

(MASTER THESIS)

**PHYSICAL AND PSYCHOLOGICAL NEEDS OF OFFICE
INTERIORS: CASE STUDY OF TARIS AND PINAR (İZMİR)**

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Bornova-İZMİR

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YASAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCE

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This study titled “Physical and Psychological Needs of Office Interiors: Case Study of Tariş and Pınar (İzmir) ” and presented as Master Thesis by Pelin Mesta has been evaluated in compliance with the relevant provisions of Y.U Graduate Education and Training Regulation and Y.U Institute of Science Education and Training Direction and jury members written below have decided for the defense of this thesis and it has been declared by consensus / majority of votes that the candidate has succeeded in thesis defense examination dated.

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ABSTRACT**PHYSICAL AND PSYCHOLOGICAL NEEDS OF OFFICE INTERIORS:
CASE STUDY OF TARIS AND PINAR (IZMIR)**

MESTA, Pelin

MASTER THESIS, Department of Interior Architecture

Supervisor: Assist. Prof. Dr. Gülnur Ballice

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Work environments are spaces which constitute an important element of our daily lives. Spaces in which we work comprise almost a whole day of our lives. Office buildings are constructions where these spaces are located in. Increasing the concentration and productivity of workers is crucial during the design of office buildings. In this perspective; specifying the physical and psychological needs of the users in office constructions and determining the elements that will affect their productivity is the main purpose of this study.

This research mentions about the office space developed from the past to the present and examines the types of offices which are generated from this development. The physical and psychological spatial needs are specified under two main titles. The physical needs are spatial, air-conditioning, lighting and sound. Also physical needs of lighting and air conditioning, decreasing the energy wasted in the office spaces and ensuring the optimum circumstances are examined with the concept of sustainability. The psychological needs are categorized privacy, behavioral and aesthetics.

In order to interrogating the hypothesis generated from the criteria of physical and psychological needs and questioning the researches information, a survey is performed between two different office organization. These organizations are the companies of Pınar Et and Tariş which are located in Izmir.

KEY WORDS: Office interiors, user needs in offices, indoor comfort, office types

ÖZET

OFİS İÇ MEKANLARININ FİZİKSEL VE PSİKOLOJİK İHTİYAÇLARININ BELİRLENMESİ: PINAR VE TARIŞ OFİS MEKANALARI (İZMİR)

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Çalışma ortamları, yaşantımızın önemli bir parçasını oluşturan ve bütün günümüzü kapsayan “çalışma” eyleminin gerçekleştiği mekanlardır. Bu mekanların bulunduğu yapılardan biri de ofis binalarıdır. Ofis binalarının kurgulanmasında çalışanların verimini ve konsantrasyonunu arttırmak önemlidir. Bu çalışmanın amacı tez kapsamında çalışma ortamı olan ofis yapılarında kullanıcının fiziksel ve psikolojik ihtiyaçlarını belirleyip mekan içerisinde onların verimliliğini etkileyecek faktörleri saptamaktır.

Çalışmanın başlangıcında geçmişten günümüze gelen ofis mekanları incelenmiş ve bu gelişimin doğurduğu ofis tiplerine yer verilmiştir. Ardından ofis mekanları içerisindeki fiziksel ve psikolojik ihtiyaçlar iki ayrı ana başlık altında belirlenmiştir. Fiziksel ihtiyaçlar, mekânsal, iklimlendirme, aydınlatma ve işitsel olarak belirlenmiştir. Ayrıca aydınlatma ve iklimlendirme ihtiyaçları kendi bölümleri içerisinde, ofis yapılarındaki enerji yükünün azaltılması ve optimum şartların sağlatılabilmesi açısından incelemiştir. Psikolojik ihtiyaçlar ise mahremiyet, davranışsal ve estetik alt başlıkları altında incelenmiştir.

Ofis mekanları içerisinde duyulan bu fiziksel ve psikolojik ihtiyaçların içeriğinde oluşturulan hipotezlerin sorgulanması ve edinilmiş olan bilgilerin sınanabilmesi için Pınar Et ve Tariş Ofisi çalışanları ile anket çalışması yapılmıştır.

ANAHTAR KELİMELELER: Ofis iç mekanları, ofislerde kullanıcı ihtiyaçları, iç mekan konforu, ofis tipleri.

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1. INTRODUCTION

The environment is where people pursue their lives and seek solutions to their versatile needs. These solutions form up the environment by affecting the conditions based on the human needs.

While designing an interior space the main purpose is answering the certain needs. The best solutions of these needs are brought up together. Every space is born out of a need and creates its own needs within itself.

The offices which are the spaces of work organizations that born out of the need to have a place to do a job interviews, storage and build archives. Offices have always been a part of life that the employees to conduct their activities in that sense.

Assuming that an employee spends eight hours of his daily life in an office; setting the needs in the office space is crucial at both designing phase. The activities to be conducted in the space may diversify between different business groups but the main common activities remain the same.

The purpose of this study is to contribute designing better office spaces by determining the needs of employees so that they can conduct their business in the best possible way. Moreover; the study examines categorizing both the physical and psychological needs of employees in the office space by limiting the needs. The study offers a survey conducted between two groups of employees work in two different office buildings. The study examines the needs with the survey results which are limited as “satisfactory” and “unsatisfactory”.

The methodology of the study was both qualitative and quantitative. Literature reviews from various disciplines were carried out during the study. The main source of data for the case study was obtained from the surveys that were handed out to the offices buildings of Tariş and Pınar. The results of the questionnaire were analyzed by SPSS v. 20 data statics software. To enrich the results of the surveys, graphical elements like photographs and maps were used.

The study mentions about office buildings starting with the formation of offices and its process throughout the history. Main content is to determine both the physical and psychological needs of employees in the office space. The study is a reference to the people in different business groups who are willing to maintain information about forming up a new office structure in an accurate way office automation and organization.

1.1 Structure of the Study

The first chapter of this thesis is introduction. In this chapter aims, objectives, methodology, structure of the study and literature review are explained.

In the second chapter; how the office concept merges into daily life, why it is needed and the reasons of its formation are explained. As a sub title; in its historical process the study examines and informs about where the spaces of work were in earlier years and what were needed based on the conditions of that times and what were the required objects back then. The first examples of skyscraper office buildings in

United States and Europe are demonstrated by their photographs and information records.

The formation concept of office and its evolution starts to create different needs with the help of technology and the needs of both corporate's and worker's needs. Also this creates the birth of different office types in sense of indoor order. Thus, in chapter three the types of office structures are explained; grouped under five different sub titles and these are supported by visual materials. These office types are cellular, open, free layout, group layout and combined layout.

In chapter four; under the title of "the needs of office users" the needs are divided into physical and psychological and limited by their sub titles. While pursuing their lives; in order not to behave physiological or physical disturbance the needs of the users must be fulfilled. And as a consequence the users become more efficient in the work also they do and feel themselves better. Physiological needs are categorized under three titles which are privacy, behavioral and aesthetic needs. Physical needs are categorized into four which are spatial, air conditioning, lighting and sound. Also those subtitles are embraced decreasing the energy used for air conditioning and lighting.

In chapter five; the case study is presented. The survey is done in the case study, in order to determine the needs of users. This was applied two employee groups who work in two different companies called Tariş and Pınar Et. Five hypotheses are specified and these hypotheses are tested with the questions. Also the hypotheses generated in the scope of this study are formed upon five main criteria which are privacy, air conditioning, sound/acoustic, visual/lighting and ergonomics.

Furthermore; the needs such as the type of office the employees work in (traditional, open, landscaped, regular group, joint regulated), location, how much time spent there, the sufficiency of illumination, the presence of daylight in the office space and its efficient usage, air conditioning, ventilation and the control of humidity are all questioned. The solution to the noise problem in the office area, the aesthetic look of office furniture and their sufficiency to the users and the distance- closeness relation are examined. The study also determines the psychological needs of are intimacy and security; the satisfaction of the users and how they feel themselves in the office space. The results are graphically described and spaces are supported by visuals and scheme plans.

In chapter six; the information maintained in this study is compared with the information known before. It also gives an idea about how this study could be improved.

1.2 Literature Review

Until now many studies have been carried out about the office organizations. When literature is scanned concerning office buildings and office interiors ;

(Altınkoç,2005), (Aluçlu,2000), (Brill,1985), (Ching,1987), (Duffy,1976),

(Elden,1950), (Gottschalk,1967), (Lehman,2002), (Naghavi,1995), (Pile,1978),

(Sakallı,1997), (Tasarım Dergisi Sayı:109,2001), (Van Meel,1999), (Wyon 1996);

it can easily be seen that they all mention about the principals of creating office spaces and interior organizations. Generally; these sources mention about the

common needs of office spaces; but they do not mention the effects of evolving technology's effect on office spaces and the change it creates in these places. The object of these sources has been the office systems set on a certain standard.

(Ataç,2000), (Dalga,2007), (Dökmeci,1993), (Dülgeroğlu,1993), (Ketencioğlu,2001), (Mitchell,1995), (Öke,1989), (Pile,1978), (Zaknic,2000), (Yeang,1999)' have evaluated office organizations in a historical perspective. These researchers mainly focus on the reasons of the formation of offices, how they have merged, and their evolution until today. However, there are some deficiencies concerning the information of the office types which are born out of change and evolution. The starting point of office organizations are evaluated under the light of their historical process. The beginning of office organizations and their development are different in cultural sense. They are different in Europe and the United States. This clear distinction is never made.

Air conditioning and acoustic need of office spaces have been studied by (Aluçlu,2000), (Doğrusoy,2000), (Ertürk,1976), (Gürer,1997), (Karabiber,1994), (Krekler,1977), (Mitchell,1995), (Onat,1990), (Okutan,2000) . These studies mention more about the physical needs of offices than the general needs. The air conditioning within the space and establishing the control of noise is examined. In neither of these studies; the lack of a case study is a deficiency.

(Bostancı,1996), (Çilingiroğlu,1994), (Doğrusoy,2002), (Ertürk,1976), (Kaymakçioğlu,1996), (Kıran,1992), (Mısıır,1996), (Özbudak,2003), (Slater,2000),

(Tuđlu,2006), (Yener,2005) are conducted remarkably successful studies which focus on lighting and creation of energy-saving methods.

(Altman,1975), (Aluđlu,2000), (Aydınlı,1986), (Çete,2004), (Dođrusoy,2002), (Fisher,2004), (Gürer,1997), (İnceođlu,1982), (Örs,2001), (Sunddtrom,1996), (Ünügör,1997) study the effects of interior design on people. Generally, these studies question how the people feel themselves in the office organization and which office type makes them happier, how their need of privacy is fulfilled. The psychological relation is between the space and the employees is mentioned. And some surveys regarding the matter are presented.

(Çakmanus,2003), (Enercan,2004), (Eşsiz,2004), (Karataş,2004), (Tönük, 2003), (Yener,2005), (Kaymakçiođlu,1994), (Kısmet,1999), (Morhayim,2003), (Raman,2001), (Sev,2003), (Tuđlu,2006), (Chiras,2004) have worked on office spaces for an evaluation of sustainability. These studies examine the need of physical need of office interiors, air conditioning and illumination by concern sustainability concept. These studies work on determining the general properties that offices must have environmental performance aspect and how the required comfort conditions can be maintained. Additionally; the environmental performance analysis models which are implemented as a consequence of having a construction permit of office building, acquiring the prestige of certification and sales encouragement are examined. Some of these studies either present a case study or offer a model.

The main scope of this study is limiting the physical and psychological needs, the literature mentioned above, used as a reference and limited in it.

2. OFFICE CONCEPT AND RELATED DEFINITIONS

The word “office” has many meanings; the first meaning of the word office is: study room, *escritoire*, second meaning is an advisory and editorial work place is being carried out, third meaning is the department, branches and fourth meaning is defined as a writing desk. (Altınkoç, 2005).

An office is a place where numerous documents, accountings and visual materials are collected, stored, transmitted and distributed, knowledge-based jobs customized are privatized (Mitchell, 1995). Arch. U. Cassan describes the word office as; “Business division and specialization is carried by a chief, officer, clerk, accountant or designer, and the man of duty who works at a desk for his or her own suitable convenience (Eldem, 1950).

The purpose of giving detailed descriptions is to compare the difference and understand between today's and 1950s office buildings. In the 21st century, “Mechanical and Natural Energy”, information technologies, and the flow of information are carried in a constructive feature, the synergistic effect of all the time and site to be maintained. Office is not only “at the desk” type of a place but also it is where information and communication jobs are done anywhere and at any time (Kismet, 1999). Office means a service as a priority. After that it is placed by the service organization or the service that is performed in the room or building. Also it is usually the service work requires seats and a lot of storage space in other words the place to work (Raymond, 1997).

The organization of the offices where people can study, work, labor, serve are same as in each period and culture.

2.1 Emergence of Offices

Offices are formed by need to study and work. Previously, this need was performed by the part of the housing. The needs for a wider and separate place have begun with the advancement of the job opportunities and the development of technology.

The growth of economies and industries formalized offices. Also office work is improved in order to increase efficiency and profitability. This process consists of many different solutions. The bottom line is to create the most productive environments because people spend their considerable work hours, working in offices (Dalga, 2007).

The organization of office is being related to a physical space. Offices represent jobs and tasks rather than the people and their needs for workspaces. Nevertheless, offices should be accepted as the use of work spaces. For example a sanitary installation contractor works at the field but his equipments are stored in the shop. Also he needs a place for taking messages, notes, telephone calls and visited by someone. For that reasons every working people needs a space and the idea of an office organization will be projected (Altinkoç,2005).

Offices are not only places which are for working and storing but also for communicating. Communication serves control. Offices are places to give decisions. Though the office user wants to make decisions, whether he/she wants basic and important decisions, both inside and outward flows require communication support. Both inside as well as outward communication, contains large amounts of data, and uses the same communication channels (Dalga, 2007).

The received information cannot be accessed immediately and also decisions taken cannot be put into effect. Therefore, data which should be stored at different times must be sought. Thus, the storage appears to be a function of the office. Contacts and messages should be kept for future references; data must be at hand when needed for future decision-making and actions.

Office is designed for the most efficient flow of information. This provides the decision being made correctly and also allows moving all the relevant information together. In addition to the physical organization of the office has data storage elements, the selection of tools and systems are effective in bringing compliance with factors, have provided a perfect communication (Pile, 1976).

Face to face conversation is the most common communication system and the importance increases with the level of subject. It is enough to send an ordinary message with a cable, a letter or a phone call but before making important decisions face to face conversations are still preferred. Each office is a scene of the conversations between the members and the visitors. Physical layout can make it easier or more difficult to place the communicators. Level of privacy may be needed or missing. Proximity can make the communications easy and full contact. Distance can reduce the communication awareness and can lead to misunderstandings. The flow of information is being made on paper while the office arrangements, messages and data can be reached anytime and anywhere they are needed, or confusion, and error and loss (Dalga, 2007).

As a conclusion, the office spaces have emerged that people's need where a place to work. This space is shown changes from culture and periods. Also the office systems represent the works and duties rather than the people and the work places that people needs.

2.2. History and Development Office Buildings and Interiors

There is not much of reference about the history of office buildings, because when the idea of office building starts the inside of the offices remained uncertain.

Nevertheless, there are some forms of offices that were considered for a long time.

The office was sometimes a place in a historic castle or monastery, but it was more than a simple room.

Origin of office and basic element of the office room is the private office itself. This room can be a work space in the house or a place at the library or the store. People went to offices to keep their privacy and their records saved in confidentiality. Office was only an address, to writing the letters and to hiding the books. Even today, this position is typical for a real-estate worker or an insurance agency in the rural areas. At the same time, the early office types did not have a typewriter and the letters were written by the sender himself. Loneliness and privacy was the symbols of 1850s and 60s office's writing desks (Pile, 1976).

Three main building types which are palaces, cathedrals and private houses were effective in the development for the office buildings.

In the past, government office works and the machine needs to function were done as a "palace" buildings addressed under the name. One of the examples to these structures is Giorgio Vasari's palace in Florence named "Uffizi Palace"(Figure 2.1.) The main function of this building is taking the specialty from the palace itself and this principle is seen as a structure close to the concept of the structure of today's modern office.

Figure 2.1 Uffizi Palace exterior view, 1560, Giorgio Vasari, Italy.



Medieval churches were not only doing their main tasks but also they were wide trading network and harboring within it. Headquartered in almost every major city and even in the smallest towns, established a wide trading network combined within the smaller offices. However, churches and cathedrals are usually evaluated on the basis of religious functions and can be considered as the ancestor of today's office

building type that large span, column-type structure are not taken into further consideration.

People gathered in front of the church and the cathedral. Naturally many business were dealt and they have made in commercial activities. This commercial buildings in the stock market has become more complex tasks developed over time has revealed. In Egypt Exchange 1750 and the Animal Exchange 1802 was founded. Then it was followed by 1846 and 1874 called Coal and Wool Exchanges. Another point is that a small attachment and changes in each of these structures is having a basilica plan type.

In addition, office space became the current issue when, wealthier segment of the bourgeois merchants in the middle ages was raised again. This group used the ground floor facades of houses facing the road as the use commercial and office purposes, also the upper floors were used as residential. Field of study in this example is called the private sector (Aykol, 1997).

Figure 2.2 Sun Life Assurance Company, 1849 architect C.R.Cockrell, Liverpool.



In the middle ages, the offices had been located everywhere such as in homes, streets, squares, churches, the inns and coffee houses. 1849 Sun Life Assurance Company built by an architect C.R. Cockrell, moved to a house made of special purpose. This structure contains the basic functions only in the interior of the home furniture, soft furnishings felt; it was used as an office space.

Houses were used as offices. The best example of that, The East India Company carries out their work in a private house between 1600 and 1726. Also in English on the basis of the government office in the home is often a synonym for the word. These houses were developed in the mid chamber had been named in the 19th century. Another issue pointed out that these buildings shared use of buildings a few people.

Architect Peter Ellis constructed "The Oriel Chambers" structure in Liverpool in 1864. It is an office space for rent on office buildings also it becomes the new idea. He used in the design of this structure for the purpose of renting a small room to room divisions. Then the design idea has been inspired (Aykol, 1997).

Figure 2.3 The Oriel Chambers exterior view, 1864, architect Peter Ellis, United Kingdom.



Another development that affects the historical development of office buildings emerged after the French Revolution. It was based on the status of the order of administration. Accordingly, based on upper-lower relationship level of the system was parallel to the working conditions of the employees. On this system, office buildings working principles have left a lasting impact.

In 1884 people generally used Morse telegraphs. Then in 1886 the typewriter was produced by Latham Sholes, Alexander Graham Bell invented the phone and the businesses and residences located in the same center or on the same street became separated from each other. Management and manufacturing branches were opened in

regions separated from each other. Inter-company communication and communication networks can easily be made in the past from city to city, from country to country (Altınkoç, 2005).

Larkin Mail Order Company building which was designed by Frank Lloyd Wright is mentioned to have similarity to the plan of cathedrals. Also it is characterized by a different scale. (Figure 2.4 and 2.5) Also the day of this building technology was so simple and industrial type. The majority of the user group was secretaries, clerks, etc. It is quite apparent distinction between employees and status. In this structure, even chairs fastened to the floor. That specifications, it is also very good representation of the social structure at the same time.

Figure 2.4 Larkin Building exterior view, view, 1904, architect Frank Lloyd Wright, New York



Figure 2.5 Larkin Building interior, 1904, architect Frank Lloyd Wright, New York



Frank Lloyd Wright has designed Larkin Building which has in addition to the office floors, toilets, showers and lockers, rest rooms, infirmary. It became a model for other office buildings. Additionally the office buildings began to take place in special places for social needs. This much is reflected in the design of contemporary fiction (Kismet, 1999).

Until the last decade of the 19th century, the 'real business' was done at the farms, mines, and was made on the high seas. In the first half of the 19th and the 20th century the overwhelming majority of the experienced workers were male. Typewriter

writing, rather than filing as a single job were working at every stage of the administrative affairs. The growth and proliferation of business have begun to change the structure of the office work. Also the office works are divided such as writing a letter or answering phones. Ranked the plant closely resembles a hierarchical view of office began work desks. A large number of workers that can use new tech tools were needed; therefore, it has increased the number of female officers. Typing and answering phones were given tasks (Dalga, 2007). The early 20th century, cause of the weight of the economy women were becoming workplace initiative. As a result of the changes has been developed that hosts the new building types.

In the old days office was just a room in houses, but it felt non-formal and unprofessional. It was comfort of the smaller room which provided the necessary services. Old houses were still preferable by some organizations, which is required for the office. Even today in these places, there is some special charm that allows creativity. Many offices which are still a lot of recycled ideas about the origin of places in this situation.

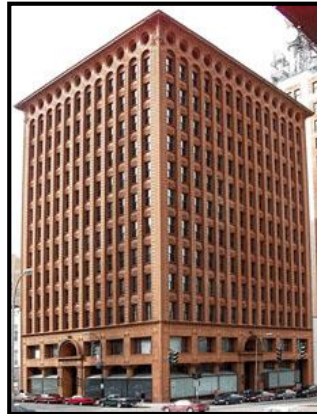
Offices became limited because they started to occupy converted houses. Also old houses were not higher than three, four or five stories. Manufacturers were seeking a specific activity center and a location sufficiently close to the situation. The job has been placed and done better in the office buildings than the residential properties converted to offices (Dalga, 2007).

At the end of the 19th century, the classic office buildings (banks and insurance buildings emerged in the 1830s in America and Europe, etc.), had already existed with the collection of the certain functions, but not defined in the 18th century. About this time (at the end of the 19th century), terms of interior design created an impressive structure type which were called the skyscrapers.

Skyscrapers have emerged as a result of the development of technology. Also workers in the companies started to work more crowded and people worked with separate in their own departments. For example, The Guaranty Building was

(Buffalo, New York, 1895) built on a plot of land with a very narrow and it has 12 floors, and each floor is divided into small work spaces (Figure 2.5).

Figure 2.6 The Guaranty Building exterior and interior view, 1894, architect Louis H. Sullivan and Dankmar Adler, Buffalo, New York.

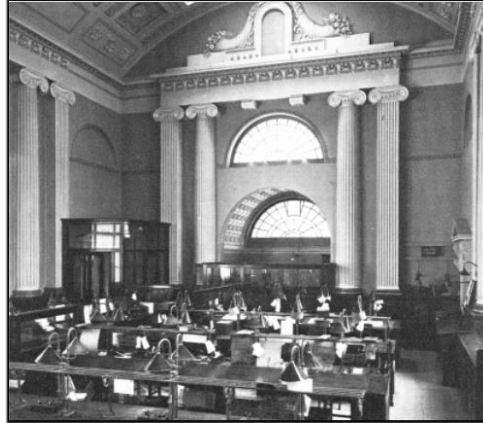


Approximately 60 years later the Guaranty Building, "Seagram" Building (New York, 1954) was built. But it doesn't show an improvement in terms of it organizational requirements. However, this building is much improved, the general air-conditioning was used, and work places were divided into large spaces suitable to rent. It is designed as a single-input, single-gathered under the roof of a building. 20 different companies were determined the internal decorations, and indoor usage patterns (Aykol, 1997).

In West Germany with more flexibility in the workplace and defending the opposition movement began to emerge during the Seagram building is being constructed in the 1960s. This movement was the field of human relations, and environmental psychology. Offices have helped to shape the environments that enthusiasm again. So, the informal settlements office was a workplace design that performs a revolution and today's open and flexible office furniture systems, has developed by the German Quickborner Consulting Group began to be called "Bürolandschaft" . Bürolandschaft is mainly on the basis of the organizational form of the building, which adopts an organic design and the idea that the principle of freedom. Cited as one of the first

examples of Bürolandschaft, "The Ninoflax" office structure (Nordhon, West Germany, 1963), has implemented new developments (Aykol, 1997).

Figure 2.7 The Ninoflax interior view, 1963, architect Nordhon, Germany



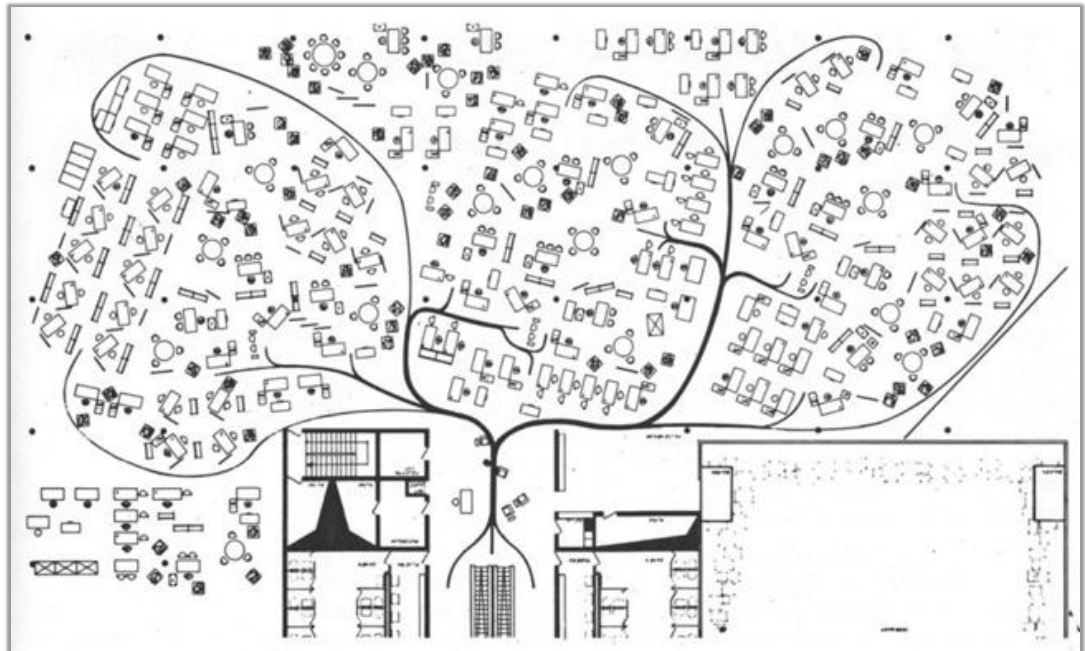
In 1967, Robert Probst developed a new design idea which was called Action Office. It has sound-proof and portable consisting of modular units, environmental comfort, a feeling of space and technology to facilitate storage operations office furniture system. This was the first time, the design of the building structure and its furniture become part of the walls. This change was a life giving shape to all the office work stations which created a whole new industry. Previously, the divider walls were the part of the construction and now they had started to be produced by furnishers. Room have been divided by panels of workstations, but still most of the world today panels are one of the most widely used solutions in residential projects (Çete, 2004).

Figure 2.8 Action Office structure, 1973, designed by Robert Probst, New York.



During the 1970s, an organization was designed by Quickborner design team became widespread in Europe. They designed buildings which were multi-story office system, and the crowd. However, with the oil crisis in 1973, this solution economically collapsed. Because it was very expensive due to the cost of heating and lighting. This oil crisis was (before 1970) in the past 20 years has an optimum range have seen in technology-related developments and economic development of the idea of sustainable building methods and this contributed to the revision (Van Meel, 2000).

Figure 2.9 Quickborner Team's office design



The historical development of structures of his own design office in the Netherlands, built by Herman Hertzberger in 1973 was called Central Beheer. It constitutes an important place in the building (Figure 2.9). This building has both indoor and outdoor office work spaces. The users could choose the colors to paint the walls, bring pets to workroom and they can invite their families (Figure 2.10).

Figure 2.10 Centraal Beheer building floor plan open and closed office spaces

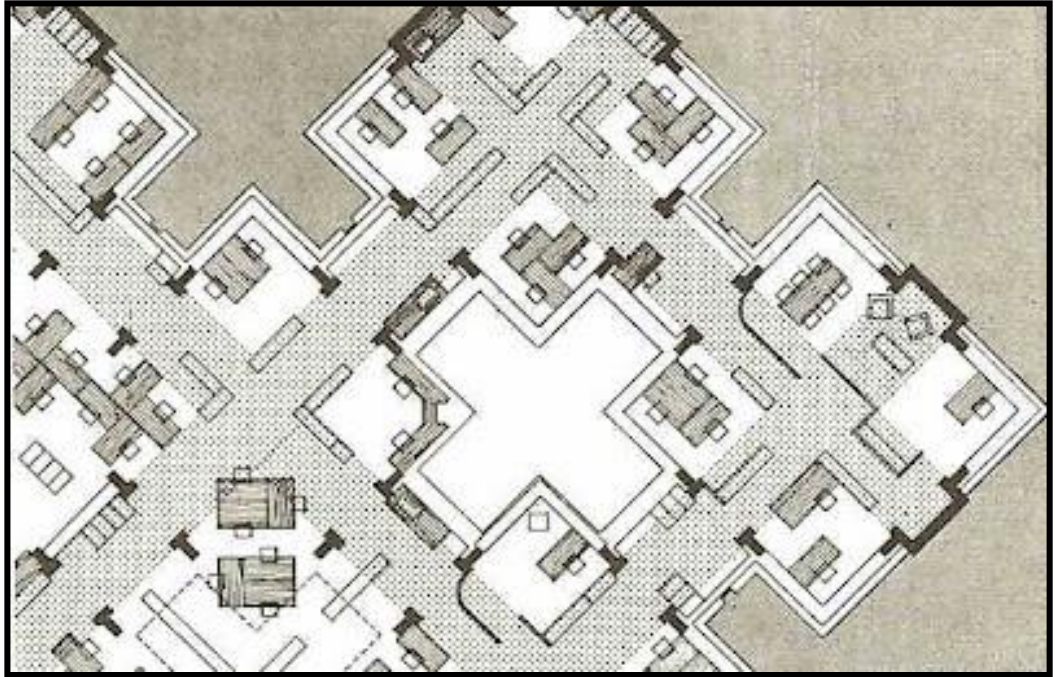


Figure 2.11 General view of Centraal Beheer office building, 1973, architect Herman Hertzberger, The Netherlands



Figure 2.12 Centraal Beheer office building interior images.



In the seventies, office buildings which were the user needs and satisfaction, was a period of emphasis on user participation in the design.

During this period, there were many new designs and much new design was in the experimental stage. Companies were looking for a certain balance between personal choices, the efficiency of the company and also the office spaces were based on the human factor. Danbury is a place which has 4 floor buildings, designed by Kevin Roche, John Dinkelos & Ass. in Connecticut. "Union Carbide" company head office building is standing out in this quest.

Figure 2.13 "Union Carbide" company general appearance of the central building, architect Daniel Burnham, 1976, New York.



Figure 2.14 "Union Carbide" company head office building, with windows facing outward appearance a private office spaces.



Car parking is located underground in the center of the building. Also the building was increased by dissolving under the window, gazing out at about 2400 from the view of green area. It has private office space in this building $4 \times 4 = 16\text{m}^2$ to workspace for each user (Çete,2004).

Figure 2.15 "Union Carbide" company, which is building, the lobby.



Figure 2.16 "Union Carbide" company head office the main entrance for visitors to the main building.



Figure 2.17 "Union Carbide" Company from the main central building, dining hall appearance.



Figure 2.18 "Union Carbide" jogging path and employees are the company's main headquarters building exterior.











As a conclusion, when the idea of an office is examined, previously it was just a room, working space or a depot which has held the books and equipments. In over the time the working organization has been changed and the communication become faster and technology was improved. Office has become a place where people needed. Office buildings are started to be built and from the sixteens they became an organization.

2.2.1. The First Office Buildings in the World, Skyscrapers




This study is divided in two and the first examples which are in USA and Europe. The first office organization was seen in 1558 in Europe. Over the years they have been developed and skyscrapers was built in the USA. (Table 2.1 and 2.2)





Table 2.1. The first office buildings have emerged in Europe






Figure	Name	Year	Architect	Location
	Uffizi Palace	1558	Giorgia Vasari	Florance,It aly
	St. Paul Cathedral	1598	—	London, England
	Somerset House	1774	Sir William Chambers	London, England





	Foreign Office Buildings	1782	Alejandro Zaero Polo and Farshid Moussavi	London, England
	Sun Life Assurance Company	1849	C. R. Cockrell	London, England
	Oriel Chambers Building	1864	Peter Ellis	LiverpoolUK
	Galleria Vittorio Emmanuela	1865	G. Mangoni	Milan, Italy
	Vienna Post Office	1904	Otto Wagner	Vienna, Austria

able 2.2 Office buildings evolution and skyscrapers emerged in the United States

Figure	Name	Year	Architect	Location	Information
	Equitable Life Assurance Building	1870	Arthur Gilman and Edward H. Kendall	New York, USA	The first office building which has an elevator.
	New York Tribune Building	1875	Richard Morris Hunt	New York, USA	The year it was built, it was described as the highest building in Manhattan Island, but it was 285 feet short from the Trinity Church Tower. It has metal interior columns and beams which are supporting the floors.
	Insurance Building (Home Insurance)	1885	Ditherington Flax Mill,	Chicago, USA	Cast-iron columns and brick were embedded in the walls. The remaining floors have Bessemer with steel beams, wrought-iron beams on the floor were the first six.

	Tower Building	1888	Bradford Lee Gilbert	New York	All the weight of the walls and the floors are transmitted to the metal stakes and the skeletal construction. Also it is demolished in 1914
	Times Building	1889	Renzo Piano and FXFOWLE Architects	New York, USA	
	Manhattan Life Insurance Building	1894	Kimball & Thompson	New York, USA	Highest building in the United States in 1894. Demolished in 1960.
	Bowling Green Building	1898	Cass Gilbert	New York, USA	

	Park Row Building	1889	R. H. Robertson	New York, USA	Highest Building till 1908. It had electric elevators.
	Iron Building	1902	Amos Eno	New York, USA	It was built on a steel skeleton and had 6 hydraulic lift.
	Larkin Building	1904	Frank Lloyd Wright	New York, USA	
	Times Building	1905	Cyrus L.W. Eidlitz, James C. Mackenzie, Jr.	New York, USA	
	Singer Building	1908	Ernest Flagg	New York, USA	Constructed with the transmission elevators. Demolished in 1967.

	Metropolitan Life Insurance Tower	1908	Napoleon LeBrun & Sons	New York, USA	
	Woolworth Building	1913	Cas Gilbert	New York, USA	3000 office buildings with more than 1200 employees. 26 Otis's electric elevators with transmission.
	Empire State Building	1930	Shreve, Lamb and Harmon	New York, USA	102 floors, 1252 feet, 381 meters high. Effective use of setbacks to emphasize tower.
	Johnson Wax Building	1936	Frank Lloyd Wright	New York, USA	

2.2.2 Development of Office Buildings in Turkey

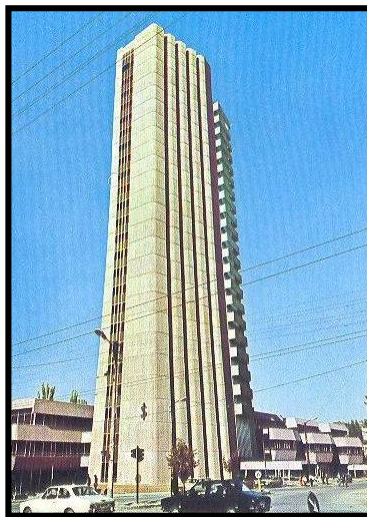
Turkey introduced the office organization after a delay of more than half a century. Until the 1950s small party companies; office block structures known as a room or shop, have demonstrated activity with one or two officers (Sakalli, 1997).

In parallel with the developments in Turkey's economy in the 1960s, family businesses and small firms started to become corporate organizations with larger workforce. People could not fit in a single room and they started to use the apartment floors as offices.

Ankara Ulus Office Building, Kızılay Emek Office Building, Istanbul Hukukçular Building, Odakule Business Centre were the most important structures in this respect until the 1970s (Öke, 1989).

Previously, organizations employing were 8-10 persons in apartment rosters, after 1970 and in the 1980s offices developed with the economy. Holdings could not be able to fit in 8-10 story buildings. Is Bank located in Ankara (Figure 2.19) is an important building of this period office building in Turkey (Öke, 1989).

Figure 2.19 Turkey Is Bank, architect Ayhan Böke and Yılmaz Sargın, 1976, Ankara



After 1985, the buildings which can reach up to 50 flats and 1000 civil servants can work comfortably with the big band in the service sector in Turkey. Also these buildings have the latest technology and the concept of modern office buildings has started to produce the appropriate office. Ak Merkez, Yapı Kredi Plaza, Sabancı Center, Maya Business Centre, İş Bank Towers are the structures such as a significant example of today's applications.

The activities offices of major cities in Turkey are compared, Istanbul has a greater proportion. It is the first metropolitan in the country which has built twenty office buildings which were constructed in beginning of the century. Mostly minorities living in Beyoglu and Sisli started to have a culture change, Westernization movements and changes in the structure of society became more widespread. Service sector then shifted to Eminonu - Karakoy center.

In later periods, the commercial and administrative centers were difficult to be obtained and as a result expensive office space intended for use has turned into apartments. Examples of this type of buildings are located in Mecidiyeköy, Beşiktaş, Kadıköy can be seen even today. But the properties of an existing building intended to keep up with the flexibility of these buildings have problems in planning.

After the 1985 period, with the introduction of improved construction techniques, and in addition all factors were stimulating the construction of high rise buildings to begin to feel self-intensive. High-rise office buildings and the building projects had been accelerated.

Until 1985, 60% of the highest structures in Istanbul were hotels, 25% were office buildings and 15% were residential. By 1991 these ratios changed. Today, however, is office buildings 70%, 15% are hotels, residential and mixed-use and 9% to 6% are office buildings.

Countries level of development is directly related to the development of office buildings. Because the business world influenced by economic factors. During the

early 1950s, the Turkish economy started to develop and effectiveness of Istanbul in the country's economy increased. Capital accumulation gathered in Istanbul, banks and corporations began to settle in Istanbul. Also it depends on the transportation system, functions such as trading and manufacturing gathered. Today with the improvements in technology, communication and transportation office buildings have turned into iconic and prestigious structures of countries.

3. TYPES OF OFFICES

The formation of office concept and its evolution starts to create different needs with the help of technology and the needs of both corporates and peoples' needs. Also this creates the birth of different office types in sense of indoor order.

Since the first examples offices have started up since the 19th century to the present day, Duffy summarizes this historical process as;

- * Home Venues Period (1849-1864)
- * Skyscraper Paper Factory (1894-1904)
- * Common Control Period (1954-1963)
- * Industrial Democracy Period (1973-1990) summarized format (Akyol, 1997).

The structure of the office was analyzed as closed and open-plan schemes, sub formatted in two titles with the historical process. In addition, regardless of the layout of space, recycled, re-structured office buildings, office and home-office types, the types can be counted as present.

In this study by the helping of the literature review the types of offices are categorized as follows;

- *Cellular (traditional) office
- *Open office
- *Landscape office
- *Regular office
- *Joined regulated office

3.1 Traditional (Cellular) Office

Analyzing of the historical development, traditional offices show that to be the oldest planning organization. These types of offices are beginning of the 20th century to the present day. Traditional office layout provides a maximum utilization of natural ventilation and lighting (Doğrusoy, 2002).

Figure 3.1 Example of a traditional office from Office Drilling Company Headquarters in Germany



Office materials which are the stone and brick have reinforced concrete and steel frame and panels in light wall divider systems that are used at the beginning of the 20th century. They have left their place turned into a load-bearing walls and traditional office arrangement which gives flexibility. As shown by (Figure 3.1) the space separated with the panels and dividers and crates a cellular office.

An indoor space to which they are depended on offices natural lighting depths 5-6 m (natural light not reach a sufficient amount of distance to more than twice the height of the window) is limited (Akyol, 1997). Window axis is between 120-150 cm and 170-190 cm. The growth of the space is one-way.

Natural ventilation and lighting are the property of traditional offices. Indoor office furniture is located according to the natural lighting. Tables are expressed in accordance with the placement of the window in an upright position and parallel to each other. Also room width is not less than 220-240 m. Vertical circulation elements, toilets and plumbing areas (technical) service areas, such as the fluidity of space is important for the analysis of coordination (Ketencioglu, 2001).

The two sides of main circulation area is planning type of fixed-aisle surrounded by walls. This type of plan limited the corridor with front office. The corridor can be single-sided, double-sided or three-sided edited.

Indoor office corridor width 1.80-2.00 m should be measure a minimum of three people may walk abreast. The core's shape is usually square and forms a square in the center of the cellular offices. Cellular offices 600-900 m² a core is required (Ketencioglu, 2001). Indoor office buildings exceed the length exceeds 50 m walk and escape distances are recommended considering more than one core (Aluçlu, 2000).

In psychological way cellular offices, retail and controlled space because they are a type of privacy provided planning. This type of offices has advantages for jobs requiring intense concentration and carried out individual spaces. On the other hand communication between offices is poor and controlled.

Cell venues are divided in three groups in terms of the user such as single, double, triple and more people. If two different characteristics people are sharing the same room, psychological stress will cause in each other (Aluçlu, 2000).

Social distance is often used in cellular. It is unwanted for the people to have close distances who are working at the cellular offices. Other than that, it can lead to discomfort distances (Ketencioglu, 2001).

3.2 Open Office

The deficiencies of the cellular offices led the designers to approach a new planning. Different needs of business and organizations over time and technological developments are made it necessary to apply this change. Large office space (free and open office) has been developed as an alternative to the traditional office. Open-plan offices and regular offices have been developed because of the traditional offices cannot provide work flow and communication between employees, co-operating facilities, such as the rational use of space. The difference between these two types, in space geometrically arranged reinforcement liners in a landfill. (Naghavi, 1995)

As a result of fast industrialization and increasing the number of staff, office space, due to the increased need for larger spaces have been obtained by removing the inner walls of traditional offices. In this system, the traditional (cellular) offices are for managers also the open plan offices arranged for employees. The differences are from the closed office, venue size, depth, and non-divided type. Location sizes are 370m² - 1200m² varies between the specified (Naghavi, 1995).

Open offices can be a divisive element, (Figure 3.3) such as an organization that is not fully open, the side or in the middle managers offices or work areas where low or high partition walls, cabinets and floral elements defined as separated systems (Doğrusoy, 2002).

Figure 3.2 An example of an open office from the company of Adidas, architect Kinzo, 2009, Herzogenaurach, Germany



Figure 3.3 An example of an open office from the company of Adidas, architect Kinzo, 2009, Herzogenaurach, Germany



3.3 Landscaped Office Planning

As entered the 21st century, due to the increasing in the number of staff, it has been observed that the open plan offices and self-organized workflow is not sufficient in the context of planning with the business growth and change in the organization. Furnishing of offices, planning, management and communication consultants are arranged and regulated by the workflow and the group activities.

There is no regular office solid geometry concept of free working groups. The layout of a plan is located according to the settlement workflow. Office equipment has had a great impact on the development scheme of the free regular plan (Sakallı, 1997). For example in Google offices strategy is ‘you can work everywhere but you always connect your department’ (Groves,2010). This idea means that people can be work relax in their offices also they have a relationship and being aware of each other. This is provided workflow by departments.

Figure 3.4 An example of a landscaped office type from the company of Google’s relaxing area designed by DEGW, 2010, Frankfurt, Germany



Figure 3.5 An example of a landscaped office type from the company of Google waiting area designed by DEGW, 2010, Frankfurt, Germany



3.4 Regular Group Office

Group regular office is a shredded and reduced form of a large office space. But while the office organization is planning, the interior dividers are more important than the building's form and shape (Naghavi, 1995).

The group regulated office is obtained with the removal of the cellular office's walls and the addition of the corridor, multi-person cells. In this kind offices, there is a section on the floor for at least 2-3, 5-10 people, the depth of space are determined by sunlight (12-14 m) and the kernel directly from the working space is introduced. As a result, there is a strong communication within the departments. Also group work is done in this plan type is sufficient for a medium-sized venue (Gürer, 1997).

The example of the group office is Chiat/Day Office building is designed by TBWA, in 1997 in Los Angeles. This space features can be summarized as followed; 5-10, 1-3 business group of people required for the space, this space forms the base.

Flexibility and economic reasons, each floor should have a combination of at least three of these basic elements. Each business group should be utilized equally from circulating currents and natural light (Naghavi, 1995).

Figure 3.6 Chiat/Day Office building's plan, designed by TBWA, 1997, Los Angles.

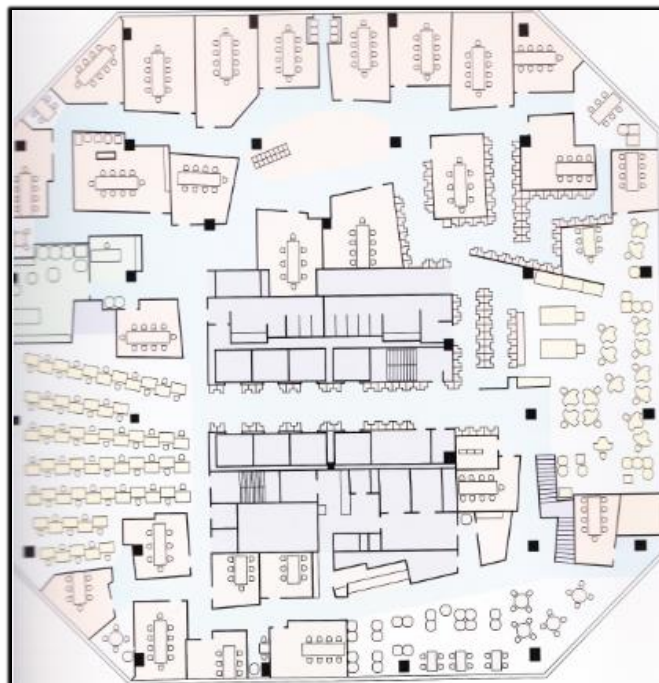


Figure 3.7 Chiat/Day Office building's interior design visual, designed by TBWA, 1997, Los Angeles

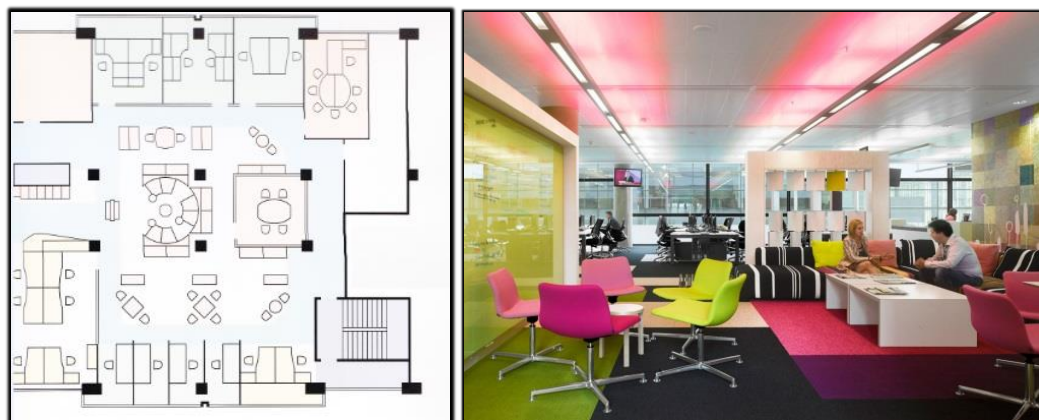


3.5 Joint Regulated Office

A combination of the above mentioned three basic types of office is called a "joint regular office". Project planning process is based on one of these three types of the plan of the office. If needed a cellular office can be added or lifted in time. It means, it has to be adaptable.

A working area can be a medium or large sized. Separated elements are reduced and several groups are arranged in the same place. If closed sections are needed for functional and behavioral reasons, they can be adding (Figure 3.8). These large work areas can be directly opening sections are separated with corridors (Gürer, 1997).

Figure 3.8 Rijksgedebouwendienst (Haarlem) Office Building's plan and interior visual, designed by W.C Metzelaar, 2010, Haarlem, USA.



4. OFFICE USER'S REQUIREMENTS

The designer's first aim is resolving the user's requirements. Environmental factors and user requirements create correctly at the design stage. In the office spaces, it is necessary to determine user requirements during the design stage and be able to identify, assess the adequacy of the use phase of the building. It is possible for understand the needs of user, reason for using the knowledge of human behavior is provided to create a working space.

The human needs are, while maintaining the life of the user's physiological, psychological and social aspects of their work is essential. Moreover people can be efficient by the helping of provided the environmental conditions. So the user requirements are the user and the users to perform certain actions and the required conditions for the environment (Ünügür, 1973).

Modern office designs always think about the human factor. It would have been possible in the past to ignore the needs of the user, but nowadays, especially in the western world, the working population is decreasing and companies will have to work harder to attract business for this young talented people. Also that has to be provided better salaries, career opportunities, and may require a more humane office environment (Van Meel, 2000).

Office user's requirements can be grouped under two main headings that are physical requirements and psychological requirements.

4.1 Physical Requirements

While not disturbing within the space, physical requirements provide the proper conditions to the user for the actions. It also provides the protection of the environment against the adverse physical conditions and comfort for the users to continue the existence with health and safety measures. These requirements are

connected to the number of users and elements of the equipment used in the location-based features for the dimensions (anthropometric, sensory, and perceptual) and the number of users, devices and equipment used in these areas. As a result of the necessary quantities to use of these requirements also cover the security, fire, disasters and theft. Physical requirements were examined in the sub-titles which are spatial, air-conditioning, sound and lighting.

4.1.1 Spatial Requirements

It is defined as the static and dynamic anthropometric dimensions of the human in space, actions and forms of construction actions, behaviors. In this study is categorized that spatial requirements; circulation, color, flexibility, standardization and ergonomics.

4.1.1.1 Circulation

People can access in the way of building called circulation which is the interior organization of efficient use of space. Horizontal and vertical circulation should be within the maximum advantage of the opportunity to meet and communications designed to create.

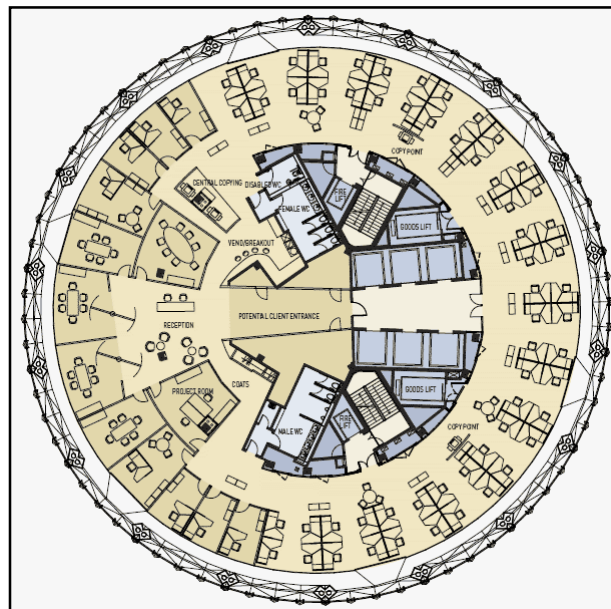
In the office buildings, public circulation and priority roads, main road areas are identified and defined a flexible and consistent traffic routes should be created. Demand is decreased from circulation in the second degree, that can be used in office space can be provided for other users with the help of the main road (Gürer,1997).

Circulation of the environment has benefits of internal roads, office usage areas and in itself does not disrupt the communication between departments. A good circulation around the fast and efficient space planning, offices, work methods, and events such

as changes in organizational needs cost-effectively as regulations permit (Lehman-Smith, 2002).

Norman Foster built the 180 m high "Swiss Re Headquarters" skyscraper building in the center of the main vertical circulation of the study in UK between 1997-2004, and sites were analyzed to not divide in between. High-speed passenger lifts with a capacity of 16 units in the building and transportation are provided in three different banks. High-speed passenger lifts with a capacity of sixteen units in the building and transportation are provided in three different banks.

Figure 4.1 Swiss Re Headquarters building plan **Figure 4.2** Swiss Re Headquarters building exterior is designed by Norman Foster, 2006, Zurich, Switzerland



Vertical circulation systems such as stairs, elevators and escalators provide vertical communication. In the Norman Fosters' "Hong Kong Shanghai Bank" building escalators provide the main vertical circulation between floors. Also it provides a visual connection, staff communication, increase traffic to detect the path of

confrontation which is coincidental. Designing provides visual connections between the layers, but also increases communication (Lehman-Smith, 2002).

Figure 4.3 Hong Kong Shanghai Bank's escalator and floor of the atrium



In the office buildings, circulation areas, tile shapes, roof shapes, ceiling height changes, expansion or shrinkage are the working places of the interior architectural elements such as walls and angles are the main route finding methods. These elements facilitate circulation and workflow accelerator factors. That is why the crowded areas which entry and exit are made, circulation is important.

4.1.1.2 Color

Color has many different effects on the ceiling, floor, walls and creativity on employees. The selected colors are adapted to the working methods should be considered in the working areas.

All those affected by the formatting, it is a very important technique for coloring and space with the effect of the regulation is indisputable. However, another equally important point is that the relationship of the colors and the use of artificial light. Reflection values as a percentage, depending on room surfaces and the colors shown on Table 4.3 (Gürer, 1997).

Table 4.1 Surface reflectance values and colors (Gürer, 1997)

Color Carrier	Reflecting Degree	Example
Ceiling	% 80- 90	White gloss paint (lacquer) White textile coating Aluminum foil Chalk paint
Wall	% 40 -60	Light Color Painting Light Color Textile
Working Unit	% 30-40	On light-colored oak or spruce green or pink paint
Floor	%30- 40	Concrete brick tone color Orange, olive, beige paint
Column	%15 -40	Green or blue textile Dark oak beige, olive, lilac, turquoise paint

Stimulating and dynamic use of colors in the areas of monotonous work tasks are performed, bringing vitality and routine killer space. The color of contrast is not recommended because of failure to fit the eye. The colors are chosen to concentration in moving spaces to the tranquility. Rarely during the use of those who see a very striking tones, such as visitors, is welcome to make an impact, despite the surfeit of users continuous (Gürer, 1997).

According to the size of the space the more space should be done with more neutral colors. If the user doesn't wish to use any color, the correct one to use the color white in color. Positive or negative psychological effects of color on people in general to take optimum offices, and white and shades (beige, etc.) are preferred colors. (Pile, 1978) On the other hand waiting areas, the furniture and the environment may emphasize selected different colors (Aluçlu, 2000).

Floors and carpet color selection is important in the free and open work spaces. It is effective unsaturated colors such as red, yellow, green for floors. The best solution is to base on neutral colors on large surfaces (e.g. carpet) and for the small substrates (cabinet, doors, curtains, etc.), strong and saturated colors should be used. Strong colors give a live and colorful view to the work places (Aluçlu, 2000).

Figure 4.4 Johnson Wax, designed by Frank Lloyd Wright, 1936, Racine, Wisconsin, USA.



Color provides safety and gives a visual comfortable effect on people. Also it allows the information can host to attract attention to the dangers, light up the areas, and on a larger degree of relaxation can be achieved and can provide aesthetically. Therefore the color provides working efficiency in physiological conditions and plays a significant role in the development. Color can be corrected with factors adverse effects on physiology, psychology, function and aesthetic (Aluçlu, 2000).

4.1.1.3 Flexibility

Flexibility is cost-effective changes affecting the interior, decoration, change the company into groups of employees, or very closely related to the inclusion of a new group. An office in standardized dimensions of planning and work stations demands re-arrangement and provides an organizational framework. A design supports as well as technological changes. Ultimately, the long-term flexibility requirement is more economical than short-term solution.

Between 1970-1971 the IBM Pilot Head Office by Norman Foster, not only considered the cost alone, but also dealt with the flexibility of the building. He constructed private buildings separately for computers at the time of the construction. Foster resolved within the existing office building. The building constructed in 18 months, projects have been completed and two are constructed as a temporary building, but still serves to 25 years (Jodidio, 1994).

Figure 4.5 IBM Pilot Headquarters interior views, by Norman Foster, 1971, Hampshire, England



Figure 4.6 IBM Pilot Headquarters exterior facade views, by Norman Foster, 1971, Hampshire, England



Movable dividers are initially can be costly, but if a company is doing constantly re-organizing the office, the money spent to relocate divider walls, movable dividers exceeds the cost (Lehman-Smith, 2002).

Modular workstations provide the flexibility. Most of this work stations, expanding can be adapted easily to a group or department. All times remodeling does not require for the destruction and start over again. Modular work stations can belong to

employees, various office personnel, work styles that appeal to party be created. Communication and power cables from workstation exist in the bodies that hold a central spine. However, the modular work stations, re-editing, the backbone flexibility is provided so far, and the keel cannot separate less power and data cables from the tile, which should be located in a very strategic positioning of data boxes (Lehman-Smith, 2002).

Figure 4.7 Some examples of modular workstations, designed by Delhi Gurgaon, 2012, India



For company owners' conference and training rooms, it should be planned without looking at the needs and wishes regarding the services that support them within the function in which the story center or the end of the floor is required. Electrical, HVAC, and other systems are highly specialized, so typical office areas have become more expensive systems; if they are located this way, the company owners provide great economic benefits. For this regulation, the space will be expanded to a flexible for future re-arrangement. Conference rooms and training rooms designed to serve two or more different uses. Movable dividers which are making these rooms should be able to accommodate various sized meeting rooms (Lehman-Smith, 2002).

Willis Faber Dumas Building's office elements which is constructed by Norman Foster in 1970, appears in the structure were only phones and typewriters. As a result of the rapid development of computer technology, the company's use of a computer on every desk, it is the beginning of the flexible design of the buildings.

Figure 4.8 Willis Faber Dumas building, exterior appearance, designed by Norman Foster, 1991, London



Figure 4.9 Willis Faber Dumas building, interior appearance, designed by Norman Foster, 1991, London



Technology grows with changes in office design. In a contemporary office design, flexibility has been the key word. Organizational structures and technical systems keep pace with the dynamics of the non-stop action until the internal stations modular wall, floor and roof systems are also being developed. The majority of office spaces with unknown requirements, based on the way words are built for unknown users, i.e. susceptibility to change, flexibility is one of the guiding factors in the design (Örs, 2001).

4.1.1.4 Standardization

Standardization is detect the common standards, promotions and organizational changes in production due to a reduction in the number of reorganization provides. There are many benefits of standardization of different elements of the organization in the interior. It provides greater efficiency and cost savings to last. Also, it serves a computer user or the service manager, increases the flexibility in the regulation of the inner space. Furniture, office size, lighting, mechanical and electrical systems can be standardized as common elements (Lehman-Smith, 2002).

Standardization, and the detection of creating high-quality issues, provides a dramatic effect on the company culture. If there is too much standardization, causes a negative effect on company culture. If the materials, elements or general office work station around the office floor with minor changes are becoming monotonous, workers may feel themselves to be working in a factory.

As changing the height of the ceiling, walls, angles, materials, colors and textures standardization between elements sprinkle the elements of architectural design, dynamic environment can be created at an office (Lehman-Smith, 2002).

4.1.1.5 Ergonomics

The word of ergonomics consists of the Greek word "Ergon" and "nomic". Ergon, means work, nomic means the rule (Salvendy, 2012).

"Ergonomics" s office design input, is the importance of understanding during the Second World War, primarily the United States and connects the acquisition of a new perspective. Engineers, sociologists and psychologists are now organizing a systematic way of study, calculation of both hardware and by the need for susceptibility believe that the people who work the machines.

After the introduction of ergonomic in offices should be considered with the necessary hardware, mechanical, electronic, equipment and personnel to use these elements to require the devices (Erentok, 1991).

People are in workplace, feel healthy, safe and productive. Also they have the necessary equipment in order to work; sound, lighting, environmental factors such as temperature and business organization and management systems for the human, structural, spatial, and psychological characteristics should be regulated.

The main task of ergonomics is to edit a business in accordance with the above purposes. In a sense, ergonomics, the arrangement of the person is defined as one that meets specifications.

Ergonomics support the physical and mental abilities of people. Used by people in all kinds of equipment are put into service in the most effective, however they use them, stance, posture, general health, safety and the system requires consideration of compliance issues. For this reason, physical and spiritual needs of human beings are taken into consideration, identifying the behavior of the people all the systems designed for use with systems running on them, should be considered as appropriate and outstanding efficiency (Salvendy, 2012).

Rapid progress in the field of technology, continuous improvement of products, activities, reorganization of enterprises and in accordance with the technical design of the system has led to the social system. For not to remain inadequate human element in this continuous renewal and development, human skills to take advantage of the maximum level of experts, people who have made continuous research on individual characteristics and capabilities. For the effects on the performance of the employees in the office furniture and equipment, ergonomics is put forward as scientific.

4.1.2 Air-Conditioning Requirements

People spent their times more than eight hours a day in the office buildings. The comfort and health requirements and indoor air quality and comfort conditions is essential also, rather than a luxury, a mandatory requirement. It is a factor directly affecting efficient operation.

The air consumption per employee in the offices are stated as, small and medium-sized working places 20-40 square meters, and 40 square meters is large work spaces. These values should not fall below 15m³ (Gottschalk, 1968).

There are some reasons of affecting the heat transfer between human and environment which are the action of the air temperature, relative humidity, air movement rate, mean radiation temperature and clothing features, skin temperature, sweating rate, skin surface moisture, etc. The first condition for thermal comfort is to have the heat exchange in the balance. Applicable air conditioning system should

regulate the space for air temperature, relative humidity, the amount of dust in the air. Also it has to be organizing the fresh air and the amount of CO₂ in the air the amount of odor and air movement (Ertürk, 1977).

5-6 floors which are the location does not exceed a depth of 8 m and also the floor area not much more larger, the heating can be use the natural ventilation through windows as if the noise barrier can be achieved in traditional systems. For the larger places are required to working the air conditioning to the artificial systems (Gottschalk, 1968).

The most important feature in the venue after the cleanliness of the air is the heat of humidity. At the times of high humidity, the temperature can be noted that a significant negative impact. Relative humidity should be 45-55%. The lower limit is determined as 30% (Lappat, 1969).

Human feel well-being and living habits of heat, season, gender, age varies from person to person. However, 50% relative humidity, a temperature of 21-24 is treated as a positive value. In summer, the indoor temperature is altered by external heat. Thus, adjusting for arrivals and departures between interior and exterior ensures the prevention of fatigue and reluctance. Temperature adjustment should be applied throughout the day. Accordance with the climatic rhythm of the day, space temperature, morning and evening, should be less than midday. Thus, the fatigue caused by heat can be prevented during the day equivalent (Onat, 1970).

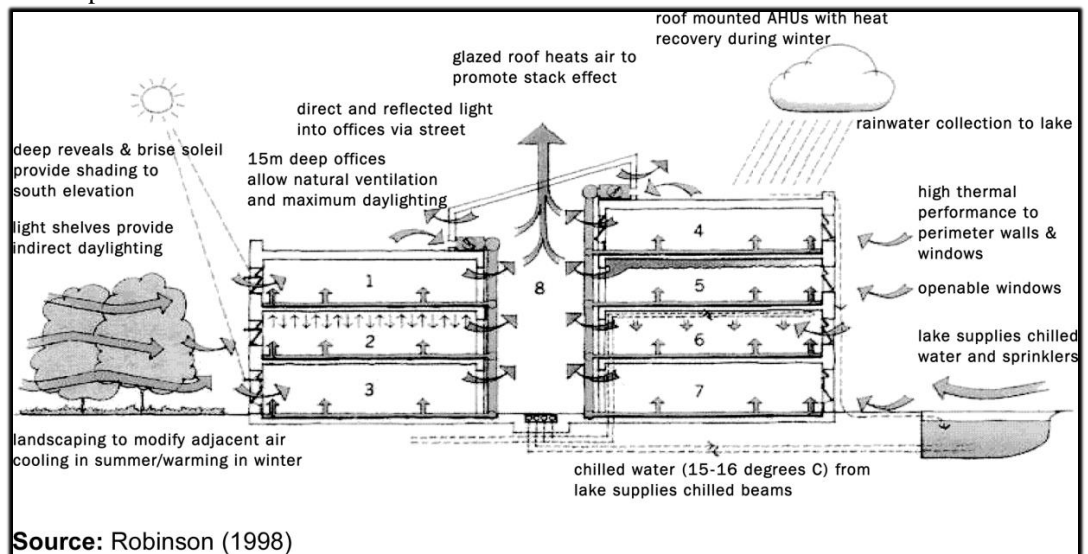
In office buildings, internal heat gain is high due to the high number of users and heat generating equipment (photocopiers, artificial lighting, computers etc), therefore, it is necessary to reduce heat gain from the sun. If solar radiation cannot be controlled sufficiently, and thermal mass of the building has not been identified, this creates a cooling load throughout the year, not only in hot seasons (Çakmanus,2003).

Controlling solar radiation, giving priority to natural ventilation and illumination, and using thermal mass with sufficient quantity and efficiency constitute basic principles adopted to reduce cooling loads.

Figure 4.10 Barclaycard Office Building exterior view, designed by Solution Architect, 1996, Northampton.



Figure 4.11 Barclaycard Office Building, air conditional system designed by Solution Architect, 1996, Northampton.



Barclaycard office building constructed in Northampton in 1996 has a 9 meter wide atrium between working spaces which are illuminated and ventilated naturally. Artificial lake constructed on the north, and the landscape around the lake balances the ambient microclimate. The building has reinforced concrete slabs which have high thermal mass. During the summertime, in addition to night-time ventilation, cold water provided by the lake is used for cooling. Moreover, sun radiation is controlled with deep ledges and sun refractors placed on the façade of the building (Jones,1998).

Operable windows are needed for natural ventilation in office buildings. Moreover, outer skins are designed as transparent or opaque. Operable windows provide

permeability to the skin of the building to a certain extent. In order to provide efficient natural ventilation in office buildings (air circulation 30 times an hour) windows should be placed on the direction of dominant winds and opened vertically. In office buildings, it is not mandatory to have all windows operable. Transoms under fixed windows or sliding windows may also create the desired effect. However, it is recommend designing 15-20% of windows in an office building operable. Providing cross ventilation by placing these windows across each other is the most efficient method (Sev, Özgen 2003).

Especially in high rise office buildings, it is a problem to open windows on higher floors due to the wind pressure. The solution to this problem is using double-skin facades which have emerged with the advancements in technology. Double-skin facades have several benefits to the building in terms of natural ventilation and energy conservation. By adding a second glass skin, the wind pressure on the inner skin is reduced and it becomes possible to provide natural ventilation by opening windows even on the top floor of a high rise office building. In double skin façade systems, the most efficient ventilation is provided by placing air inlet-outlet openings on the skin at the level of each floor.

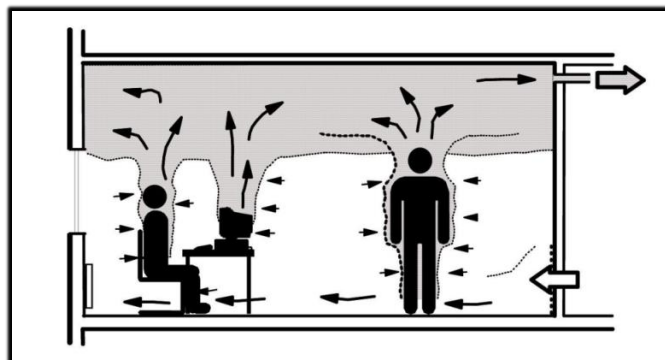
Another advantage of these facades is to have night-time cooling by opening the windows on the inner skin. In addition, the natural air present in the cavity between two facades may be given to the internal space after it is conditioned, and any undesired air movement is avoided in the internal space while natural ventilation is used. Typically below natural ventilation strategies are used in office buildings:

- Placing long façade of the building, and the facades which have more openings on the direction of the wind dominant during the summertime (for instance if west is the direction of the dominant wind, they should be placed on the north-south axis).

- Air outlet openings should be positioned on the higher sections of the walls and vertical to the wind, whereas air inlet opening should be positioned just across the air exits and on the lower sections
- The distance between the floor and the ceiling should be minimum 3 meters.
- All air outlets should be accessible to and operable by users.
- Efficient natural ventilation should be provided by arranging inlet-outlet openings on double-skin at each floor level (Karataş,2004).

In addition to natural ventilation, there is another energy-efficient ventilation system which can be used in office buildings: displacement ventilation. In displacement ventilation clean and cool air distributed at a low speed through the floor and it replaces contaminated warm ambient air exiting from the ceiling level (Figure 4.9). This system has different applications including blowing air below the walls and windows. When natural ventilation, displacement ventilation, FCU and VAV are compared based on various criteria including cost and difficulty in application and control, displacement ventilation emerges as the most favorable method (Yeang,1999).

Figure 4.12 Displacement Ventilation Principle 1994



4.1.3 Sound Requirements

Sound requirements are in accordance with spatial sound intensity and the sound reflection and dispersion characteristics. There are two types of noise which are general noise and only noise in the office buildings. The heard of employees' conversations and the sound of footsteps, the sound of the phone and office equipment, heating, ventilation and lighting equipment noise, noise from outside the building work are noise sources (Onat, 1995).

The human body begins to be affected by physiological noise after 50 dB. 45-50 dB noise level should not exceed for the free regular large offices. Offices ensure acoustic comfort, space noises coming from outside, the volume, the effect of noise level, the noise sources in the volume, subject to inspection. Acoustics are the factors that determine comfort, sound intensity, and sound level, the action, the sound source, the sound continuity, which is against sound habits (Çete, 2004).

In the cell office sound passes through speech rooms, down the hall and outside, wall, floor and ceiling. In this type of building physics, work spaces are measured to prevent noise. In the free scheduled areas, the noise distribution, and ingestion are delivered to an optimum level of comfort.

The open-plan offices, whether it be human or machine noise sources and receivers share the same space requirement, makes it difficult to ensure acoustic comfort. Productivity and the acoustic design of open-plan offices are the basic contradictions. Lack of acoustic comfort or distraction such as increased productivity and efficiency are reducing the level of speech leads to this kind of results.

Space is a feature that directly effect of the performance of the user in an acoustic design of open-plan offices. Conditions for the formation of acoustic comfort is furnishing, design, features suspended ceilings, furniture, choosing the size of the partition element, even to the format of lighting devices. Office carefully handled and requires examining each object contained (Karabiber, 1994).

Mechanical systems are provided the architectural systems (doors, dividers and ceiling), acoustics and noise control materials, providing open plan offices are three important factors.

In the mechanical systems, sound level, can be used control the fan according to the category. Low-noise ratio and helps to reduce noise is to use the appropriate-sized distributors.

Sound-proof systems are used to control the level of sound and to prevent from the white noise in the open plan offices. White noise means that the low volume of computer, television and radio also it cannot so easy to distinguish. However, it is tiresome and distracting for a long period of time and has an effect on the employees. Therefore, the noise made by different fluids flowing through pipes, plumbing causing noise and air channel, proofing is necessary to make roads. It keeps the attention of the people stabilized who work in offices building systems and helps to reduce the level noises (Lehman-Smith, 2002).

The second acoustic control systems in the architecture are doors, dividers and ceilings. For the frameless doors, it is difficult to avoid the noise from the outside. Overlapping filled with massive wooden doors should be preferred. Sound isolation between rooms, splitters, acoustic isolations put into the ready-paneled walls, adding new layers should be provided. Specific and high-priming ceiling coverings made of fiberglass used in open-plan offices. Work stations plane and panel heights, walls, acoustic privacy and personal work area should be established by determining the volume control (Lehman-Smith, 2002).

In the third systems the provider of the volume control materials can be prohibitive. Wood flooring, wall paneling or on the stone walls and metal panels or hard materials, such as furniture systems, volume control should be used where it is not needed. Sound sensitive areas, such as open office, it is best to use soft, sound-absorbing materials (Lehman-Smith, 2002).

Whether classic or open-plan offices, acoustic comfort should ensure speech privacy on the other hand depends on the limitation of the background noise. Users can concentrate on the work without disturbance from the background noise level.

The elevator of the building and traffic noise sources are in the exterior of the office space and beyond. They can create a variety of problems. Their prevention is provided prevention of structural elements to pass audio fundamentally sound in the form of increased proofing.

Acoustic studies related to the early stages of architectural design, connecting carried out in interaction design. It is a very important issue as well as open plan offices are very difficult acoustic problems.

4.1.4 Lighting Requirement

In the office spaces, lighting design, interior arrangement supporting the work area to ensure that energy efficiency should increase the value of its surroundings. Both areas such as differentiation, as well as to serve the needs of various users in different business and recreational areas require different lighting (Lehman-Smith, 2002).

In the workplaces, adequate lighting, reflection from the lighting, surfaces, lighting, contrast, shadow and color components of the characters 'overall comfort effect referred to as' optical conditions. (Gottschalk, 1968).

One of the most important benefits of lighting, both quantitative and qualitative increase in work efficiency and is able to respond to the needs of visual comfort. Lighting should not be an equivalent level. This perception is both tiring and hard to adapt. To ensure high performance lighting, lighting density of the surrounding surfaces, the difference in lighting between the regions, lighting, tools, glitter, such as colors that dominate the surrounding visual and environmental elements should be examined.

The structure of the user and the eye's structure are the factors that affect the comfort. Lightning is the subject of free regular working places of traditional and useful to examine separately the traditional aspect of the arrival of daylight in the workplace,

the layout of workplaces, and therefore it affects the direction of view. Generally, in order to take better advantage of natural lighting desks are placed perpendicular to the outer walls.

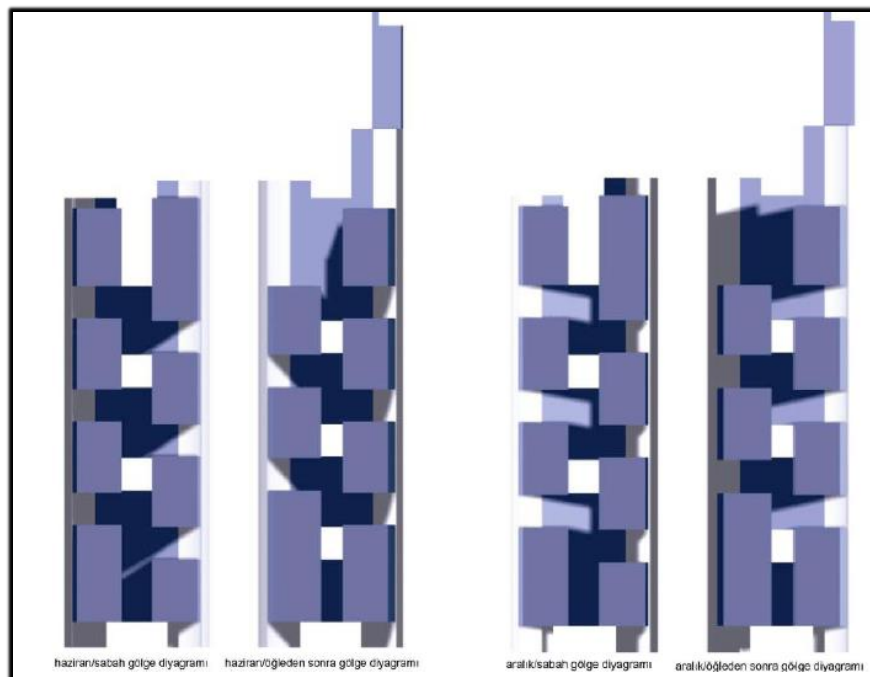
In office buildings, in average 25% of electricity energy, which is very difficult to generate, is used for lighting purposes. Therefore, identifying and implementing energy conservation methods in lighting is very important for sustainability. In lighting, energy conservation measures can be examined under two main strategies. The first one is to increase natural lighting in spaces and the second one is to select lighting equipment which provides energy savings. In office buildings, natural lighting is very important for visual comfort and it is becoming popular once more with the use of modern natural lighting systems. In places where natural lighting is not sufficient, measuring the need for lighting accurately, selecting the most efficient lighting equipment suitable for the office building, using lighting control systems constitute energy conservation measures that can be taken in relation to lighting (Tuğlu,2006).

At the design stage, the most important measure that can be taken to increase natural lighting in office buildings is making sure that multi-storey atriums and sky-gardens created in the building, and sunlight is used directly in internal spaces. Thus, all employees can benefit from natural lighting in multi-storey and deep open-plan offices. In Commerzbank office building, offices are located on interior and exterior facades. The facade is divided by sky-gardens to ensure that offices located on interior facades can benefit from natural lighting during the day in all seasons and also there is a central atrium with a glass ceiling, allowing daylight in. When diagrams in Figure 4.14. are examined, it is possible to see that natural light enters the interior space throughout the day through sky-garden when the sun hits the building horizontally and through a yard covered with a glass ceiling when the sun is high in the sky (URL, http://web.utk.edu/~archinfo/a489_f02/PDF/commerzbank.pdf).

Figure 4.13 Commerzbank Building interior, transparent divider panels office partitions, designed by Foster & Partners 1994, Hesse, Germany



Figure 4.14 Commerzbank Building Winter and Summer Shadow Diagrams



Another element which influences use of natural lighting in interior spaces of office buildings is the nature of glazing used on the front of buildings. Glasses with varying transparency can balance the relationship between natural light and heat. With advances in technology, glasses with varying transparency (smart glass) are being used. Electro chromic glass, of which transparency is changed with an electric current, is a multilayered mechanism which is created by placing a thin film over the

glass. In connection with the central conditioning system, transparency can be changed with a small electric voltage to provide comfort and to dynamically control level of sunlight entering the building (Karataş, 2004).

In addition to linking the building to the exterior space, glasses also control and recover energy from solar radiation. Today, there is angle-selective glazing and spectral selective glazing to fulfill these duties. Angle-selective glazing does not permit sunlight to come vertically during summertime. Instead, it permits sunlight with a low rising angle, but permits light coming with a low rising angle. Spectral selective glazing permits visible radiation, however, it absorbs or reflects infrared radiation (Yener, 2005).

Upon reviewing design measures and glazing selections in terms of energy conservation in lighting, modern systems which have been developed to use day and sunlight in a space should be discussed. The general principle of modern natural lighting systems is to benefit from optical characteristics of daylight using various tools placed on the building skin or interior spaces. These characteristics include reflection, refraction, absorption or refraction and reflection of light rays.

One of the most important factors which influence the efficiency of employees in office buildings is visual comfort. Artificial lighting is used when natural environment inputs cannot be used to meet visual comfort requirements or if preferred by users. When developing an efficient lighting system, first steps are to identify lighting needs of the space and to accurately select the components of the system. After this system is created, operation, utilization and maintenance also influence the efficiency of the whole system (Kaymakçioğlu,1996).

In order to provide comfortable lighting for office building users, the first step in terms of energy conservation is to identify lighting needs in line with the function of the working space. There are several variables which determine lighting needs of a space including geographical location, climate conditions, function, quantity and quality of access to daylight, dimensions, etc. In a sustainable design, when

calculating the lighting need of a space, the nature of the work to be carried out in that space, volume utilization characteristics, and how the lighting system will be used in a single day are determined by observing sunlight characteristics of the location in a business year (URL, www.lrc.rpi.edu/programs/delta/pdf/SMUD.pdf).

Lighting needs of a space is also influenced by physical properties of the space such as dimension, color, reflectivity and absorptiveness. In an interior space, a portion of the light rays which travel towards directions where there are no objects that will be seen, is absorbed to a certain extent by surfaces on such directions and then reflected to a certain extent. Light reflected from these surfaces create ambient visibility, whereas absorbed light is wasted. Therefore, physical properties of spatial surfaces increase or decrease luminance requirement of a space (Kaymakçioğlu, 1996).

When surface or working areas is light colored, the amount of light emitted to useful area through reflection increases. Moreover, light is diffused as a result of its consecutive reflection on these surfaces, and it ultimately has a positive impact on the quality of the luminance. Generally speaking, using light colors on large surfaces in spaces which will be lighted is important in terms of energy conservation.

Another factor which influences lighting needs of a space is directing light accurately to objects which have to be seen. Objects and surfaces in a space may be colored or colorless, opaque or glossy, flat or concave or convex surface. This variety presents very different characteristics in terms of visual perception. Lighting technique defines the method necessary for each characteristic. For instance, in an office building, visibility is required in working areas. In such case, the lighting need of the space is to direct the light in relevant directions and to provide ambient visibility. If the light is diffused to the whole space it will be a wrong lighting functionally and too much energy will be wasted (Mısır, 1996). Therefore, in addition to ambient light, desktop lighting elements controlled by users should be considered.

When making an efficient lighting design, after lighting needs of the space are identified, the most suitable lighting equipment should be selected. Lamps, ballasts

and fixtures used in lighting of interior spaces provide different types of illumination. The efficiency of all elements influences the total efficiency of lighting equipment (Slater, 2000).

In the process of generating light using electric energy, when a wrong lamp is selected, energy that could have been converted into light is lost and energy is wasted. Thus, lighting designers are responsible for selecting lighting elements that will meet lighting needs of the space. In addition, using 58W fluorescent bulbs with 26 mm dia. and automatic control systems in working areas of office buildings instead of 20, 40, and 65 W bulbs with 38 mm dia provides 75% energy conservation with same luminance level, whereas preferring low pressure sodium vapor lamps over high pressure mercury vapor lamps provides almost 70% energy conservation.

After selecting a lighting source suitable for the function of the space, it is important to select the most efficient type of such lighting source. Efficiency factor of a lighting source depends on the nominal power and color of the lamp. New technology lamps are expensive but they are cost-effective during their life cycle given their energy efficiency characteristics and long life. According to studies, replacing old equipment with modern and highly efficiency equipment contributes significantly to energy conservation. Ballast is also an important element that has to be taken into account in terms of efficiency of the lighting source. Excluding tungsten or tungsten halogen lamps, all lighting sources need ballast. Since ballast consumes energy, it increases the energy consumption of the lamp. Therefore, the efficiency of the ballast is important in lighting for energy conservation.

Identifying the space to be lighted and selecting the most efficient equipment and placing such equipment accurately constitute the design stage of an energy-efficient lighting process. Lighting control systems are used to ensure that users use the lighting system accurately and efficiently. The goal of such systems is to provide a luminance at good visual standards determined according to human physiological characteristics and ensuring conservation of energy and the environment. The lighting

control equipment may be a stand-alone system or connected to other installations (heating, cooling, and ventilation). The purpose of building automation systems is to develop a general energy policy and to create a microclimatic ambient which is comfortable for humans. Such computerized control systems maintain the luminance level of the building and spaces at a level determined by scientists according to their functions and ensure that no lighting system is deactivated in areas which are not used. The system is user oriented and also respects environmental systems in terms of saving energy (Tönük, 2003).

In the free regular work spaces, openness and high and fluorescent lighting can be used to highlight the size of the work area. At the large work spaces yellow light is not useful to the user's eye. White light can provide visual comfort. Indirect lighting, reducing the glare on the computer screen due to the small intensity and maximum flexibility for future re-regulation could provide a solution to the needs of the host venues for the free regular work should be preferred.

Finally, a study of a successful lighting design needs to be done in order to:

1. Maximum use the light of day,
2. Use indirect lighting,
3. Use high-energy, long-lasting, the best color fluorescent lamp as the new containing lamps and fittings, providing high energy efficiency and low cost using electronic ballast regulators as listed (Lehman-Smith, 2002).

4.2 Psychological Requirements

People have a strong relationship with the built environment; psychological theories have established relationship between people and environment in two ways.

The main objective of the working environment is to improve performance in a peaceful and secure environment. Thus, the main asset in the office system, which is not to waste human resources, and effective and efficient working space should be provided (İnceoğlu, 1982).

Psychological user requirements are described as to create the necessary conditions, not to have a psychological disturbance. These are auditory and visual privacy, the social environment, human behavior in the space on the characteristics of the human form, color, texture, such as the aesthetic conditions. Psycho-social requirements, which vary depending on user's culture group, on personal wishes and desires characteristics (Ünügür, 1973). In this study is categorizing the psychological requirements are categorized in three subheadings which are privacy, behavioral, aesthetic requirements.

Table 4.2 Psychological Requirements (İnceoğlu, 1982) (Kaya, 2007).

Privacy Requirements	The space is suitable for auditory, visual, and socialization with confidentiality
Behavioral Requirements	Actions of the users in the office distances they need. (Individual limit is 45cm, 54-120cm distance between individuals, society distance is 120-360cm, distance from the public is 360cm and larger.)
Aesthetic Requirements	Elements that constitute the physical structure of the space of form, color and on the requirements of the material media

4.2.1 Privacy Requirements

The need for privacy is universal. It is directly related to the humanitarian needs as being safe, belonging and to be appreciated. However, in different cultures, different factors depending on the need for privacy in order to meet, this need may arise and can be viewed in different ways (Fischer, Tarquinio, and Vischer, 2004).

Privacy in this study are evaluated under two main headings;

- Visual privacy
- Auditory privacy

Visual privacy can be categorized as see and to be seen. The work place which is requiring high concentration is needed isolation increases for efficiency. In such cases, users have a large number of offices or open office layouts, office system by creation of may be needed closed cells (Wyon, 1996).

In the office systems to be seen is different than to see and this can cause problems. For example the managers can oversee the other employees or person does not want to appear due to the job interview. Researches show that office users do not like being watched by others while working, they are observed as anxious (Brill, Margulis and Konar, 1985; Clements-Croome, 2000).

Visual privacy is concern about disturbed by the noise heard and other users in the form of unwanted conversations are heard (Altman, 1975). People do not want their phone calls to be heard by other employees, and they do not want to hear other people's conversations.

With today's technology it is possible to control the noise (Aluçlu, 2000). This can be provided by measures for building physics, acoustics, or in the office is obtained by the noise distribution and absorption.

In the offices, it is the natural right to have privacy for users and therefore their most important psychological need. Offices should provide the visual privacy, as well as the visual privacy levels, so employees can be productive. This is the most important concept for providing privacy (Kupritz, 2000).

People need privacy times also want to be on their own concentrating on work, to interact with others or to have peace and quiet for relaxation. The users also need privacy to have confidential meetings with an individual or a small group, to have private or confidential telephone conversation, to transfer confidential information

through technology (fax, electronic mail, voice mail) and so on and so forth. These needs identify the concept of isolation, control, communication, confidentiality and crowding in relation to privacy.

4.2.2 Behavioral Requirements

People's living standards have increased the expectations from the development of technology. The comfort of home and in other places is now the same level at the work place. For this reason, the office which serves as a venue not only functionally, as the place where users spent a large part of the day is discussed.

People want to reflect their individual characteristics, social status and bonds, commodities held a variety of tastes and personal interests to express their needs to sections (Kupritz, 2000). This is the definition and ownership of office space and the user provides his/her own (Altman, 1975). In other words, the section of the user take control of him/her in the office to mark the life and work partly reflects the office.

These arrangements within the office, users define areas of influence and personal areas. Offices in the minds of users' personal spaces to indicate their office at the same time shows the identity of the user (Elshbach and Kramer, 1996).

Environmental psychology studies of the symbolic meanings that the users markings were found to be within the organization (Sundstrom, Bell, Busby and Asmus, 1996). These symbolic meanings are as a part of their social identity, status and privileges within the organization indication (Frank, 1985; Elshbach and Kramer, 1996). User within the organization's office furnishing and functional products are generally seniority, prestige and status are used as indicators. (Sundstrom, Town, Brown, Forman, and McGee, 1982).

Donald (1994) had a study of the productivity of users that decreased with the restrictions of the users regulations in the office. Another study shows that it increased confidence in their psychological state and users with their regulations, it created personal skills and expertise of the users in the office (potential) as an

indicator of office was used as a way of communicating with other colleagues (Sundstrom and Altman, 1989).

Studies have revealed the direct relationship between behavior and environment and they affect each other in physical settings.

4.2.3 Aesthetic Requirements

The aesthetic requirements mean the appropriate form, color and textural properties in the space (Inceoglu, 1982). It takes place in the form of color, texture, aesthetics depending on the psychosocial needs of the variety of the conditions (Aluçlu, 2000).

The shape and geometry of the surfaces of materials that constitute it, the color, texture, pattern, and be recognized as the defining characteristics. These are visual characteristics which are affected by visual weight, the perceived size and rate, degree of reflection of light, acoustic in space (Aluçlu, 2000).

Forms of surfaces are the most important elements of architecture and interior design. The visual properties of these relations in space; places determine the forms and characters. The location of furniture and other elements affecting the aesthetic form of the space contribute to perceived (Ertek, 1994).

The color has a strong effect on the time spent in a space long or short. Dominant colors are made a space more weight. The weight effect of colors such as red, blue, orange, green, yellow are reduced as a sequence. In addition the areas dominated by warm colors on the actual time is the elapsed time, the time spent in the cold-colored space is under the direction of the actual time. (Aydınlı, 1989). In the experiments, the colors have effect on the people's sense of smell and taste. For example, yellow and green evoke sour, orange, yellow and red evoke sweet, blue and green evoke bitter, salty taste suggests a pale green and light blue, green evokes the smell of perfume (Teker, 2003).

Color is an important factor in architecture. The integration of the visual perception of space evolves around the three detection factors. These are:

- Light detection,
- Spatial perception of the organization,
- Color perception.

It is connected to the perception of colors, light sources, light sources of different colors and locations also it should be selected to match the characteristics of the action. Color has a psychological factor of humanization of the office environment and in the context of responding to the sentiments of the people. In an efficient, high-quality and safe environment systems are created a human being, fatigue, stress, loss of enthusiasm for work, monotony, such as social expectations are an important contribution to solving the problems of color. These studies examined the positive effects of color in many different areas also ergonomic information was obtained on the contributions. Color as a result of the establishment of relations between the rights to provide visual comfort easier, allow users to perform actions more easily and willingly (Ozbudak, Gumus, Cetin, 2003).

Several studies state the effects of the psychology of the users' perception and the colors are determined by this factor. Color is an environmental factor affecting the employees' status, satisfaction, motivation and the performance. Warm colors are export to make people focus on the subject, to increase their awareness of the environment. The cool colors provide visual and mental focus on job. Red reminds aggression, anger, tension, excitement, happiness, dynamism, and the emphasis of blue, green resembles with relaxation, comfort, security and peace. Students' feelings and thoughts on the following parts of the study surveys the environment, according to the blue room and the red room, stated that they felt calmer and better in the blue room. Blue calms the pain of relationships, the red is a stimulating color, but the colors of environment should be selected appropriate to the nature of work (Stone, 2003). The effects of the colors are shown on Table 4.2.

Table 4.3 Color influence to user psychology and heat perception

Color	Influence of the perception of distance	Heat Perception	The psychological effects
Blue	Far	Cold	Relaxing
Green	Far	Very Cold	Very Relaxing
Red	Close	Warm	Restless / Stimulant
Orange	Very Close	Very Warm	Stimulant
Yellow	Close	Very Warm	Impulsive
Brown	Very Close	Neutral	Impulsive
Purple	Very Close	Cold	Aggressive / Restless

Where the stimulating and dynamic use of colors in the areas of monotonous work tasks are performed, brings vitality to the place. Color contrasts may cause distraction. For active places, tranquility, and concentration will be selected as the colors defined. On the other hand rarely during the use of those who see very striking tones such as visitors, despite the fact that a nice effect is a continuous surfeit of users (Kaya, 2007).

As a result, in terms of comfort, safety and productivity have effect on people with psycho-social environmental conditions. This is not taken into account the interactions between the person's comforts, monotonous jobs for the working order of the creation of motivational factors. The group behavior, boredom in the environment taking into account the organization of work and life by providing an aesthetic of saturation appears.

5. CASE STUDY

In this thesis; firstly the definition of office areas and the reasons of their formation are discussed. Following the formation, the historical process of interior office spaces is examined by a literature survey. The first office structures in the world and Turkey are discussed and studied in details. Some different types of offices such as traditional open, landscape, regular, joint and etc. are examined and exemplified.

The psychological and psychical needs of office works are examined in two different groups. Psychological needs are divided into sub-parts which are privacy, behavioural; aesthetics whereas physical needs are divided into four parts which are spatial, air-conditioning, sound and lighting.

Establishing the context of the study, this chapter briefly makes and the introduction to it. The research aims finding how and what the extent elements of office interiors contribute towards the physical and psychological well-being of office employees in current offices. In order to have a study which is self-supportive by proven data and to test the necessity of the user needs; a survey based on two samples is also presented.

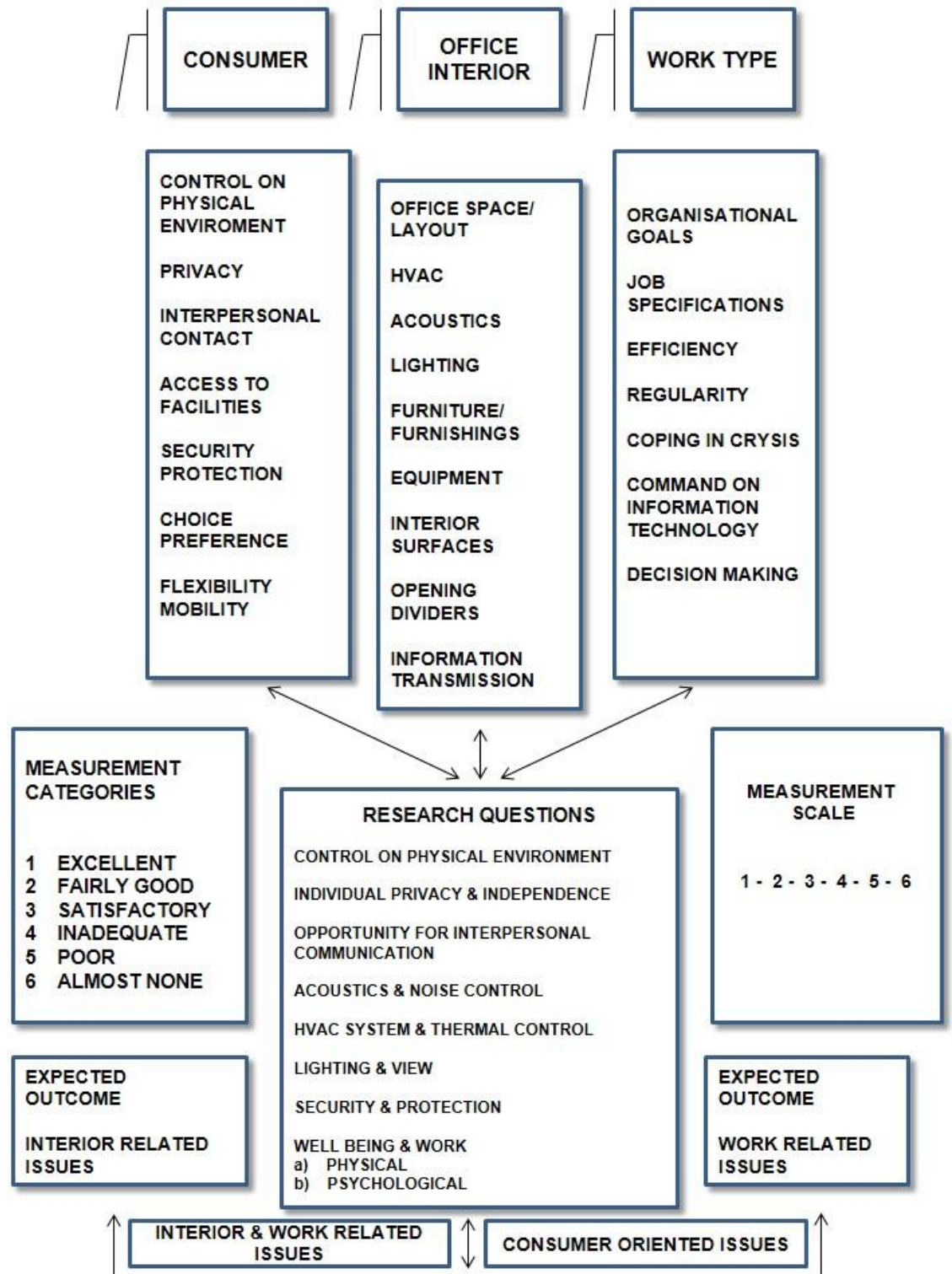
5.1. Methodology for the Case Study

The research theme is based upon the office interior environment. The term environment this is conceptualized as the physical setting including interior elements (for example, HVAC system, lighting, acoustics, furniture, storage, interior surfaces, office layout and Office facilities) and the way they affect employees/consumers to generate either positive or negative environmental conditions (for example: thermal

comfort, noise control, individual privacy, individual environmental control, interpersonal communication etc.). Environmental conditions are studied for both physical and psychological impact on consumers.

Based upon this; conceptual model research topic is conceived as an environmental assessment of office interiors from the consumer's perspective. This topic suggests three major variables for research. First is environment which in this case is the work environment, second is office interior and third is consumer or employee. The emphasis in this topic as well as in whole research design is to obtain direct opinion from the consumers. Focusing on three major variables, minor variables are derived from diverse and extensive literature review on office environment studies from various perspectives. By grouping all the minor variables under three major variable headings, it was possible to develop the research questions. (See Table 5.1).

Table 5.1. Research variables and questions



The research is split into two stages of data collection by employing multiple techniques. It was fore seen that the multi-strategy would facilitate the full coverage of selected environmental issues in relation to office interior environment and thereby increase the chances of validity.

Also this study, ordinal level of measurement has been used where the measurement scale 1-6 and categorized are almost none, poor, inadequate, satisfactory, fairly good, excellent. For stage one a survey method is used with mailed questionnaire technique; this technique is selected for its effectiveness where relatively simple information is to be gathered from a large population and also for cost effectiveness when broad geographical locations are to be investigated. The questionnaire is divided into two sections. Section one is cover information about the employee and his/her office; section two is based on the physical setting; section two includes psychological aspect in the work environment. Section two also includes the visual effects of office settings and shows their support to the questions for more accurate responses. The questions are close ended in section one and matrix in section two.

Data collected at stage one through survey was electronically scanned and processed for statistical analysis and interpretation using Statistical Package for Social Sciences (SPSS- computer software). An evaluation was carried out at the completion of stage one to seek the most crucial environmental factors – quantitative form of evaluation. Later on; these factors were put forward for in a deeper evaluation at stage two quantitative and qualitative form of evaluation.

5.2 Hypotheses

The hypotheses generated in the scope of this study are formed upon five main criteria which constitute the comfort conditions of office interiors. These criteria which are privacy, air conditioning, sound /acoustic, visual / lighting and ergonomics are questioned within the questionnaire.

Hypotheses 1:

In office interiors; the temperature under which the users feel themselves well, varies based on the season, gender and age. Therefore in open-offices, it is not possible for the users to be content under a common temperature.

Hypotheses 2:

In office spaces, artificial lighting must be activated in addition to the natural lighting when it is not enough. The users work more efficiently and more productive in the office spaces where the natural lighting is in use at its maximum level.

Hypotheses 3:

In the open offices the problem of “noise” which is caused by the human noise; furniture, moving noise, the noise between the office floors, the noise caused by the outside elements; effects the user’s performance and concentration in a negative way and decreases sufficiency.

Hypotheses 4:

The office furniture and space which are designed based on the ergonomics have positive effects on users. The productivity increases when the work environment is convenient in sense of user's health, sitting position and posture.

Hypotheses 5:

In the open office layout, dividing the space layout by transparent separators might prevent the "noise" issue considerably however; it is against privacy when the users still now that they are still visible and monitored.

5.3. Sample Description

In the questionnaire study two sample groups are identified. One group is the Pınar Et office with its 57 workers and the other one is Tariş office with its 53 workers. Two sample groups are comparatively presented.

Table 5.2. The comparison of surveys between Tariş and Pınar.

SAMPLES	TARIŞ	PINAR
The number of employees working in the office floor	98	83
The number of employees involved in the questionnaire	53	57

5.3.1 Tariş Building

Tariş Building which consists of Cotton Facility area on 84.000 m²; Tariş Olive and Olive Oil warehouses area on 27.000m², Tariş Fig Union's cologne factory on 18.000 m², Tariş Yemta AS on 5.000 m² are and common fields of 10.000 m² – these lands add up to 144.000 m² area in total. And the executive building is also in the same area Liman Cad No:10 Alsancak-Kordon / Izmir

Figure 5.1. Tariş Building's satellite view.



The executive building has two floors. On the first floor there is the lobby, secretary's office and the fig department. On the second floor there are the employees of grape and cotton department. These departments are locally separated between each other. The questionnaire is performed with the 2nd floor employees.

Figure 5.2. Tariş Building's exterior view.



Figure 5.3. Tariş Building second floor plan

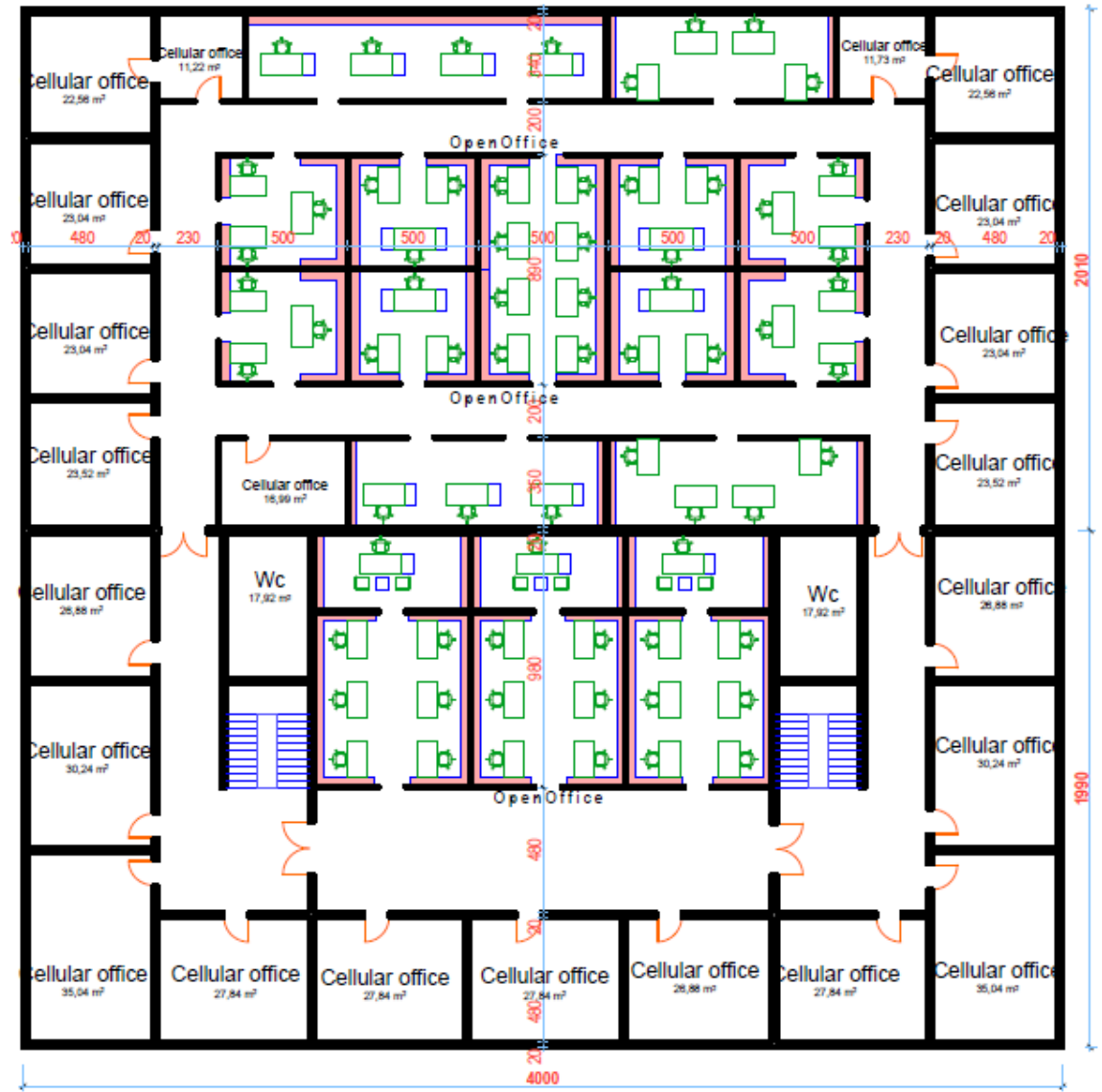


Figure 5.4. Tariş Building office interior views.



5.3.2. Pınar Building

Pınar Office building's address is in Kemalpaşa Asfaltı No: 1 35060 Pınarbaşı / İZMİR is located in an area where Pınar Et,Pınar Su, Pınar Süt ve Süt Ürünleri are all together.

Figure 6.5. Pınar Et Building's satellite view.



Figure 6.6. Pınar Et Building's exterior view.



Figure 5.7. Pınar Et Building's office plan.

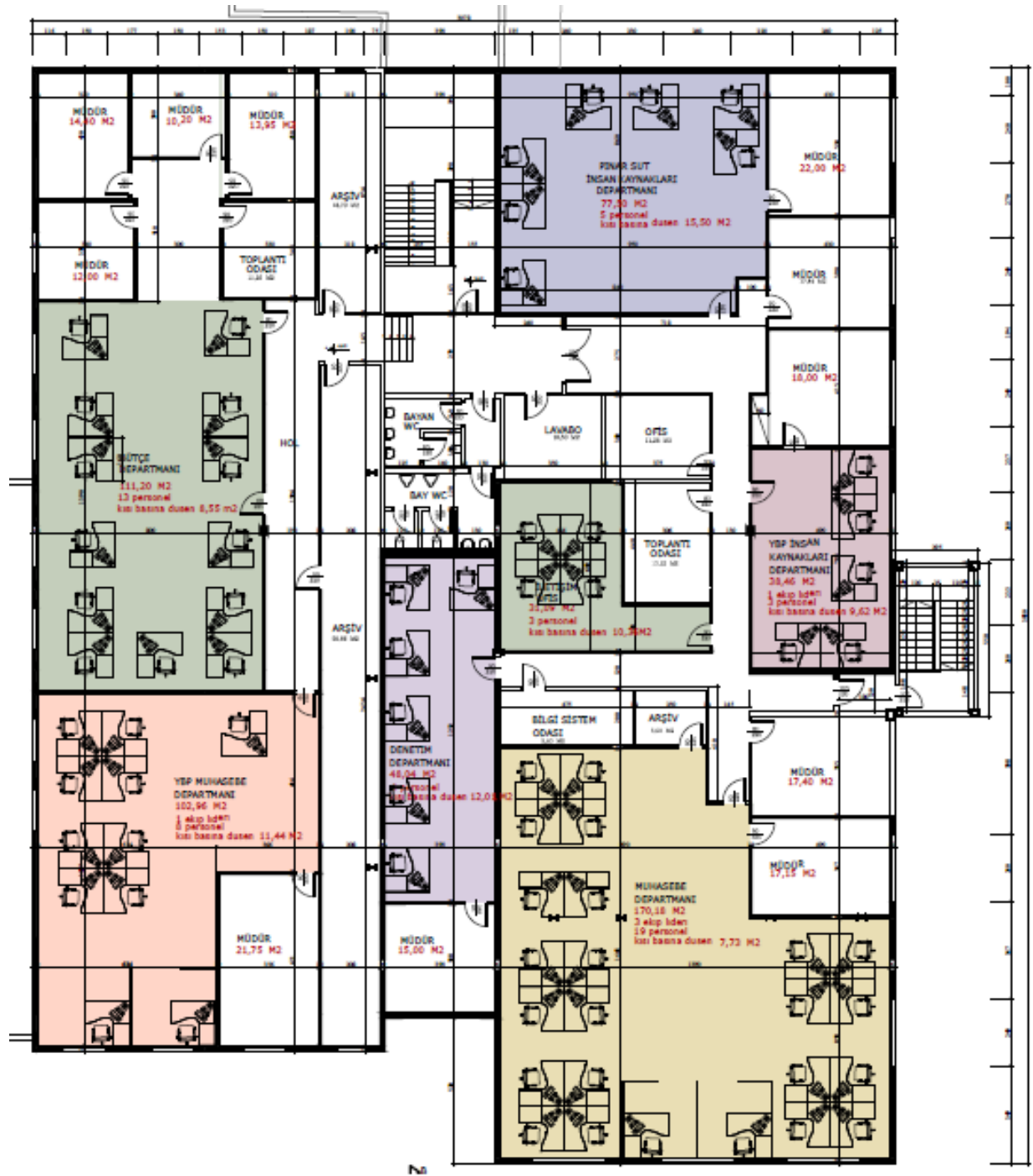
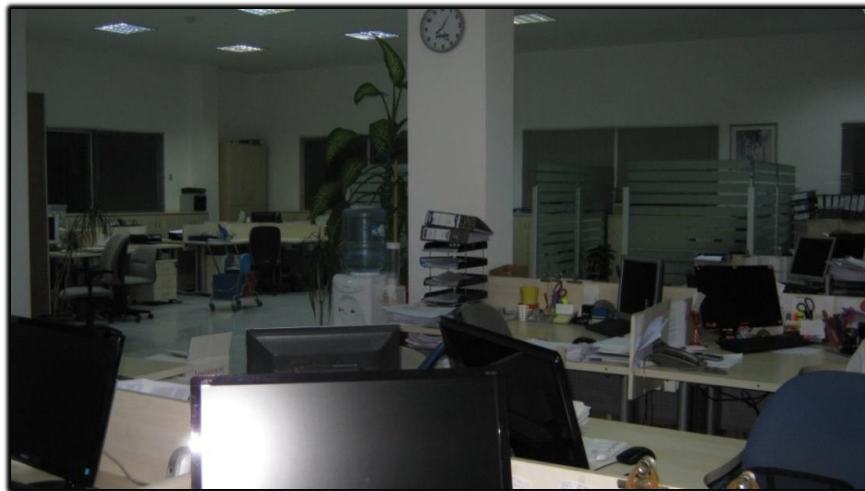
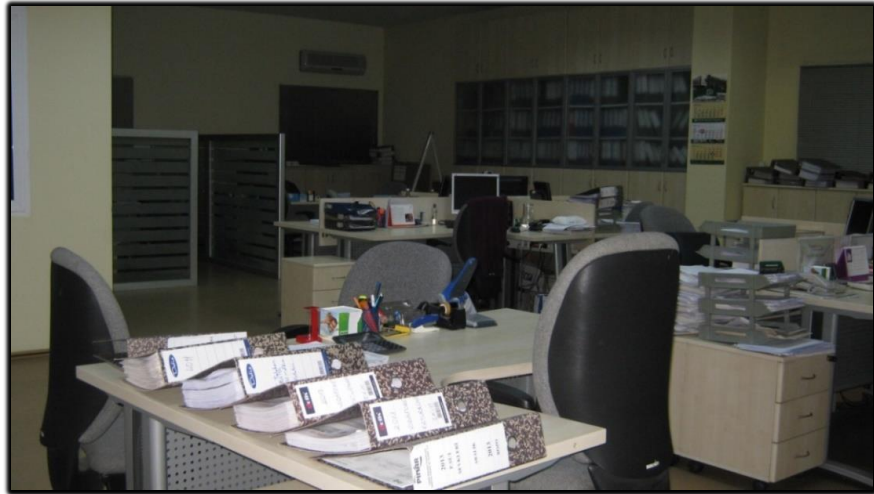


Figure 5.8. Pınar Et Building's interior views.



5.4. Survey Evaluation

The questions which are in first section are identifying the users. The study firstly questioned their ages, gender and how long they have been working their offices. The samples chosen from Pınar are working in their company from 4 to 10 years and the ones from Tariş are working in their company from 11 to 15 years. Having worked for a long time in one place cannot be an objective. Because people where in order to get used to their office organizations, they cannot see the negative things sometimes. On the other hand having worked for a long time can be called experience. It can be said that the working experience of Tariş employees are more than Pınar's. The employee of men and women distribution in the company Pınar is almost equal whereas in Tariş the men population is more than women. The age group working in Pınar is younger whereas in Tariş the ages vary between 31 and 40. In both sample groups the educational status is at university degree. In the survey; the briefing of both of the sample group may be found in below Table 5.3.

Table 5.3. Demographic Survey Data Distribution

	PINAR Percentage %	TARİŞ Percentage %
Start to working in this particular office building:		
less than 1 year	8,1%	0%
1 to 3 years	21,6%	3,2%
4 to 10 years	43,2%	30,8%
11 to 15 years	21,6%	48%
16 to 20 years	5,4%	18
Gender:		
Female	45%	39%
Male	55%	61%
Age:		
under 21 years	5,4%	0
21 to 30	45,9%	18,4%
31 to 40	29,7%	58,4%
41 to 50	13,5%	24,2%
51 to 60	5,4%	0
61 to 65	0	0
Level of education attained:		
completed secondary level	21,6%	3%
completed two years further education (post-secondary)	10,8%	6%
completed three/four years university (under graduate)	51,4%	91%
post graduate, doctorate or professional degree	8,1%	0
Position of business:		
secretarial	5%	6%
clerical	55%	67%
technical	3%	12%
professional	35%	6%
managerial	2%	9%

The questions which are in second section are about defining the office structure, organization and user's psychological and physical needs. In both of the companies the employees mentioned that their floors are in 1st floor and the organization they have worked in has been open-office. The office they are working in at the moment is separated open office.

48.6% employees of Pınar and 85% employees of Tariş mentioned that the area measure is more than 20 m². The weekly working hours of Pınar is more than 40 hours whereas it is 31 hours and 40 hours in Tariş. The study shows that each company have same structure. Both of company define their offices; open office, separated by dividers and larger than 20 square meters. Also this mean that their working environment in equal terms. In addition to add they are wasting their times approximately 30-40 hours in a week so both of the company work their office at the same times.

Although the telephone traffic of Tariş group is 20% more than Pınar's; however concerning report making and meetings, Pınar employees are 22% busier than Tariş. The noise of telephone and talking with telephone are the reasons of noise in offices. The noise reasons and how can resolved them are mentioned by this study on chapter four sound requirements section.

While creating the office organization, the users have limited the what kinds of activities they do in their offices. For example in DreamWork Office in USA, they designed the office organization to consider the work flow. They separated the

activities which are creating / brainstorming, meeting, working and relaxing areas (Groves, 2011).

Figure 5.9 Creating / Brainstorming area from DreamWork Office in USA



Figure 5.10. Working area from DreamWork Office in USA.



In the first hypothesis it was mentioned that the temperature varies between season, gender and age. In such open-office areas it is not very easy for the users to agree on a certain room temperature. When compared to Pınar; the employees in Tariş are

more uncomfortable about the temperature, ventilation and moist in the air when it is winter season. In Pınar this data changes quite much and shows that the employees are %13- %18 content with their working environment In summer time; the half of Tariş employers are complaining about their working area however Pınar employees state that they are 52% more content.

The men and women employers who are working at Pınar answers about temperature are vary each other. Women are not happy in winter temperture. They are more getting cold than men. In Tariş women are not satisfied that winter and summer temperature. Men %22 is more satisfied than women. On the other hand the age is not a relationship with the temperature in this study.

Chart 5.1 The temperature questions are replied by women who are working in Tariş and Pınar Office

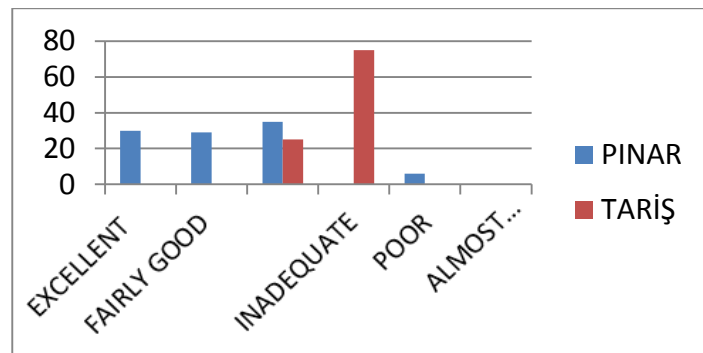
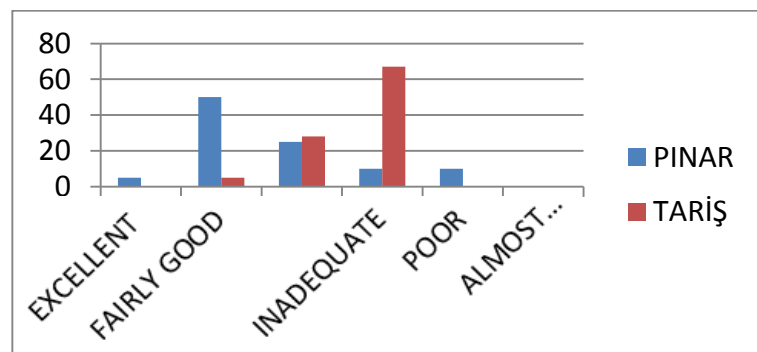
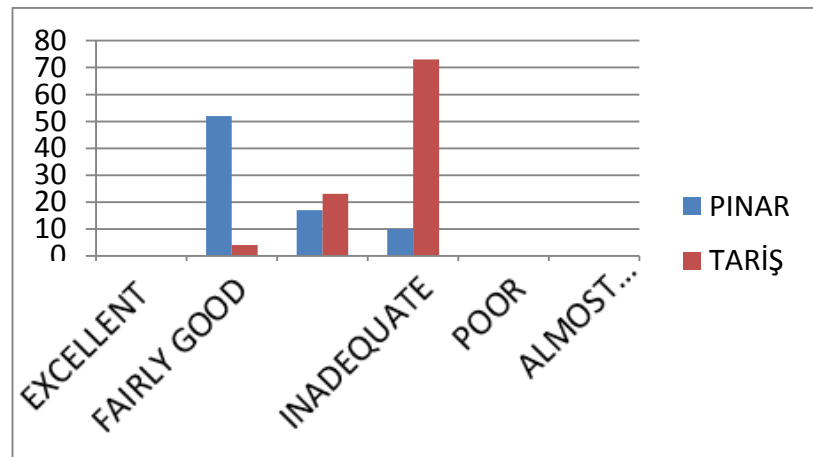


Chart 5.2 The temperature questions are replied by men who are working in Tariş and Pınar Office



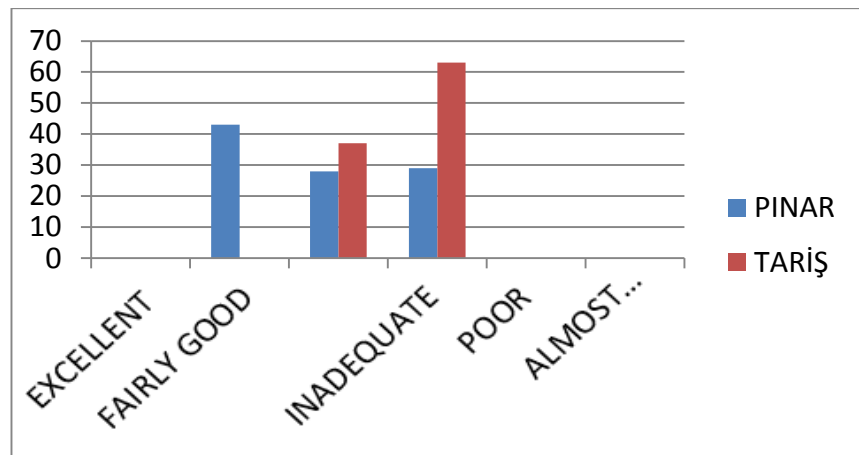
Male and female employees of Tariş response about climate showed similarities. The answers of Pinar employees have varied. In both samples the satisfaction rate changes 15% between men and women.

Chart 5.3 The temperature questions are replied by who are under 40 year age in Tariş and Pinar Office



Likewise, employees over the age of 40, at a rate of 10% by the age of 40 under was concluded that cold more.

Chart 5.4 The temperature questions are replied by who are 40 year age later in Tariş and Pinar Office



In the Pinar of employees aged over 40 employees are answered about climate, gave a more satisfactory answers.

In second hypotheses; it is mentioned that natural lighting increases productivity. However neither of the companies is using natural lighting.

People who are working with daylight show higher performance. But both of the employees said that they do not use daylight and it is not a problem for them.

Figure 5.11. Pinar Et office interior view.

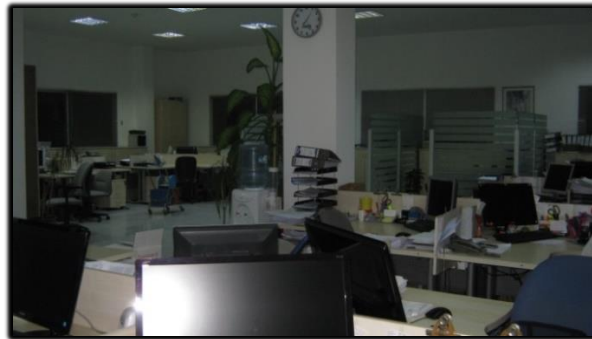
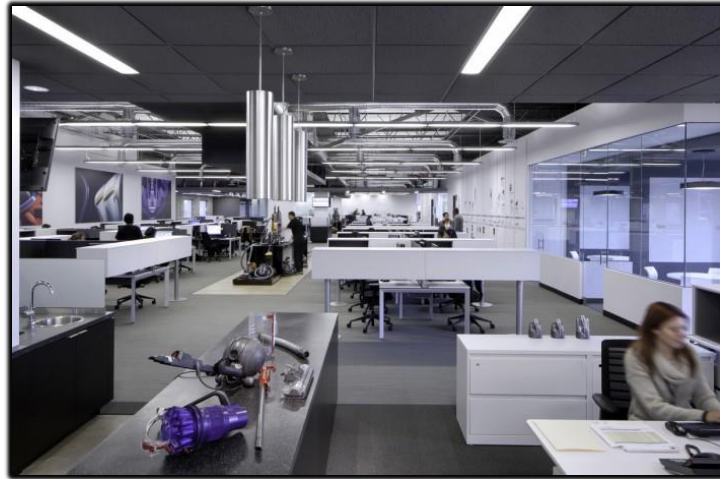


Figure 5.12. Tariş office interior view.



The study mentioned about the benefits of working with the natural lighting in chapter four lighting requirements section. Also users have a positive effect on psychologically. On the other hand a company called Dyson in UK has a different strategy about natural lighting. They designed the working area without natural light. They put task and artificial lighting in a standard level. Because they want to provide employees can not feel the time and also miss understand how time passes (Groves, 2011). The casinos and some malls are designed like that idea.

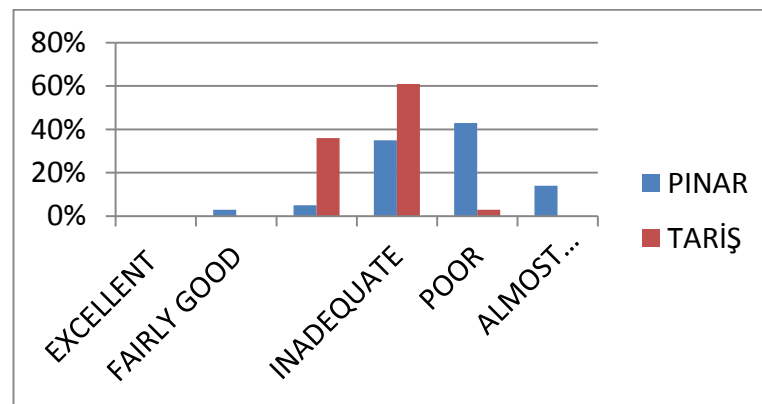
Figure 5.13. Dyson Office Building's in interior view in UK



In these samples there is not an idea for not using daylight. They aimed to locate more people and that's why they have not benefited from the light of day in a quality manner.

In the replies; it is clear that Tariş employees are using daylight 33% more than Pınar therefore the satisfactory regarding the light is more.

Chart 5.5 The daylight questions are replied by Pınar and Tariş Office workers

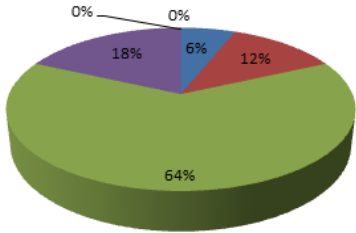
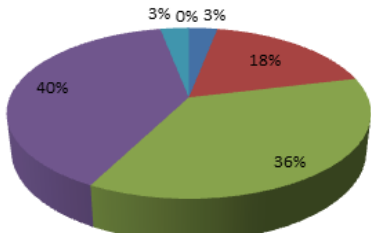
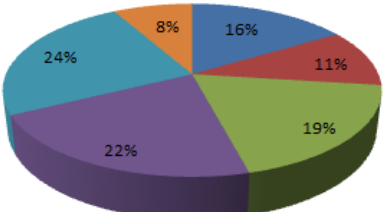
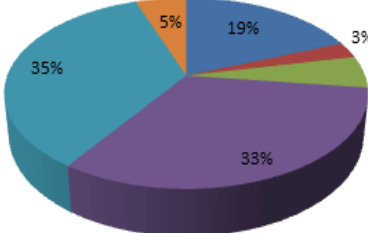


In third hypothesis it is mentioned that in the open offices the problem of “noise” which is caused by talking noise; furniture moving noise, the noise between the office

floors, the noise caused by the outside elements; effects the user’s performance and concentration in a negative way and decreases sufficiency. In both of the sample group it is clear that the precautions are not enough to prevent the noise and/or control it.

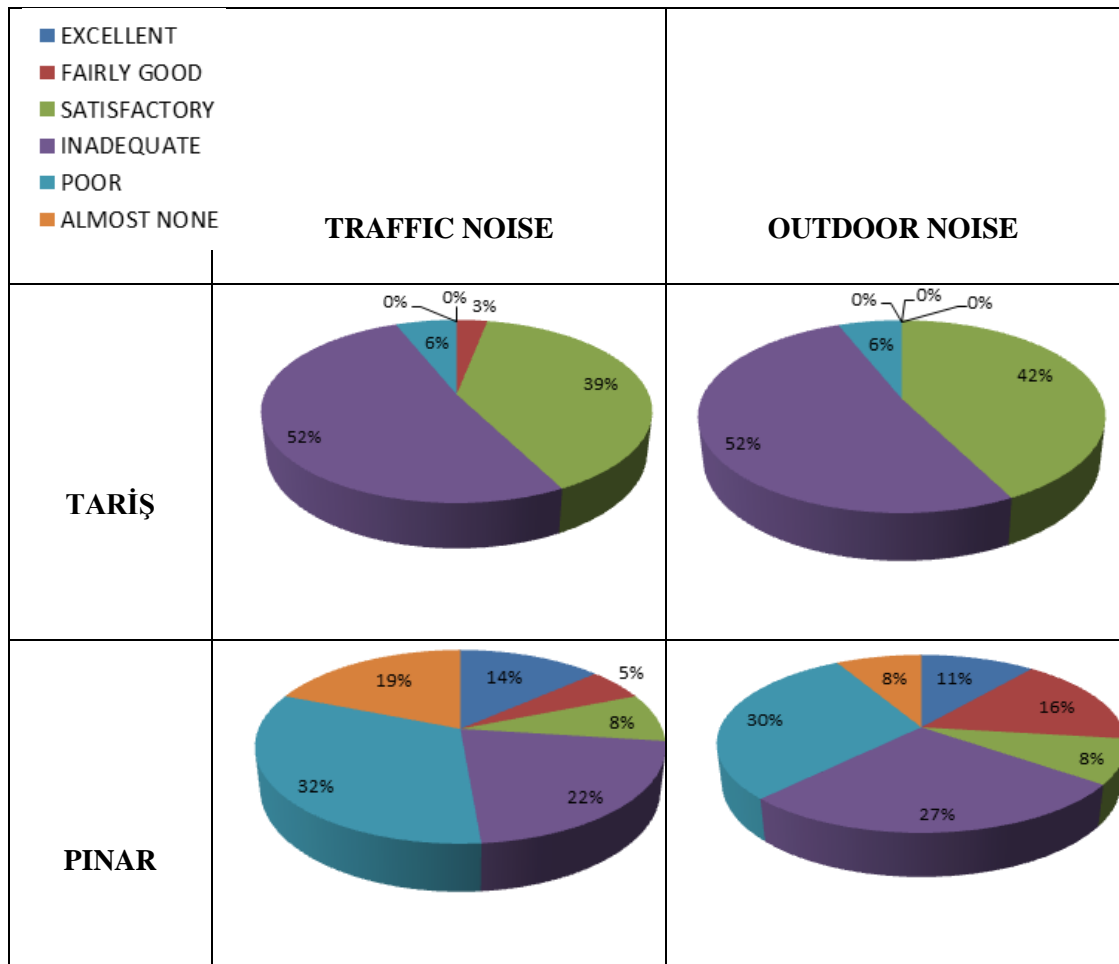
The study mentioned that possible causes noise problems in the offices and what kinds of things to resolve these noise problems in chapter four, sound requirements section.

Table 5.4 The answers about talking noise and furniture noise problem are replied by Pinar and Tariş office workers

<ul style="list-style-type: none"> ■ EXCELLENT ■ FAIRLY GOOD ■ SATISFACTORY ■ INADEQUATE ■ POOR ■ ALMOST NONE 	TALKING NOISE	NOISE OF FURNITURE																												
TARIŞ	 <table border="1" style="display: none;"> <caption>Tariş Talking Noise Data</caption> <tr><th>Category</th><th>Percentage</th></tr> <tr><td>Excellent</td><td>6%</td></tr> <tr><td>Fairly Good</td><td>12%</td></tr> <tr><td>Satisfactory</td><td>64%</td></tr> <tr><td>Inadequate</td><td>18%</td></tr> <tr><td>Poor</td><td>0%</td></tr> <tr><td>Almost None</td><td>0%</td></tr> </table>	Category	Percentage	Excellent	6%	Fairly Good	12%	Satisfactory	64%	Inadequate	18%	Poor	0%	Almost None	0%	 <table border="1" style="display: none;"> <caption>Tariş Noise of Furniture Data</caption> <tr><th>Category</th><th>Percentage</th></tr> <tr><td>Excellent</td><td>3%</td></tr> <tr><td>Fairly Good</td><td>18%</td></tr> <tr><td>Satisfactory</td><td>36%</td></tr> <tr><td>Inadequate</td><td>40%</td></tr> <tr><td>Poor</td><td>0%</td></tr> <tr><td>Almost None</td><td>3%</td></tr> </table>	Category	Percentage	Excellent	3%	Fairly Good	18%	Satisfactory	36%	Inadequate	40%	Poor	0%	Almost None	3%
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47% of Tariş employees are more uncomfortable than Pınar employees about talk noise. Because Tariş has more telephone talking and also Tariş’s ceiling height is lower. These reasons will cause more audio in the inside. Noise of furniture is proportional to the materials used in the office space. In both sample they used mineral wool ceiling. This material can absorb the noise. On the other hand in Tariş the floor is ceramic and it is the part of reason of noise. Pınar is covered vinyl which is absorbed the noise and hygienic material. Also that’s why Tariş employees are more dissatisfactory than Pınar.

Table 5.5 The answers about traffic noise and outdoors noise problem are replied by Pınar and Tariş office workers



Pınar employees are not affecting the traffic and outdoor noise rather than Tariş employees. Because Tariş building is located in Alsancak which is crowded place in İzmir and there is a metro station nearby. Pınar is located in Kemalpaşa and it has just around the factory buildings. So, Tariş employees are %37 is more dissatisfied than Pınar. Both of the samples give right answers because traffic and outdoor noise are directly relationship with the location.

Both of the groups state that the communication is satisfactory between the employees but working area and space of employees to move within are not enough. The storage area and the archive area in Tariş is 27% more satisfactory than Pınar. The storage and archive area are given more space in Tariş because the office organization of Tariş is older than Pınar. There is no need any storage over the years because of the development of technology and computers. Nowadays people's archives are in cd and all the info and documents are kept in the hard discs. Also the study mentioned about history and development office building and interiors in chapter two.

In hypothesis fourth; it is mentioned that the office furniture and space which are designed based on the ergonomic have positive effects on users. The productivity increases when the work environment is convenient in sense of users' health, sitting position and posture. Both of the sample groups mentioned that the office furniture and supply are enough and satisfactory. However Tariş employees state that they suffer from back, neck and shoulder pain during the day. 20% of Pınar employees mention that they also have the same problem. Both of the company used same chairs and desks so they causes same physical discomfort. The study mentioned about the

importance of the using ergonomic furniture and benefits for human healthy in chapter four ergonomics section.

The complaint of Taris employers are 28% less than Pınar employers in sense of physical health. The complaints concerning the general fatigue and lack of sleep are under a certain level however the employers at Pınar’s general feeling is 32%less than Tariş.

Table 5.6 The answers about shoulder pain and backache are replied by Pınar and Tariş Office workers

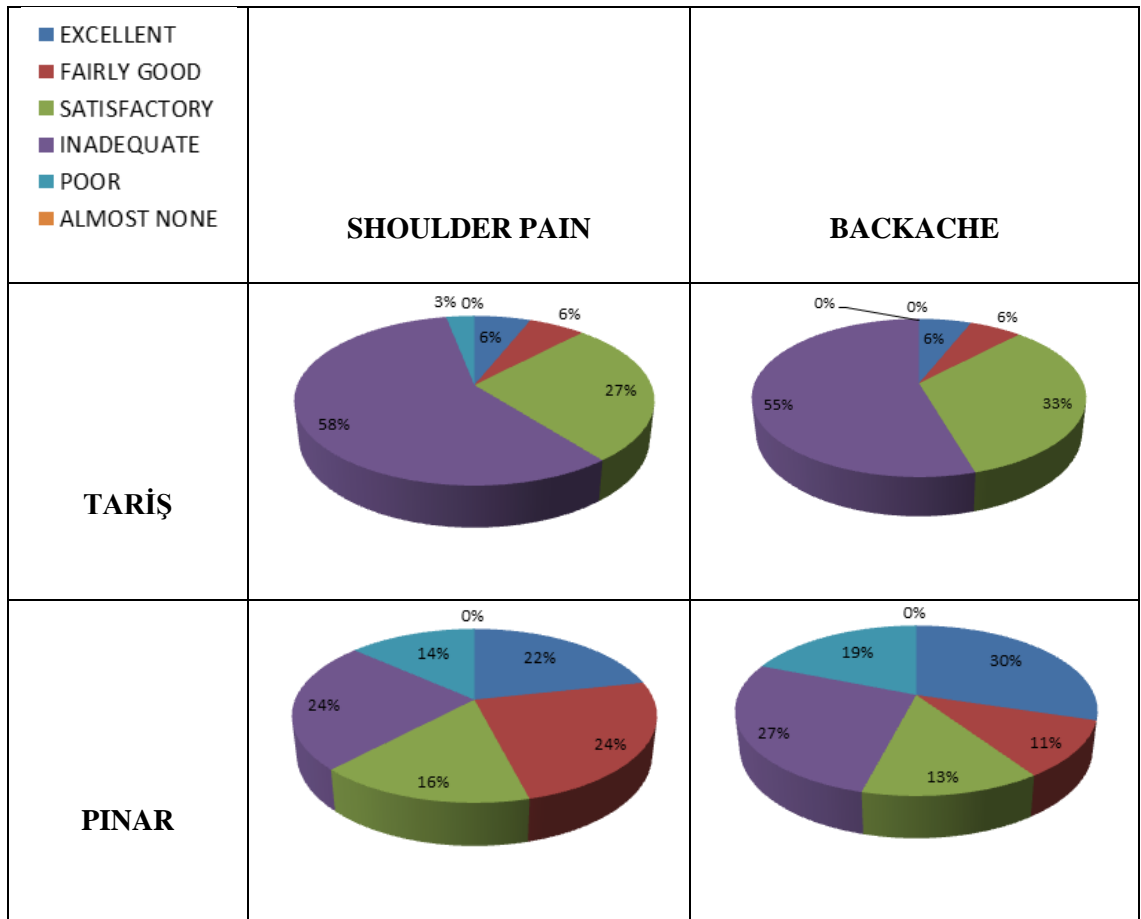
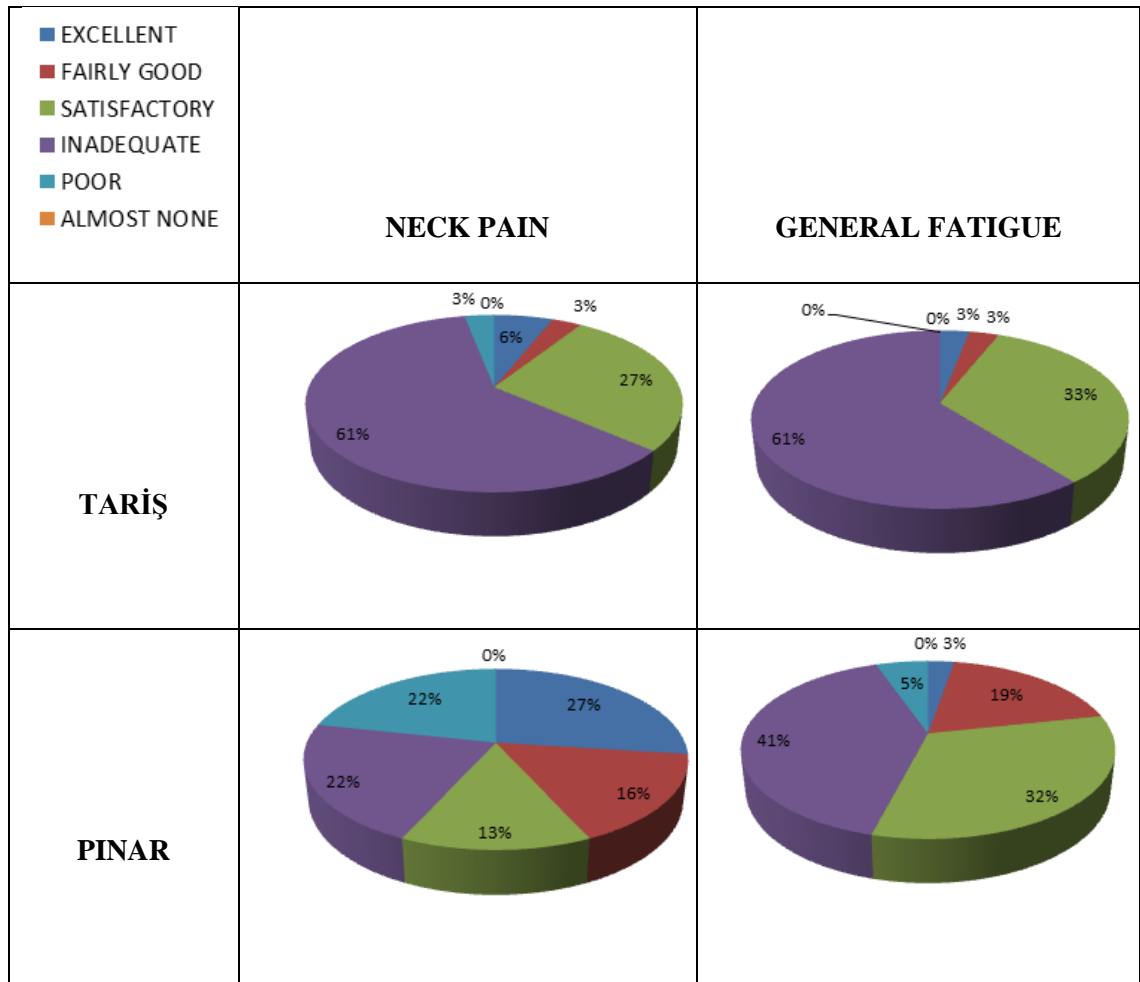


Table 5.6 The answers about neck pain and general fatigue are replied by Pınar and Tariş Office workers



50% of Tariş employees thinks that the interior materials (for ex: ground, ceiling, wall materials) are inadequate. 32% of Pınar employees think that they are satisfied their interior materials. When compared to Tariş; Pınar employees are more satisfied about the accessibility of office Tariş toilets and the resting areas are inadequate. This situation is quite different in Pınar. It is important for the user to easily reach office equipment. For example Google Office in Zurich they can provide to use the equipment easily. They put whiteboards everywhere because they think that ideas can

happen anywhere. They used local task lighting for personal control. Also in Google Office Building there are many bicycles for an efficient mode of transport to fast accessibility (Groves, 2011).

The study is mentioned about accessibility of the material used in office and toilets or resting rooms in chapter four. Google Office Building is bigger than Pınar and Tariş and they put bikes in everywhere for easily transportation. It provides save time, relaxing and accessibility to everywhere.

Figure 5.14. Google Office Building's in interior view in Zurich

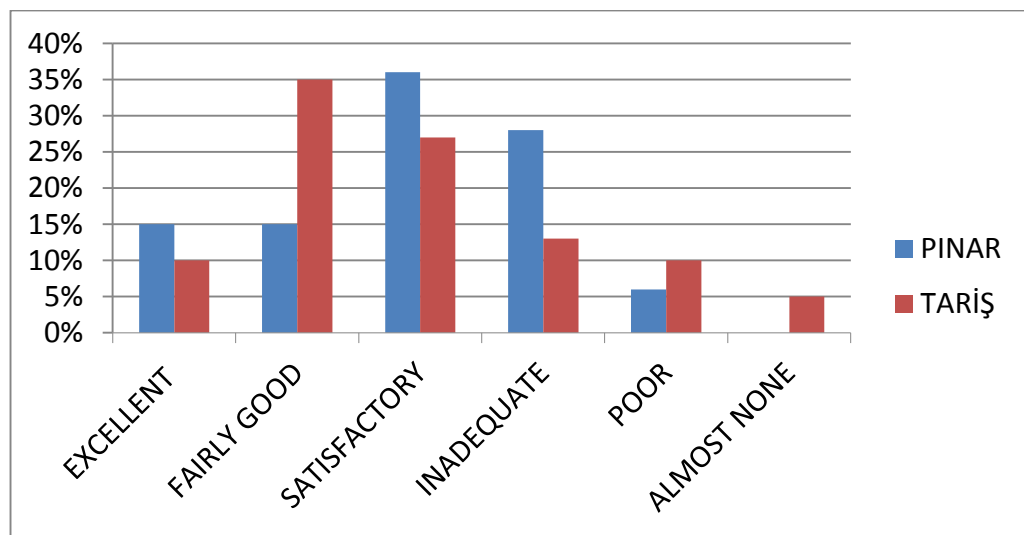


When compared to Tariş employees Pınar employees have 27% more chance to interfere in the comfort conditions (illumination, temperature, ventilation, noise control and etc.) individually.

In hypotheses fifth it is defended that in the open office layout, dividing the organisations by transparent separators might prevent the “noise” issue considerably however; it is against privacy when the users still know that they are still visible and monitored. Neither of the groups is happy with the separators.

The study mentioned about the privacy requirement on chapter four. In an open office organization privacy is always problem for employees. So this study shows that it is hard to provide privacy open office organization.

Chart 5.6 The question about dividers are replied by Tariş Office workers and Pınar Office workers



Pınar’s Office communication is 26% more satisfactory than Tariş. Both of the sample groups are not content with the fire security. However; they are satisfied with their personal and equipment security in the office.

Both samples made an effort to bring a change in routine for better. Pınar pays more attention to what employers think about the work environment. Therefore when compare to Tariş; Pınar employers are more satisfied about their thoughts are taken

into consideration. For both of the sample groups the satisfaction level is either “good enough” or slightly over “good enough”.

The usage of technology and the satisfaction level at Pınar is higher than Tariş.

Tariş’s computers are older than Pınar’s. So Tariş is not following the development of technology. However both of the sample groups think that the education programs on the technological changes are not adequate. The situation of the office environment is satisfactory for both of the sample groups.

5.5. Survey Conclusion

Although in both samples defined their offices similar in a physical term, there are some physical differences of office layout between Pınar and Tariş buildings. The office floor of Pınar has the separators made up of walls and transparent plastics. In the cabin/alcove rooms; there are minimum 4 and maximum 24 people working. They used vinyl on floor; the walls are covered insulated sheathing. Employees have their own table and for the meetings in the middle of the office they put a table for four people. They put some plants and it also shows their office more cute. Tariş office floor is an open office example with its area where 57 people work and is about 1543m². This place is larger than Pınar. The floors are covered ceramic. The office organization is divided by the cabinets and transparent divided into three or four personality groups. Tariş employees have many files compared Pınar and that is showing their offices look more untidy. (Photos in Appendix 3 and 4). These differences might have affected the replies given to the survey questions.

When absorbing the Tariş employee's personal issues; %48 of employees are working there 11 between 15 years. %61 of male, %58 of 31 between 40 years old and %91 of graduated from university. Pınar employees of %43 are working there 4 between 10 years and %55 are male. %45 of Pınar employees are 21 between 30 years old. Also %51 of employees is graduated from university. It shows that Pınar employees are younger than Tariş, Tariş employees have more experiences and they have higher level of education.

Limiting the types of works done in the office interiors is important because it directly affects the interior design. Regarding that the Tariş organization the firms which are domestic or foreign are contact the employees for buying grapes, figs or olives. On the other hand Pınar has to contact the firms, sell and market their products. So that difference affects the activities which are done in office such as meeting, telephone call and preparing a report.

In first hypotheses it was stated that the office users cannot agree on a certain room temperature and the temperature satisfaction changes between gender and age groups.

In the second hypotheses it was stated that the artificial lighting must be activated in addition to the natural lighting when it is not enough. The users work more efficiently and more productive in the office spaces where the natural illumination is in use at its maximum level. In both sample groups; no natural lighting existed. When Tariş employers were unhappy about not using the natural lighting; 33% of Pınar employers were not making this issue a problem. So that hypothesis was approved.

In third hypothesis in the open offices the problem of “noise” which is caused by talking noise; furniture moving noise, the noise between the office floors, the noise caused by the outside elements; effects the user’s performance and concentration in a negative way and decreases sufficiency. Both of the sample groups respond that they are unhappy because of the noise. Moreover Tariş employers were also not happy about their internal office noise which is caused by the telephones, the noise of traffic they have because of the location. Pınar employees are unhappy about the noise between the floors as they have more meetings when compared to Tariş.

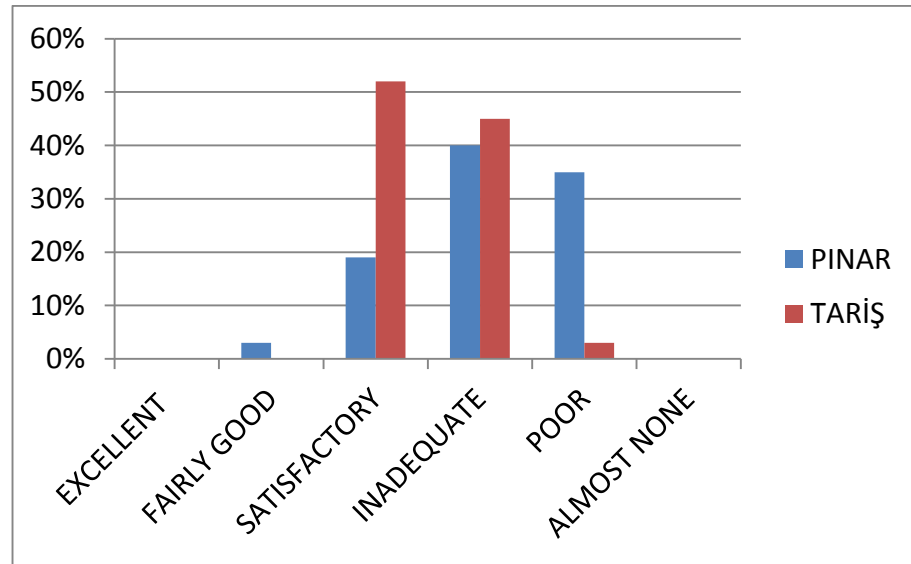
In hypothesis four the office furniture and space which are designed based on the ergonomics have positive effects on users. The productivity increases when the work environment is convenient in sense of user’s health, sitting position and posture. By the responses; it can be said that Tariş employers are suffering from shoulder- back and neck aches. Despite this in both groups used their office the same table and chairs.

In hypothesis five it was stated that the transparent separators makes the employers feel that their privacy is invaded and this office type is affecting their performance in a negative way. Both of the sample groups mentioned that they are unhappy in this working environment and they feel like as if they are monitored all the time and they are irritated by everyone seeing them or they see everyone.

In general; the satisfaction level of Pınar is more than Tariş in sense of both physical and technological matters. The satisfaction level of Tariş employees is at average. By

the replies given; it can be said that both sample groups would like to change their work environment and bring a change in their routine

Chart 5.7 The workers in Tariş and Pınar take a satisfaction from their workplace



When reasoning; the work performance is less than expected. The satisfaction level is not achieved for both physical and psychological sense and the employers suffer from concentration difficulty.

6. CONCLUSION

Based on the technological progressions, the business conditions and capacity; the locations and interior design of offices had changed and evaluated throughout the time.

In the first ages; offices were the work places located in a church or styled as a palace which contained closed rooms. However; when the business capacity, industry evolved offices became quite different places when compared to their first formations. Focusing on “how to improve” the office places, creating new ideas on this and working for this purpose has been a requirement in case of fulfilling the need of work places as the new branches of business.

Determining the needs of office users, creating set up where the individuals will be working most efficiently are the main topics of this study. The main purpose is to categorize the physical and psychological needs of the office users by militating these needs conducting a survey within two different sample groups. Questioning these needs in the survey conclusion named as “satisfied” and “unsatisfied” is the main purpose of this study.

Primarily, the definition of office spaces and the reasons of their formations have been discussed. Following the formation, the historical process of interior office spaces is examined by a literature review. The first office structures in the world and Turkey are discussed and studied in details. Some different types of offices such as traditional open, landscape, regular, joint and etc. are examined and exemplified in the world and Turkey. The psychological and physical needs of office users are

studied in two groups. The psychological needs are divided into three groups which are privacy, behavioural, aesthetic whereas the physical needs are divided into four groups which are spatial, air- conditioning, sound and visual. In chapter fifth acquired and imitated office needs are questioned within a survey conducted in Pınar and Tariş.

The study shows that the office users primarily think the office as a physical place where they can conduct the activities such as writing, using the computers, filing documents, sitting and talk to phone. Secondly; they would like to fulfill their needs of ventilation and illumination and work in a quite environment. They also mention that they would prefer having a control over managing these needs.

However it is obvious that the office users do not have enough care regarding the energy saving, using economically less costly energy which is a physical and psychological need. The people must raise their awareness about the sustainable architecture, indoor ventilation quality, passive energy saving, choosing recycled materials and waste product management. Moreover, the sustainable constructions must increase and example building to this type of construction must rise every day; because office buildings are the places where energy waste is at it is most and many waste products occur.

The office users state that the “privacy” is the most important topic among the psychological needs. They neither want to see their colleagues when working nor to be seen. Although open office structures help the communication to be easier due to

visual and physical contact; it also affected the concentration level to decrease when everyone can hear each other's phone conversation or talking.

The possibility to interrupt the ventilation and illumination of the office makes the office users feel relieved and as they are able to dominate or are dominated they feel themselves more secured.

Having a personal object such as a mug, a photo or a mini toy on their tables makes the office users feel themselves related to their working area.

In this study although the aesthetics are analysed under the physical needs; the office users mention that they feel themselves psychologically relaxing and relieved when the offices are furnished aesthetically. They also mention that they dress more chic and stylish in an office which is decorated more elegant.

Consequently; open office structures help communication between departments to be easier due to the visual and physical contact. And easier communication saves time, it makes spaces to get larger or smaller. Open offices have fewer expenses however the open office employees have lower satisfaction level. As the environmental conditions are not based on individuals but everyone; when one is shivering the other sweats so this creates dissatisfaction. Privacy and confidentiality needs unfulfilled; phones ringing, noise caused by conversations and untidiness of tables irritates the users. Although employees love their jobs; they are not satisfied in open office structures.

6.1. Future Research

How the “offices of future” will be cannot be predicted. In future a physical place might not be needed; the offices might not have an address, web site or a head quarter. Definition of the future offices will certainly change inevitably.

In light of these; this study foresees the office automations in future, develops a new project offer or a new order by protecting the stable factors of the day. Likewise, this study might be used as a reference to offer a new office organisation based on the office users proven complaints and dissatisfactions criteria.

This study can be elaborated by interviewing the people who have permanent seats in the office they work in. For example; the replies will certainly differ when an employee sitting by the door or by the window is interviewed- and that will have a direct effect on the case study.

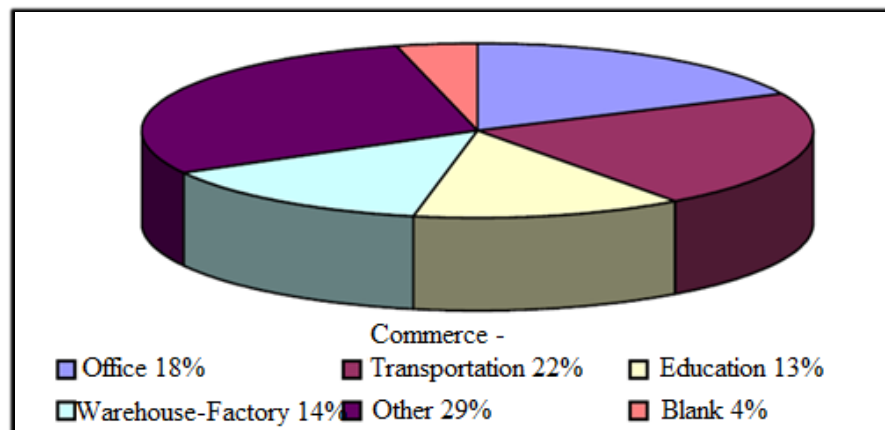
The other idea is for improving that study is the office buildings which are existing structures how can be converted into energy-saving building. It is important because growing urban population is consuming more natural resources, generating more waste, and ultimately disturbing the ecological cycle. Disruption of the natural resource cycle threatens human kind and other living creatures. Given that the construction sector is a heavy consumer of natural resources, sustainable architecture is critical for the future (Sev, Özgen 2003).

Commercial industry is among the highest energy consuming industries. Office buildings used in the industry rank the second in terms of heavy energy use with 18%

(Chart 7.1.) Therefore, assessment of office buildings within the framework of sustainable architecture principles and identification of design measures are very important in terms of applicability of this concept (Enercan, 2004).

Before the energy crisis, a substantial amount of energy was spent in offices to provide comfort. Typically, offices were equipped with a combination of operable windows and conditioning systems, and their energy costs skyrocketed with omission of natural lighting systems and robust heat isolation.

Chart 7.1. Comparison of Different Building Types on basis of their Energy Consumption



Since 1970s, the concept of sustainability has made a must to adopt an ecological approach in buildings and to minimize energy needs. Due to high number of users, office buildings have the highest consumption of energy and resources, and therefore, conservation of energy in these buildings is crucial in terms of implementation of the concept of sustainability. Energy conservation criterion of sustainable architecture requires identifying functions of the building which uses energy and designing such functions in a manner to reduce energy use. This has accelerated the development of

the construction industry and caused emergence of new technologies. With sustainable design, office buildings started to become comfortable places where less mechanical systems are used and comfort is provided with minimum energy (Eşsiz, 2004). When the energy consumption of standard office buildings and sustainable office buildings is compared, it is seen that energy conservation up to 40% is achieved with energy saving measures (Chart 7.2).

Chart 7.2 Annual Energy Consumption in a Standard Office Buildings

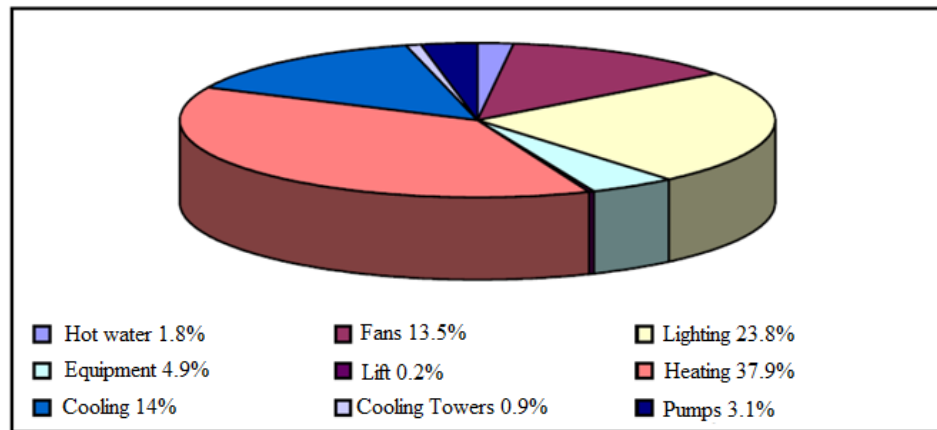
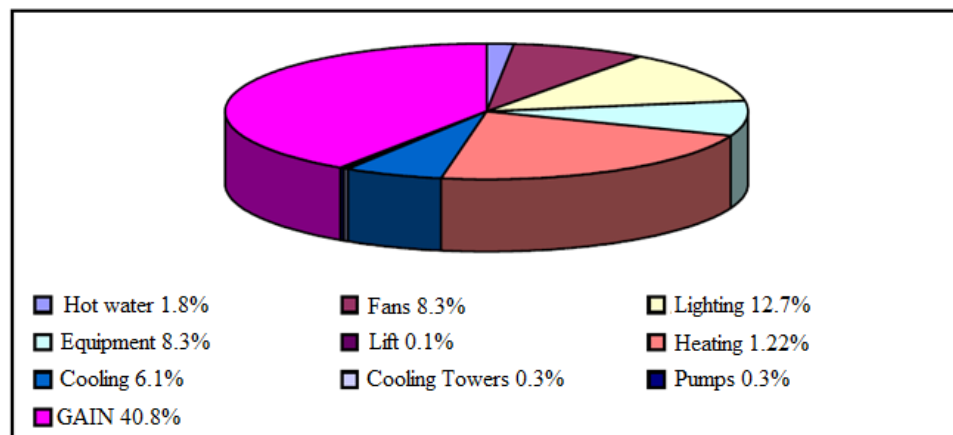


Chart 7.3 Annual Energy Consumption in a Sustainable Office Buildings



Energy spent when constructing a building does not change substantially from one structural solution to another, and it constitutes 5% to 10% of total energy cost. In

fact, energy consumption is higher in office buildings during the utilization stage. Typically, in a standard office building, 25% of electric energy is spent for lighting, 55% for conditioning, and 20% for other purposes (lifts, equipments, etc.). Energy cost has a 34% share in total costs of a high rise office building in a 50-year period. Therefore, within the framework of sustainability concept, making a design which minimizes energy consumption and selecting energy efficient equipment are the most important goals of energy conservation. There are also secondary design measures which contribute to energy conservation including reducing energy spent for transportation by using local materials, reducing energy spent for construction-maintenance-demolition by using a flexible design and durable-recyclable materials. Another important element of energy conservation is the source of energy, as much as efficiency of selected equipments. Therefore, using equipments which consume renewable and clean energy is another design measure that can be implemented (Raman, 2001).

One of the most important measures to reduce energy consumption in office buildings is energy efficiency. Today, energy-efficient intelligent buildings which spread in parallel with advances in technology are designed to use renewable energy resources such as sun and wind and to block them whenever necessary and they are supported with passive systems which reduce the need for mechanical systems. For these reasons in future research this study can be choose an office building and identified the items of energy savings that can be made in. Also making a survey or interviews with the office buildings which are reducing energy is getting more improve that study.

In addition to this study; more surveys about the office order could be performed. Surveys could be performed in different structural offices located both in Turkey and Europe. Hence it can be analysed whether organisation chart and work flow based on different cultures and countries. Therefore sustainability concept could be discussed under a bigger scope such as economic, cultural and social.

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(MASTER THESIS)

**PHYSICAL AND PSYCHOLOGICAL NEEDS OF OFFICE INTERIORS:
CASE STUDY OF TARIS AND PINAR (İZMİR)**

APPENDICIES

Appendix 1: Turkish version of the questionnaire

Appendix 2: English version of the questionnaire

Appendix 3: Images from Tariş Office Building

Appendix 4: Images from Pınar Office Building

Bornava-İZMİR

2014

APPENDIX 1: TURKISH VERSION OF THE QUESTIONNAIRE

1. BÖLÜM

İSİM:

ŞİRKET:

Email:

1) Ne kadar zamandan beri ofis tipi binalarda çalışıyorsunuz?

- 1 yıldan az
- 1 ile 3 yıl
- 4 ile 10 yıl
- 11 ile 15 yıl
- 16 ile 20 yıl
- 21 ile 25 yıl

2) Ne zaman bu özel ofis binasında çalışmaya başladınız?

- 1 yıldan az
- 1 ile 3 yıl
- 4 ile 10 yıl
- 11 ile 15 yıl
- 16 ile 20 yıl
- 21 ile 25 yıl

3) Cinsiyetiniz nedir?

- Bayan
- Bay

4) Yaşınız nedir?

- 21 altı
- 21 ile 30
- 31 ile 40
- 41 ile 50
- 51 ile 60
- 61 ile 65
- 60 üzeri

5) Eğitim düzeyiniz hangi seviyededir?

- Lise mezunu
- İki yıllık üniversite mezunu
- Dört yıllık üniversite (lisans) mezunu
- Yüksek lisans, doktora öğrencisi veya mezunu
- Diğer _____

6) İş yerinizi nasıl tarif edersiniz? (sadece size en yakın olan bir seçeneğini seçiniz.

- sekreterlik
- büro/ofis
- teknik
- profesyonel
- idari/yönetimsel
- diğer _____

7) İş yerinizdeki statünüz nedir?

- kalıcı tam zamanlı
- sürekli yarı zamanlı
- geçici tam zamanlı
- geçici yarı zamanlı
- birden fazla ofis çalışan
- diğer _____

8) Ofisiniz binanın neresinde bulunmaktadır?

- zemin kat
- birinci kat
- ikinci veya beşinci katlar arasında
- beşten yukarıdaki katlarda

9) Genellikle ne tip ofis düzenlerinde çalıştınız?

- sadece açık plan ofisler
- sadece hücresel/kapalı ofisler
- açık planlı ve hücresel/kapalı ofislerin birlikte kullanıldığı karma düzenli
- diğer _____

10) Siz ofisinizin tipini nasıl tanımlarsınız?

- hücresel/kapalı
- bölmeleri olan açık planlı
- bölmeleri olmayan açık planlı
- paylaşılmış oda düzeni
- diğer _____

11) Eğer kapalı düzenli bir ofiste çalışmıyorsanız masanızın mekan içerisinde nerede bulunduğunu tanımlayınız.

- pencerenin yakınında
- ofis kat alanının girişine yakın
- ofis binasının iç merkezine yakın

12) Çalışma alanınız yaklaşık olarak kaç metrekaredir?

- 5 m² 'den daha az
- 6 ile 10 m²
- 11 ile 15 m²
- 16 ile 20 m²
- 20 m² 'den daha fazla

13) Ortalama olarak ofisinizin içinde bir hafta boyunca kaç saatinizi geçiriyorsunuz?

- 10 saatten az
- 10 ile 20 saat
- 21 ile 30 saat
- 31 ile 40 saat
- 40 saatten daha fazla

14) Ofisinizde harcadığınız zamanı aşağıdaki faaliyetlerle ne oranda sınırlandırabilirsiniz?

	Hiçbir zaman	Az	Bazen	Çok fazla
Telefon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rapor hazırlamak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toplantı yapmak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diğer faaliyetler				

ANKET SORULARI

2. BÖLÜM

Bu bölümün cevaplarını 1'den 6'ya kadar numaralandırarak cevaplayınız. Örneğin ofisinizin gün ışığını hiç almıyorsa () içerisine 1 yazınız. Numaraların kategorisi aşağıdaki tabloda belirtilmiştir.

Cevap Kategorisi					
Neredeyse Hiç	Zayıf	Yetersiz	Tatmin Edici	Oldukça İyi	Mükemmel
1	2	3	4	5	6

1) Kış aylarında ofisinizin ısınma ve havalandırma sistemini puanlayınız.

- sıcaklık
- havalandırma
- nem oranı

2) Yaz aylarında ofisinizin ısınma ve havalandırma sistemini puanlayınız.

- sıcaklık
- havalandırma
- nem oranı

3) Çalışma alanınızın etrafındaki ışık kalitesini değerlendiriniz.

- gün ışığı
- yapay aydınlatma
- gün ışığının parlama kontrolü
- yapay aydınlatmanın parlama kontrolü
- ışığın mekana yeterliliği

Cevap Kategorisi					
Neredeyse Hiç	Zayıf	Yetersiz	Tatmin Edici	Oldukça İyi	Mükemmel
1	2	3	4	5	6

4) Ofisinizi akustik ve gürültü kontrolü bakımından değerlendiriniz.

- konuşma gürültüsü için alınan önlemler
- yürüme/ulaşım/kat yoğunluğu gürültüsü için alınan önlemler
- mekan içerisindeki ekipmanların gürültüsünün önlenmesi
- trafik gürültüsü
- dış seslerin gürültü kontrolü

5) Çalışma alanınızı aşağıdaki durumlarla yeterlilik ilişkisini değerlendiriniz.

- çalışma alanınızın boyutları
- hareket alanı
- diğer çalışanlarla iletişim kurabilme
- depolama/arşivleme alanı

6) Ofis mobilyalarının yeterliliğini değerlendiriniz.

- masanızın boyutunu, yüksekliğini, genişliğini, derinliğini
- sandalyenizin boyutunu ve konforunu
- dosya dolabınızın boyutlarını ve adedini
- depolama/arşivleme alanınızı
- estetik açıdan görünüşünü

7) Genel anlamda ofisinizin iç görünüşünü değerlendiriniz.

- zemin kaplamasını
- duvar yüzeyi/kaplaması
- tavan kaplamasını
- mobilya donanımını

8) Ofisinizin aşağıdaki araç/gereçlere ve yerlere olan erişimini değerlendiriniz.

- faks
- telefon
- fotokopi makinesi / scanner
- kafe/içecek alanı /dinlenme alanı
- tuvaletler

9) Aşağıdaki konfor şartlarını bireysel müdahale edebilme oranına göre değerlendiriniz.

- aydınlatma seviyesi
- sıcaklık
- hava hareketi
- gürültü kontrolü

Cevap Kategorisi					
Neredeyse Hiç	Zayıf	Yetersiz	Tatmin Edici	Oldukça İyi	Mükemmel
1	2	3	4	5	6

10) Ofisinizin bireysel mahremiyetiniz oranını nasıl değerlendirirsiniz?

- kapılar
- duvarlar
- bölücüler

11) Ofisinizdeki karşılıklı iletişimin sağlanması hakkında ne düşünüyorsunuz?

- rutin idari konuşmalar
- gayri resmi sosyal görüşmeler

12) Ofisinizi güvenliğinizi ve sağlığınızı açısından değerlendiriniz.

- yangın güvenliği
- yangın çıkışları
- hırsızlık
- ofis içinde bulunmadığınız anlardaki araç/gereç güvenliği
- kişisel güvenliğinizi
- ofis içindeki malzemelerin sağlığınızı açısından güvenilirliği

13) Ofisinizde değişiklik yapma konusunda ne düşünüyorsunuz?

- yeni bir stil oluşturarak değişiklik yapmak
- rutin olanlardan kurtularak daha iyiyi elde etmek
- ofis mekanını mevcut elemanlarla yeniden düzenlemek

14) Yönetimin, ofiste çalışanların tercihlerini dikkate alma konusunda ne düşünüyorsunuz?

- bireysel ofis alanı
- mobilya tipi ve düzenlemesi
- aydınlatmanın düzenlenmesi
- renklerin seçimi

15) İş yerinizin yönetim esnekliği hakkında ne düşünüyorsunuz?

- çalışma saatleri
- işe varış saatleri
- tatiller
- mazeret izni
- doğum izni

16) İş yerinizin teknolojiye ayak uydurması ile ilgili ne düşünüyorsunuz?

- bilgisayar teknolojisi
- elektronik posta ile haberleşebilme
- teknolojik değişiklikler için personelin eğitilmesi

17) Bir bütün olarak iş yerinizdeki doyumunuz nedir?

-

18. ve 19. soruları ařađıdaki cevap kategorisine gre cevaplayınız.

Cevap Kategorisi				
Neredeyse Her Gn	Haftada Birka Defa	Ayda Birka Defa	Bazen	Asla
1	2	3	4	5

18) Hangi sıklıkta ofis ierisindeki alıřmalarınızda fiziksel rahatsızlık hissediyorsunuz?

- bař ađrısı
- gz yorgunluđu
- genel yorgunluk
- omuz ađrısı
- boyun ađrısı
- sırt ađrısı

19) Ofis alıřmalarınızın hangi sıklıkta zihinsel sađlıđınız zerinde etkisi oluřmaktadır?

- mod dřklđ
- uykusuzluk
- genel yorgunluk

20) Verdiđiniz cevaplara ek olarak belirtmek istediđiniz konuları bu blme yazabilirsiniz.

Deđerli katkılarınızdan dolayı teřekkr ederim.

APPENDIX 2: ENGLISH VERSION OF THE QUESTIONNAIRE

SECTION 1

NAME:

COMPANY:

Email:

- 1) How long have you been working in this organization?
 - less than 1 year
 - 1 to 3 years
 - 4 to 10 years
 - 11 to 15 years
 - 16 to 20 years
 - 21 to 25 years

- 2) When did you start working in this particular office building?
 - less than 1 year
 - 1 to 3 years
 - 4 to 10 yeras
 - 11 to 15 years
 - 16 to 20 years
 - 21 to 25 years

- 3) What is your gender?
 - Female
 - Male

- 4) What is your age?
 - under 21 years
 - 21 to 30
 - 31 to 40
 - 41 to 50
 - 51 to 60
 - 61 to 65
 - over 65

- 5) What is the highest level of education attained?
 - Completed secondary level
 - Completed two years further education (post-secondary)
 - Completed three/four years university (under graduate)
 - Post graduate, doctorate or professional degree

Other specify _____

6) How would you describe your work? ((select only one which you think most relates to your work)

- secretarial
- clerical
- technical
- professional
- managerial
- other specify _____

7) What is your work status?

- full time permanent
- part time permanent
- full time temporary
- part time temporary
- working in more than one office
- other specify _____

8) Where is your office located in the building?

- ground floor
- first floor
- second to fifth floor
- above fifth floor

9) What is your work experience with reference to office layout?

- only worked in open plan office
- only worked in cellular plan office
- offices with cellular and open plan
- other specify _____

10) How would you describe the layout of your office?

- cellular
- open plan with partitions
- open plan without partitions
- shared room
- other specify _____

11) If you not cellular/independent then where is your desk located in the open plan?

- near exterior window
- middle of the office space
- near interior core/center of the building

12) What is the approximate size of your office/work space?

- less than 5 sq. m.
- 6 to 10 sq.m.
- 11 to 15 sq.m.
- 16 to 20 sq.m.
- more than 20 sq.m.
- do not know

13) On average approximately how many hours do you spend in your office during a typical week?

- less than 10 hours
- 10 to 20 hours
- 21 to 30 hours
- 31 to 40 hours
- more than 40 hours

14) Approximately what proportion of the time spent in your office is devoted the following activities in a typical week?

	No time	Little	Sometime	A lot more
Telephone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drafting reports/letters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meeting with persons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other activities				

SURVEY QUESTIONS

SECTION 2

Please responses this section questions range from 1 to 6, 6 being excellent, 1 as almost none and 4 as satisfactory or average.

Response Settings					
Almost None	Poor	Inadequate	Satisfactory	Fairly Good	Excellent
1	2	3	4	5	6

1) How do you find the heating and ventilation system in your office during winter?

- temperature
- ventilation
- stickiness in the air

2) How do you find the heating and ventilation system in your office during summer?

- temperature
- ventilation
- stickiness in the air

3) How do you find the quality of light around your desk?

- day light
- artificial light
- control on glare with sunlight
- control on glare with artificial light
- adequacy of light

Response Settings					
Almost None	Poor	Inadequate	Satisfactory	Fairly Good	Excellent
1	2	3	4	5	6

- 4) How do you find the acoustics/noise control in your office?
- talking noise
 - walking noise
 - equipment noise
 - traffic noise
 - external noise
- 5) How do you find your office space in relation to your nature of work?
- size of work space
 - movement area
 - proximity/closeness to other employees
 - storage space
- 6) How do you find the furniture in your office?
- dimensions of table/work surface (high, width, depth)
 - size and comfort of a chair
 - filing cabinet
 - storage space
 - appearance
- 7) How do you find the interior surfaces in your office generally?
- floor finishes
 - wall finishes/covering
 - ceiling treatment
 - furniture
- 8) How do you find the access and location of facilities in your office?
- fax
 - telephone
 - photo copier
 - café/refreshment area
 - toilets
- 9) How do you rate the provision for individual control on?
- lighting level
 - temperature
 - air movement
 - noise control
 - other specify
- 10) How do you rate the provision for individual privacy in your office?
- doors
 - partitions
 - dividers

Response Settings					
Almost None	Poor	Inadequate	Satisfactory	Fairly Good	Excellent
1	2	3	4	5	6

11) How do you feel about provision for interpersonal communication in your office?

- routine official discussions
- formal official discussions
- informal social discussions

12) How do you feel about the health/safety provision in your office?

- fire safety
- fire exits
- security from theft
- personal security after office
- movement/circulation in office
- materials used

13) What do you think about the decision making opportunities in your office?

- introducing change in style and sequence of performing a task
- bringing change in routine for better
- rearranging the office space

14) What do you think about the willingness of management in your office on choice/preference of employees on:

- individual office space
- furniture type and arrangement
- lighting arrangement
- color and texture of furnishing

15) What do you think about the managerial flexibility on:

- no of working hours
- time of arrival and leaving the office
- holidays
- compassionate leave
- maternity leave

16) What do you think about the response of management in your office for the provision of new technology?

- computing technology
- electronic mail
- staff training for new technology

17) All in all what is your current level job satisfaction?

-

Please answer the questions 18 and 19 according to respond to the following categories.

Response Setting				
Almost Daily	Several Times/Week	Several Times/Month	Sometimes	Never
1	2	3	4	5

18) How often do you feel the impact of your office work on your physical well-being?

- headache
- eye strain
- general tiredness
- sore shoulder
- sore neck
- sore back

19) How often do you feel the impact of your office work on your mental well-being?

- general feeling
- sleeplessness
- general tiredness

20) Is there anything else you would like to tell us about your office interior and your/well-being, which is not covered in this questionnaire?

Thank you for your contribution.

APPENDIX 3: IMAGES FROM TARIŞ OFFICE BUILDING



Figure A-B: Interior view of Tariş



Figure C-D: Interior view of Tariş



Figure E: Interior view of Tariş

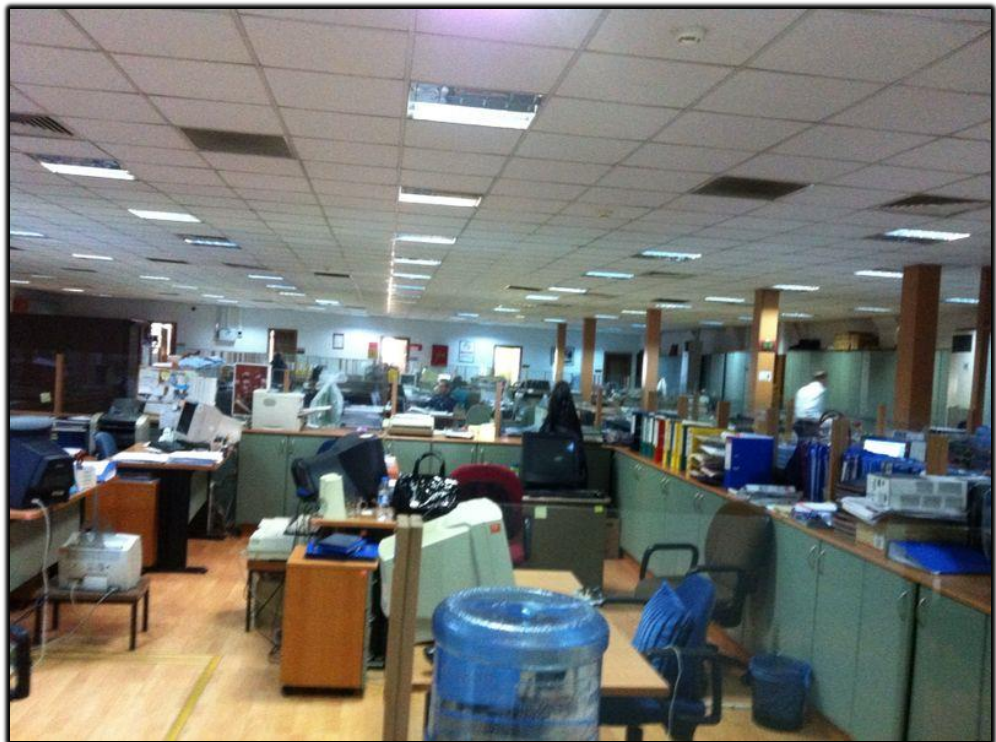


Figure F: Interior view of Tariş

APPENDIX 4: IMAGES FROM PINAR OFFICE BUILDING



Figure A-B: Interior view of Pinar

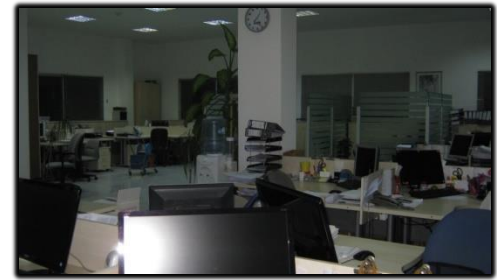


Figure C-D: Interior view of Pinar



Figure E-F: Interior view of Pinar