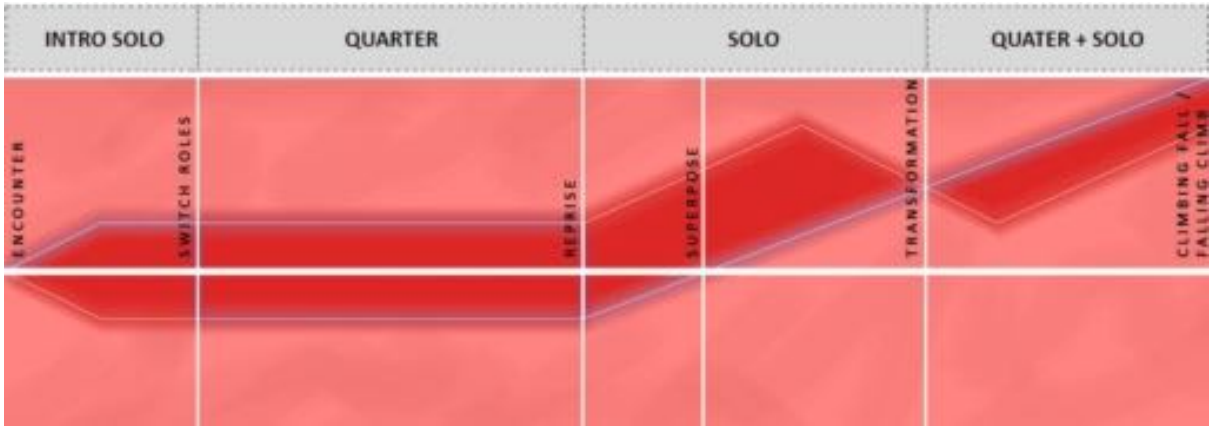

Figure 1. Breaking points diagram

VERTIGO PERFORMANCE

The performance of 'Vertigo' emerged in the process of examining the 'body and space relationship' by Tuğçe Tuna. The question that reveals the performance is 'how the movements will be affected when the choreography produced on a normal ground is performed with different environments and floors' (Tuna, 2003). Because in movement, it is not possible to draw a boundary between the stimulus and the response. The body's reactions can be conceived not as objective processes, but as actions that respond to a particular environment (Barbaras, 1992). The spatiality of the body, of course, takes place in action (Merleau-ponty, 1945). So, the quality of the movements in Tuna's performance will also affect the relationship of the body with the space. Tuna aimed to make the choreography completely belong to that place, by acting with questions such as what it shows, what it hides, what it says and what it doesn't show if space embodies (Tuna, 2003). At this point, the museum where the performance was held, has also gained importance. Tuna took the museum out of its usual state and made the liveliness of the museum atmosphere become visible with Vertigo. The bodily dialogue of the audience in the viewer position and the dancer in the viewed position created an unusual becoming of space in the museum. The structure of the museum has become the skeleton of the performance. Because the process of creating the movement of the body during the performance was continued with the attitude of the movement structure of the museum determining. In Tuna's words, "By listening to the wall, we started to see what this

place will give us", it is stated that the performance emerges as a becoming of body-space. The performance, which was constructed in four sections, was placed according to the possibilities of the museum structure. The solo intro, which is the first part, is presented in front of the paintings of Vanessa Bird on the second floor of the museum, while the quartet dance is presented at the back of the second floor. While the solo is presented on the second floor but in the area where the administrative office is located, the quartet dance - solo section is presented on the ground floor of the museum. In the whole of the 'Vertigo' performance, breaking points were detected through the unusual and dizzying 'other' situations. Thus, encounter, switch roles, reprise, superpose, transformation, climbing fall-falling climb emerged, which do not depend on Tuna's performance segmentation and can be shown as the other's emergence as an action potential. Vertigo as a performance incorporating body-space formation is discussed through six breaking points.

Encounter

At the encounter, the first break point, in the intro solo of the performance, the dancer danced in the area bordered by Vanessa Bird's paintings and the bench on the second floor of the museum. (Figure 2) In this solo, figures in Vanessa Bird's paintings are also included in the movements (Tuna, 2003).

Figure 2. In the intro solo of the performance (Tuna, 2003)

The break point that begins when museum visitors reach the area where Vanessa Bird's paintings are located on the second floor of the museum is called the encounter. Because while those who came to visit the museum were waiting to encounter stagnant paintings as they are used to, they encountered a dancer dancing in front of the paintings which they were not accustomed to. (Figure 3) As soon as the act of seeing encounters a living body in action, the objects surrounding the living body acquire a new layer of signification. In this way, those objects cease to be objects that only the viewer can do something, turn into things that the living body in action can also do something about (Merleau-ponty, 1945). In this case, the encounter started the dialogue between the audience in the position of seeing and the dancer in the position of being seen. According to Aydınlı, dialogue coincides with a state of being that creates different images in the audience, rather than finished and completed formations. Because dialogue is the one that points to the becoming between the viewer and viewed (Aydınlı, 2014).

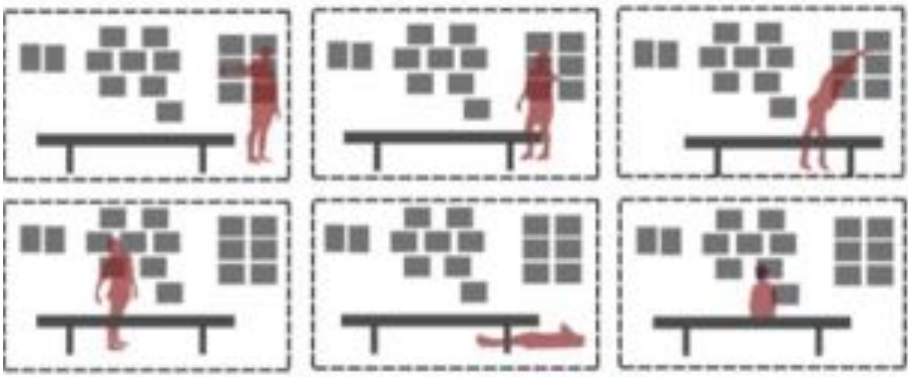

Figure 3. Encounter

Considering that the concept of "becoming" through process, content arises with the tension between the viewer and the viewed, the perceiver and the perceived, so it can be said that being in the current situation is contained in perception and vision. Therefore, a rebirth occurs in every act of perception as the bond is re-established at every moment between the perceiver and the perceived. It would be more realistic to call the dialogue in the solo process a trialogue. Because in this process, the dancer, the audience, and the pictures have encountered.

Switch roles

At the end of the intro solo performed on the second floor of the museum, the switch roles, the second break point, was revealed when the dancer finished the solo by sitting on the bench between dancer and the audience and watching the pictures. (Figure 4)

Figure 4. End of intro solo (Tuna,2003)

The subject of an action can become the object of this action in the process (Tschumi, 1994). An example of this is the switch roles that initiates the subject-object-based questioning of the viewer-viewed. The dancer, who was watched by the paintings and the audience during the process, finished the solo by sitting on the bench and watching the pictures on the wall. Here, in the audience-dancer-paintings trialogue, the question of "who is the audience, who watches what and when?" is revealed. While the museum visitor who came to see the paintings saw and watched the dancer, the dancer started to sit on the bench and watch the paintings at the end of her performance, just like the visitor who came to the museum. (Figure 5)

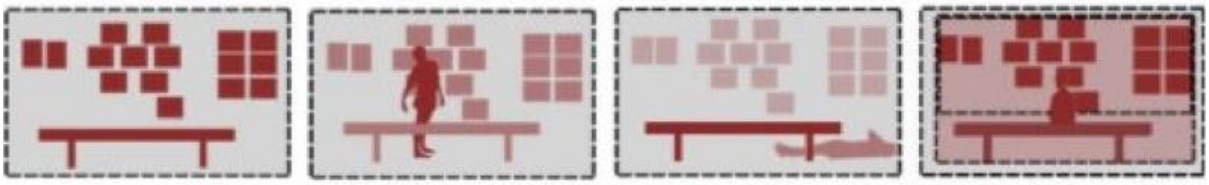

Figure 5. Switch roles

This situation, which was created by the dancer's assumption of the role of the audience, brought with it a notice whether the audience could also take on the role of the dancer. Tuna acted with the idea that "the pictures are looking at the audience, the audience is passing by" rather than "the pictures stop, and people look" and enabled the switch of roles between the audience-dancer-painters visible. (Figure 6) One of the elements supporting visibility is that there were movements included in Tuna's performance in this section from the images on the wall paintings. According to Maurice Merleau-ponty, painters transform the world into a painting by giving the world not only a bundle of volume and functions, but also their bodies with intricate vision and movement (Aydın, 2017). Here, too, the dancer has transformed the world into dance by giving her body, in vision and movement, to the world. At this point, on the basis of being embodied, the switch of roles between the dancer and the paintings has been revealed. Just as in Tschumi's statement that barricades in a street in Paris and being a flanuer on the same street are not the same thing, being a spectator in a museum is not the same as being a dancer in the same museum in the switch roles break point (Tschumi, 1994). However, on the basis of being embodied, it is possible for a person the mirror neuron system allows us to 'read' other people's actions by simulating or inwardly performing them. So, in each case the viewer's response involved a kind of acting out of the dancer's movement, 'reading' the work by inwardly performing the gestures that would have been involved in producing it (Hale, 2016).

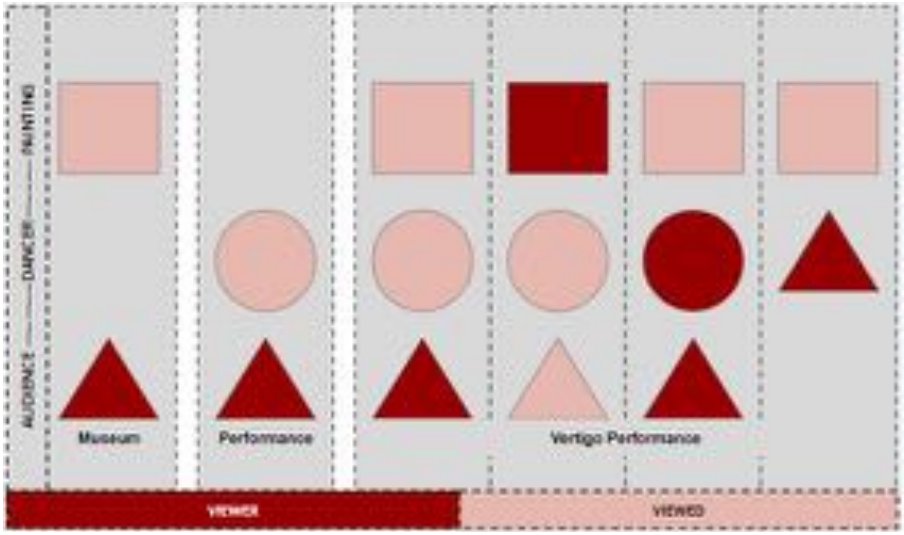

Figure 6. Audience-dancer-painting diagram

Reprise

The dancers danced as close to the audience as possible at the back of the second floor of the museum during the reprise, that is the third break point, in the performance's quartet dance. (Figure 7) Three different versions of the same melody were used in the dance music (Tuna, 2003).

Figure 7. Quarter dance (Tuna, 2003)

The answer that 'the audience can also take the role of the dancer' was given to the question 'whether the audience can also take on the role of the dancer or not', with the effect of the audience can read the gestures of the dancers from the inside and the audience and the dancers are intertwined here. There is no sharp distinction that can be thought of as between the dancers and the audience. Like the distinction that is thought to be between subject and object…Like the distinction that is thought to be between the viewer and the viewed… The result of the dancers and audience being able to create each other in their bodies as 'others' and to read each other's bodies from the inside is intersubjectivity. (Figure 8) Although the actions are performed individually, the actions are done under a form of generality and this generality is felt by others (Zafer Esenyel, 2017). So, the actions of the other are always understood through the 'I' (Merleau-ponty, 1945). Merleau-Ponty states that, with the idea that intersubjectivity is at the core of life, bodily human beings exist together with other bodily ones that surround them. Thus, he defines the body as an absolute presence that enables the positioning of others in a sense (Şan, 2017). So, the positions of the audience and dancers are realized by the possibility of one another's body.

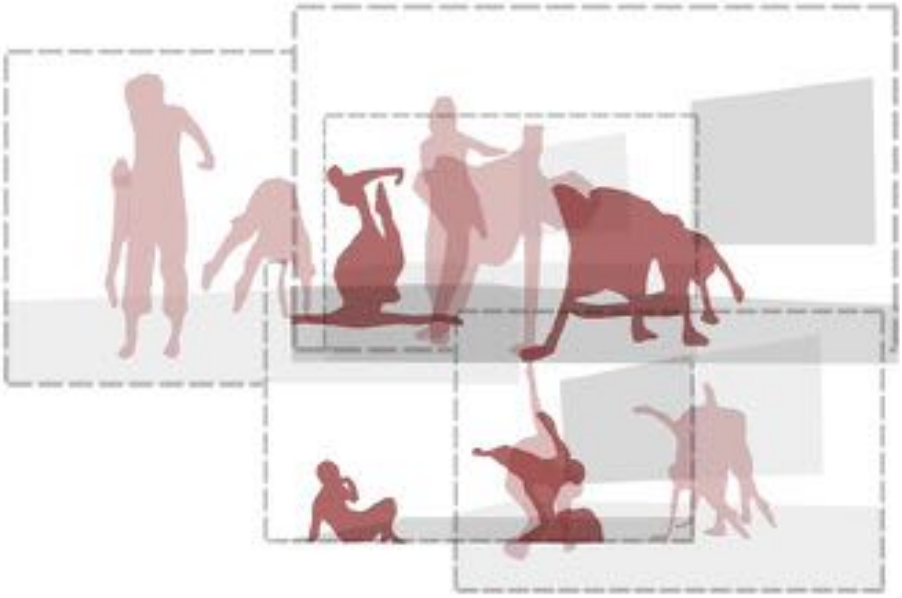

Figure 8. Reprise

Superpose

The superpose, that is the fourth break point, in the solo dance of the performance, the dancer performed in the glass window located on the second floor of the museum, in the area where the administrative office is. (Figure 9) The performance in question was carried out in a water-filled pool and recorded beforehand. During the performance exhibited in the showcase inside the museum, the images of the performance in the water were also reflected. In addition, the shadow of the dancer was created with a strong light source, and the performance displayed in the showcase, the images of the performed in the water and the shadow of the dancer were superimposed. The audience could watch this part, which was held on the second floor of the museum, from the first floor of the museum (Tuna, 2003).

Figure 9. Solo dance (Tuna, 2003)

When the movements in the superpose break point were performed in water, the movements were slowed down by the body's resistance to water. Actions are not performed in an empty and irrelevant space, but in a

space that has a very specific relationship with them. Movement and ground are only artificially separated moments of a unique whole, as in the viewer and the viewed (Merleau-ponty, 1945). The questioning of the 'same' movement in different environments has become evident by including the shadow of the dancer, which is created and reflected using a light source, in the movements performed in the water and on the window. Here the shadow element is included as an image of the body. Pallasmaa also states that the shadow stimulates the imagination and phantasy, based on the fact that the shadow gives shape and life to the object under the light (Pallasmaa, 1996). The body in motion has become unusual by overlapping in layers on the same plane. The overlapping of bodies made the ambiguity in perception even more visible (Figure 10). By closing the light source and the projected image, the solo was completed and although the dancer's body was invisible, the established layers expanded the space size. The spatial dimension, which differs with overlapping layers, can also be exemplified by the fact that a different music emerged when the musician Lucier recorded his own voice in an empty room and then played the recording again and again until the words were erased (Erdem, 2003).

Figure 10. Superpose

Transformation

It can be said that this part of the performance is divided into four dances and solo. The fifth break point is that transformation has taken place in the dance of the quartet. In the performance, which was held on the ground floor of the museum, two dancers were on the wall, while two dancers were on the floor. (Figure 11) The audience could go down to the ground floor and watch the performance from the side, from the sitting units placed perpendicular to the wall. It was possible for the audience to watch this performance as well from a bird's eye view from the gallery space on the second floor.

Figure 11. Quarter dance by couple (Tuna, 2003)

Just as the spoon initiates and carries out a certain type of eating, its meaning is to eat in this way. The cave likewise leads to the act of satisfying the need for protection. It initiates the shelter action and communicates that a possible function exists. Both objects (spoon and cave) communicate something like a wall even when not in use (Eco, 2019). Objects are primarily determined by their behavior, not through static properties (Metzger, 2018). For example, a wooden wheel set on the ground and a weight-bearing wooden wheel are not the same for vision (Merleau-ponty, 1945). Similarly, the wall on which pictures are hung for visibility will not be the same as a wall on which dance takes place. Pallasmaa quotes Henri Bergson as saying that architectural images are an allusion to action, to the moment of actional encounter, or to a promise of purpose and function: "The objects surrounding my body reflect my possible action on them." Pallasmaa thinks it is this possibility of action that distinguishes architecture from other art. Architecture initiates, directs and organizes the movement (Pallasmaa, 1996). At this point, the wall at the entrance of the museum also offered the opportunity to dance for Tuna in an unusual way. In this break point, where the wall-floor transformation is experienced, the dancers on the floor and on the wall have formed a dependent couple. In this case, the performance allowed different duets: two people on the floor, two people on the wall, and a couple with person on the wall and person on the floor. During the performance, the dancers on the wall and the couples on the floor were bound to each other in terms of weight and balance, so they had to control the movements of the body to which they were attached together with their own movements (Tuna, 2003). At this point, the wall element not only constituted an obstacle in front of the body, but also worked as a constant on the conceptual plane. There is no movement without a wall, no wall without movement. The collision of the dancer's body with the wall is due to the necessity of facing the wall as a concrete constant for the visibility of the potentials of the body, rather than the existence of the wall as an obstacle (to which a relationship must be entered such as jumping or hitting). The confrontation in question includes the violent relationship that Tschumi mentions. According to Tschumi, every relationship between a building and its users is a relationship of violence. Because every use means putting the human body into a given space, putting an order into another (Tschumi, 2001). Violence against the wall in the performance is an unusual form of violence. In the usual situation, violence is expected to be applied to the ground. The wall in the museum is not designed to be climbed and danced, but in this performance the dance is performed on this wall. With the dancing on the wall that was not designed to be danced, the necessity of architecture to be the actions rather than the ground for the actions became apparent (Tschumi, 1994). As Pallasmaa states, a building is not an end

in itself. This performance in the museum is an indication of this. The building frames, articulates, structures, makes sense, relates, separates and unites, facilitates and prohibits. Therefore, basic architectural experiences do not have nouns, but rather verb forms (Pallasmaa, 1996). There is nothing fixed with the return of the dynamic structure of architecture in the verb form (Ballantyne, 2007). On the other hand, what is the ground? What is a wall? When the question is asked, the answer can be formed from the position of the body. (Figure 12) Because the position of the dancers' bodies has changed and transformed the plane's state of being a wall or a floor.

In this performance exhibited on the wall-floor plane, depth perception was used to make the integrated structure visible. Depth is a structure that enables things to coexist, slide into each other, mix and integrate with each other (Gökyaran, 2003). In other words, depth is the dimension in which things or their elements envelop each other (Merleau-ponty, 1945). Depth is rather a reversibility of dimensions; It is the experience of a total locality from which height, breadth and distance are deduced from which everything is at the same time, a voluminousness expressed in a word by saying that something is here (Merleau-ponty, 1964).

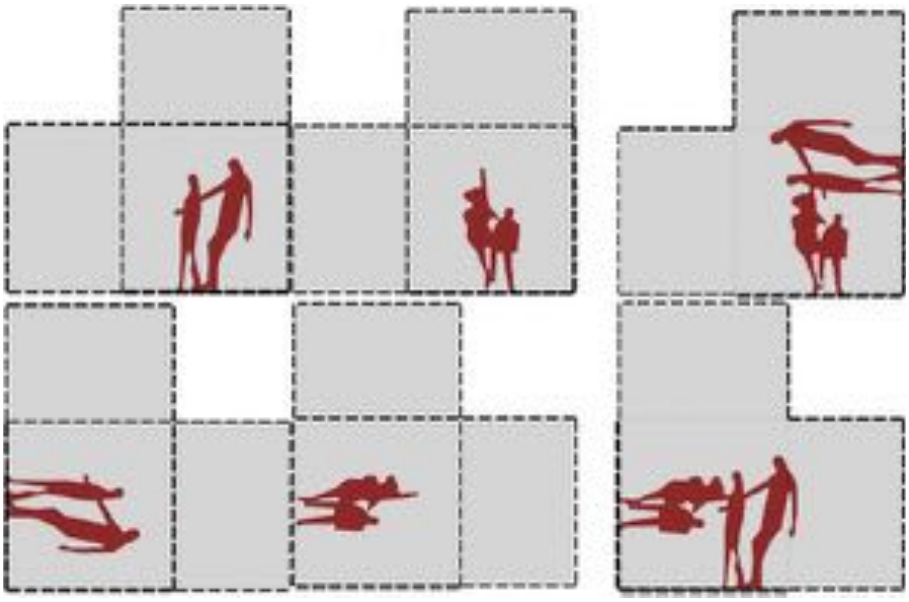

Figure 12. Transformation

Climbing fall-falling climb

In the solo part of the quartet dance-solo dance of the performance, the climbing fall – falling climb break point occurred. In the performance, which was held on the ground floor of the museum, the dancer danced in a rope arrangement set up between two beams on the ceiling above the area where the audience sat. (Figure 13) In this performance, the dancer exhibited the third version of the solos performed in the pool and window (Tuna, 2003).

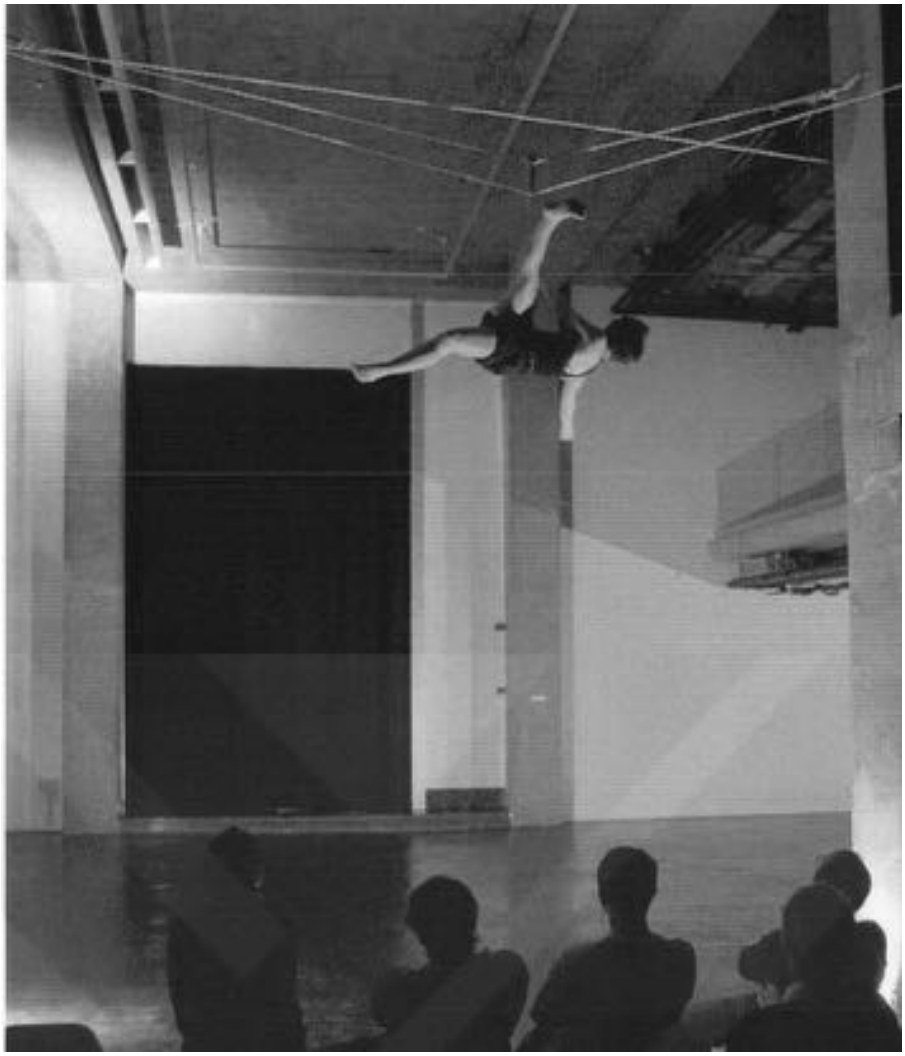

Figure 13. Final solo dance (Tuna, 2003)

Even though the setup of the movements is the same as those exhibited in the water and in the window, the dancer's body displayed a different performance than the one in the water and the window, while it was performed as if suspended in the air and in a vacuum. The situation of the dancer varied according to the place where the audience positioned their body. According to the position of the audience , it is possible for the dancer to be both in the climbing position and in the falling position. Just like the return to the center and centrifugal movements are a single movement, the dancer's movement is also a single movement, but the situation depends on the position of the audience (Şan, 2017). Because all that is required is to always have one point of view and occupy only one point of view at a time (Merleau-ponty, 1945). At this point, it becomes apparent that the dialogue can be experienced from the position of the bodies. (Figure 14)

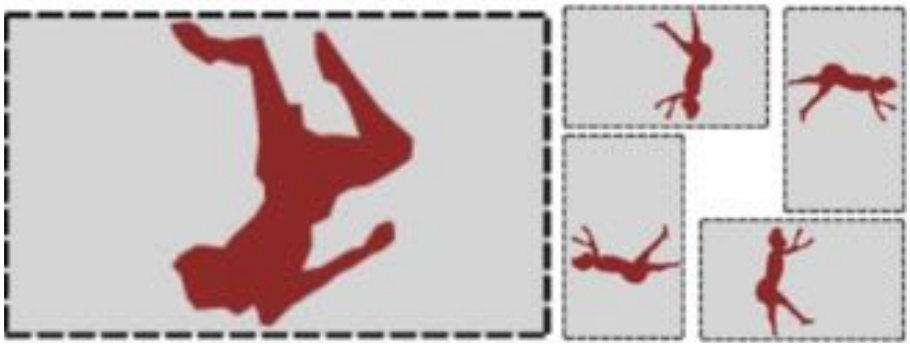

Figure 14. Climbing fall-falling climb

REVEALED THINGS

Tuğçe Tuna's Vertigo performance made it visible that the body and space take shape together as living, lively, changing and transforming structures during their dialogue with each other. (Figure 15) During the performance, the bodies shaped the spaces in visible or invisible ways with their movements. Bodies have created new and unfamiliar spaces with their fluid and irregular movements (Tschumi, 2001). Thus, space has turned into a dynamic structure depending on temporality and performance with the movement of bodies (Dervişoğlu, 2008). The performance made the transformation of body and space into each other become visible and their repositioning according to each other's position, revealing that body & space necessitate each other and create an incomplete unity.

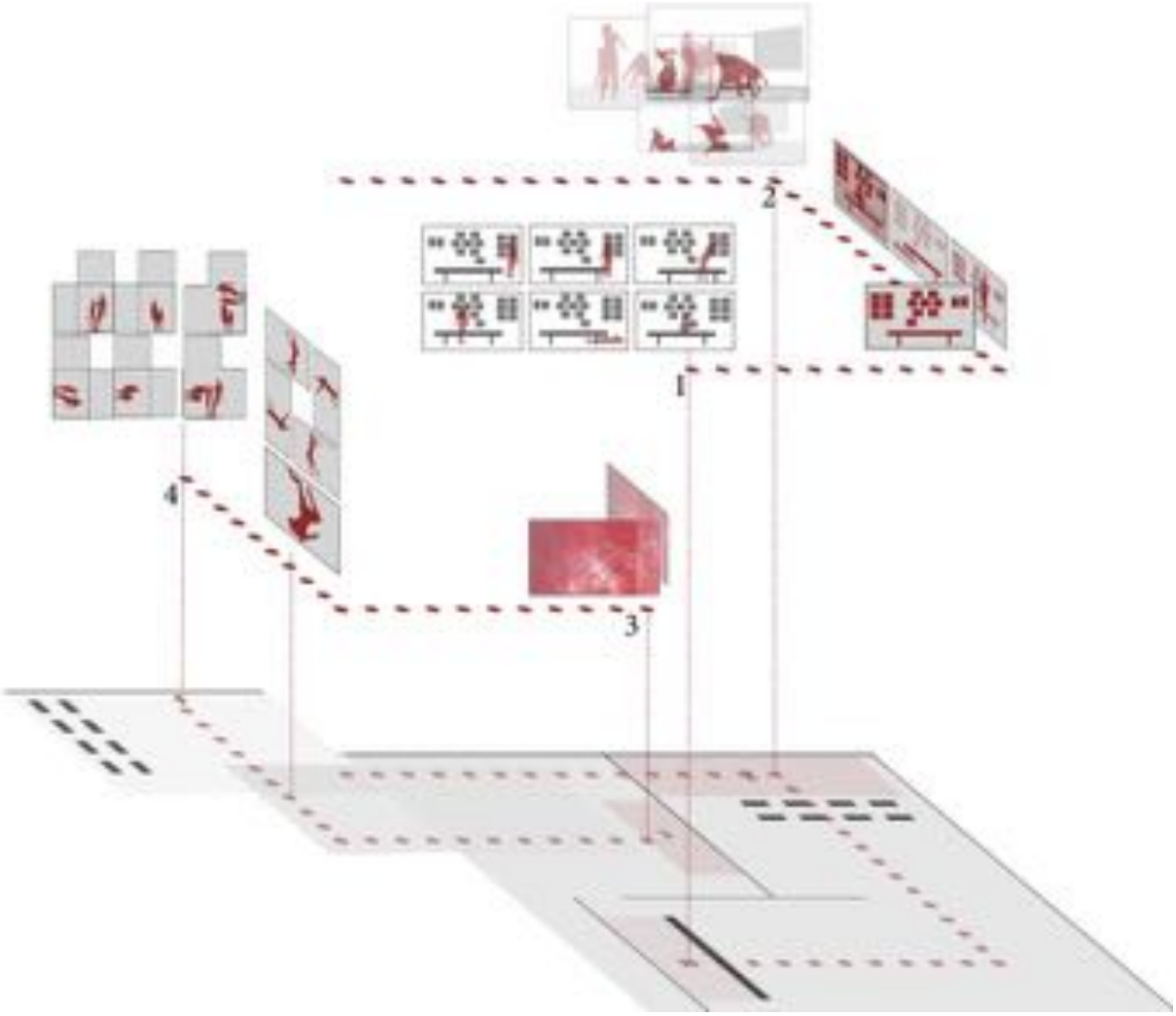

Figure 15. Vertigo Performance with breaking points

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POSITIVE DISTRACTION FACTORS IN HEALTHCARE FACILITIES

NERMIN AHMED SEIF ELDIN ELSAYED ELWAKAD

ABSTRACT

This article presents research on the effect of positive distraction factors and their importance. The paper explores it through a theoretical framework review and presents it in this research paper. Oncology Hospitals are a stressful environment for all stakeholders (patients, their families, and staff), accordingly, the use of positive distraction factors can contribute to hospital occupants' sense of well-being and comfort, as to reduce their focus on their own physical condition, such as artwork, nature, large furniture units, colors, music…etc., and can reduce the stress levels and improve the psychophysiological condition of patients. The paper present how respectively, distraction units are used in oncology hospitals; how the type, color, and shape of these units can affect the people and distract them from their medical and psychological condition. And how the presented lighting design can influence the occupants' perception of these distraction units, how it will affect their experience in hospitals, and how it will shape the interior space and affects the ways in which people use the spaces and their behavior. These separate aspects of the distraction factor and the surrounding environment combine to become what can be described as the generators of interior space design atmospheres in the healthcare facility.

KEYWORDS: Positive distraction, Interior design, Healthcare, cancer, lighting, color

ENVIRONMENTAL IMPACT ASSESSMENT IN THE SELECTION OF FINISHING MATERIALS USED IN HOTEL BEDROOMS

NİL KOKULU, SEDEN ACUN ÖZGÜNLER

ABSTRACT

With the increase in population in the world, the development of technology and the diversification of user needs, natural materials are artificialized in order to show better performance, and they are used in the building by choosing without considering resource consumption and environmental effects during the design process of the building. When the distribution of the environmental impacts of building materials according to the sectors is examined, it is seen that the touristic buildings, especially the hotels, are in the first place. In this study, the environmental effects of finishing materials (flooring, wall, ceiling) used in hotel bedrooms are evaluated. In this context; the studies prepared were examined, the most used materials in hotel bedrooms in Turkey were determined, the performance requirements of the materials were mentioned, standards, regulations, awards and programs were explained.

KEYWORDS: environmental effects, hotels, finishing materials, material performance requirements

SOUND AND SPACE INTERACTION AND ITS EFFECTS ON ARCHITECTURAL DESIGN

EMIR ÇEKMECELIOĞLU, ÇIĞDEM POLATOĞLU

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ABSTRACT
Since the first conceptual ideas about space began to emerge, the sense of vision has been kept superior to other senses. In particular, western thinkers have organized the senses hierarchically since antiquity and have expressed the sense of vision as the primary sense. This common cultural assumption has also shaped the design of the built environment. Especially with the Cartesian space philosophy of the modern movement, the eye-centric paradigm has reached its peak. This perspective, which is based on the users are experiencing environment through eye and with deterministic relationship, has excluded all other senses except vision from architectural design processes. Contrary to the modernist architecture perspective, users experience space as a whole with all their senses and with their bodies. This highlights the necessity for a more inclusive perspective on spatial experience than modern architectural thought.
The built environment has an aural presence as much as it is visual, and the aural qualities in an environment are not just a simple, neutral background. The auditory qualities of the space contribute heavily to the experiential identity of an environment. Therefore, it can be stated that the experiential aspect of the builds can have a richer and more satisfying environment to the extent that the sound and even all senses and body can be included in the design and evaluation processes.
The concepts and approaches generated on the relationship between sound and space have a deep history. When evaluated chronologically, the first approach to systematically examine this process is the concept of acoustics. Then, the concept of soundscape, which defines the environment created by all the sounds that can be perceived in an environment, takes place in the literature. The concept of aural architecture, which is a more recent concept; is defined as architecture that combines the physical aspects of acoustics with the perceptual and cultural aspects of the user and aims to provide a high-quality acoustic environment that responds to the user's needs.
Based on these approaches, it is aimed to examine the place of the sound phenomenon in the spatial interaction process and to discuss the effects of this relationship on architectural design studies. For this purpose, first of all, the historical change of space-user-sound interaction is presented and related concepts are introduced. Parallel to the concepts, the potential of the interaction of sound and space to expand and influence architectural design approaches is discussed by exemplifying related architectural productions. Based on the examinations, it is understood that the inclusion of auditory qualities in architectural design processes contributes to presenting a more inclusive and meaningful space experience.

KEYWORDS: Sound; Space; Sound and Space Interaction; Soundscape; Aural Architecture; Architectural Design.

* This paper reveals some of the findings of 1st authors' PhD research at Yildiz Technical University, Department of Architecture, Architectural Design PhD Programme, supervised by 2nd author.

ARCHITECTURE IN ITALY AND OTTOMAN IN THE 16TH CENTURY: CONCEPT, PROCESS AND SCOPE

SERAY ILIK, NUR URFALIOĞLU

ABSTRACT

The concept of architecture is an expression with a wide scope that defines the act of developing and building. Architect, in its simplest definition, is expressed as a professional who designs, plans, and produces these structures. However, today, due to the rapid developments in the field of building technology and the increase in the amount of work to be designed, built, and controlled during the formation of a building, different job descriptions have been formed or different branches have been chosen thanks to people who are specialized in different professions. The effort, labor and work of architects, engineers, contractors, interior architects, landscape architects and many other professions are in question, from the planning stage of a building to its completion and putting it into use. Development activities are progressing thanks to the coming together of these different professional groups and working together in harmony.

Today, when a review is made of how these professions, whose job descriptions and jurisdictions are defined with clear lines, have been reflected in the literature in the historical process, we see that the boundaries have become blurred and they have begun to be gathered under a single definition. This definition, on the other hand, often comes up as an expression as "the architect of the building". However, what exactly is the definition of the job that is meant by the expression "architect of the building" and how many of these different professions it covers today is open to interpretation and may cause some debates in the researches on the field. In addition to this conceptual confusion in the process, what exactly the scope of the expression used covers is not defined with clear boundaries and increases the perception of ambiguity.

The aim of this study is to contribute to illuminating the conceptual confusion arising from this uncertainty in the literature. By defining certain criteria, it is aimed to conduct a literature review for a certain time period and to provide a clearer definition of both the conceptual meaning of the term "architect of the building" and what it encompasses, thanks to the data obtained from these sources. Since the change in the meaning and scope of the concept in the process will be examined, the 16th century, when important architectural works were built in many different geographies, was preferred for literature review. In the context of the selected time period, Renaissance Period Italy and Classical Period Ottoman architectures were examined in order to compare the works that fall within the scope of the definition of profession in different geographies. Another important reason for the preference of this time period and two geographies, as well as the abundance of studies in the field of architecture, is the availability of documents and information in the field of architectural history in a suitable amount for scanning. While scanning the literature of the periods, a research was conducted on the relevant architects, their correspondence with their patrons, official documents, palace records, memorandums, and books. The findings were compared with each other and with today's understanding of architecture, and a research on the concept change in the process was revealed.

The findings obtained as a result of the literature search are expressed in understandable expressions and tables. Both the changes in the process and the application differences between the two geographies were separately compared and determinations were made in this direction. As a result of this study, it is aimed to contribute to the clarification of the uncertain boundaries of the definition of "architect of the building", and to form a basis for future research on this subject.

KEYWORDS: architecture, process, Renaissance, Classical Ottoman, architectural terms.

REPRESENTATION OF ARCHITECTURE IN ART: THE WORKS OF ILYA AND EMILIA KABAKOV

TÜRKAN NIHAN HACIÖMEROĞLU

ABSTRACT

Russian-born, American-based artists Ilya and Emilia Kabakov had many exhibitions worldwide that attracted attention, including "The Utopian Projects" hosted by Hirshhorn Museum, from September 2017, till April 2018. The exhibition consisted of small-scale models and info posters of both realized and unrealized works of the artists'. The realization of the works meant constructing 1/1-scale architectural structures ranging from standard-sized rooms to approximately three-floor high constructions. The works in the exhibition famously blur the lines between art and architecture. The artists are also designers of space in a utopian world.

Art and architecture come together with utopia in the works of Kabakovs'. For this purpose, this paper focuses on the works presented in "The Utopian Projects" to question the relationship between architecture and art and how art utilizes architecture. Eight works (models) from the exhibition are selected to achieve that. First, these works' common elements related to representation are defined and grouped. Then the narrative of the artworks is analyzed to understand how it utilizes architectural elements, representation, and narrative with references to Bolt, Pallasmaa, and Derrida's conceptual approaches.

This paper ascertains that the representative power of architecture is utilized by art in different senses. The creation of space for any purpose is the work of architecture, but art has the power to take the experience of space from reality to beyond, to the unknown, a dream, or a utopia. The architectural space allows users to self-reflect and gives them a chance to realize themselves in an alternative experience.

KEYWORDS: Architectural representation, Narrative, The utopian projects, Ilya and Emilia Kabakov, Art.

REAL VS. IMAGINARY: CREATION OF TWISTED MEMORY IN ARCHITECTURAL HISTORY BY CINEMA AND MEDIA

TÜRKAN NIHAN HACIÖMEROĞLU

ABSTRACT

Architecture and the city are integral parts of media and cinematic vision. As a tool, architectural spaces in cinema and media serve the narrative. What is seen is what should be seen as part of the story on the screen. That means cinema and media often change the perception of the city and built spaces regarding scale, program, context, spatial plans, user-space relationship, and material. Buildings are misread because of alterations in their context, facade, or surroundings, repurposed or re-functionalized spaces, distinct changes in dimensions, spatial patterns creating fictional connections following cut/edited movements in space, altered sound, material, and color of spaces using digital technologies. Spaces are deconstructed and reconstructed by using montage to fit the story. What we have in the end is not the actual space but a fictional one in the mind of the viewers and eventually in public memory. Even cities are transformed and presented as part of the spectacle. Collective memory on architecture is at risk of losing its integrity by popular culture via cinema and media.

This study is about the situations that challenge and change the memory of architectural history with fictional imagery. It analyzes how media and cinema change the perception of space for the sake of narrative and create fictional spaces within the original ones, thus creating twisted memory in the public's mind.

KEYWORDS: Architectural History, Architectural Space, Perception, Collective Memory, Media and Cinema, Twisted Memory.