


DESIGNING A TECHNOLOGY AND INNOVATION CENTER IN THE CONTEXT OF ANTALYA/TURKEY

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Abstract

Nowadays, technology and innovation are advancing very fast. This evolution and progress should be followed by continuous monitoring. However, while making these improvements, sustainability should never be put aside. The main research problem is that today's cities, architectural programs and forms of management do not respond adequately to the development of technology and innovation.

City of Antalya in Turkey with a Mediterranean climate was chosen to create the challenge for the problem of natural ventilation and the land selected for the project has been defined as a technology development area in the regulation plan. The project, aims to achieve the rapid development of technology and innovation in cities while providing natural ventilation. The goal of the center is to meet citizens, artists, technologists, business and public sector organizations for creating new ideas, tools and technologies. This center will be also serving as community center, an awareness museum of technology and user experience center for people to participate and experience the process of innovation and technology.

In this study, case study method is used as a main methodology. Başakşehir Living Lab Technology and Innovation Center by Istanbul Design Factory and Teknopark İstanbul by Tabanlıoğlu Architects are examined for better understanding.

Keywords: Architectural Design, Technology and Innovation Center, Natural Ventilation, Courtyard Effect

ANTALYA/TÜRKİYE BAĞLAMINDA BİR TEKNOLOJİ VE İNOVASYON MERKEZİ TASARLAMAK

Özet

Günümüzde teknoloji ve inovasyon çok hızlı ilerliyor. Bu gelişme ve ilerleme sürekli takip edilmelidir. Ancak bu iyileştirmeleri yaparken sürdürülebilirliği asla bir kenara bırakmamak gerekiyor. Temel araştırma problemi, günümüz şehirlerinin, mimari programlarının ve yönetim biçimlerinin teknoloji ve inovasyonun gelişimine yeterince cevap vermemesidir.

Türkiye'de Akdeniz iklimine sahip Antalya şehri, doğal havalandırma sorununa meydan okumak için seçilmiş ve proje için seçilen arazi, düzenleme planında teknoloji geliştirme alanı olarak tanımlanmıştır. Proje, şehirlerde doğal havalandırma sağlarken teknolojinin ve inovasyonun hızlı gelişimine ayak uydurmayı hedefliyor. Merkezin amacı, yeni fikirler, araçlar ve teknolojiler yaratmak için vatandaşlar, sanatçılar, teknoloji uzmanları, iş dünyası ve kamu sektörü kuruluşlarıyla buluşmaktır. Bu merkez aynı zamanda insanların inovasyon ve teknoloji sürecine katılmaları ve deneyimlemeleri için bir toplum merkezi, bir teknoloji farkındalık müzesi ve kullanıcı deneyimi merkezi olarak hizmet vermek üzere tasarlanmıştır.

Bu çalışmada temel yöntem olarak durum çalışması yöntemi kullanılmıştır. *İstanbul Design Factory* firmasına ait Başakşehir Living Lab Teknoloji ve İnovasyon Merkezi ve *Tabanlıoğlu Mimarlık*'a ait Teknopark İstanbul daha iyi anlaşılabilmesi için incelenmiştir.

Anahtar Kelimeler: Mimari Tasarım, Teknoloji ve İnovasyon Merkezi, Doğal Havalandırma, Avlu Etkisi

1. Introduction And Theoretical Framework

Technology and innovation are progressing at a very fast pace these days. Continuous monitoring and emerging technology should be used to track this evolution and growth. However, when making these improvements, the importance of sustainability should never be overlooked. According the main research problem of this study, architectural programs and forms of management will be studied for the development of technology and innovation.

Different climatic conditions bring changes in architectural solutions. These changes also vary depending on the environment. It is necessary to carry out studies and researches on the climate of the environment before starting the design. The project proposes the design of Antalya Technology and Innovation Center as continuation of existing technology development area in Antalya/Turkey, which has Mediterranean Climate and it gives a challenge for the problem of natural ventilation. Various renewable energy technologies can be used for passive air conditioning, and different design choices can be made. Many of the solutions are passive air-conditioning with the use of solar and wind power, including natural ventilation.

Throughout this analysis, the systems where natural ventilation, which is accomplished by the use of passive solar and wind energy systems, is achieved by providing the effect of courtyard, gallery or atrium with in structures.

1.1. Aim

Nowadays, cities and building purposes cannot keep pace with the advancement and presenting of technology. While making these improvements, sustainability should never be put aside and handled properly. In areas such as the Mediterranean climate, which receive high annual solar and solar radiation for a long time, there are problems with natural ventilation. The purpose of this study is to design a center that can follow rapidly developing and evolving technology and work on it and to provide necessary solutions according to the climate.

1.2. Scope

This paper was written in order to create a design brief as a result of the research made to design a technology and innovation center in context of Antalya. This study starts with a literature review and is supported by case studies and supported by interviews in order to ensure that the examples are understood thoroughly. Since this design brief is in the Antalya context, solutions in the local area will be investigated and will affect the form and functioning of the project.

2. Methodology

2.1. Deductive Approach Method

The study begins by identifying research problems. These problems lead the study to the main aspects and research questions. The main aspects identified in this study are as follows; natural ventilation in Mediterranean climate by courtyard affect, and design of technology and innovation center.

2.2. Case Study Method

Case study method is adapted by Başakşehir Living Lab Technology and Innovation Center and Teknopark İstanbul in Istanbul/Turkey. In this study, Başakşehir Living Lab Technology and Innovation Center was examined using case study method and it is first and only Technology and Innovation Center in Turkey approved by ENoLL (European Network of Living Labs). Its planning approach, values, advantages and privileges are examined. Teknopark İstanbul project is another project which is examined as secondary case study.

2.3. Interview Method

The method is used for better understanding and support for the study case of Başakşehir Living Lab Technology and Innovation Center and inspirational example of Teknopark İstanbul. Two people are interviewed for the case studies to understand the design concepts, functions and management systems. For the study case, Başakşehir Living Lab Technology and Innovation Center, Assist. Prof. Dr. Mehmet Emre Arslan is interviewed and for the secondary case study Project of Teknopark İstanbul, Gonca Arik Çalışkan (Research, Publication & Communcation / Associate) is interviewed.

3. Findings

A large part of the buildings' energy use is expended on heating, cooling, and ventilation systems that provide internal comfort requirements. The problem is that they consume fossil fuels like gas, coal, fuel oil. (Sev, 2009) Being or designing sustainable should have never seen as complete unless we also start to create an awareness about sustainability, promote sustainability and educate the people about sustainability.

Regardless of the scale, making a healthy environment is a set of subsystems that meets the physical, social and economic needs of people at the highest level. (OK, 2007) Natural / passive air conditioning, which is one of these subsystems, is also an important part of energy efficient design. Today's technological possibilities should be centrally located in buildings designed for sustainability, management and promoting, especially in technology and innovation centers.

3.1. Case Study - LivingLab Başakşehir Technology and Innovation Center

The aim of the study case is to explore about the idea of Living Lab and Technology and Innovation Center on its real place. This Center is the one and only example in Turkey. The study gave the idea of starting the project of Antalya Technology and Innovation Center. The results obtained by examining the areas and operating systems in the project are the most important basis for the design guidelines of Antalya Technology and Innovation Center.



Figure 1: 3D visualization of Başakşehir Living Lab Technology and Innovation Center (Basaksehir-Livinglab.com).

The three main zones in this Project, room defining and their work systems, were greatly inspired. Inspired part of the room defining with their main zones are User Experience Center (seminar room, design experiment areas, 3D printing area), Incubator Center (work area, electronic laboratory, conference room, workshops and meeting rooms.) and Social Space (green areas, use of top floor which serves social events).

Başakşehir Technology and Innovation center is visited and necessary preliminary assessments are provided from Co-Founder Architect of *Istanbul Design Factory*, the company designed this project, Assist. Prof. Dr. Mehmet Emre Arslan was interviewed to reach deeper information about Başakşehir Living Lab Technology and Innovation center. This building supports technology and innovation and motivates users and visitors to produce. Due to its structure and contents, it can also be said that it has the function of a cultural center of the future and a museum. With its nature it is a center which welcomes everyone. Beyond introducing new technologies to people, they support them for new inventions and designs and then bring them together with stakeholders to play a major role in the realization of their projects.

3.2. Case Study - Teknopark İstanbul



Figure 2: 3D visualization - master plan of Teknopark İstanbul (Tabanlıoğlu Architects, 2019).

“TEKNOPARK, which will establish analog and human relations in the more digitalized world of the future, will be an important landmark for the foresight of environmental development with its high standard structuring” (Tabanlıoğlu Architects, 2019).

Teknopark project, which aims to operate in a broader perspective with common goals and created synergy in innovative production, blends indoor and outdoor spaces and brings urban life to office time and space. The design, which embraces mixed-use structures in unity and emphasizes the symbolic nature of the innovative approach, proposes a dynamic structure that is more interactive with shared facilities and adds social life to its program (Tabanlıoğlu Architects, 2019).

With its innovative design that is functional in style, contemporary in style and sustainable in its components, a campus, an office and living complex is aimed in an effective and direct communication, supporting research, creation and production in a contemporary environment that creates a strong belonging.

4. Results

4.1. Design Brief of Antalya Technology and Innovation Center – Design Guidelines



Figure 3: 3D visualization - Antalya Technology and Innovation Center.

The project proposes the design of Antalya Technology and Innovation Center as continuation of existing technology development area in Antalya/Turkey. The goal of the center is to meet citizens, artists, technologists, business and public sector organizations for creating new ideas, tools and technologies.

The guidelines of the project Technology and Innovation center will be prepared according to the followings. Designing the first phase of the form of the project will be according to Mediterranean climate and vernacular architecture. Preparing and creating the functions of the places and zones will be mostly according to the knowledge from case studies.

4.2. Implementing Mediterranean Vernacular Architecture Solutions

Building layout: In Mediterranean climate, the efficient building layout is the one with a courtyard or patio. In order to minimize the surfaces which are exposed to sun, compact forms are chosen.

Building envelope: Building skin is highly affected to the energy efficient design. That's why external finishes are light and bright colors to protect envelope from absorbing the unwanted sun heat.

Solar Protection: To protect the building skin from the sun, extension of the roof (roof overhangs) should be made. Smart roof will protect the roof from unwanted solar heat gain and will be closed partially by itself during the rainy days to not get so much rain inside of the building. Having trees on the east and west would solve the problem of unwanted angle of the sun.

Courtyard with Vegetation and Water Structure: Arranging forms with courtyard providing shade and cool spaces on the design.in courtyards having water structures and vegetation helps for evaporative cooling. They increase the air moisture by evaporation and cool it down.

Green roof: Green roof provides cool roof by the vegetation on it. Vegetation will cool down the air before reaching the roof. It also provides good social area for people to spend time.

Landscaping: Vegetation creates needed microclimate and it should be included to the design. Use of trees provides shade, cools down the air before reaching to building façade, barrier for the noise, reduces air pollution, etc. It should be highly considered for landscaping. (Fathy, 1986)

4.3. Main Sections

The Project of Living Lab Technology and Innovation Center Project in Antalya, will have five main sections:

Table 1: Main sections of Living Lab Technology and Innovation Center.

SECTION CODE	SECTION	TYPE OF FLOOR SPACE
1	User Experience Center	Public
2	Social Space	Public & Semi Public
3	Administration, Offices & Service Providers	Private
4	Game Center	Semi Public & Private
5	Incubator Center	Semi Public & Private

User experience Center: It is an environment where new technological products and services are shared. It exhibits new products in the market and presents them to experience.

Table 2: User experience center - definition of areas.

1	User Experience Center	
	Design Experiment Area	open area/ public
	Recycled Modelling Area	open area/ public
	Digital Experience Room	enclosed area/ public
	Exhibition area	semi-closed area/ public
	Conference Hall	closed area/ public
	Foyer	open area/ public

		Seminar Room	enclosed area/semi public
		Green Design Awareness Area	semi-closed area/ public

Social Spaces: The social area includes public spaces or the places for socialization for the users and visitors of the center.

Table 3: Social spaces - definition of areas.

2	Social Space		
		Main Lobby	open area/public
		Secondary Lobby	open area /public
		Information Centerx2	open area /public
		Cafe	open area /public
		Souvenir shop x2	enclosed area/public
		Courtyards	open area/public
		Rooftop/ Social Event Area	open area / public

Administration, Offices: This area is the most private part of the center. It has its own entrance for the workers.

Table 4: Administration, offices & service providers- definition of areas.

3	Administration& Offices		
		Manager Office	enclosed area/ private
		Meeting Room x3	enclosed area/ private
		Presentation Room	semi closed/ semi public
		Secretary	semi closed/ semi public
		Service Providers Offices x3	enclosed area/ private
		Kitchenette	open area/ private
		Wc F&M x4	enclosed area/ private

Game Center: This is a design and development are for the Virtual Reality and games. It includes places for the designers, developers and experiencers.

Table 5: Game center - definition of areas.

4	Game Center		
		VR Experiment/ Gaming/ Exhibition	enclosed area/ semi public
		VR Experiment &Gaming Room	enclosed area/ semi public
		Gaming Room	enclosed area/ semi public
		Game Development Area	enclosed area/ private
		Game Design Area	enclosed area/ private
		Terrace	enclosed area/ private
		Workshop Room x2	enclosed area/ semi public
		Casual Study & Social Area	open area /semi public
		Open Terrace	enclosed area/ semi public

Incubator Center: It's an office, workspace, and laboratory atmosphere that provides innovative ideas for entrepreneurs and entrepreneurs with the appropriate hardware, software, and equipment.

Table 6: Incubator center - definition of areas.

5	Incubator Center		
	Workshop Center	Brainstorming Room x4	enclosed area/ semi public
	Workshop Center	Workshop Room x4	enclosed area/ semi public
	Workshop Center	Casual Study & Social Area	open area /semi public
	Workshop Center	Food and Beverage Area	open area /semi public
	Workshop Center	Open Terrace	enclosed area/ semi public
	Workshop Center	Multipurpose Terrace	enclosed area/semi-public
	Quite Area	Coworking Area	enclosed area/ semi public

	Quite Area	Coworking Offices x4	enclosed area/ private
	Quite Area	Work Station	enclosed area/ semi public
	Quite Area	Research Area x2	enclosed area/ semi public
	Quite Area	Meeting Room x2	enclosed area/ semi public
	Quite Area	Casual Study & Social Area	open area /semi public
	Lab Area	Robotics Lab	enclosed area/ semi public
	Lab Area	Multipurpose Lecture Room	enclosed area/ semi public
	Lab Area	3D Design, Scan and Printing Lab	enclosed area/ semi public
	Lab Area	Computer Lab	enclosed area/ semi public
	Lab Area	Green Building Design Strategies Lab	enclosed area/ semi public
	Lab Area	Prototyping Lab	enclosed area/ semi public
	Lab Area	Electronics Lab	enclosed area/ semi public
	Lab Area	Casual Study & Social Area	open area /semi public
	Drone Center	Drone Tech. Development Lab	enclosed area/ semi public
	Drone Center	Drone Flying Field	enclosed area/ semi public

4.4. Access

Access to the Antalya Technology and Innovation Center should be easy to reach to everyone. There will be vehicular and pedestrian access to the Center. Accesses from outside to inside of the Center will be from the side near to the roads according to have better accessibility. Besides those public entrances, there will be a separate entrance for the office workers.

Main entrance for users and visitors – connects the building with the visitors on the side which will be more accessible and closer to community. From the entrance foyer, visitors and users will reach all the facilities easily. Secondary entrance for users and visitors- this entrance connects the people from the other side of the building. Which can be easier to reach to the Center for some people. It also provides connectivity, transparency and easier accessibility for some visitors and users. Also entrance for the garage is next to the secondary entrance. Entrance for workers- provides private entrance and exit for the workers.

4.5. Security

The security of the building provided by the securities next to entrances. In addition, there are officials who are responsible of the security of some rooms of the center. They keep the records in places.

4.6. Technical Areas

This area includes, securities, toilets, infirmary, Service Areas (boiler, mechanical, electrical, delivery...) and storages.

Table 7: Technical areas - definition of areas.

6	Technical Areas		
		Security x2	enclosed area/ private
		Wc F&M x6	enclosed area
		Infirmary	enclosed area/ public
		Service Areas (boiler, mechanical, electrical, delivery...)	enclosed area
		Storage x3	enclosed area

4.7. Parking

Table 8: Definition of parking areas.

7	Parking Type	Vehicle Type	Number of Parking Lots	Location
	Parking for workers and Visitors	Private Car	109	Underground Garage
	Parking for disable people	Private Car	10	Underground Garage
	Bus parking for groups	Bus	3	Outdoor
	Parking for delivery and services	Service Bus	2	Underground Garage
	Total Number of Parking Lots		124	

4.8. Floor Plans and 3D Visualizations of the Project of Antalya Technology and Innovation Center

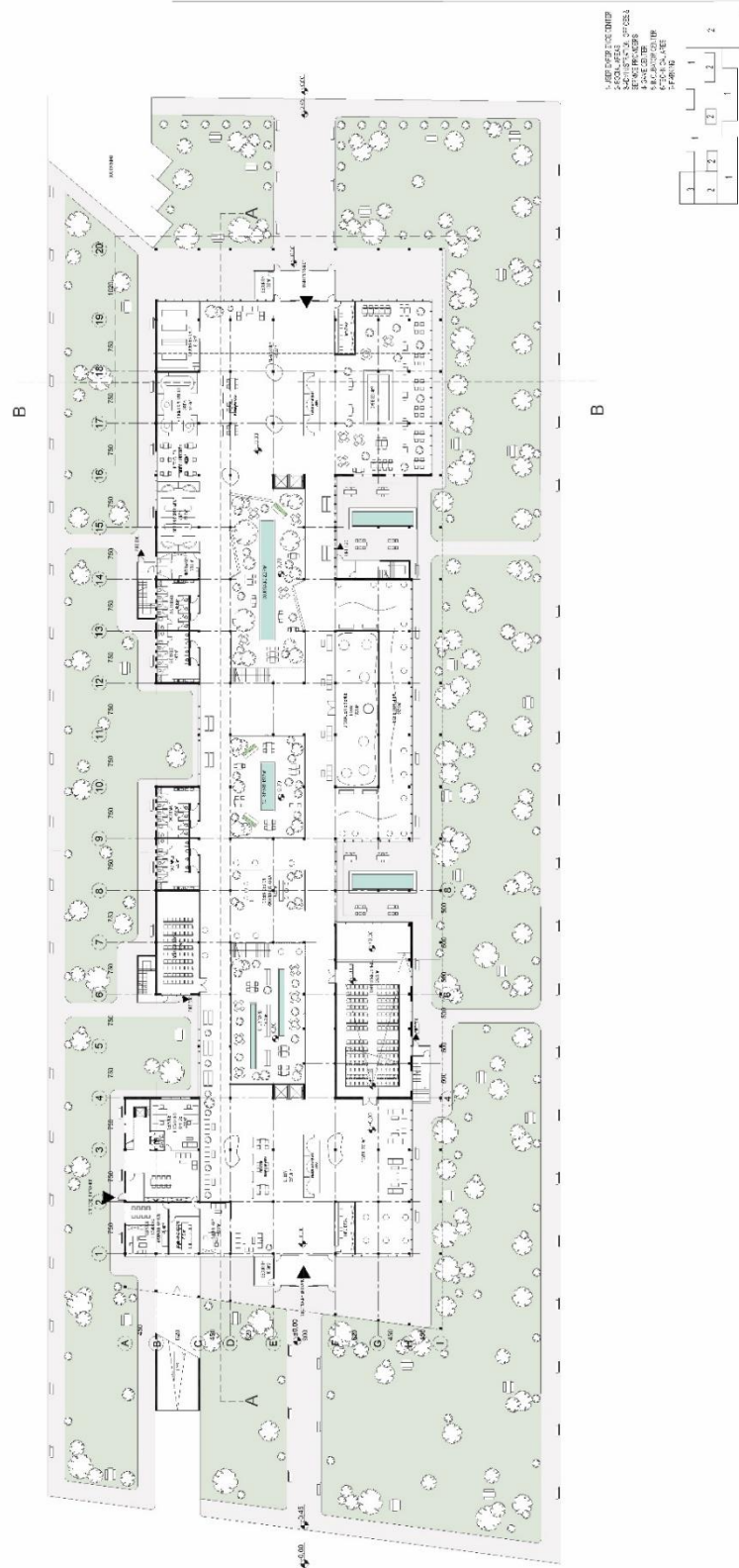


Figure 4: Ground floor plan of Antalya Technology and Innovation Center.

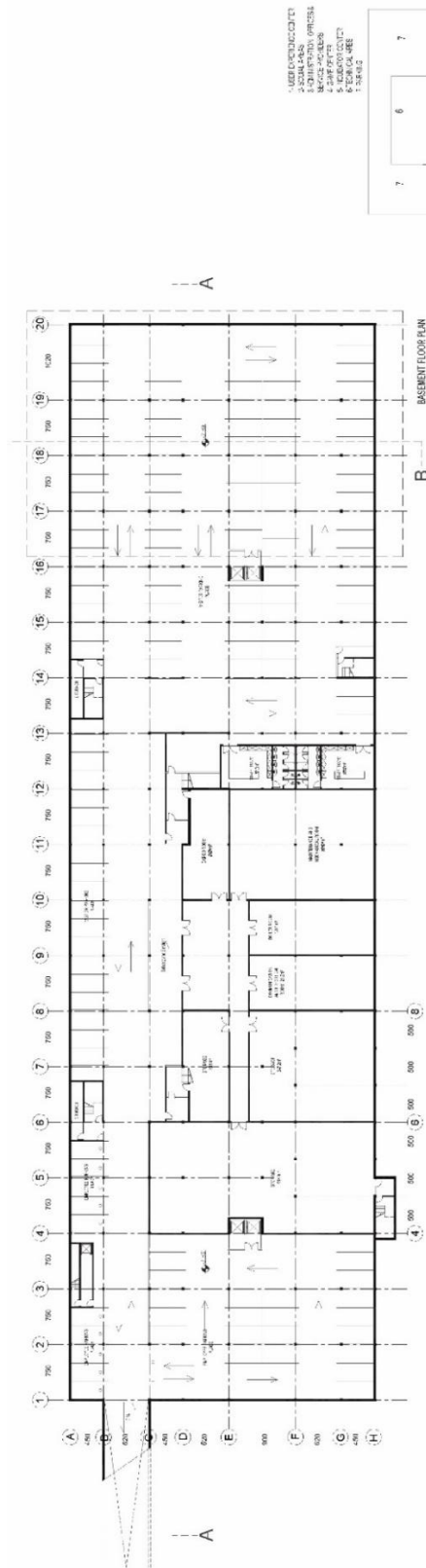


Figure 5: Basement plan of Antalya Technology and Innovation Center.

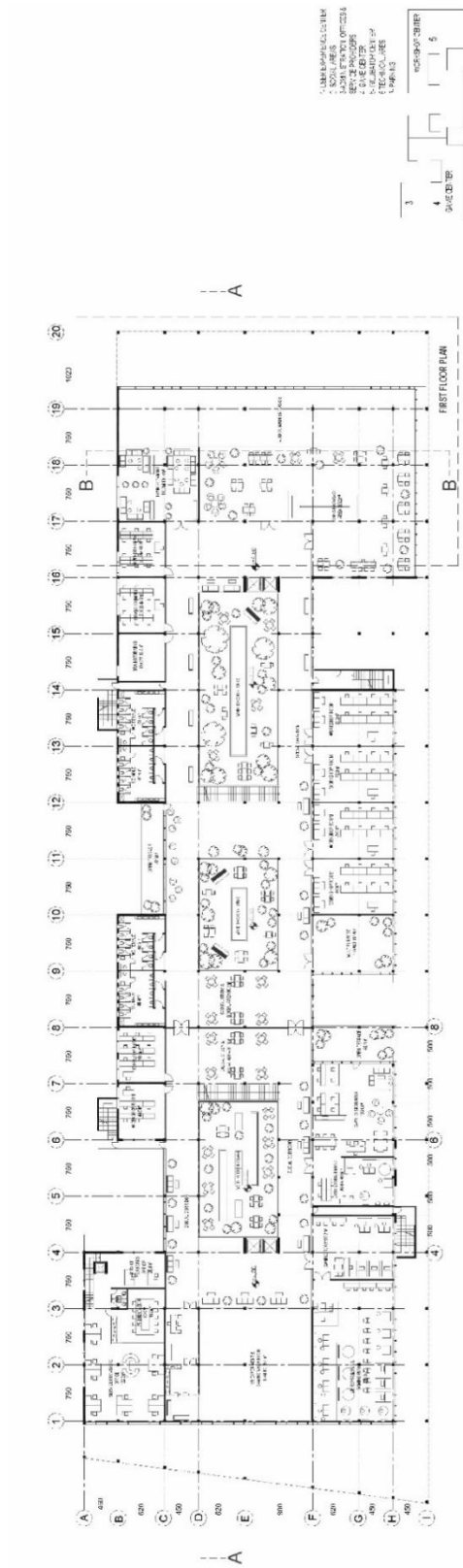


Figure 6: First floor plan of Antalya Technology and Innovation Center.

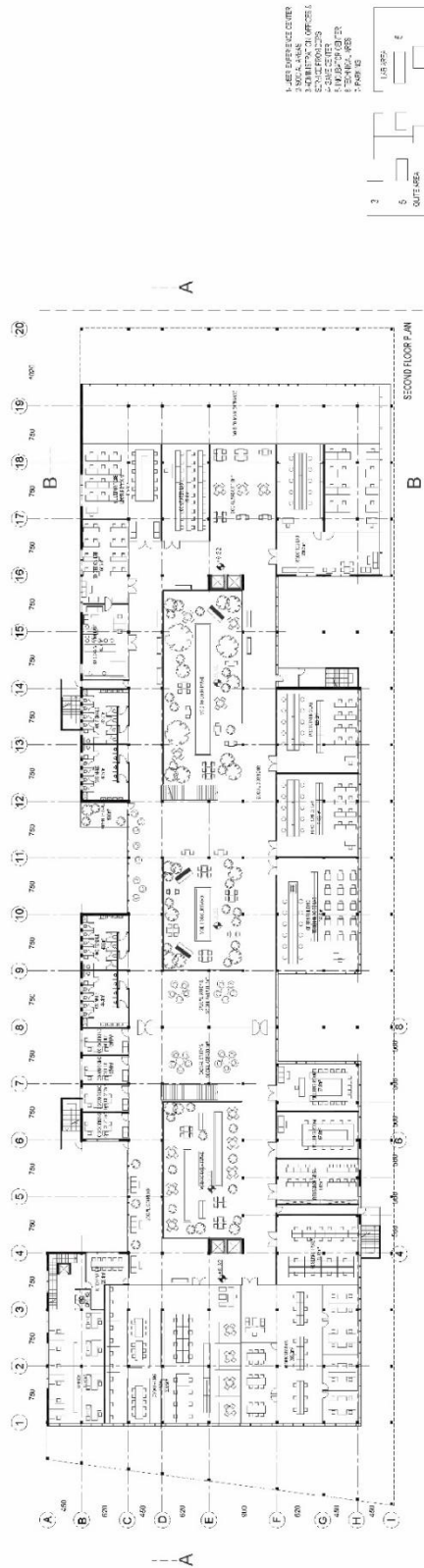


Figure 7: Second floor plan of Antalya Technology of Innovation Center.

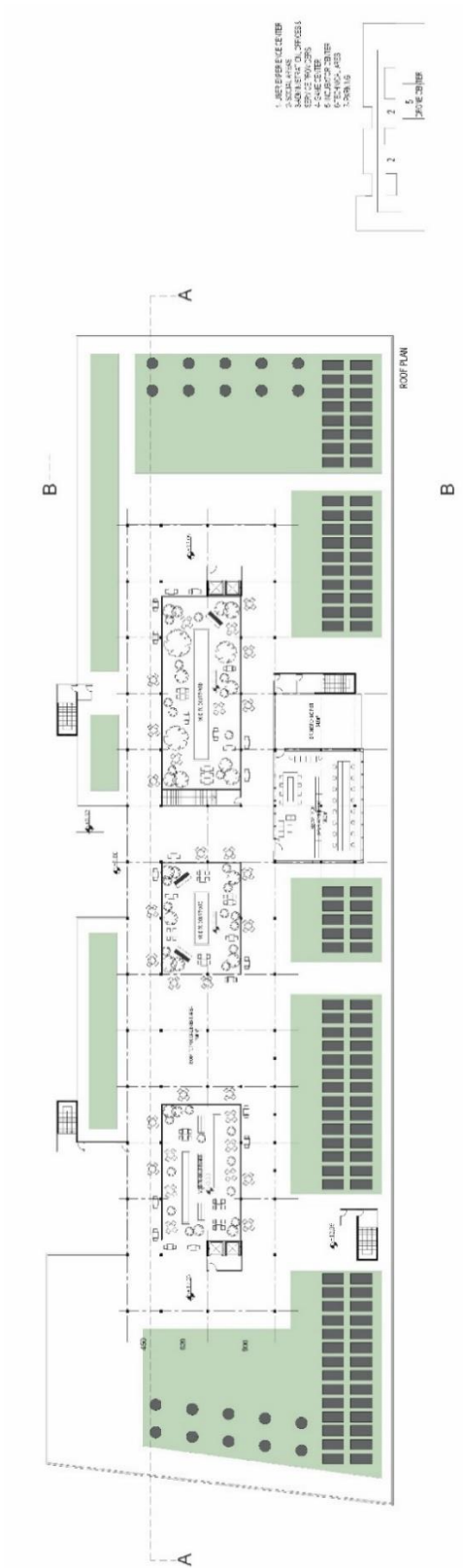


Figure 8: Roof top plan of Antalya Technology of Innovation Center.



Figure 9: 3d Visualizations of Antalya Technology and Innovation Center.

5. Conclusion

Different disciplines' responsibilities should work in a harmonious way to understand and answer the nature of the project, environment of the project and management of the project to satisfy all the needs. Being or designing sustainable should have never been seen as complete unless we also start to create an awareness about sustainability, promote sustainability and educate the people about sustainability. To achieve these goals designers and investors need to understand the environment and climate of the project first.

Different climatic conditions bring changes in architectural solutions. These changes also vary depending on the environment. It is necessary to carry out studies and researches on the climate of the environment before starting the design. In terms of energy efficiency, the value of the courtyard and courtyard effect generated in buildings for passive air conditioning.

The city of Antalya in Turkey was chosen because it is in the Mediterranean climate zone and it challenges in order to create better solutions. There are problems with natural ventilation in areas such as the Mediterranean climate, which has been receiving high annual solar and solar radiation for many years. In this study it has been researched and contributed to potential natural ventilation solutions without using mechanical systems in Mediterranean climate regions.

Another main research topic of this study was that today's cities, architectural programs and forms of management do not adequately respond to the development of technology and innovation. Due to this problem, Başakşehir Living Lab Technology and Innovation Center has been examined as the most appropriate case study to recognize the concept of Living Laboratory and adaptation of it to the Technology and Innovation center. The study was supported by interviews to increase clarity for the case studies.

At the end of this work "Antalya Technology and Innovation Center" was created with a focus on technology and this management method was integrated into the building. With the Technology and Innovation Center design, it is aimed to keep up with and contribute to the rapid development of technology and innovation.

This paper is resulted as a design program which can be developed, adapted and applied for the specific projects in specific contexts.

Notes

¹ Designing a Technology and Innovation Center in the Context of Antalya/Turkey, titled article was presented at 5th International Congress on Architecture and Design on 26/27 May 2021 date and published as a full text. This article was produced from the thesis, "Designing a Living Lab Technology and Innovation Center and Providing Natural Ventilation in Mediterranean Climate Regions in the Context of Sustainable Design", written by Büşra Nur Aydın with mentorship of Adnan Zoranić and completed in 2020.

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