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ANALYSES ON VISUAL COMFORT CONDITIONS OF PASSENGER SERVICE OFFICERS' RESTING AREAS AT AIRPORT BUILDINGS

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ANALYSES ON VISUAL COMFORT CONDITIONS OF PASSANGER SERVICE OFFICERS' RESTING AREA AT AIRPORT BUILDINGS

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ACCEPTANCE AND APPROVAL

This work entitled **ANALYSES ON VISUAL COMFORT CONDITIONS OF PASSENGER SERVICE OFFICERS' RESTING AREAS AT AIRPORT BUILDINGS** prepared by **SEVİLAY GÖKTAŞ** has been judged to be successful at the defense exam on **22 June 2022** and accepted by our jury as **MASTER'S THESIS**.

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DECLARATION ON RESEARCH ETHICS AND PUBLISHING METHODS

I, SEVİLAY GÖKTAŞ;

- This Master's Thesis is my own original work and that due references have been appropriately provided on all supporting literature and sources;
- This master's Thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution.
- I have followed "Kadir Has University Academic Ethics Principles" prepared in accordance with "The Council of Higher Ethical Conduct Principles".

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SEVİLAY GÖKTAŞ

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22.06.2022

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"If you can't fly, then run; if you can't run, then walk; if you can't walk, then crawl, but whetever you do, you have to keep moving forward." Martin Luther King

I guess I gave my best effort during the thesis period. Everyone has a purpose in life and everyone was sent to earth for a purpose. I think one of my goals in life is to touch people's lives at some point and make that happen through design

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Sevilay Göktaş

Interior Architect

ANALYSES ON VISUAL COMFORT CONDITIONS OF PASSENGER SERVICE OFFICERS' RESTING AREAS AT AIRPORT BUILDINGS

ABSTRACT

This thesis focuses on the "passenger service/ground service officer" personnel who make best operational effort in the airport sector. They spend most of the day working in shifts at the airport. During this period, the break room provided by the company to which they are affiliated can be defined as the area where daily activities, socialization and rest actions are performed. Within the scope of thesis, discusses the visual comfort parameters of the floor service officers' break offices. The impact of this parameter on performance, employee productivity, on people's health has been investigated. The main focus of the work was an airport in İstanbul. Three different ground service companies participated in the study. As a research method, a survey study was conducted with 25 randomly selected people from each company and a total of 75 participants. Survey results show that, there are differences that can be measured in terms of both performance and efficiency between the employees of the office that does not receive any daylight and the office employees that are homogeneously illuminated. Analyses and assessments of the results of the survey are likely to contribute to the future, both socially and economically. Improving the existing offices of employees and creating new offices are critical for the employees to be in appropriate conditions of visual comfort, while the company empowers its employees and affects their competitive position in the sector.

Keywords: Ground Handling Passanger, Visual Comfort Parameters, Resting(Break) Room, Airport Design

HAVAALANI BİNALARINDA YOLCU HİZMETİ MEMURU DİNLENME OFİSLERİNİN GÖRSEL KONFOR KOŞULLARI ÜZERİNE BİR İNCELEME

ÖZET

Bu tez havaalanı sektöründe operasyonel anlamda işleyişin en iyi şekilde olmasını sağlayan *"yolcu hizmeti /yer hizmeti memuru*" personeli üzerine odaklanmıştır. Günün büyük bir bölümünü havaalanında vardiyalı bir şekilde çalışarak geçirirler. Bu süre içerisinde bağlı bulundukları şirket tarafından sağlanan dinlenme odası (break room); günlük aktiviteler, sosyalleşme ve dinlenme eylemlerinin yapıldığı alan olarak tanımlanabilir. Bu tez kapsamında ile yer hizmeti memurlarının dinlenme ofislerinin görsel konfor parametreleri ele alınmıştır. Bu parametrenin çalışanların verimlerine, performanslarına ve kişiler üzerindeki sağlık durumuna etkisi araştırılmıştır. Çalışmanın ana merkezi olarak İstanbulda bulunan bir havaalanı ele alınmıştır. Çalışmaya üç farklı yer hizmeti firması katılmıştır. Araştırma yöntemi olarak her firmadan rastgele seçilen 25 kişi ile, toplam olarak 75 katılımcı bir anket çalışması gerçekleştirilmiştir. Anket sonuçları göstermektedir ki, hiç gün ışığı almayan ofisin çalışanları ile homojen şekilde aydınlatılmış ofis çalışanları arasında hem performans ve verim olarak ölçülebilen farklar bulunmaktadır. Elde edilen anket sonuçlarının analiz ve değerlendirmesinin hem sosyal hem de ekonomik olarak geleceğe yönelik katkı sağlayacağı düşünülmektedir. Çalışanların mevcut ofislerinin iyileştirilmesi ve yeni tasarlanacak ofislerin, uygun görsel konfor koşullarında olması çalışan için önem taşırken, şirketin de çalışanlarına önem vermesi sektör içerisindeki rekabet durumunu etkileyecektir.

Anahtar Sözcükler: Yolcu Hizmeti Memuru, Görsel Konfor, Dinlenme Ofisi, Havaalanı Tasarımı

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LIST OF ABBREVIATIONS

ACRP: Airport Cooperative Research Programme

AMP : Airport Master Plan

CCHOS: Canadian Centre for Occupational Health and Safety

CRI: Color Rendering Index

DGCA: Directorate General Of Civil Aviation

FAA: Federal Aviation Administration

GSA : Ground Services Agent

IATA: International Air Transport Association

ILO: International Labour Organization

1.INTRODUCTION

By moving from the past to the present, people's desire to save more time and to get where they want to go more quickly has made airline travel a more important transportation means for people. Meeting increasing demand, a safe, quality, and trouble-free operation is manned not only by technological advances, but by manpower as well. In this case, the aviation industry is increasing the workload on employees. Increased workload causes health problems for people, both physically and mentally. Dede says that the work of ground service officers in his dissertation can lead to serious fatal accidents for employees, even if it is of little danger (Dede, 2020). This is always a good point of view for employees that the opportunities and conditions should be created. An employee's satisfaction needs to be in the form of protecting his health, as well as the rights that are afforded to him or her.

For employees who work in shifts and spend most of the day at the airport, the act of rest is a crucial necessity. There are break offices where they can take care of rest, eat, socialize and many other human needs. Given that a single space has multiple functions, and a space that satisfies the needs of individuals, the competence of the physical space and the visual comfort inside is essential. The quality of this action is as important as the lighting of the physical space when people spend time in the resting area.

Lighting elements used in venues should be of the same size as the space, the type of work performed, the colour of the lighting element and the size of the user. Otherwise, illumination has significant effects on individuals, both psychologically and physically. These are both visible and invisible effects that are involved in human life. Both problems can have adverse effects not only on one's personal life, but also on their work life. Working in closed office environments, especially day after day, has become more likely to trigger health problems for individuals. The illumination that is not positioned correctly and has no suitable properties causes visual comfort to be disturbed for employees.

The service was introduced thesis at the airport and was mentioned in service buildings. The work order in aviation was then discussed by talking about circadian rhythm and other physical/spiritual issues that illumination in offices creates on individuals. In the final part of the study, the study analyzed various resting and office environments. In the results of the analyses, the findings and results of how and to what extent the visual comfort parameters affect the employees' work performance, productivity and their health are included. For those who spend most of their lives at the airport, the comfort of their space is a significant factor in making their work better, so the design of existing offices has been evaluated as ergonomic and physical fitness. Thus, the positive results it will create and the advantages it will provide for the future are listed.

2.AIRPORT BUILDINGS' SERVICES AND BUILDING PROGRAMME

Airports have a more complex structure compared to other building types of buildings. The main goal in aviation is to provide passengers with a safe and comfortable flight. In this context, airport design also affects this situation. One of the main expectations of airport design is to provide passengers with a comfortable transition from one point to another more comfortably. Building aesthetics is also momentous in this area. For many airports, it will have a positive impact on the airport's level of service if passengers conduct their transactions routinely and do not experience services interruptions. In this part of the thesis, information is given about the building at the airports and the which are used by systems of these buildings. In addition, service types will be explained together with their location. Public spaces such as seating and waiting area, restroom and circulation area passanger services' office locations, sizes and interior plan types will be explained.

2.1 Service Types At Airport Buildings

According to Baysal; airport terminal buildings are the center of airports and there are many functional spaces within these areas (Baysal, 2012). At airports, passengers not only take flights but also spend time in this area. It is aimed that passengers spend more time at the airport during their arrival and departure by providing different service areas within the premises. Service areas in airports include areas such as ticketing offices, circulation areas, waiting rooms, and stores.

The main purpose of these areas in airports is to show passengers what they expect to see. Typically, these are areas provide food service, shopping, retail and food. IATA has mandated that the location of these areas in the airport's spatial network must be designed to maximize their visibility to passengers and visitors. These areas are also referred to "privileged areas" by IATA and typically they are grouped under six main headings (SHGM, 2009).

- Duty Free.
- Special Products, Bonden Retail
- Daily Need Retail
- Food & Beverage.
- Services
- Advertisements

The breakdown of these six heading is given in Table 1, airports should have wet areas available to visitors, passengers, and staff. They should be planned considering strategy and traffic (Baysal, 2012).

The number capacity and variety of these areas within the airports are evaluated according to some criteria that the airport has. Criteria such as general passenger flow, flow within the terminal, and the size of the airport help determine the number of service areas.

Services	**Special Products Retail**	**Food& Beverage**	**Advertisment**	**Daily Need**	**Duty Free**
Banks, ATM's	Souvenir	Coffe bars/Snack Shop	Wall Ads	News Paper	
Exchange Office*	Wearing/ Shoes	Coctail Lounge/ Restaurants	Demonstration		
Luggage wrapping, storage*	Books	Cafeteria	Event Areas		
Medical Services*	Wine Liquor (bonded)	Food Courts	Advertisment		
Communal CIP Lounge	Greeting Card				
General/ Toursim Information					

Table 1: The Services Places At Airport

2.1.1 The location of service areas

There is a relationship between physically spaces and passenger circulation processes at airports. Baggage claim is located for arriving passengers, duty free stores are planned on the international side and departure from the airport. For departing passengers, the process continues with the use of the parking lot, access to the terminal via the ramp or elevator, baggage/ticket handling, security passes, and use of the service areas up to the boarding gate.

The area where all of these transactions occur is referred to as the "passenger terminal building." According to the Airport and Airway Development Act as terminal building is defined as follows: "Terminal areas include all areas outside the aircraft movement area. This definition includes areas where passenger and baggage transactions are conducted, areas where baggage is loaded and unloaded, cargo buildings, maintenance centers, and vehicle/aircraft parking areas" (Küçükönal, 2001).

The design of terminal buildings affects both the operation of service areas and the number of flights. Terminal buildings are planned two main components at airports. Land side and Air side.

The airside consists of the runway, apron and taxiways. In other words, it is the area where passengers stay for the flight. The landside is the point where the passenger performs the flight operations, such as passenger and baggage transactions, ticket sales, cargo operations. Generally, the airport consists of these two components and the service areas surrounding them (Tunç, 2003).

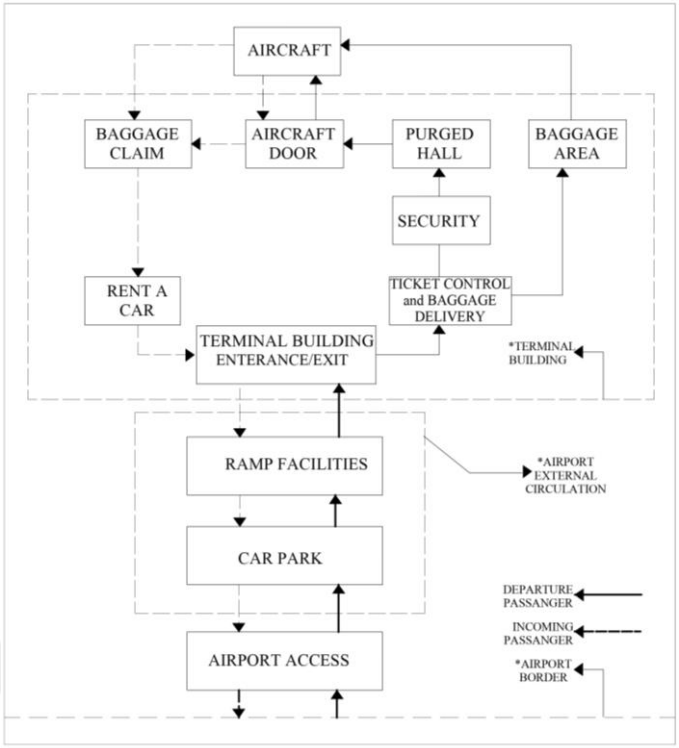

Figure 1: Relationship Between Airport Activities And Physical Facilities (Tunç, 2003)

Figure 1 shows that general circulation areas of airports and facilities. The location of various service areas at airports is primarily designed based on passenger flow. However, the location of venues in the area should be such that they do not generate passenger traffic and allow passengers to spend extended periods of time there. Before going to the gate where the aircraft is located, the majority have places where people can shop and eat and drink. This helps people reduce their flight stress.

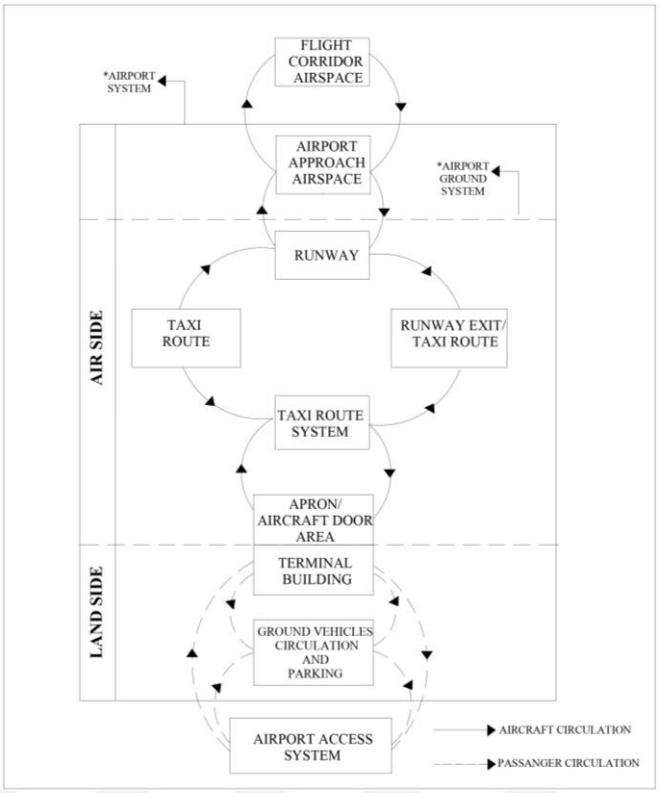

Figure 2: The Part Of Airport System (Tunç, 2003)

The spaces on the "landside" should constitute 20-30% of the general spaces at the airport. The goal is to get the passenger to the air side as quickly as possible. The "airside" should have 70-80% of the seats, again following IATA recommendations. The areas that accompany both international and domestic passengers should be comfortable for sitting, eating and shopping.

Figure 3: Departure Services Area From Mjas (Mjas Airport)

2.2 Building Programmes At Airport Buildings

Airport planning and design is a very complex task. When planning an airport, a system should be chosen that covers the needed areas such as aircraft, passengers and cargo, while keeping a low budget but also ensuring the comfort of personnel and passengers. For airports that are complex and contain many different units, each unit should be considered separately and designed in the best possible way. Different units and services shall be in connetion with each other by considering their functional. Depending on whether the number of passengers increases or decreases over time, the spaces should be designed to stretch and flexible.

The design of the airport takes into account the situation of the society and the region. At the same time, the design should be done considering the future time, the density of the region and the continuous growth of the society. It is expected to be prepared for the developments in the aviation sector with the Master Plan. Master Plan Concept: it is the process of making each unit as efficient as possible by evaluating it in the best way. It is a plan in which many areas such as the runway, apron, taxiway, passenger buildings and

cargo areas of the airport are designed in a harmonious and balanced way. A well-designed master plan "provides the most efficient framework with flexibility, expansion opportunities, and optimal balance of all individual airport facilities/services to provide the required capacity for aircraft, passengers, cargo, and vehicle movements with maximum facilitation for passengers, operators, and staff at the lowest capital and operating costs and maximum revenue" (SCAA, 2018).

As mentioned in Section 2.1.1, airport structures are basically divided into the following specific parts: the landside, the airside, and the terminal building in general. The landside is; open to all passengers and the general public. The terminal area is; the general definition for the entire airport building and the airside is; the area that only passengers can enter.

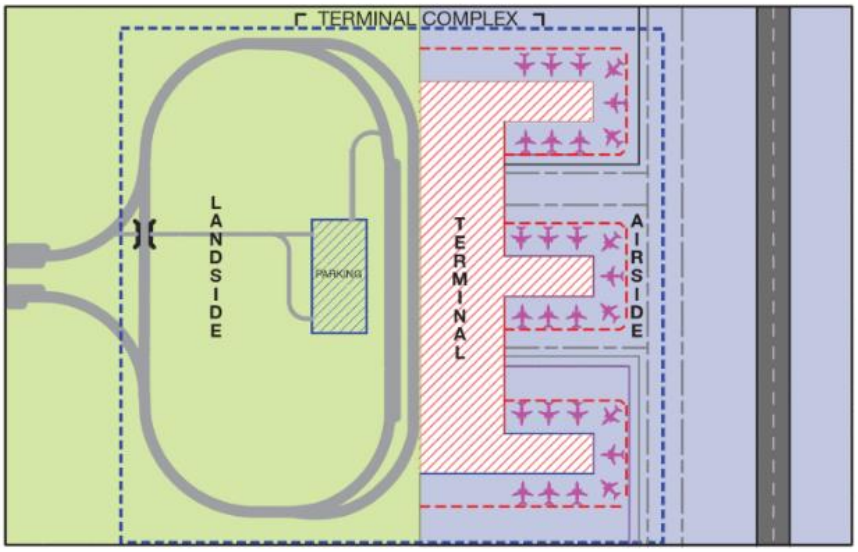

Figure 4: Terminal Building Complex (Laundrum& Brown) (ACRP,2010)

2.2.1 Landside terminal area

According to the Directorate General Of Civil Aviation's Aviation Planning Guide, landside is "the term used to the part of an airport that starts from the point where passenger loading vehicles meet the passenger building, extends through and includes the passenger buildings and cargo facilities, and reaches the ground transportation system by being added to that area" (SHGM, 1987). The Collins dictionary defines it as "the part of an airport furthest from the aircraft and at the boundary of which is the

security check, customs, passport control, etc." (Collins Dictionary). In addition, Tunç says that the landside "...is a facility where passenger baggage and cargo handling, parking, and internal circulation areas, that is, operations of the passenger ground handling, take place" (Tunç, 2003).

It accommodates all the various activities of an airport, with and without landside flight operations. It includes the boundaries of areas such as airport management offices, cargo companies, official companies, airline companies and ground handling companies. Access to the land side is easier than the air side. A good landside is the gateway to the world for a tourist. Therefore, it can be said that the public spaces, service areas and ambiance make the airport design better. The facilities on the landside are generally as follows ;

- Cargo building
- Passanger Terminal Building
- Commercial Vehicle/Transit Staging Areas
- Curbfront Pedestrian Facilities
- Access to the airport

They can be grouped under general headings. Compared to airside, this is the priority level of these facilities for more airport access and passenger flight operations.

Figure 5: Istanbul Airport Land Side Terminal Area (Author Archive)

2.2.2 Terminal building area

"Passenger terminals are one of the basic facilities and services at the airports, and one of the most important parts of the infrastructure required to operate the airports regularly, also they play a vital role in the local and global economies and provide clear social benefits" (Hussain and Ramdan, 2020). According to Durgun, terminal buildings are multifunctional structures where passengers and cargo are transported to different destinations. For the people who use the airport, these buildings serve as gateways to the city or the country (Durgun, 2014).

Each unit is designed separately according to the rush of domestic and international passengers. Structures that maintain their flexibility should respond to areas that need to be changed with the lowest cost. Airport terminals are not designed with a single type and concept. It has three different types and concepts: *capacity/size, horizontal* and *vertical distribution*. Airport terminal buildings design is based on these three titles. These three concepts and types are essential components of airport designs. These three points used when designing the airport are planned according to location, number of passengers and flight status.

- Capacity/ Size: In the main setup of the design, passenger carrying capacity is classified by numerical data, including passenger volume, places that will serve that volume, and additional services.
- Horizontal/ Vertical Distribution: Regarding spatial organization, horizontal concepts are more concerned with air-landside separations and transitions, such as the terminal-apron relationship, while vertical concepts vary according to arrival and departure procedures (Yalçın, 2017).

Passengers passing through the terminal buildings pass through the flow, airport access, check-in and baggage procedures, passport control for international flights and security control for domestic flights and reach the boarding gate. Both passengers are transferred to the aircraft after passing the final ticket control. Arriving passengers for international flights, must pass through passport and customs control and then collect their baggage; on domestic flights, they go directly to baggage claim. For this reason, terminal

buildings should have separate areas for arrivals and departures and be individually designed. Terminal buildings are formed by combining many functional spaces in airports. There are many areas, such as pre-flight eating and drinking areas, apron doors used to reach the aircraft, airline shuttle service offices.

There are also service areas such as airline ticketing offices, circulation areas, baggage areas for arriving and departing passengers, restaurants, cafeterias, and ground handling offices.

Some areas within the terminal structures can be listed as follows;

- Airline Officess
- Sales Ticket Offices
- Passanger Check-in Proccess/ Baggage Proccess
- Elements to Provide Convenience to the Passenger
- Security Units
- Public Spaces

All spaces combine to form a terminal building. Therefore, each of them should be evaluated in its own way during planning and designed to meet needs and be open to future change.

2.2.3 Airside terminal area

All operations such as the approach, landing and takeoff of aircraft, the unloading and loading of passengers on the apron, and the parking of aircraft on the apron, which consists of the airspace, runway, taxiway and aprons for various purposes, take place on the airside (Tunç, 2003).

The airside terminal area it is the side where the whole operation process of the aircraft takes place. It is the area where passengers circulate from passport control and security control until they reach the aircraft. Airside is an area that is more important than landside in terms of security. Since there is more operational work on the landside, the number of employees and passengers in the structures in this area is quite high. Apart

from the operational areas, the areas where passengers can carry out activities such as shopping, eating and sleeping on the airside are mainly located on this side.

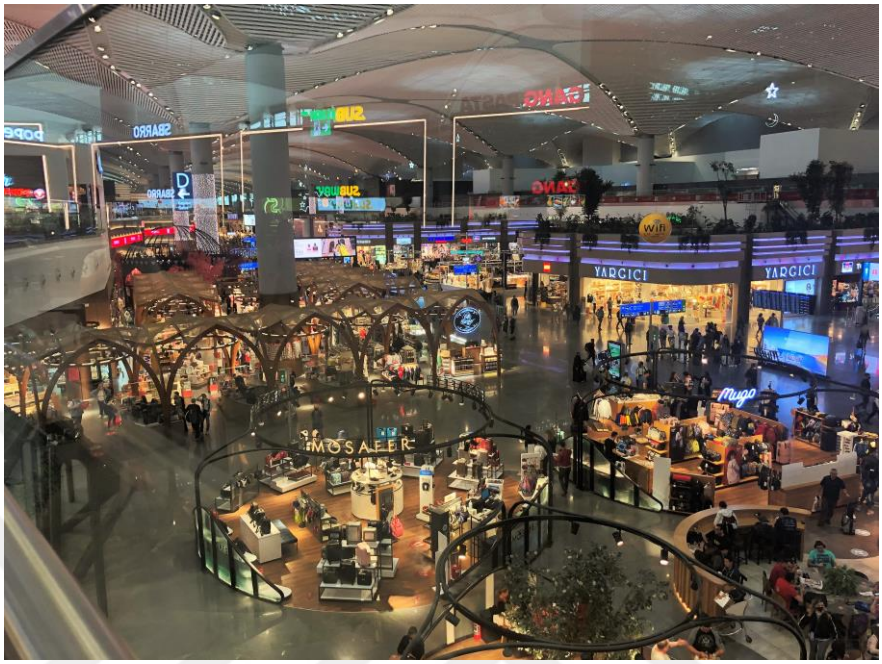

Figure 6: Istanbul Airport Airside Terminal Area (Author Archive)

2.3 Public Space At Airport

Airports are public spaces where passangers and staff meet. The activities in terminal buildings are considered the landside represents “public space.” Where seating and waiting areas, restrooms, and circulation areas are located. Everyone in the airport can use these areas. However, the public areas on the landside are only used by passengers and employees who want to say goodbye or get information about the flight detail. The air side is more semiprivate and is only used by passengers and staffs. For this reason, the landside is more open to public use compared to the airside. The density of public spaces is based on the peak hour of passengers. Public spaces generally exist everywhere, both airside and landside. However, the number of venues varies depending on the number of passengers and traffic.

2.3.1 Seating and waiting area

The seating and waiting areas are evolving day by day. A 15% seating area is for people who want to visit passengers before 2001 (ACRP, 2010). Nowadays, there are areas where passengers can sit before passing through passport and security control, along with the people they want to see them off. During the passenger reception, those waiting to board usually greet passengers while standing. They are located on both the landside and airside of the terminal building.

Landside waiting areas are usually waiting areas near the ticket lobby, baggage claim areas, and concessions. Airside seating and waiting areas are usually located in the areas where aircraft are located, near the boarding area, or in the food and beverage areas. Lounge areas in the airport are also included in the seating and waiting areas.The furniture used in lounges is more ergonomic, aesthetically pleasing and makes passengers feel particularly comfortable.The furniture in the public areas can vary diverse. The furniture near the flight doors is simpler and plain in design. Apart from this area, there are also different types of furniture in the waiting and seating areas.

Figure 7&8: Seating and waiting area at Airport (Author Archive)

Both images above are on the land side of the terminal building. The seating area in Figure 7 is right next to the counter area. Next to the counter areas are waiting areas for passengers and their families, one after the other. The seating area in Figure 8 is located near the transit area for passengers on domestic flights. In the middle area and on the upper floor, there are dining areas where passengers can have something to eat and drink before the arrival of the aircraft. Since it is near the check-in area and the door, it is designed to handle passengers' transactions and lead them directly to the door.

2.3.2 Restroom

Airport terminal restrooms are used by all passangers. They shall easily be accessible shall be clean. Due to the fact that, design, physical properties and location of restrooms should be good designed. In line with technology, sustainable touchless devices (hygiene conditions shall be satisfied...) and doors, will be attractive to people. The design of the restrooms will be created according to certain criteria. "Restrooms should be sized for the users of the building according to the regulations applicable to each region, country, etc. The size of the place is 139 m^2 for 500 passangers in the peak hour (incoming and outgoing) and can vary up to 167 m^2. The restrooms to be placed inside

the airport are usually located at many disparate points such as arriving and departing passengers, flight gates and transit area intersections. The landside and airside restrooms are designed according to the airport's master plan. According to the Airport Cooperative Research Program. "To meet the projected passenger demand requirements, airport restroom sizes are typically calculated based on the portion of the terminal they serve. Airside, concourse, or secure (postsecurity) restrooms are calculated based on aircraft seat capacity. Landside, terminal, or nonsecure (pre-security) restrooms are based on passenger peak hours and their expected visitors" (ACRP, 2010).

The restrooms on both sides can be used by both passengers and airport personnel, but the restrooms on the land side are used by both. In addition, they can also be used by those who come to visit passengers. As for the airside restrooms, observations have shown that passengers use the restrooms after disembarking from the aircraft. Another observation is that passengers use the first restroom for baggage claim.

"Landside restrooms are usually located in areas such as the luggage area, ticket sales and concession areas. Restroom occupancy calculations are based on total rush hour O&D passengers" (ACRP, 2010).

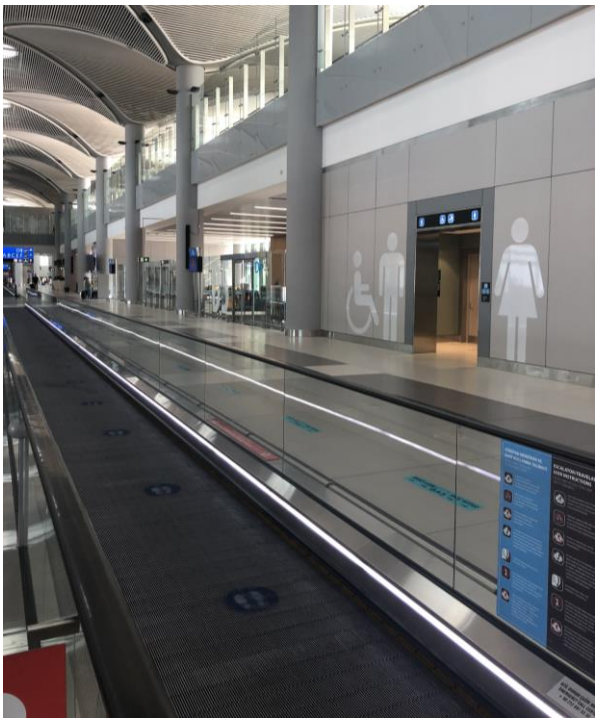

Figure 9: The restroom near to gate zone and walking area (Author Archive)

When designing restrooms for women and men, women are provided with 25-50 percent more space than men because women also use their restrooms with their children. When designing an airport restroom, this should be done within a standard. In this way, the design and construction phase will be better organized, while the maintenance time will be more efficient. Some of the criteria that should be considered in the design.

- Prototypical layouts
- Products
- Finishes and colors

These 3 elements should be considered and updated every 5 years. Designs need to include not only men's and women's restrooms, but also unisex restrooms, restrooms for elderly passengers, disabled, and family members (baby with mother).

Figure 10: Sign of restrooms and other examples of restroom types (Author Archive)

2.3.3 Circulation area

The uninterrupted circulation during the arrival and departure, the greeting and the flight operations of the passengers in the terminal buildings ensures the continuity of the traffic flow inside. Given the design principles of this area, it should be accessible to passengers arriving through the entrance gates with an unobstructed view of the passenger reception area and can easily determine where to go for reception operations. Ideally, this field of view extends beyond the passenger reception area so that passengers can see their final departure location and/or aircraft (SHGM, 2009). The dimensions of the circulation area are approximately 20 to 30% of the terminal

area, depending on the layout, location of facilities, and dimensions (Arusoğlu, 2010). For pedestrians, simplified direct flow for passengers and visitors is a primary goal in terminal design. For instance, paths should not be too long for passengers to carry their luggage. Also, privileged areas should be placed in the main circulation areas (FAA, 1980).

2.4 Passanger Service Officer/Ground Handling

The concept of Ground Handling at Airports covers all the services that an aircraft receives on the ground, from landing to take off. It includes passenger traffic services in the terminal for passenger aircraft that will fly, palletizing operations in the warehouse for cargo aircraft, loading, unloading, catering and technical services for passenger aircraft that have landed and are preparing for flight (Eski, 2018). Ground handling is very crucial in terms of airline, customer satisfaction and flight safety because ground handling companies ensure that all operational transactions related to aircraft and passengers are carried out. Ground services are divided into many sub-headings and each of them includes separate service areas. "Passenger Services" is one of them.
In Turkey, 3 large ground handling companies provide service to airlines.

Passenger Services include services which are provided to the aircraft and passengers during the period from the landing of the aircraft to its departure. Most airline companies make agreements with ground handling companies to ensure that they can get good service and service at their flight points. It can create a company from the people working in its own team, or it can provide this service from outside.
It is defined by the passenger service officer Türkoğlu (2018) as follows.

> Passenger service, include all ticket, baggage and passport control operations carried out within the scope of international rules and airline standards from the passenger's entrance to the airport to the boarding of the plane, meeting the passengers at the arrival of the aircraft and directing them to the passport control, helping the passenger with all kinds of problems related to his baggage is called "Passenger Services".

Passenger service officers help passangers by a group of services. Their work covers various responsibilitiesis very wide and they do not have a single duty and responsibility. Passanger Services Officer works can be divided into check-in, group check-in, VIP lounge, ticket information counters, flight control center, lost and found, boarding gate, baggage, transit, weight balance and load control, etc. Most of these titles are used in more than one aircraft service during the day.

2.4.1 Location of the passanger service offices

In a well-designed airport plan, not only passengers but also personnel should be considered. According to the DGCA, defines the offices of the passanger services officers as follow: “The section reserved at the airport for airline and ground handling personnel is called the “operations area”. This area has an area reserved for airline personnel, host/hostess, while there are also designated areas for ground service officers (SHGM,2009).

The Offices serve as areas where employees can rest, perform social activities, eat or prepare for work during the day. At airports, each ground handling company allocates such an office for its staff. In general, on the land side, passenger check-in should be planned near ticket offices and airline offices.

These areas are also called “break rooms”. According to the dictionary break room means “a room in a workplace that is set aside for employees to use during a break from work, as to relax, socialize, or eat” (Dictionary).Passenger services officer break room it should be located closer to the public space. Thus, they are closer to the counter area, ticket offices and passengers.

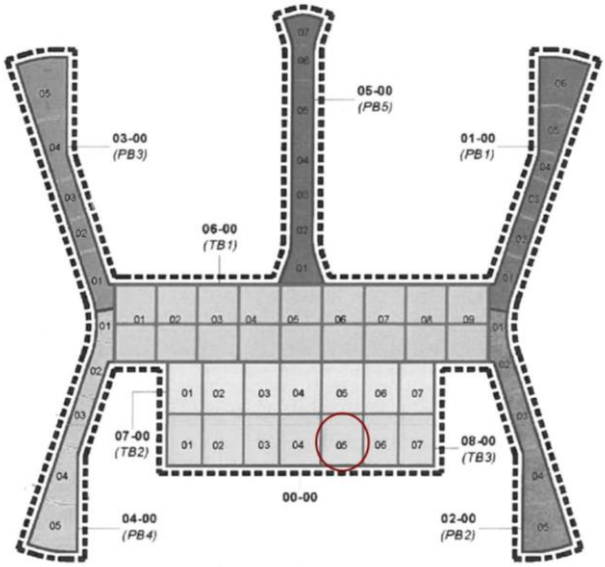

Figure 11: Location of the passanger services officer resting area at İstanbul Airport

Figure 11 shows that location of the passanger services officer resting area at İstanbul Airport. Offices at this airport are located between the arrivals and departures floors.

2.4.2 Sizes of passanger service offices

According to the research resting area or break room size has no clear information about its' size. According to the density of each area within itself, the number of working personnel and team varies. The number of passenger service officers who are in one-on-one communication with passengers varies according to the number of airline companies they serve, the frequency of flights and the personnel demand of the airline. The size of the interior is designed with consideration not only as a place for officers to rest, but also as spaces where they can meet their daily needs.

2.4.2.1 Classification of office types

In the 21st century, with the development of technology, people have begun to spend most of their day in offices. Technological developments have also led to changes in the design of office environments. A flexible, sustainable, open and closed contemporary office environment has emerged. "The operational workforce is being replaced by a

computerized commercial movement, increasingly globalized world trade, and the advancement of science to the space age have revealed offices with an up-to-date approach. In this context, modern office typologies, functions and design forms have emerged to shape the 21st century have emerged" (Noraslı and Köse Doğan, 2020).

Due to the change and development of offices with technological developments, increasing workloads and changes in the number of employees, changes in spatial organization have occurred. Office types can be divided into three main groups based on their interior design. Cellular offices, open-plan and mixed office types.

- Cellular Office

This is a type of office that is divided into several offices with the help of partition elements within the main office. Depending on the type of work, they are units separated by certain dimensions.

- Open Plan

Offices formed around the core in a free regular plan consist of changeable elements. The office core system (bullpen) is divided into three parts, namely the executive core system and the open settlement system. This situation can allow the implementation of more flexible plans within the space.

- Mixed Plan

"Cellular offices and open regular offices are located together. The cellular type is preferred throughout the office, and the partition and dividing elements are also reduced to allow group work" (Serinkaya and Nakışçı, 2019). The rest offices investigated in the thesis work are included in the "mixed plan" office type among these types. Resting area, where resting units and office areas are located together, are available in the study.

2.4.3 Passenger service office interior design plan types

Airline companies that want to be in a better position than their competitors in the global arena, increase their market share and keep their service quality at the best level, keep customer satisfaction at the top. Passenger satisfaction and the realization of all the other mentioned effects are related to the job satisfaction and motivation of the passenger service officers.

“The job satisfaction of the ground handling personnel is important in terms of providing safe service and increasing the service quality” (Varışlı, 2016). Passenger service officers also need both mental and physical rest to ensure their motivation and job satisfaction. Creating an area where employees can rest and meet their needs during the working day is a strategic move for both the company and the employees. For this, the design of the break offices of passanger services officers’ is important. Making break rooms more effective and useful for users can make the office and employees more dynamic. The interior planning of these offices shall include proper lighting acoustical conditions, as well as color scheme and furniture style

It can be done to make a resting (break) room effective and to provide a connection between work and rest can be listed as follows: (Judson, 2019).

- Coffe Machine and Supplies
- Furniture
- Healthy Snack
- Natural Light and Plants
- Kitchen Area

These titles, which will be included in the break room, will also contribute to the development of the company culture. While the employee’s intention to leave the job decreases, it will show positive developments in performance, productivity and health.

Figure 12: United Airlines Employee Break Room (Nordstrom, 2014)

3. LIGHTING EFFECT IN OFFICE SPACE

Lighting not only affects the appearance of the place where the person is located, but also activates people's emotions of the people. Light has both physical and psychological effects on people. There are differences in the effects of daylight and artificial lighting on people. Everyone needs daylight at certain hours of the day. However, in today's conditions, this is impossible for people who go to work in the morning and return in the evening or work in shifts. In this case, they are sometimes exposed to artificial light only and sometimes to both natural and artificial light in offices. Artificial lighting is crucial for people working in many industrial facilities and workplaces. "Nowadays, it is expected not only that the objects around us can be selected by artificial lighting, but also that it protects the health of the eyes and is economical, at least in addition to providing adequate and quick vision from a physiological point of view. In addition, it is necessary that the lighting is psychologically peaceful, provides a warm atmosphere and satisfies the need for comfort" (Özkaya and Tüfekçi, 2011).This section is about the parameters for visual comfort in enclosed work and rest areas such as offices, and the inconvenience caused by using parameters that are not suitable for users.

3.1 Lighting Types At Offices

In addition to general lighting in rooms, there are lighting elements that require different accents, orientations or different levels of lighting. The fact that the rooms are well lit, and the right lighting element is placed according to the purpose is one of them. The "quality" and "quantity" of a precise lighting element are directly related to visual comfort and the action to be taken. Activities such as eating, relaxing, watching television, and doing paperwork are performed in the resting area of passenger attendants. For this reason, the types of lighting placed in the offices should vary depending on the activity. In conjunction with these two elements, the perception of the areas surrounding the room, such as walls, ceilings and floors, becomes more important: to perform a job properly, it is important to be able to see and look. These are only possible with sufficient light. At the same time, when objects are perceived with light, the harmony of space and time also becomes clear. The different actions that take place

in the break room also determine the type of lighting element to be used. Besides with, there are also different values for the lighting used for each activity. In order to use the best type of light, you should always keep in mind the balance between people and work when choosing equipment. LED lights, compact fluorescent light, task lighting or recessed lighting. In the break offices, where work is done, recessed lighting is usually used. In the rest areas, which are provided to the companies for use, the lighting elements are located in the main structure of the building. In addition, under-cabinet lighting is used in the kitchen area or task lighting is used in office areas. Each type of lighting is important in itself in terms of location and purpose. The use of lighting in the right place and in the right way has an impact on the personal and business lives of users.

3.2 Visual Comfort Parameters At Offices

"Visual comfort is defined as 'a subjective state induced by the visual environment'. While this definition refers to the psychological dimension of comfort, there are also physical properties that influence visual comfort. Visual comfort parameters include the amount of daylight, brightness distribution, degree of glare, colour of light, flicker rate of light, and illuminance. The quality of visual comfort depends on the quality and quantity of light source and the brightness it imparts to its immediate environment" (Sezer, 2015).

"The purpose of lighting is not to provide a specific level of illumination, but to provide good visual conditions" (Sirel, 1992).

"A person is visually comfortable, visual performance and, accordingly, increased efficiency in the work done, eye health protection is undoubtedly possible with the help of an accurate lighting design that meets the physiological and psychological needs of users. Therefore, according to the variability of action in architecture, the conditions of visual comfort should be considered in the light of the criteria established by the international standards and aim to protect the eye health of users" (Sezer, 2015).

“Visual comfort should be provided within the design concept as part of the architectural project in accordance with certain norms and standards. This application should be economical, facilitate maintenance during and after the installation phase, be environmentally friendly and energy efficient. In this facility to be used by people, the eye should be able to perform the visual function comfortably, in other words, physiological comfort parameters should be provided, and aesthetic judgments related to psychological comfort should be taken into account” (Manav, 2005).

3.2.1 Physical comfort parameters

In order to be able to continue an action without problems, there must be a certain amount of light to perform the physical visual action. In order to for this area comfortable, it depends on many variables. The parameters of physical comfort are more related to the physical characteristics of the space.

Özkaya defines this situationas follows: “Physiological comfort is related to the quantity of lighting and requires that objects and shapes can be seen quickly and comfortably in their colors and details. In order to meet the conditions of physiological comfort, the thresholds of the eye, the adaptation state of the eye, shine and glare should be determined in addition to the required illuminance” (Özkaya, 2009).

The fact that the illuminance level is too high does not mean that it is correct to better perceive an object. The correct and appropriate level of lighting quality is ideal for skilled viewing.Some of the ideal visual parameters in spaces can be said as, light level, brightness, color and glare. When these parameters are present in sufficient levels, they create the ideal environment for users.

3.2.1.1 Illuminance

“With a simple definition of the illuminance level, if the luminous flux falling on a 1 square meter surface is 1 lm, the illuminance (level) on this surface is 1 lux or 1 lm/m²” (Marka Aydınlatma, 2021).

The illuminance required for a visual process can vary depending on the time of day and can also differ from person to person. The lighting level has a significant impact on whether you can do the job in a relaxed, comfortable and safe manner. For those working in the office, the level of lighting is important according to the work done. "When calculating the lighting level in offices, the work level should be taken as a basis and the type of work being performed should be considered" (Manav, 2005).

If the level of illumination in the work area is not sufficient for the users, it is predictable that there will be errors in the work. The fact that a place is too bright does not show that there is a lot of satisfaction in its people. "While high light levels can provide better visual performance, they also bring visual discomfort" (Erdem & Enarun, 2007). For this reason, the lighting level in the office should be the right level for both users and should be adjusted according to the sensitivity and importance of the work.
The European standards for lighting levels in the work environment are given as follows.

Type of area, task or activity	**Ēm** **Lx**
Filing, copying, etc	300
Writing, typing, reading, data processing	500
Conference and meeting rooms	500
Reception desk	300
Kitchen	150-300

Table 2: Illuminance level for offices[1] (BS EN 12464-1, 2011)

3.2.1.2 Luminance

We see the objects around us with their glitter, and sparkle is essential (Özkaya, 2011). The formation of large glare differences in what we see causes people to be dazzled. This situation also negatively affects the comfort of vision. According to another

[1] The resting area researched within the scope of the thesis work are available in places that can be used both as offices and as break rooms. Therefore, the activities shown in Table 2 are the units in the offices where the research is conducted during the study. The values of the illuminations are standard.

definition, “the phenomenon of glare is caused by a decrease in the ability to distinguish objects, or difficulty in seeing them, or both at the same time, as a result of improper distribution of luminaires, excessive luminance levels, or excessive luminance differences in time or space” (Kılıç, 1994).

Another definition states that it is a “lack of ability or difficulty in distinguishing objects or their details due to improper distribution of luminances or excessive contrast, or visual conditions that cause interference” (Sirel, 2012).

Glare is one of the most common lighting problems and a factor that reduces a person’s vision. Even when all lighting parameters are correct and sufficient, glare minimises the perception of the entire object in the room. Glare is divided into 3 main categories, depending on the impact it has on people (Kılıç, 1994).

- Discomfort Glare (psychological glare)
- Insufficiency Glare (physiological glare)
- Blinding Glare

Each type of glare has a negative effect on people. Insufficient level of illumination tires the eyes of people, causes discomfort to the person and causes negative effects both physically and spiritually. However, it reduces the productivity of employees at work. Some studies can be done to prevent people from being glare in their workspaces. “For purpose of general comfort, absolute luminances of any surface, window or daylight element or luminare should be limited to avoid glare” (Steffy, 2008).

- Using adjustable local lighting with brightness controls.
- Instead of direct lighting in the work area, the lamps must necessarily be located close to the distributor and the work area.
- Increasing the brightness of the area around the glare source.
- Using several small low-intensity light fixtures rather than one large high-intensity light fixture.
- Position the workstation so that the light fixtures are NOT in the front or directly overhead. (CCHOS).

These situations are factors that can prevent glare.

3.2.1.3 Color

“The perception that occurs when the wavelengths of light reach the retina of the eye is called color. This perception varies due to the effects of light on materials and partially absorbed and partially reflected, which are called hues or colors
(Şahin, Oğuz and Büyüküstün, 2013). The colors found in nature mainly consist of 3 colors. All other known colors are created by mixing with each other. People do not perceive white light, but the sum of the different colors that make up the colored light spectrum as “white light”. The color properties of light are called “light spectrum”, and its color, temperature and color rendering index constitute these properties.

Color of light; it is the color of light produced in the environment. Its unit is expressed in Kelvin (^{o}K). The color temperature of daylight is defined as cool and white. It can be said that the Kelvin value is high when the sun has bright, blue effects, and the value decreases when the red and yellow components dominate.
This situation is defined as the color of light and divided into three main directions in terms of temperature. It is hot, medium hot and cold.

Color Temperature (^{o}K)	Light Temperature	Color Of Light
<3300	Warm	Reddish White
3300-5300	Medium Warm	White
>5300	Cold	Bluish White

Table 3: Light temperature and color depending on color temperature (Özkaya, 2011)

The color of light has an important effect on the perception of space. While the illumination level makes the visual process more comfortable, the color of the lighting allows the user to distinguish objects and better perceive the space. In addition, the same objects illuminated by different light sources can appear different in many different aspects. This is due to the color rendering properties. The color rendering index (CRI) refers to the quality of the color of a particular light source on colored objects.
According to the IESNA Lighting Handbook “Color rendering is a general expression for the effect of a light source on the color appearance of objects in conscious or

subconscious comparison with their color appearance under another (reference) light source" (Rea, 2000).

The unit of measurement is Ra and daylight is considere 100% values. "Typically, light source rendering index of 80 to 90 are regarded with a color as good and those with a CRI of 90+ are excellent points. The general rule is that the higher the CRI, the better color rendering capacity" (Ünsal, 2018).

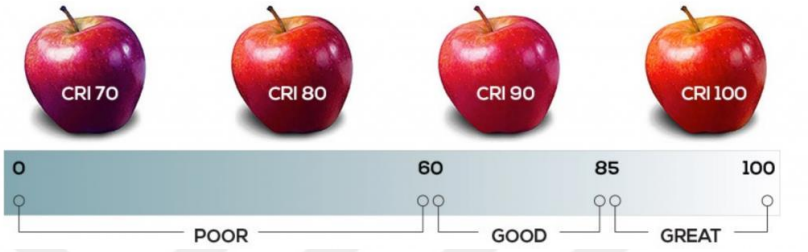

Figure 13: Color Rendering Index(CRI) (Haynes,2021)

The temperature of light and the effect of illuminance are related. To achieve a positive effect, the illuminance for a room should be reduced so that warmer lighting is preferred. The color of the light source used in places that do not receive daylight should be close to daylight. This will give the user a warmer and more comfortable feeling. The color of the light source used in office environments also varies depending on the location, size and purpose of the interior. However, the Kelvin value that should be used for a warm environment is 3000 and below, while a value of 5000 and above should be used to create a cool area. The color of the light source to be chosen should harmonize with the room.

Figure 14: Different Lighting Temperature for Office (Sheebamagazine)

3.2.2 Psychological comfort parameters

Lighting and the physical effects of lighting affect people. In addition, it is possible that the lighting in the environment affects the person psychologically. Environmental psychology also includes the physical and psychological conditions required to improve the comfort conditions of people, as well as the relationship between architecture and psychology. Lighting plays an active role in providing these conditions. Properly solved lighting has a positive effect on the perception of the space, provides psychological comfort, saves energy, increases interest in work, concentration and performance (Manav, 2005).

Colors can have psychological and physical effects on people. The basic elements that make up interior design; the colors used for ceilings, floors and walls can add depth and difference to people's perceptions. "The selection of colors to be used in the space differs according to the dimensions of the room on the walls, ceiling and floor, and the accessories to be used on the surfaces, furniture and other elements should also be considered along with the physical and psychological effects according to the function of the room" (Özsavaş, 2016). The color of the light is as important as the colors used in the furnishings for the psychological effect it has on the people in the rooms.

The color of the light that the place emits is as important as what the colors of the environment trigger in you. Whether the colors are warm or cold also affects how we feel in our daily lives. While bright colors make you feel warmer and warmer feeling, dark colors tend to make you feel colder. This is true for many places where you work, relax, and eat. The direction, amount, and texture of light entering a space have different effects on spatial perception and on people. At the same time, age, gender and experience differences are considered in the relationship between the color of light and users. These factors show that light can not produce the same psychological visual comfort in everyone.

It can say that the color of the lighting elements in the places where we work has an impact on our work efficiency and performance that day. Especially in areas such as offices, workplaces, and manufacturing facilities, factors such as color, angle, and

intensity of light play an important role. When the effects on employees of the light to be used in offices or lecture halls are studied, psychological comfort parameters can be determined. The color of the light to be used should not disturb the user; on the contrary, colors that have a positive effect should be preferred. There can be some effects of lighting on people. These include psychological mood, quality of life, sleep condition and stress factors.

Nowadays, these effects can be seen in employees as more time is spent in closed environments such as offices. Little or no access to daylight, inadequate lighting elements or color issues have a negative impact on people. Psychological comfort in workspaces is not only achieved through the comfort conditions of physical and functional spaces. Veitch says that lighting is a quality when the lighting conditions in a space meet people's need. However, the quality of lighting in a space depends on, the architecture, economy and individual well-being.

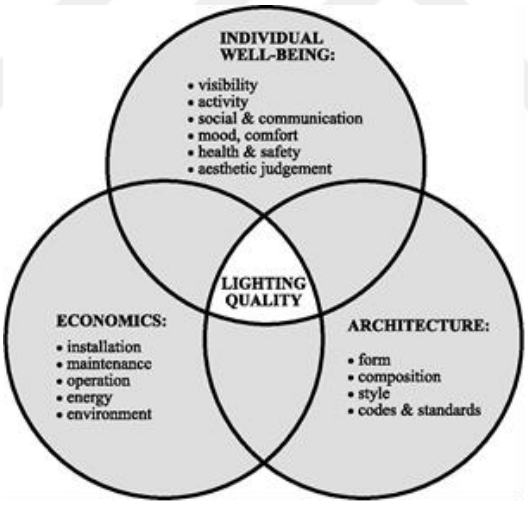

Figure 15: "Lighting quality: the integration of individual well-being, architecture and economics" (Veitch, 2001)

On the other hand, Vischer mentioned that environmental factors should be supported to ensure psychological comfort and suitability of work performance. At the bottom of the pyramid of environmental comfort, which consists of three categories, is discomfort. The higher up you go, the more psychological comfort is achieved. This situation creates a positive and effective work environment by improving the physical environmental conditions and the spaces made available to employees.

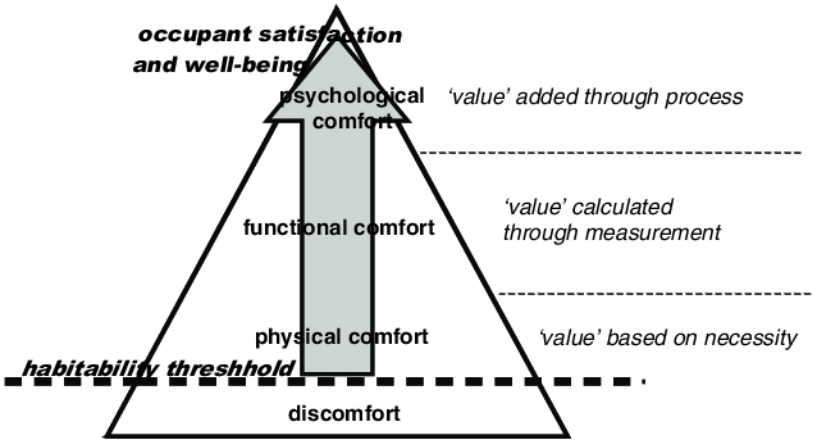

Figure 16: "The 'Habitability' pyramid" (Vischer, 2005)

3.2.2.1 Space perception

"Place or space; although it is handled differently by different approaches, it can be broadly defined as the space that separates the human from the environment to some extent and is suitable for continuing his actions in it, and whose boundaries can be perceived by the observer(s)" (Aslan, 2015).

"Place or space; Although it is treated from different perspectives, it can be explained as a piece of space that separates people from their environment to a certain degree, enables them to perform actions, and is designed and arranged in this direction. A place is a conceptual entity obtained by combining planar elements or by designing three-dimensional masses" (Alici, 2020).

"Place is the environment organised for human movement and behavior. Humans can regulate and act in accordance with all kinds of objects and messages around them. It is three-dimensional and is formed by the combination of depth, width, height, distance and distance relationships" (Özkan, 2007).

If it looks at places in general, people should come together for a specific purpose and use this space functionally. From the past to the present, spaces have been designed to

meet people's needs. It guides the design process based on spaces, users, and the work to be done. There are generally accepted standards for design processes. These can be divided into engineering, functionality, and aesthetics. The position of lighting in the interior can lead to differences in the perception of the space and its aesthetic appearance.

> In the design of space, the interior (space) and its reflection, the shell (the outer mass), are not in opposition to each other. On the contrary, they complement each other. An interior is both a mass and part of an external form. The user also belongs to this place. For the interior to be a living space, the user or users must be in that space and set it in motion (Turgay,2011).

The situation in which a person can experience the space not only physically but also with the five senses can be defined as "spatial perception." As a factor in increasing the perceptibility of the place; The fact that users have gained experience or a situation, albeit for a long or short time, in the environment where they are located, can make them remember the place. In addition, the social group and associations formed in the space and three-dimensional perception of the space are also important.

> Increasing the dimensional perception of the space by making the space perceptible means the same as making the space between the objects that give it meaning. The volume between the bounding elements in space looks like a void. However, this space is used to create meaningful dimensional relationships in the room. For this reason, space design is also called "the art of chipping the blank (Özkan, 2007).

It is said that if the space in the offices is perceived and provides visual comfort, it will have a positive effect on the performance and efficiency of the employees. The color, intensity, and temperature of the lighting used in the spaces change how people perceive the space. In one study, fluorescent lamps and incandescent lamps used in a study were used. As a result, it was found that cold light sources in the room make the space more spacious, provide visual clarity, and the use of low lighting has a relaxing effect (Manav and Küçükdoğu, 2006). In this case, it can be said that the colors and the intensity of the light used have different effects on human perception in terms of the perceptibility of the spaces.

3.2.2.2 Well-Being at work

First of all, if the word *well-being* were to be defined as a simple, "the sate of feeling healthy and happy" (Cambridge Dictionary). Although, well-being is a more comprehensive phenomenon than happiness and satisfaction, because in the long run, positive effects are seen in both individual and business life of people. About the well-being it has many definitions and generally often has the same meaning as mental health.

According to the The World Health Organization defined" a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2001).
It is extremely crucial for a person to gain this well-being in the work environment as well as in the society. For the ensure this, well-being in the office should be the priority and goal of companies.

The International Labour Organization (ILO) states that "Workplace Wellbeing relates to all aspects of working life, from the quality and safety of the physical environment, to how workers feel about their work, their working environment, the climate at work and work organization. The aim of measures for workplace well-being is to complement OSH measures to make sure workers are safe, healthy, satisfied and engaged at work" (ILO, 2009).

"Occupational health and safety are important because, work plays a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is on a plantation, in an office, factory, etc. Therefore, work environments should be safe and healthy" (Topal, 2011). Creating a wellbeing at office, extremely important. Nowadays, people are dealing with a many problems such as; stress, depression, anxiety, social and economic problems etc. Along with these increasing problems, the performance and efficiency of the employees at the workplace are decreasing day by day. There are many health problems that people who work long hours in the office are potentially exposed to. Illnesses, both physical and mental, can

develop into major problems in the long run. Central musculoskeletal disease is one of the biggest problems faced by desk workers. However, problems such as tennis elbow, carpal tunnel syndrome and trigger finger also occur. In addition, people who spend time indoors often suffer from "sick building syndrome." Sick building syndrome, "...people who spend long periods of time indoors suffer from malaise, headaches, drowsiness, nausea, dry skin, dry eyes, and stinging, stuffy noses. These complaints occur in enclosed spaces without windows or in open work environments that depend on central ventilation" (Akpınar, 2018). In many workplaces, windows are no longer opened. So, natural ventilation and the lack of fresh air to circulate inside lead to more occupational diseases in people.

To prevent this situation and create a solution, creating a workplace your people love may be the primary solution this can have many positive effects. While the performance and work efficiency of the employees will increase, the company culture will strengthen over time and enable the employees to enjoy their work. The effect of an employee who enjoys his job and its reflection on other people will cause the company to be heard more in the sector, to increase competition and to come to the fore. Here, national gain is positively affected as much as individual gain.

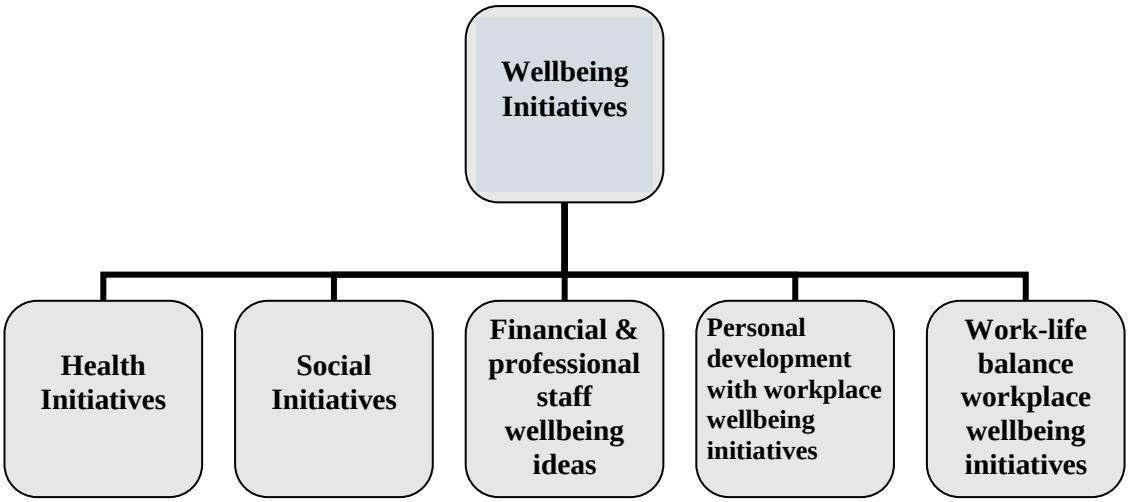

Table 4: "20 employee wellbeing initiatives to implement at work" (Perkbox, 2021)

Health Initiatives include in an office; It aims to provide employees with healthy snacks, make lunch break mandatory, reward them with a meal when they do a good job, and create an office that receives sunlight with plants in the working environment.
Social initiatives: it is mostly aimed at creating a social bond between the employees and the workplace. For this, creating activities outside of work with employees may be the solution. While, financial and professional ideas, it includes taking actions that will make employees feel valued. For use outside the company, employees can be given products, as well as motivational mails for congratulations, awards and promotions. The last two initiatives mostly cover the well-being of employees outside of work. For this, making investments for the self-development of the employee and organizing seminars will have a positive effect on the employee. In addition, sometimes applying flexible working hours provides a good environment for the employee.

"Wellbeing programmes can enhance mental health through continuous learning, social engagement and encouraging physical exercise (all shown to improve mental health). Occupational health and safety and wellbeing programmes can also work together to educate workers on mental ill-health – this will bring about workplace and individual benefits" (BSI GROUP).

3.3 Non-Visual Effects Of Lighting

There is a connection between light and human being from the past to the present. Light has an important place in human life, apart from doing the work of people or the act of seeing. The fact that the human body receives sunlight is biologically very beneficial. Light affects human metabolism, hormones such as stress and sleep. So, we can say that lighting is as necessary for a good quality of life as it is for the spiritual side of a person's life.

> In today's modern world, the time we spend indoors and away from natural light is getting longer by the day, and the concepts of day/ night are getting confused due to the increasing workload. The physical and psychological problems caused by the prolonged working hours and the need for artificial light have shown that it is necessary to evaluate the lighting technologies in the places where we spend most of our time from the perspective of view of human health (Turgay, 2011).

It is believed that the needs of the human body, deprived of daylight, can be met by artificial lighting of the room. The effects of lighting can be divided into two different groups: visual and non-visual. The non-visual lighting effects mostly result from the effects of light on humans in terms of quality and quantity: circadian rhythm disorder, subjective and objective alertness and mood.

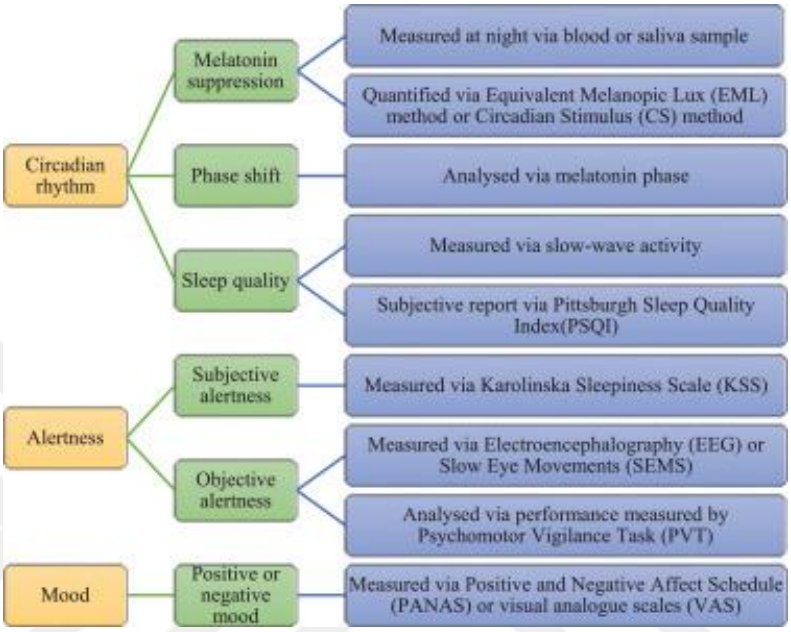

Figure 17: Non-Visual Effects Of Lighting (Physiology & Behavior)

Thus, it can be said that humans need daylight to satisfy their physical and biological needs. Knowing the non-visual effects in the design of indoor spaces and designing accordingly not only make indoor spaces more perceptible, but also reduce the negative effects on humans. The problems faced by people who do not benefit from sufficient daylight in their daily lives may develop into more serious mental and physical problems in the future.

3.3.1 Circadian system and working shifts

Circadian is of Latin origin and means “about day”. Circadian rhythm referes to the biological cycle of plants and animals (Steffy, 2008)., which is also called the self-repeating events in the body within a 24-hour cycle.

After light strikes the retina of the eye, it is transmitted through the nervous system to the area called the suprachiasmatic nucleus (SCN) in the hypothalamus, and regulates the circadian

> rhythm, controlling the body's biological clock. Thus, it is ensured that activities such as hormone secretions, cortex work, body temperature, sleep-wake cycle in the human body occur at certain periods (Memiş and Ekren, 2019).

The effect of natural light on the human body is far greater than that of artificial light. The human body is biologically divided into day / night, and changes in daylight during the day also affect the human circadian rhythm. While active movement is provided at certain times of the day, slower movement is provided at certain times of the day. The times when one is biologically out of the ordinary and the forcing of such situation cause disruptions in the circadian rhythm. Working in shifts, an unusual photoperiod, disruption of sleep-wakefulness and aging are just a few of them.

The way of working in the aviation sector also has an order that may cause the disruption of a person's circadian rhythm. The "shift working" system is used to ensure service continuity, create a more competitive environment, and respond more quickly to the needs of the consumer. With reference to the studies, the shift working system is defined as "a form of work in which different groups of workers are employed in workplaces that are continuously operational, uninterruptedly on all days of the week and at various successive time periods during the day, depending on the nature of the work or workplace" (Yılmaz, 2019).

It is defined, according to another international legislation, as "the method of arranging the working hours of the employees of the organization in a way that follows each other" (Değirmencioğlu, 2019). Working outside of traditional working hours has caused issues in people's social lives, health problems, and business lives, as well as circadian rhythm disorder.

3.3.2 Working shift cycle

Airports are non-stop working areas. The work flow continues even on official and national holidays. In general, it is also important that the work is not disrupted and continuity is ensured. The desire to benefit more from existing capacity, expanding existing services, and attempting to increase employment are all viewed as factors that make shift working economically necessary. Therefore, the mode of shift working here

is an inevitable fact. For this reason, consecutive working hours are scheduled. In the mode of shift working, 2-3 or 4 different forms of work are offered outside the traditional working hours. These forms of work are divided into continuous (fixed) and alternating shifts.

In the continuous form of shift working, one continuously works in day shift or evening / night shift. In the alternating form of shift working, there is a constant change in the day, night and evening on a weekly basis. The frequency of flights, the number of flights per day, the number of personnel working and the flight hours of the airline affect the forms of shifts (Yılmaz, 2019).

Apart from creating a competitive environment and providing a quality service to the customer, shift working is also preferred as a form of work due to the need for different areas such as public interest, economic reasons and service benefit
(Değirmencioğlu, 2019).

The effect produced by the shift working system on people is called the "shift lag" effect. Shift lag occurs when the body's internal rhythm has difficulty in adapting to the new order in cases where the living (working) period and the sleeping (resting) period are partially or completely switched because of work obligations (watch, emergency situations, night duties, etc.) without changing the geographical region. Being as a result of shift working, shift-lag experienced by individuals leads to disruption of circadian timing synchronization. Ruggiero ve Janino have stated in their research that the fact that shift workers, participated in the study, work on weekends and special days affects their social lives (Deveci and Okuyan, 2017).

Physiologically, the human body, which is more inclined to work during the day, may have different reactions in the shift working system. It leads to problems in the life of employees both in organizational, individual and social spheres. Likewise, factors such as low job performance, decrease in job satisfaction and low job achievement can be listed among the negative effects of the shift working system (Arı, 2013).

Shift working orders lead to a number of problems in people's lives, both socially, organizationally and physically. The effect of the working order on sociability, one of the negative factors established in individuals, can be explained as follows. A person is a social being and continues to exist by staying in touch with other people. However, individuals working in a different order shift system are isolated from social life. They have difficulties in fulfilling family roles in social life, their participation in social activities decreases and, moreover, they have problems in being included in family activities. Especially for individuals working in night shifts, this condition is considered a "social death."

Airplanes, where passenger service officers working in the aviation sector serve at night, are usually at hours when human physiology is not accustomed to being awake. The high error rates of the officers who are staying awake during these hours are the main results of insomnia, inability to rest and fatigue. A decrease in productivity and work motivation is observed in an employee who cannot get enough rest and sleep. In this case, it affects the airline and passengers served.
It is stated that long working hours and shift working orders increase fatigue and weaken perceptual functions, which increases operational errors, and therefore, these problems also cause an increase in occupational accidents within the organization (Yılmaz, 2019).

Accidents that occur within the organization occur not only during night shifts, but also during day shifts. The results of the research show that people are most often found faulty at 15.00 in the afternoon and 03.00/ 04.00 at night (Akgöl, 2010). The reason for this situation is caused by the fact that employees could not get enough rest and quality sleep. When shift working is considered as an organizational form, in fact, the effects of the fact that the individuals have not had enough rest and worked long hours on their social and daily life are in question. Long and irregular working hours lead to increased fatigue and therefore to a perceptual weakening, the error rate of a staff member whose perception starts to decrease is also observed to be more. This situation of the personnel who make mistakes is reflected in both the ground service company and the airline company within the organization and causes difficult situations. The inability of ground

service personnel to have a quality rest both during and after the shift causes many problems, ranging from increased report receipt in individuals, reduced productivity, quit the job and lack of motivation. Because of such factors, there is a constant recirculation and personnel change within the organization itself.

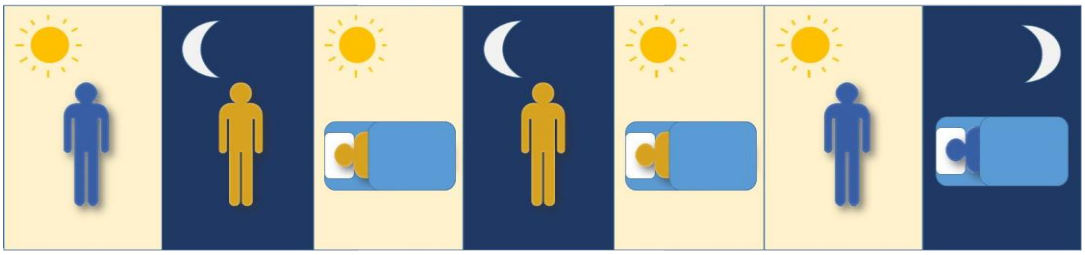

Figure 18: Shift Work Representation (Mycircadianoclock.com)

Individual problems are usually caused by the individual's working conditions and the physical conditions of the place where he or she works/rests.

"Concerns or criticisms about shift working generally center on the fact that it causes sleep disorders and rest problems" (Eren, 2018). Employees' resistance decreases even more when they have limited rest time during their working hours. Decreased body resistance leads to different health problems in individuals. At the very beginning of these are the effects caused by insomnia. If people do not have a quality rest and do not get enough nutrients, they face problems with the digestive system.

Digestive problems that ocur in the stomach in cases such as employees not getting enough rest, having a quick bite also affect the employee's social life. In addition, it causes many ailments such as tension, fatigue, cardiovascular diseases, stress at various levels and burnout syndromes in people. All these ailments affect the individual life of people, as well as cause negative effects on working and social life. Long-term health problems can cause permanent damage to people. Developments in lighting design, scenarios managed with biodynamic lighting / automation control system can be suitable solutions for these problems.

3.3.3 Performans measurement

Lighting elements in office spaces not only make it easier for us to perceive the space, but also help us do the things we do more accurately, without errors and in the best way. A good lighting quality provides positive effects on the efficiency and performance of users while protecting their health. The use of natural light is a priority, considering both the health of the users and the budget. It is a priority to be preferred in the working environment because the employees are aware of the outside world thanks to it, and furthermore, it is more efficient with the effect of daylight in the environment. However, because Access to daylight is limited in some office settings, it is preferable to use a homogeneous type of light in such settings.

> It turns out cooler light makes workers more productive. A number of studies have found sunlight can have a multitude of benefits on our health. Exposure to natural light is especially beneficial to workers cooped up in an office all day. Natural light from both the morning and evening has been found to reduce depression and improve mood, energy, alertness and productivity (Giang, 2017).
>
> In recent years, the use of direct and indirect lighting fixtures has increased. In this way, reflections and glare that may occur are minimized, while the ceiling and floor are illuminated to provide a comfortable working environment. With this understanding, it is seen that the transition to the application of "active light" is made by considering the biorhythms of employees in most of today's office designs (Altınok Kayan, 2012).

"It is estimated that a significant part of the fatigue caused by working conditions comes from straining the eyes. For this reason, a good lighting will enable employees to work effectively and efficiently, while a bad lighting will increase fatigue in employees, cause health problems, and reduce employee productivity" (Koçer, 2016).

In addition, misusage of lighting leads to problems in people's work performance, as well as physical ones. Complaints that will affect visual comfort, such as tears, headaches, dry eyes, and eye irritation, also negatively affect a person's life (Bayrakdar, 2016). In order to avoid this situation, the lighting that employees use in their work units may vary depending on parameters such as the job they do, the size of the job. However, if there is one thing that can be generalized, it is that proper lighting elements have a positive effect on users.

The benefits of proper and effective lighting can be listed as follows;

- It helps to increase vision by protecting eye health in people.
- It increases the efficiency and performance of the employee.
- It provides a safe working area by preventing accidents.
- It helps to improve the quality of life and standard of living of people.

“Favorable environmental conditions improve the performance of people. Lighting in working areas that is tailored to the task needs of the users not only improves employee performance, but also contributes to their psychological comfort by positively affecting their satisfaction” (Uyan, 2018).

Along with working conditions, factors such as the volume of work, solution of problems, customer relations, teamwork also affect the performance of employees. Individual human factors such as feeling good, motivation, and job satisfaction are included in the first stage of the main factors affecting productivity in the workplace, and systemic factors such as organizational structure, internal environmental conditions, external environmental conditions, facilities and services provided are included in the second stage. Humidity, ventilation, crowding and lighting are also included when defining internal environmental conditions that affect a person’s performance during work (Şahin, 2012).

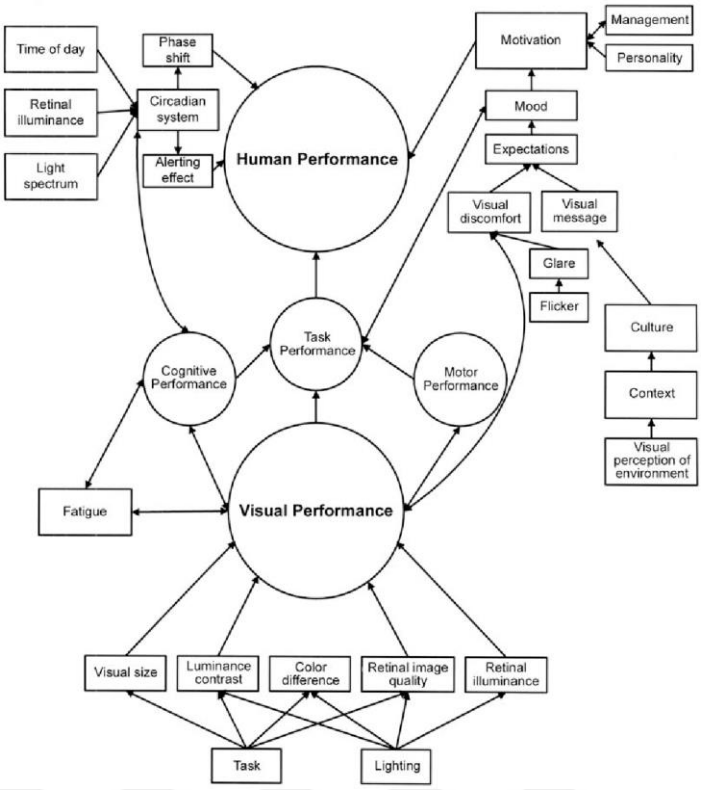

Figure 19: "A conceptual frame work setting out the routes by which lighting can influence human performance" (Boyce and Rea,2001)

4. ANALYSES ON VISUAL COMFORT PARAMETERS AT PASSENGER SERVICE OFFICES

4.1 Aim Of Study

The aim of the study is to measure the effects of the interior design parameters of offices such as lighting on the visual comfort parameters of employees. In the study, passanger service officers's interior design conditions are evaluated with a specific focus on the visual comfort parameters. The topic of research based on experiences of author on the thesis, as she is one of the users of these spaces and has experienced and observed the palce extensively. It is intended to analyses visual comfort conditions in the passanger services officers and create a comfortable space for other users by transforming the resting area into a better place.

4.2 The Experimantal Set-Up

Firstly, the airports in Turkey were considered as the building types of and the universe of the study. Later, this study was limited to the airports in the Marmara region, and finally out of the airport terminals in Istanbul only the İstanbul Airport is examined in the thesis.

In Turkey, there are a total of 45 ground handler firms with 3 different license types. The firms with A type licence are selected as the study group for the present study. These ground handling companies provide services in many parts of Turkey and continue their services on a global scale. The ground handling services are specified in the Directorate General Of Civil Aviation regulation at least three airports that are open to international traffic. Therefore, their passanger service offices shall support certain planning and design criteria. There are certain norm and standarts for Directorate General Of Civil Aviation.

4.3 The Participant Group

Three different groups of ground service personnel were participated in the survey. A survey was conducted with a total of 100 people 75 of the participants were found eligible and evaluated. In the study, 3 different Ground Handling Companies are included. A total of 25 individuals from each ground handling company was participated in the survey.

Age Range	Number Of Participant/ Total
22-25	25
26-30	**31**
31-35	12
36-40	7
***Total**	***75particant***

Table 5: Passanger Ground Handling Officer age distribution

The age range of those participating in the study changed between 22 to 40 years. Most of the respondents are between 26 and 30 years old. 31 out of 75 individuals (approximately 41%) are in this group age range. Which may show that the majority of employees are young.

4.4 Survey Methodology

A quantitative research technique is used in this study. A questionnaire is prepared under 3 different headings and the questions were divided into three parts: demographic data, visual quality and physical conditions, of the offices. The survey was conducted between to January and March,2022.

Firstly, a pilot study was conducted by 10 people in or der to understand the user group. At the same time, incomprehensible, misunderstood, unclear questions were eliminated. Then it was distributed to the participants and the process was completed face to face. In the survey demographic data way collected, working hours and working shifts were recorded, asked about the suitibality of the office space for activities. Third part is about

physical conditions of rest (break) room, include; daylight, air quality and lighting quality. The name, companys' data or phone number were not collected. The demographic data consist of; age, gender, educational statues, the duration of work in the company, the type of work and the shift times in which it usually works.

In the second phase, the participants were asked questions about the suitability of the office and the working hours. In the first part, they were asked about the weekly working hours and then how long they spend in the rest office on average. In the survey, 5 questions were about the suitability of the rest office. Participants were asked about the suitability the rest office in order to do their office activities, such as eating, socializing, spending time, sleeping, and preparing.

In the last section,3 separate sub-items were evaluated under the title of physical characteristics of the resting area. The conditions together with the quality of ventilation, and visual comfort were evaluated.

4.5 Evaluating Survey Data

In the survey study, the results were evaluated as "inferential" data analysis. The survey results collected from the participants were recorded to an Excel file and analyzed. In the study, 3 office types were evaluated. Participants' evaluation about each of these offices are analyzed and compared through bar charts(graphics.. etc). Meanwhile, their age, working hours and work shifts were evaluated.

Three ground handling offices tested in the study were identified without the use of company names due to confidentiality rules. The offices are designated as Office A, Office B and Office C. Office A was the first by evaluated office; Office B was as the secondly evaluated office; and Office C was the lastly evaluated office in the survey.

Each of the three ground handling companies' provide seperate areas for their employees relax, while also defining different areas to spend their free time.

While some offices have a kitchen area where they can satisfy their basic needs, in another office the same area is used as an executive office, creating a mixed office type. All offices are located on the same floor. One of the offices receives no daylight it and is lit only by artificial light, while the other two offices have both daylight and artificial lighting. The ceilings in all offices are designed with the Shell&Core system. Each rest office lighting is rated differently.

4.5.1 Interior design and plan of Office- A

The first office belongs to the International Company. It is spesicified " Office A" in the study. It is used as the resting area of ground handlers' employees.. It is located between the two main corridors. Which prevents the office from receiving daylight. Since it is surrounded by walls on all four sides, it falls under the definition of a "deaf office." The office is lit only by artificial lighting elements. In the study, the physical comfort conditions and lighting conditions of the office are considered, under thee following.

The main activities in the area are as follows;

a) Resting area with seating units
b) Storage area with personnel belonging units
c) Food preparation area

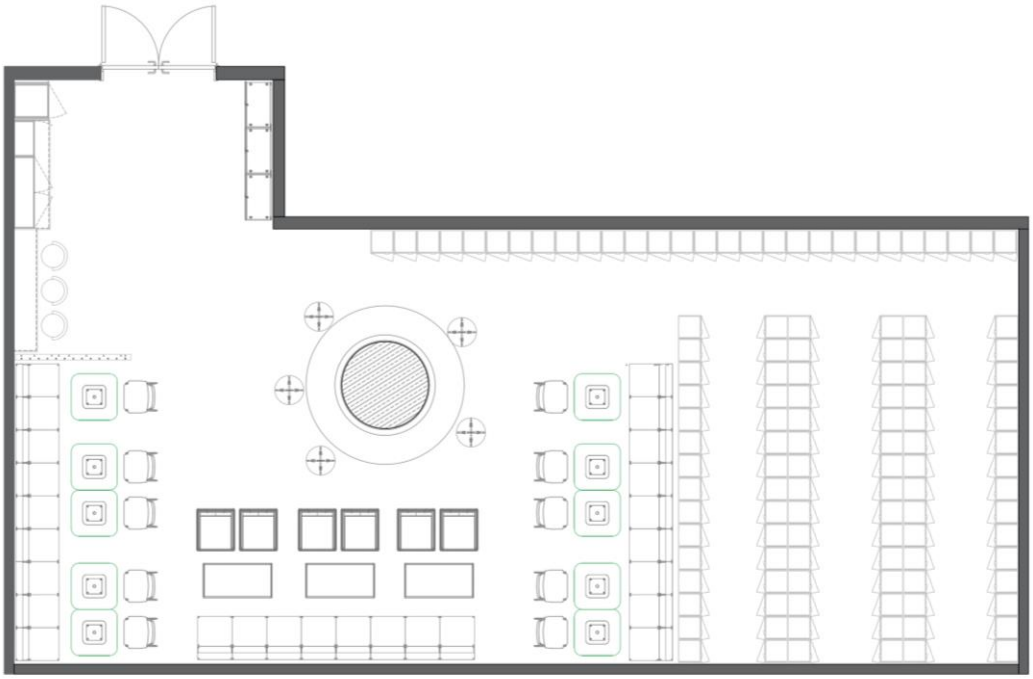

Figure 20: Plan of Office A[2] (142m[2])

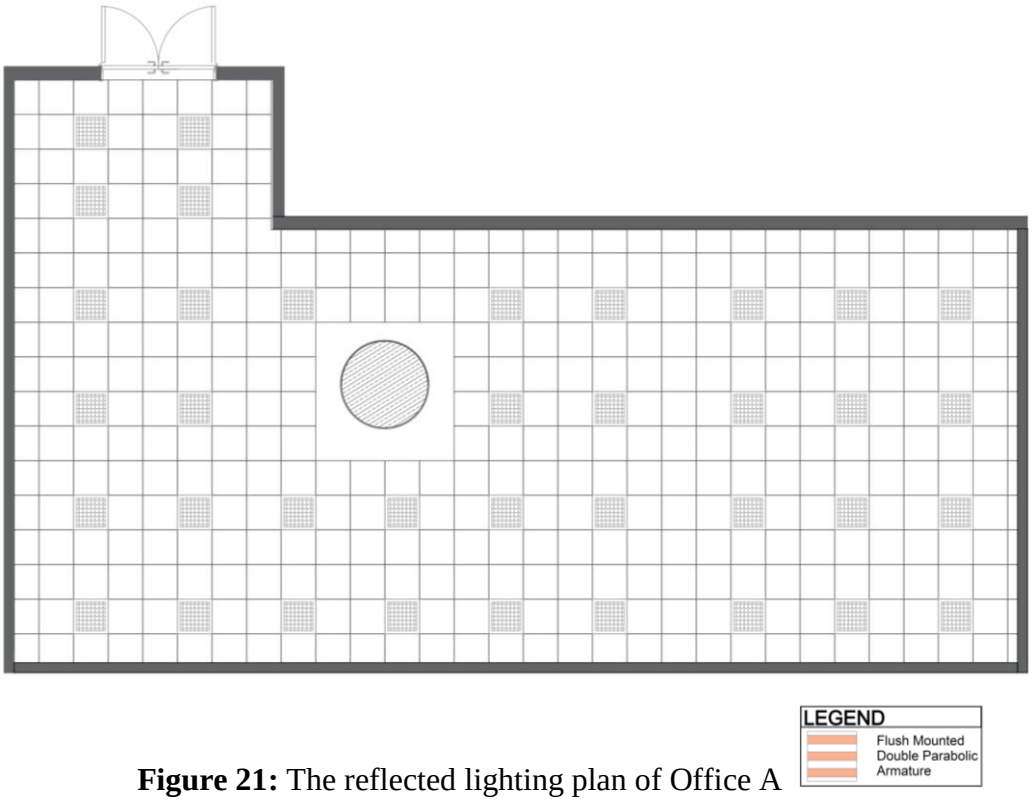

Figure 21: The reflected lighting plan of Office A

[2] All plans are taken by IGA ordinary companies partnership archive.

Figure 22: The ceiling images Office A (Author Archive)

The ceiling fixtures in Office A have adhered to the Shell & Core design. A single lighting model is used in the interior. This office is illuminated by double flush mounted parabolic luminaires. These luminaires can be independently lit as an entrance, rest area, and storage. There is a flexibility in the system. Although the lights are placed in a specific order in some areas, there is not a rhythm as it does not continue at the enterance.

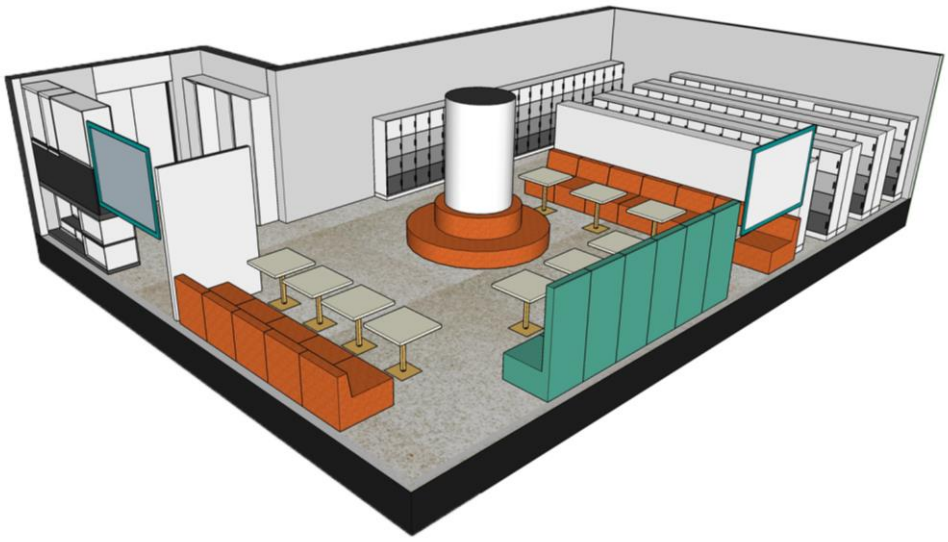

Figure 23: Axonometric view of the Office A

The plan of Office A, is illustrated in Figure 20, Figure 21 shows that ceiling lighting plan. Figure 22 is original ceiling images Office A and figure 23 is the axonometric view. When office A is examined, by means of the different functions there is a kitchen area at the entrance where employees can prepare their meals. In the middle of the

office, there are rest units for office users and at the back there is a storage area. Apart from tables and armchairs, there are no movable office elements in the space. The column, seperates the office into two parts. The storage areas and the seating units around the column are built in elements. The preferred colors in this space are mainly orange, light green, gray and white which also reflect the corporate identity.

4.5.2 Interior design and plan of Office B

The second Office belongs to the International Company. It is specified as "Office B" in the study. It is shared by both managers and ground handlers, so it can be said that the place is used more as an office space than as a rest unit. Only one side of the office is covered by a wall, and there are windows at the front. Daylight enters the space, it reaches both to the rest area of the employees and the offices of the managers. In this way, their connection with the exterior is not interrupted. Artificial and natural light are used together in the room. As the location of the office is far away from the facade, daylight receiving interior diminishes.

The main activities in the area are as follows;

a) Advisory units
b) Offices of directors and chiefs
c) Resting area with seating units.

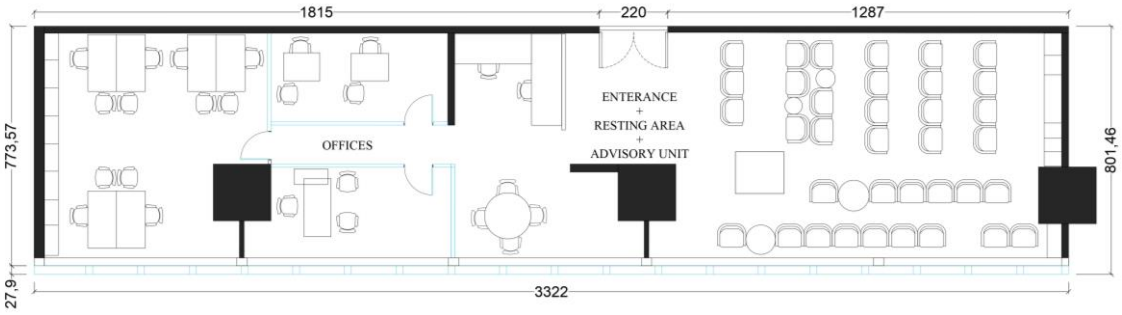

Figure 24: Plan of Office B [3] (188.97m^2)

[3] All plans are taken by IGA ordinary companies partnership archive.

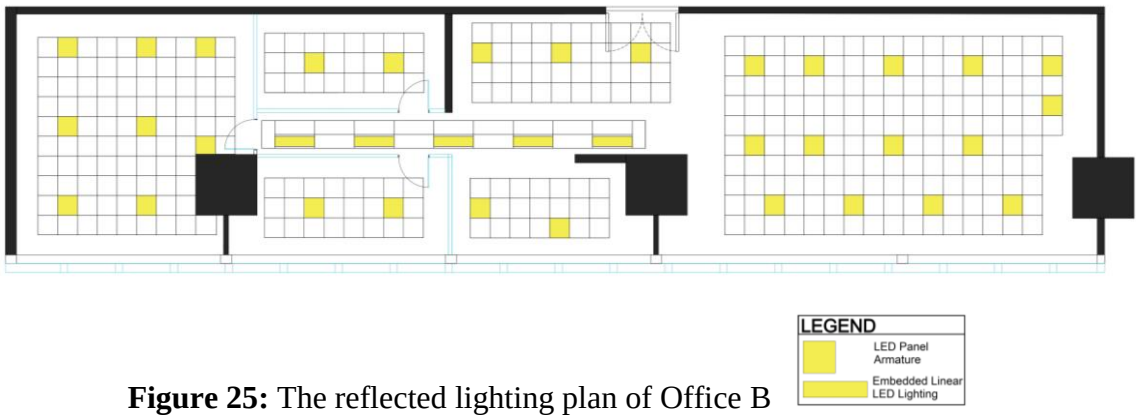

Figure 25: The reflected lighting plan of Office B

Figure 26: The ceiling images Office B (Author Archive)

The ceiling construction Office B has been completed by the Shell & Core design, but it is available to change the lighting system if needed. Two different lighting fixtures are used for the office's ceiling lighting. In the offices, rest areas, and information units, LED Panel Fixtures are used primarily, while embedded linear LED lighting is used in the inside of corridor.

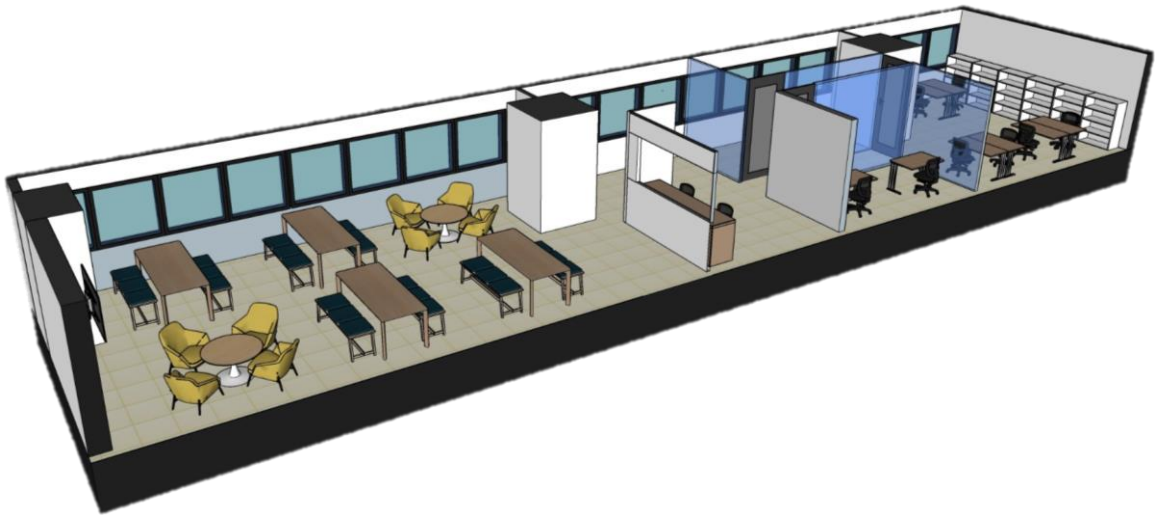

Figure 27: Axonometric view of the Office B

The plan of Office B is illustrated in Figure 24, Figure 25 shows ceiling lighting plan. Figure 26 is original ceiling images Office B and the visual combining artifical light and daylight. Figure 27 is the axonometric view. At the entrance, an information unit welcomes the staff. The back of the advisory unit consists of the manager offices. Where the partition walls are made up of glass. The narrow and long corridor is used in this way. The other side of the consulting unit is used as a rest area for tehe employees. The layout of the rest area is not as currently as it is seen in Figure 24. In order to use the space more efficiently upon the request of the employees' a different layout is used. The partitions and columns are fixed elements in the space which separate the different functions in the space. Apart from that, the flexibility in the space is furniture. The interior color scheme is mostly black, gray and white.

4.5.3 Interior design and plan of Office C

The third office is C which belongs to International Company. It is specified as "Office C" in this study. Office C combines many functions with respect to the Office A and Office B. The office, receives sunlight from its front facade. Depending on its location, daylight receiving inside diminishes. It is reflected many times before reaching to the interior. As a result of these multi reflections, the amount of daylight is low. Reflected daylight enters the executive offices and the rest area. The layout of the plan shown in

Figure 28 has been updated, the function of the interior continues to be used in the same way.

The main activities of the area include;

a) Food preparation area

b) Resting area with seating units

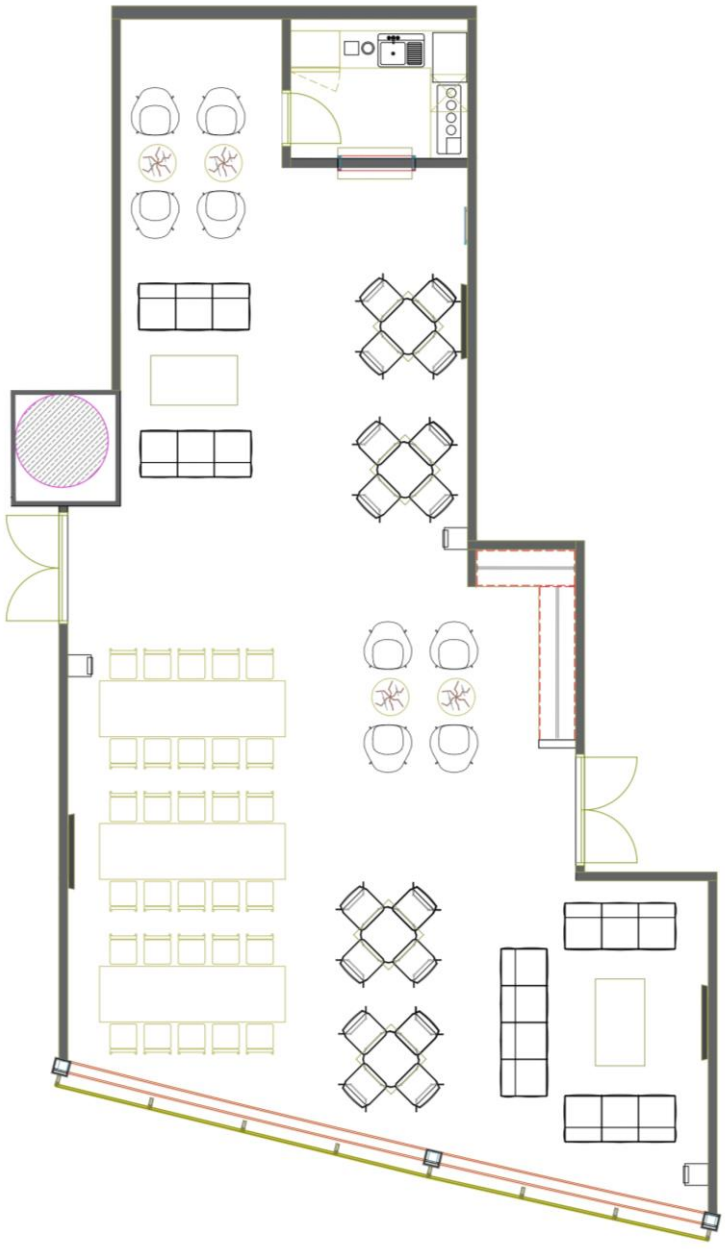

Figure 28: Plan of Office C [4](134.1m^2)

[4] All plans are taken by IGA ordinary companies partnership archive.

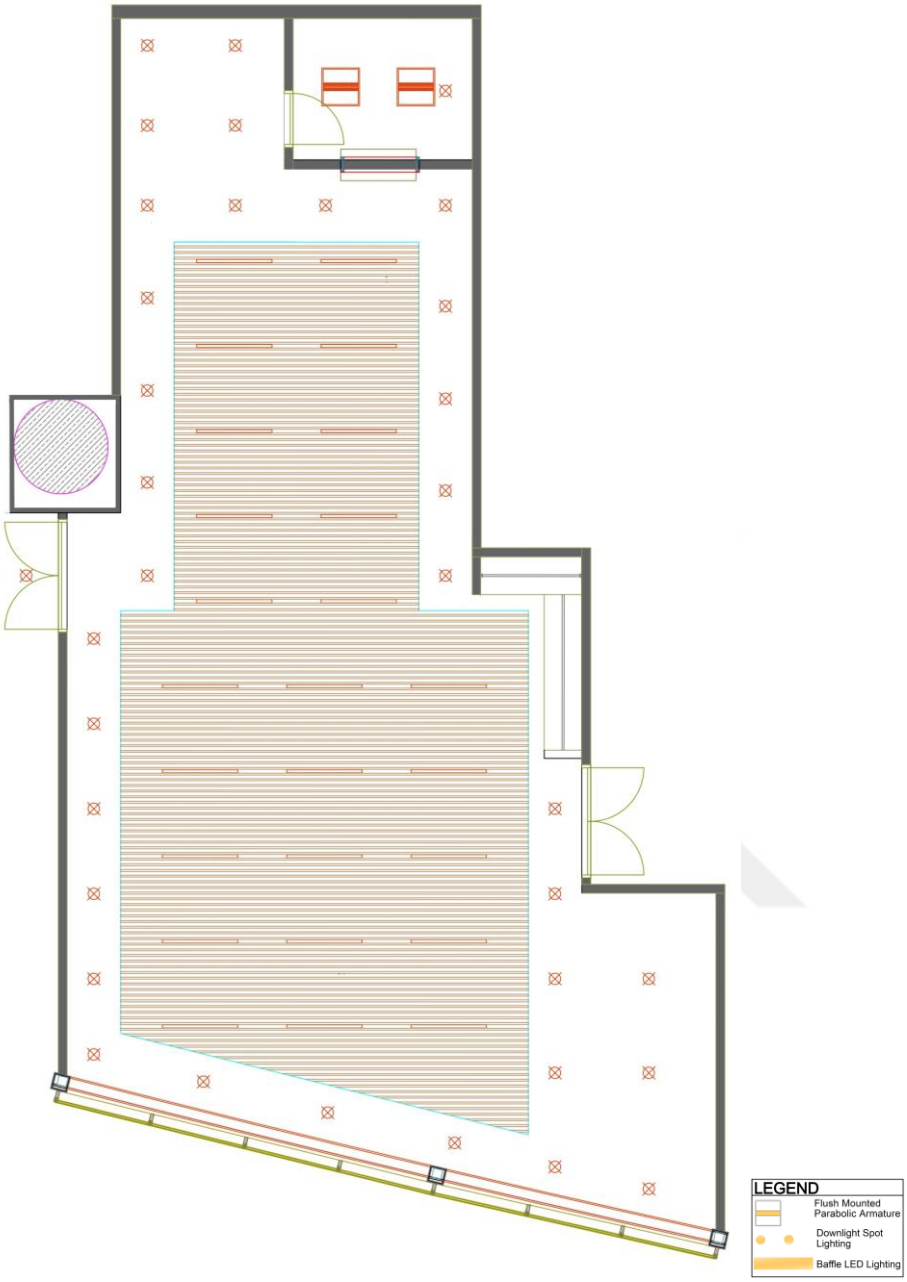

Figure 29: The reflected lighting plan of Office C

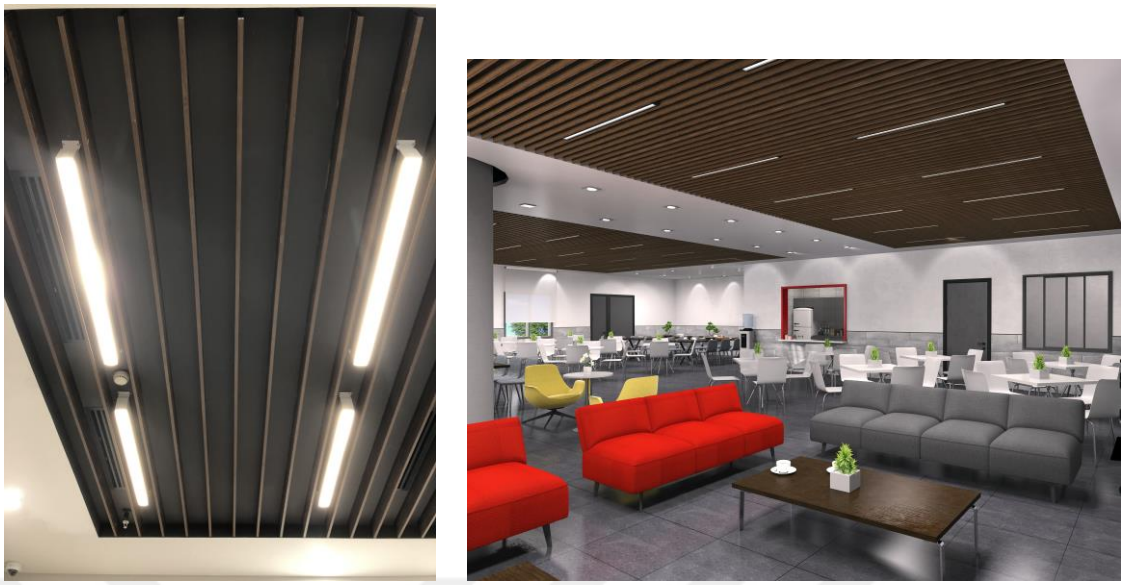

Figure 30: The ceiling images Office C[5]

The ceiling plan of Office C is different from the other two offices. The structure was completely changed by not following the Shell & Core system. A system of suspended baffle ceilings was used on the ceiling. The lighting is also preferred accordingly. Two different types of lighting are used in the room. While Baffle LED is preferred for general lighting, downlight spot lightings are used in the corners. The location of this office has a direct relation with the facade and it receives direct daylight.

Figure 31: Axonometric view of Office C

[5] Some images in Figure 30 belong to the author's archive. The other image is a modeled version of the original ceiling image of the office and is taken from the internet.

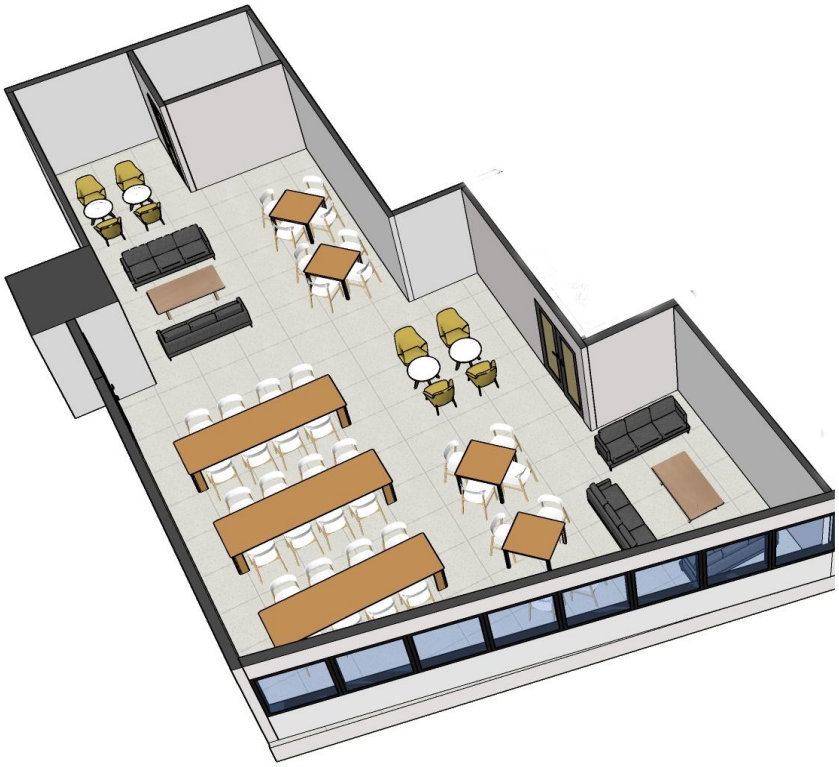

Figure 32: Top view of the Office C

The plan of Office C is illustrated in Figure 28, while Figure 29 shows the reflected ceiling plan. Figure 30 is original ceiling images Office C and the interior space rendering has been put in order to give information about ceiling lighting. Figure 31 and 32 shows the axonometric and top view. To reach the rest area in Office C, it is first pass through the corridor. One side of the corridor consists of administrative offices. At the main rest area is the kitchen for the passenger service officers at the back. Various furniture elements such as armchairs, chairs and single armchairs are felexible and re-changable according to the preference of the employees. Except for the columns and the partition wall in the interior, all the furniture is movable. The colors used in the interior are mainly black, white and gray, as in the Office B.

4.6 Evaluating Of Working Hours And Working Shifts

The participants are asked to the evaluate about the suitability of the rest (break) room in regard to, working hours and working shifts. In the first phase, they were asked about

weekly working hours in the last week, since they work in shifts. The aim of this question is to understand how much time they spend at work. Then they were asked about how the rest area is designed according to the needes of the employees. The average time they spend in the rest area, is also evaluated.

a)"How many hours did you work as average in your shift last week?(Q1)"

Hours	Number Of Participant	Percent
30-40	7	9,33%
41-50	**55**	**73,33%**
51-61	13	17,33%
***Total**	75	100%

Table 6: Weekly shifts of the participants

There are people who work a minimum of 30 hours and a maximum of 61 hours per week. The result of the general survey is that 73% has the highest number of working hours. Within this range of hours, 45 hours (24%) per week was considered the maximum working hours. This is followed by 50 hours of work per week. Thus, it can be said that ground handling employees mostly work 45 hours or more weekly

b) "How many hours a day do you spend in the rest office?(Q2)"

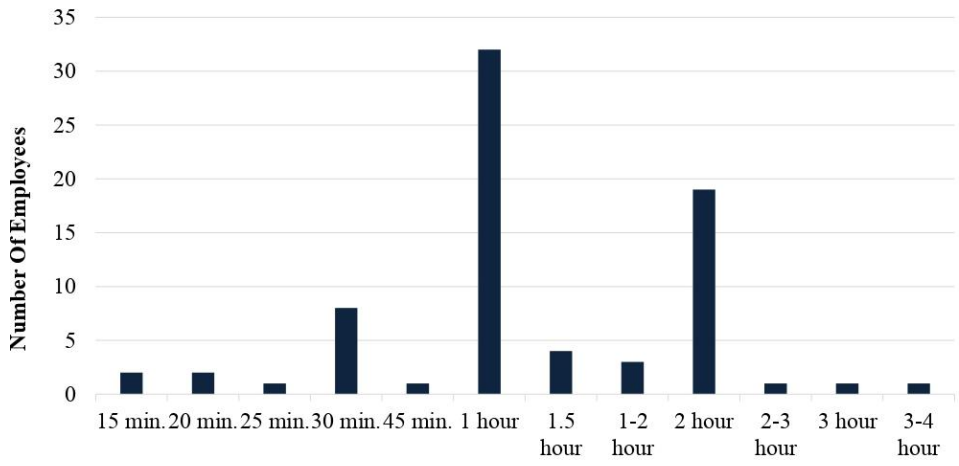

Table 7: Time spent in rest offices

Table 7, shows the duration employees spent in rest offices. According to the answers given by the 75 participants, the survey shows that the maximum resting time is 1 hour with a rate of 42,66%.

4.6.1 Analyses of suitability for daily activities

In the second part, participated were asked to what extent their daily activities in the rest office were suitable for eating/sleeping/preparing for work/socializing and spending time before/after the shift. Likert scale with five-point scale was used for the scale of the study.

4.6.1.1 Daily activities analyses for the Office- A

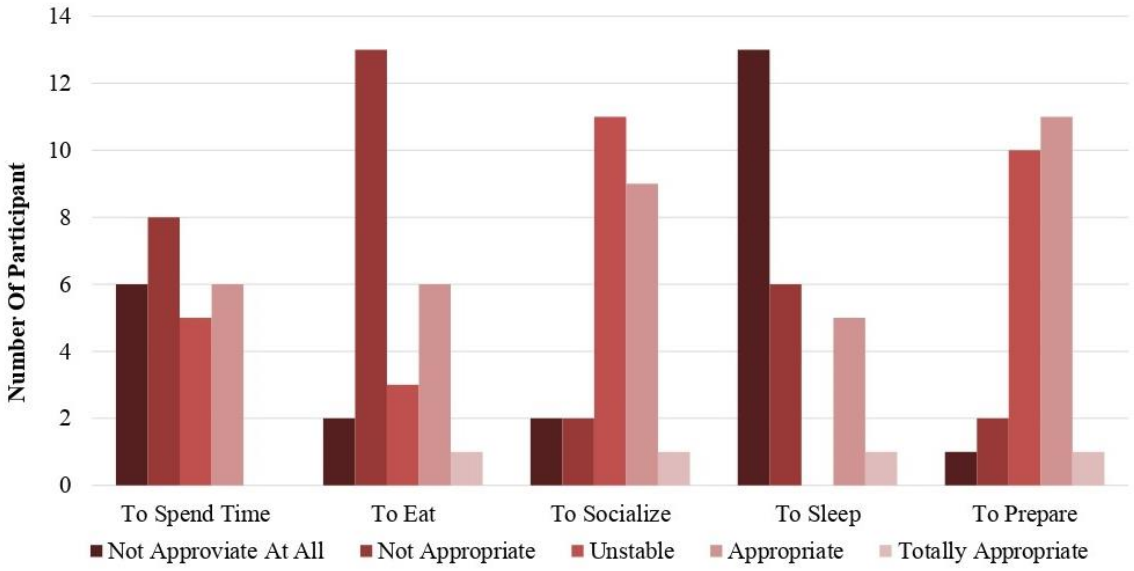

Table 8: *"Daily Activities"* analyses for office A

Participants evaluated the suitability of whather Office A is for "spending time, eating, socializing, sleeping and to get prepared for daily activities." Results show that 24% of the participant found office A "not appropriate at all" for spending time; while 32% of evaluated "not appropriate"; 20% "unstable"; 24% "appropriate" and none of the participants said, "totally appropriate".

The same office is evaluated for being suitable "to eat". When the results are compared, 8% said that it is "not all appropriate", while 52% suggested that it is "not appropriate". Office A is found to be "unstable" for eating while 12% of evaluated as, 24% rated it as "appropriate" and just only 4% found "totally appropriate".

When the office A is evaluated for "being suitable to get socialized", 8% believed that it is "not appropriate at all" and (8%) rated it is "not appropriate". While 44% rated the office as "unstable"; 9% said that it is "appropriate" and 4% rated it as "totally appropriate".

Another assessment statement for the office is about how suitable it is for "sleeping" While 52% said that it is "not at all appropriate"; 24% rated it as being "not appropriate". No one chose the "unstable" option. It is "appropriate" for 20%, while "totally appropriate" only for 4%.

The last evaluated "to get prepared for daily activities". When the result compared 4% said that it is "not all appropriate" while 8% suggested that it is "not appropriate"; 40% "unstable"; 44% "appropriate" and 8% "totally appropriate".

4.6.1.2 Daily activities analyses office- B

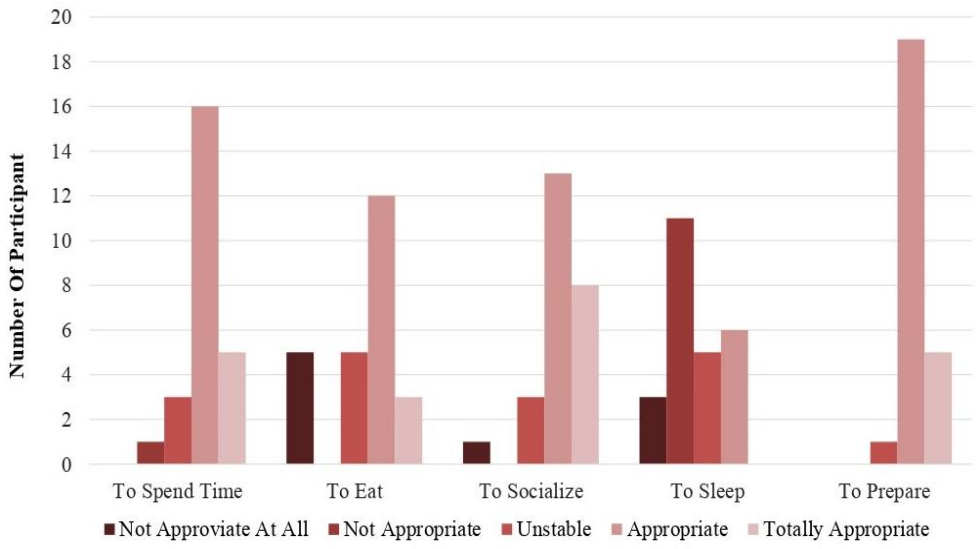

Table 9: *"Daily Activities"* analyses for office B

Participants evaluated the suitability of Office B is for “spending time, eating, socializing, sleeping and to get prepared for daily activities.” No one chose the answer “not at all appropriate”. Results show that 4% of the participant found office B “not appropriate all” for spending time; while 32% of evaluated “unstable”; 64% “appropriate” and 20% “totally appropriate”.

The same office is evaluated for being suitable “to eat”. When the results are compared 20% said that it is “not all appropriate” and same percentage 20% rate applies to “unstable”. Office B “appropriate” for eating while 48% of evaluated as, 12% found it “totally appropriate”.

When the office B is also evaluated for “being suitable to get socialized” 4% believed that it is “not appropriate at all.” While 12% “unstable”; 52% “appropriate” and 32% “totally appropriate”.

Another assessment statement for the office is about how suitable it is for “sleeping”. When the results are compared, 12% said “not at all appropriate”, 44% said “not appropriate”, 20% “unstable”, and 24% “appropriate”.

The last evaluated “to get prepared for daily activities”. Result show that, there was no one who said, “not at all appropriate” and “not appropriate”. While 4% of the participants were “unstable,” 76% said “appropriate” and 20% said that it is“totally appropriate”.

4.6.1.3 Daily activities analyses office- C

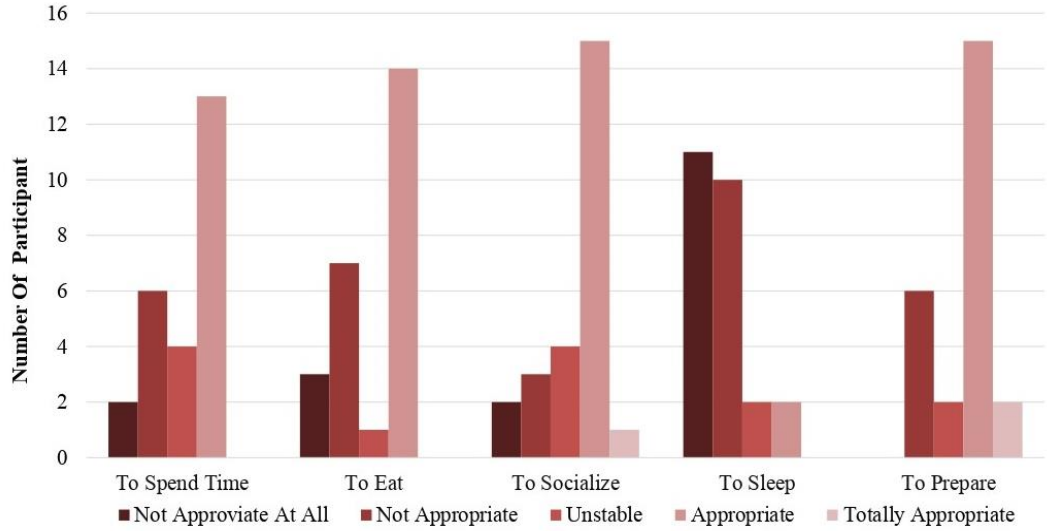

Table 10: *"Daily Activities*" analyses for Office C

Participants evaluated the suitability Office C is for "spending time, eating, socializing, sleeping and to get prepared for daily activities." Results show that 8% of the participant found office C "not appropriate all" for spending time, while 24% of evaluated, 16%" unstable" and 52% said that "appropriate".

The same office is evaluated for being suitable "to eat". When the results are compared, 12% said "not at all appropriate" and 28% said "not suitable". Only 4% remained "unstable". Office C is found to be "appropriate" for eating" 56% "appropriate".

The office C is also evaluated for " being suitable to get socialized" 8% believed that it is " not appropriate at all and %12 "not appropriate". While 16% rated the office as "unstable", 60% found it " appropriate" and 4% said "totally appropriate".

Another assessment statement for the office is about how suitable it is for "sleeping". When the results are compared, 44% rated it "not at all appropriate", 40% said "not appropriate", 8% "unstable", and 8% "appropriate".

The last evaluated “to get prepared for daily activities”. Results show that, there was no one who said “not at all appropriate.” While 24% of the participants were “not appropriate” ,8% said “unstable”, 60% “appropriate” and 8% said “totally appropriate”.

4.7 Analyses On Physical Comfort Conditions

Physical comfort conditions are, auditory comfort, indoor and natural lighting can also be evaluated as indoor air quality and natural ventilation. In the study, indoor lighting elements are studied. There are 3 questions to evaluate the physical comfort conditions. These questions are related to the analyses on natural lighting availability, lighting quality and and the effects of natural light on people.

4.7.1 Natural lighting analyses

In the questionnaire, there are three questions about the accessibility to “Natural light” which are as follows. “*The daylight of the rest office affects my mental state. (Q1)”*, *“I feel comfortable in the area where there is natural light(Q2)” and “I do my job more actively when I get natural light before working. (Q3)”*

When Office A is evaluated by means of *the* first questions, as seen in Table 11, 8% said they are “strongly disagree” and 4% rated the office “disagree”. While 36% said “agree”, 52% said “absolutely agree”.

When the answers to the second question were examined, 4% said they are “strongly disagree”. The rate of those who say “disagree” and “unstable” is the same as 4%. The highest rates were “agreed” with 44% and “strongly agree” with 40%.

When the same space is evaluated by means *“I do my job more actively when I get natural light before working (Q3)* the responses are as follow: 8% said “strongly disagree”, 16% “unstable”, 40% said “agree” and 36% “absolutely agree” which means daylight makes people more active.

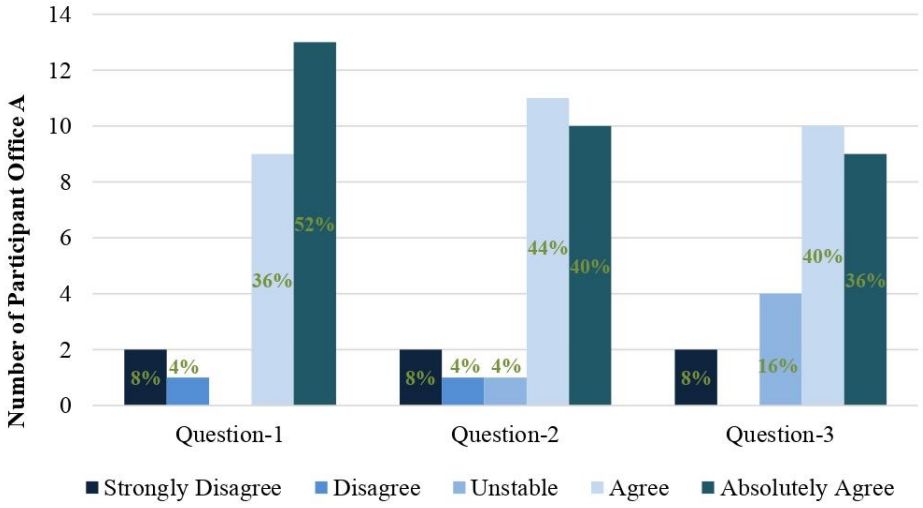

Table 11: *"Natural Light"* percentage graphic distribution for office A

When Office B is evaluated by means of first questions, as seen in Table 12. For the first question, no one gave a negative answer and remained undecided. On the contrary, 40% and 60% gave the answers "agree" and "totally agree". Thus, they said that daylight affects the mental positively.

The Office B is also evaluated for being comfortable with daylight availability. Only 4% were "strongly disagree" while, 28% were "agree" and 68% were "strongly agree". That the space is comfortable where daylight parameters. It can be said that daylight reflected in the interior is important for this office.

When the same space is evaluated by means of making one's job actively (better) under the presence of daylight, the answers are as follows; 4% said to be "strongly disagree", 4% said that it was "unstable", 36% said they are "agree" and 56% were "absolutely agree" which means daylight makes people to study more actively.

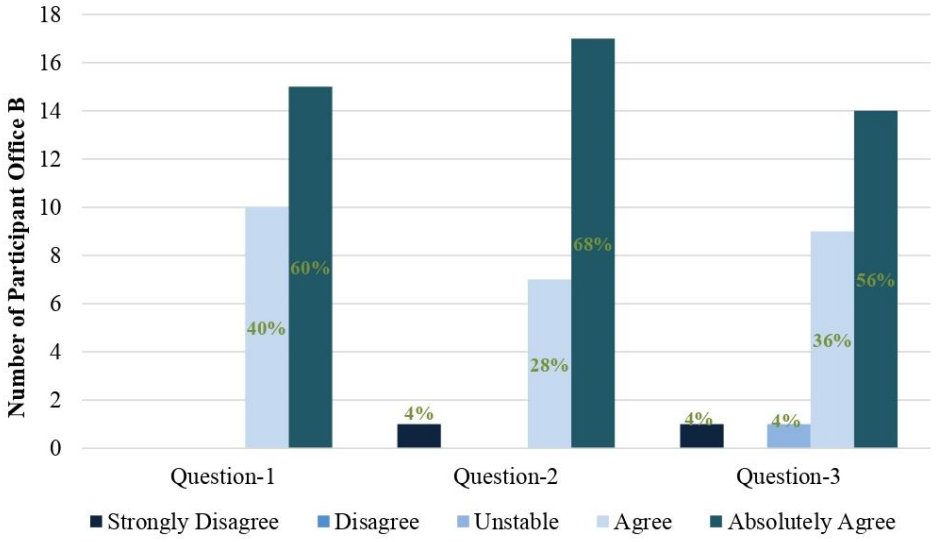

Table 12: *"Natural Light"* percentage graphic distribution for office B

When Office C is evaluated by means of daylight availability of the rest office is affective on mental state, 4% said that they "strongly disagree" while the other 4% said that it was were "unstable" 52% and 40% said that daylight is affective on their mental health.

As seen in Table 13, where the Office C is also evaluated for the same criteria only 4% said that they are "strongly disagree". 56% were "agree" and 40% were "strongly agree". It can be said that the daylight reflected in the interior is important for this office.

As seen in Table 13, when the same space is evaluated by means of making one's job actively (better) under the presence of daylight, the responses are as follow: users did not give any negative answers to this question. 12% said that"unstable", 48% "agree" and 56% "absolutely agree" which means daylight makes people the study more actively.

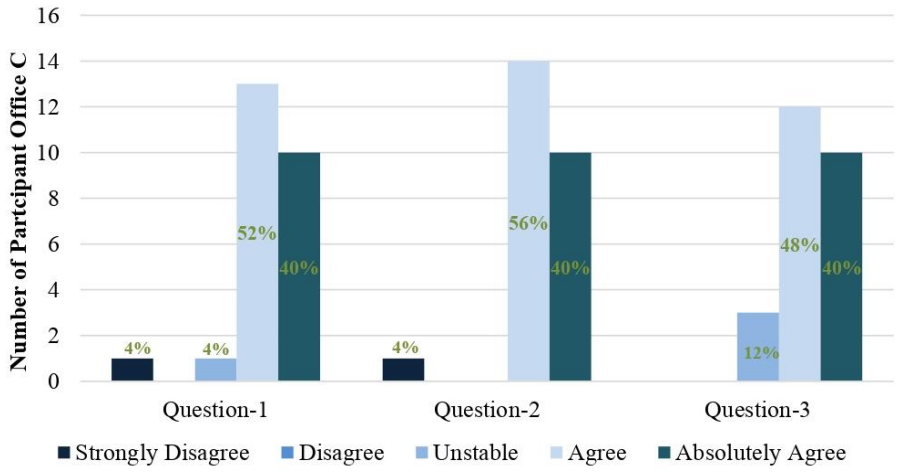

Table 13: *"Natural Light"* percentage graphic distribution for office C

4.7.2 Air quality analyses in the rest room

In the questionnaire, questions which are prepared to evaluate air quality are as follows: "*The general temperature of the office is suitable (Q4),*" *"The ventilation of the office is sufficient. (Q5)", "The ventilation system is set up so that I can adjust the ambient temperature and intensity (Q6)",* "*The quality of ventilation is good during peak hours (work entry/exit) (Q7)",* and finally, *"The air conditioning system does not interfere (Q8)."* In accordance with this information, the answers to evaluate the ventilation in the offices are as follows.

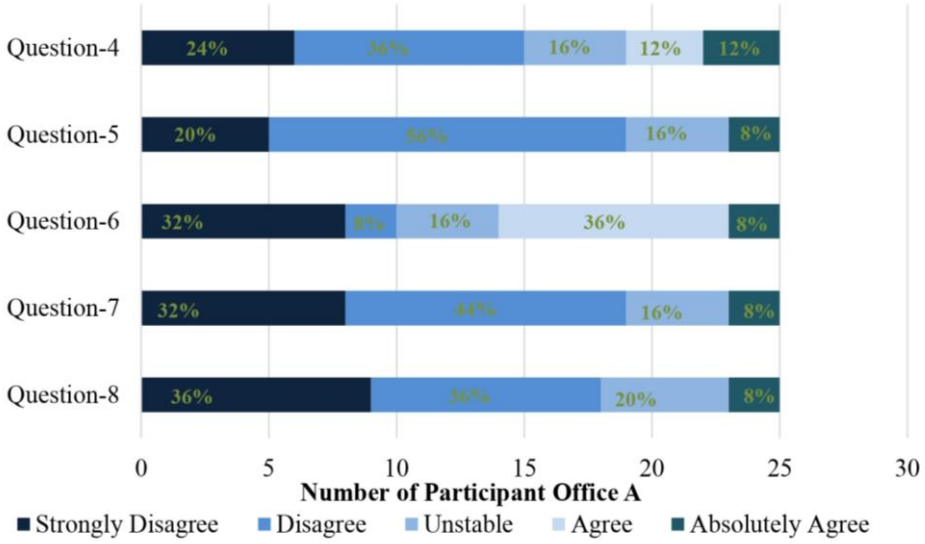

Table 14: *"Air Quality"* percentage graphic distribution for office A

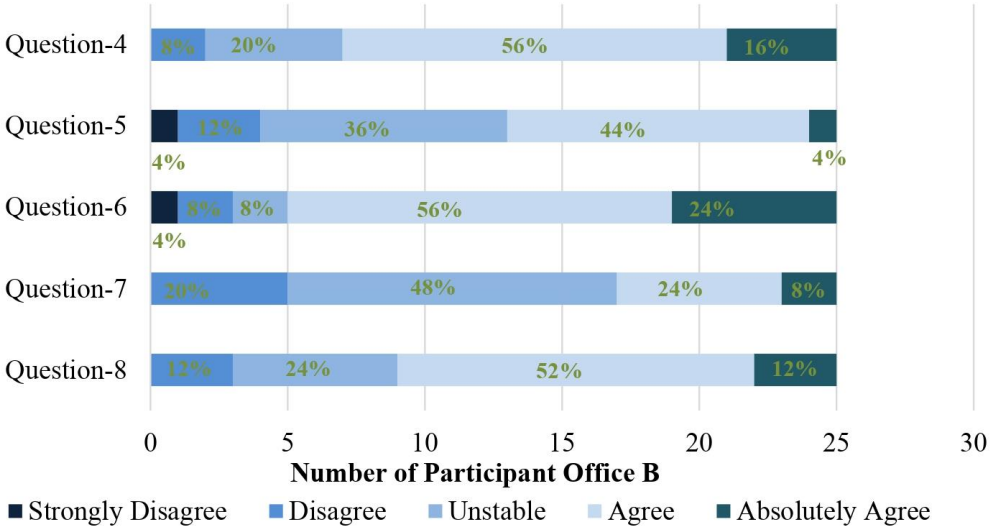

Table 15: *"Air Quality"* percentage graphic distribution for office B

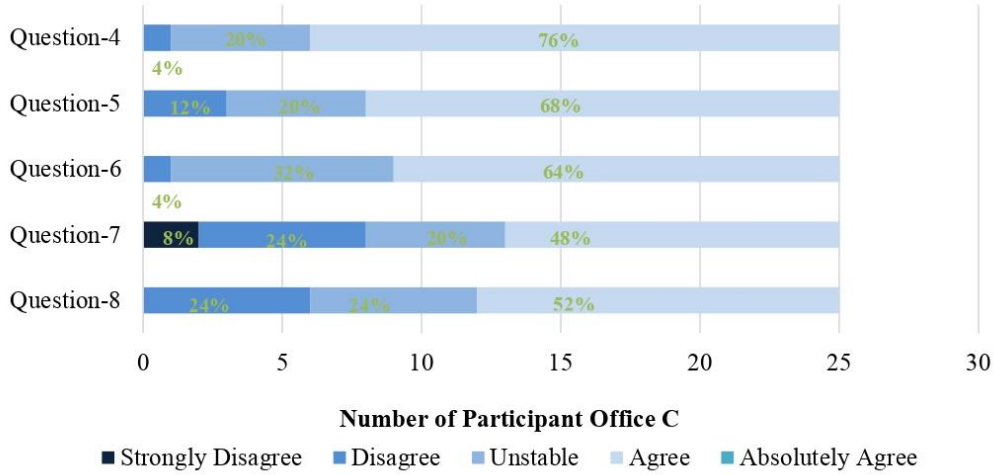

Table 16: *"Air Quality"* percentage graphic distribution for office C

The responses of each office regarding air quality are included in the data. The results to be derived can be analyzed as follows. The responses of the employees of Office A are generally "strongly disagree/disagree". It can be said that they are generally not satisfied with the ventilation of the office. The only point to which they responded positively is the fact that the ventilation mechanism inside can be adjusted manually.

Offices B and C, on the other hand, indicated that they were satisfied with the ventilation and the general temperature of the office, as was office A. When examining the percentiles, the option "I agree" was the most preferred.

4.7.3 Lighting quality

In the last part, the passenger service employees were asked to evaluate the quality of lighting. The following questions were asked : *"The brightness level is sufficient for office activities here (Q9)"*, *"The color of the light is ideal for the rest office (Q10)"*, *"The color of the light used is disturbing. (Headache, drowsiness)(Q11)"*, *"The illumination of the interior is disturbing. (Headache, glare, drowsiness)(Q12)"* and *"The color of the light and the brightness are important factors for me to spend time here(Q13)."*

The purpose of these questions is to find out whether the lighting quality of the rest(break) room causes problems for users and how well the light is suitable.

a. Lighting quality analyses for Office- A

In Office A, which does not receive daylight, as seen in Table 17, that users' ratings for the quality of the lighting are generally negative. The color of the lighting element in the office bothers users quite a bit. Lighting is not ideal for users to perform their office activities. At the same time, the color of light in the office is not ideal, causing problems such as headaches and drowsiness among.

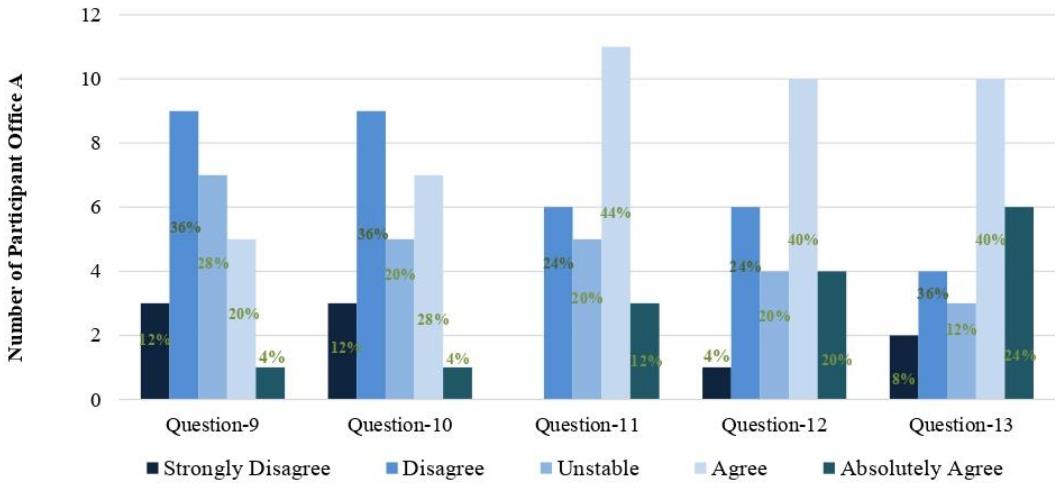

Table 17: Lighting quality analyses for Office A

b. Lighting quality analyses for Office- B

In office B, where both natural and artificial light is used, most users express positive opinions about the lighting. In general, "agree" and "strongly agree" were the most frequently selected answers in the survey.

For the first two questions in the table, "The brightness level is sufficient for the activities here," 15 people responded, "The color of the light is ideal for the rest of the office," and 18 people responded "agree," forming the highest percentage in the survey.

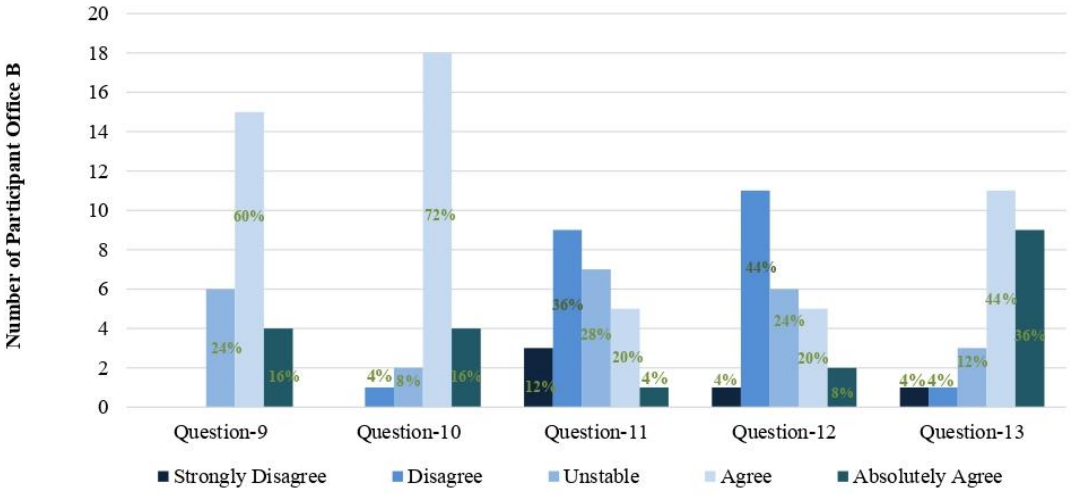

Table 18: Lighting quality analyses for Office B

c. Lighting quality analyses for Office- C

Office C's responses to "quality of lighting" mostly indicate that the place is suitable. While 17 people (68%) are satisfied with the color of the light, they also say it is sufficient for them to spend their daily activities here. The fact that the light used in the rest(break) area disturbs the users has revealed a very small difference between those who do not participate and those who do. The intensity of the lighting was found to be disturbing by 10 people (40%). The brightness and color levels that allow users to spend time in the break room also received the highest percentage on the last question.

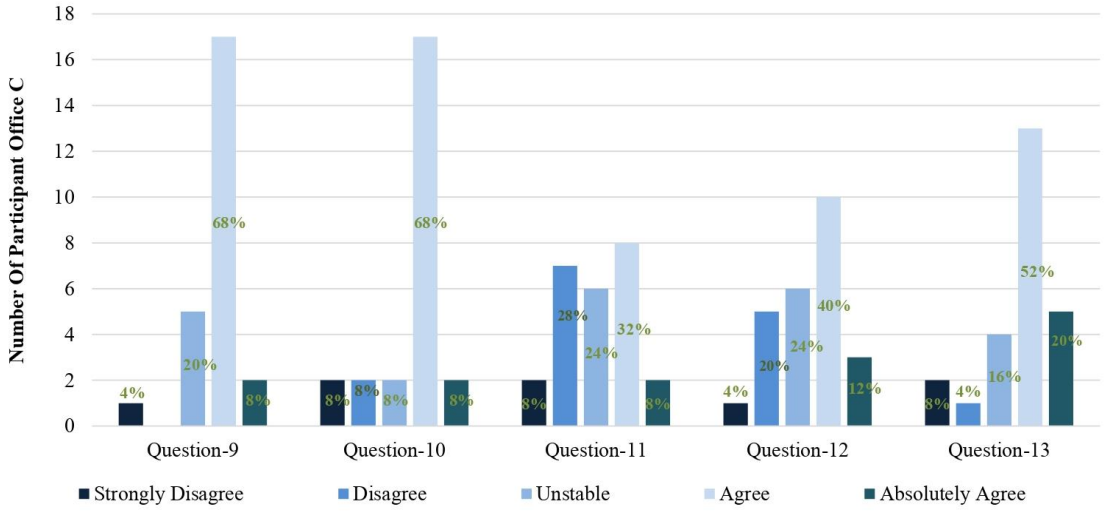

Table 19: Lighting quality analyses for Office C

5. DISCUSSION AND RESULT

When the survey result for three different ground handlers are compared, it was seen that there are both differences and similarities in the responses. In general, the results of the survey can be analysed as follows;

The participant group is form various age groups. However, the majority of the participants in ground handling services is between 26 and 30, according to the survey results. The survey results also show that the weekly working hours of 73% between 41 and 50 hours on a shift system. It is not easy to handle more than one aircraft daily and to keep up with the fast pace of work. Taking into account factors such as work style, long hours and the intensity of the sector, young, dynamic and more active people are preferred for this field.

There are similarities and differences between the spatial characteristics of employee rest (break) offices. All offices are designed to serve as employee break offices. Offices have the opportunity to make changes to the interior, but they have to comply with the airport's specifications. For this reason in the interior space flexibility is limited, built-in furniture is used for interior layouts, columns, partician walls etc… There are also areas where employees can meet their daily needs. In office A and Office C, also have access to areas such as the kitchen area and food vending machines. In this way, employees can easily maintain their eating and drinking habits here. In addition, office A and Office C is only used by ground handling services, while Office B share by administrative staff and managers. Office B kitchen area at diffent location and it is forbidden for using passanger services officers.As the same space is used by different departments for multi-functions, there is a limited space for the staff to get socialized and to perform, activities, resting..

Lighting plays an important role in offices for a good performance of every daily activity. Özkaya and Tüfekçi (2011) also argued that this situation should be at a psychologically satisfactory level. Daily activities include “spend timing, eating, socializing, sleeping (resting) and preparing”. The better the quality of time employees

spend in the rest office, the better their work efficiency will be. According to the results of the survey, employees working more than 8 hours daily spend a maximum of 1 hour in the rest (break) office. In terms of daily activities, Office A is evaluated as "not suitable" or "not suitable at all" to perform their daily activities. Especially, "eating" and "sleeping(resting)" are the most difficult activities for users in this place. Office B is mentioned as the place which is suitable for performing activities. Office C is also mentioned as for all activities, such as spend timing, eating, socializing and preparing just like Office B.

Although this shows that offices B and Office C are suitable for daily activities. The offices give the result that the users are not suitable for resting and sleeping before or after the shift. This is confirmed by the survey results in all three offices. All offices have in common that it is not suitable for employees to sleep (rest) indoors. However, all three offices agree that it is appropriate for preparations before starting work (preparing documents, preparing for the counter and boarding, etc.). In this case, it can be concluded that the rest offices are not suitable for long-term use.

When evaluating the natural lighting of the rest (break) rooms: office A does not receive any daylight when compared to office B and Office C and it has a completely enclosed environment. Office B and Office C are able to receive daylight from their front facade due to their location. Even though daylight does not enter the offices directly from the façade, the offices receive indirect sunlight. However, while Office A is fully illuminated by artificial lightly, Office B and Office C use both artificial and natural light. In this case, the employees in office A are not satisfied with the lighting conditions while the responses of the users in offices B and Office C are more positive because they receive natural light. It was not possible to measure the illumination level in these 3 offices, only the responds of participants are evaluated.

When the ventilation in the offices are asked Office A got the highest negative answers about ventilation. The closest response to this result was "strongly disagree/disagree". Only the fact that the air conditioning in the office can be adjusted manually is approved by the users. The other offices were rated as "agree" to the ventilation

questions which means that they are satisfied at office ventilation. It can be said that, from air conditioning point of view, air conditioning to the employees were satisfied with their office. All three offices are not naturally ventilated. The fact that office A gives such different results compared to the other offices may have many reasons. The size of the offices in square meters, the frequency of users in the space, and other factors also affect the air circulation in the office. Office B and Office C have windows, but they do not open to the outside. They only visually contribute to natural light entering the interior. In general, no office has access to fresh air. Even if there are windows in the offices, not opening them is equivalent to the absence of glass in office A. Staying in a closed environment for a long time and being exposed to artificial ventilation affects the health of employees and reveals the sick building syndrome among employees. Akpınar (2018) said that staying away from fresh air for a long time causes many diseases in people. This is one of the problems that may occur in the future in three ground handling companies that do not receive fresh air.

The three offices are evaluated from lighting design. The entire airport ceiling plan has been designed with the Shell&core system. Shell & Core system it is the structure that comes with the main core of the buildin. Columns form the main building, as do ceiling plans and partitions. The three ground handling offices under study are referred to as "tenants" within the airport. Tenant offices can enter into an agreement with a design firm if they want to make changes to their offices. Interior lighting can vary depending on the work being done in the office and the number of employees. The number of lighting elements in the interior is also calculated according to the number of people who will work in the resting offices. The plan for ceiling lighting in the rest offices differs depending on the user and the intended use. Office A is illuminated by only artificial light. However, according to the survey results, the users of office A are not satisfied with the artificial lighting in the office. Even though the color of the lighting used in office A is a warm color, it mostly had negative effects on employees because the interior did not receive daylight. Daily activities are difficult to perform and cause discomfort to users. They say that only the color and level of lighting in the room affect the employees. Office B contains both artificial light and natural light. Users were impressed with this situation and gave positive answers to most questions. The lighting

and color of the space provide comfort to users in every way. Office C has both daylight and artificial lighting, just like Office B. Again, users found the brightness suitable for their activities, while at the same time many people agreed that the lighting color was not uncomfortable. The fact that the lighting does not cause discomfort does not include problems such as headaches and somnolence in people.

Physical Properties	**A Office**	**B Office**	**C Office**
Daylight	No	Yes	Yes
Window	No	Yes	Yes
Mixed Lighting	No	Yes	Yes
Natural Ventilation	No	No	No
Share Office	No	Yes	No

Table 20: Comparison of physical characteristics of offices

The right lighting element and lighting color also affect the mood of the employees. Veitch (2001) states that the quality of lighting also depends on architecture. As a result of the observations, Office C offers a brighter and more spacious resting office environment compared to the other two offices. Among the factors that cause this situation, even if there is natural lighting, the wall colors used in the offices are insufficient or the wrong lighting element can change the perception of the interior.
In the study, comfort conditions include physical and psychological parameters. However, color rendering property, color temperature of the light sources are not considered.

According to the Table 20, Office A and Office C is not a shared office, they are only used as a rest area by passanger service officers. Office A has no windows, thus daylight and natural ventilation do not come into the interior. Despite this, even the thought of working in an environment where there is daylight affects them mentally in a positive way. The lighting element uses central lighting as a uniform. Office B and C have exactly the same features. Having glass on the front facades allows natural light to reach the interior. However, not opening the windows prevents access to natural ventilation, as in Office A. In both offices, they are use the central lighting system and

different lighting elements. Besides, Office B share office with administrators or managers. So, it can say that among the offices, the users of office A are not satisfied with their offices, while offices B and C have more useful and user-friendly offices.

There are many limitations in the thesis work. First, the study is mainly concerned with the rest office of the passenger service officers. In the literature review, there are not many studies on this topic. There are evaluations and studies on employee performance and efficiency, especially flight attendants. However, when considered separately, there are different studies related to the rest office, the passenger service officer and the lighting in the offices. As well as the limitation in the literature, the implementation of the survey also brought some limitations. The survey questions were applied to randomly selected people from 3 ground handling companies. While the two companies could be delivered directly to their participants, the other office did not allow communication with the employees and distributed the questions themselves.

Access to the current status of the technical drawings contained in the dissertation was not shared for security reasons. The lighting plans are up to date. However, the interior layout has changed in some offices. Some drawings are from the emergency escape plan in public spaces, others are from the airport archives. For the office ceiling and lighting plans, the two ground service offices have agreed to work in the office and gave their approval for the interior images. However, another office refused to allow access to the office for reasons of employee safety and, after several stages, allowed analysis and observation in the rest office for a certain period of time. Figure 30 is the original rendering about the Office C. Due to the security reason no photos were taken about interior space but, a render image of the interior was used. The technical department of the airport did not allow technical measurement of lighting in all three offices, and they did not share notes in terms of information security. Therefore, only the observation technique was used in the offices.

6. CONCLUSION

The development of technological studies required growth in many business sectors. As in any sector, the aviation sector is one of them and perfect service is one of the most important points in this field. Uninterrupted service, a safe flight and customer and airline satisfaction are the top priorities. Even though these services are provided in their entirety, the passenger's in-flight experience begins with ground service. The passenger service agent is responsible for all operational processes from the passenger's arrival at the terminal building to their departure. Passenger service officers work in shifts, unlike traditional working conditions. However, there can be some problems caused by working in shifts. It can prevent these problems and is based on the fact that employees should be satisfied, happy and content with their work. Officers who work long hours need to rest at regular intervals.

This study investigated how the physical characteristics and visual comfort of rest offices affect employees. The physical characteristics of the rest office and lighting comfort affect employee performance during the day. Spending hours in a closed office or rest area has become a routine activity in people's lives. The color and intensity of lighting in rest areas also have an impact on people. The fact that people do not receive sunlight for a long period of time, and the visual and physical comfort of the rooms in the bugging office is not adequate, leads to long-term health problems. Daylight plays an important role in human life, both psychologically and physically.

A study was conducted on natural light, ventilation, lighting level and daily activities and their effects from three ground handling companies evaluated in the thesis. According to the result of the study, the perception of both daylight and spatial concept tends to decrease after a while in office workers who have no communication with the outside world. They do not receive daylight, and the color and intensity of indoor lighting do not satisfy employees. Employees who lack quality time in the quiet office work tired, with headaches and bad mood. This situation causes employees to experience health problems and leave their jobs in the long run. The presence of windows in the rest offices and the penetration of natural light into the interior have an

impact on the office environment. Even if not directly, the fact that they receive indirect daylight in their offices contributes positively to employee performance and efficiency. The fact that they can connect with the outside world, recognize the time of day, and comment on the weather makes the time they spend in the rest office a quality. This situation is reflected in all kinds of mental and physical health of employees.

The suggestions for the future and the positive effects it will bring can be summarised as follows: It will be a benefit that will increase the efficiency and performance of the passenger service officers working in the aviation sector. Thus, actions such as commitment to the organization and leaving the workplace will decrease and employee satisfaction will increase. In three offices, it is not able to spend the rest activity efficiently. For this problem, arrangements can be made for lighting indoors and furniture that is flexible. For shift workers, modules that provide more "privacy ", furniture that will be used in part of the offices, may be preferred. Sleeping pods or cubic chambers that can be opened and closed with a screen can be used where employees can enter and relax. In addition, the lighting that will be used in offices that never receive daylight can be designed in such a way as not to disrupt the circadian rhythm of people, not to reduce efficiency and performance, but also not to cause physical / mental health problems in employees. Artificial lightings are usually of a fixed structure. This also affects the perception of the interior. It can lead to loss of the concept of day and night in employees and to disorders in perception. Apart from a uniform lighting color and element, smart LED lights that change according to the time of day (morning, noon, evening...) can be preferred. Thus, apart from the constant and traditional lighting color, the time zone of the person during the day can be taken into account.

In addition, the lighting used in daily activities should be preferred according to the work to be done. Different lighting elements may be preferred for an employee who is eating and an employee who is reading a book. Modular wall lighting or more localized lighting may be preferred. For any type of lighting to be selected, factors such as light color, illuminance, and distribution of light must be well evaluated for the work to be performed. More careful design of the physical properties and visual comfort

conditions of the interiors will protect the health of the employees and prevent many problems. Preferring the lighting to be used in the resting areas according to the work to be done will ensure that every work gives better results. Thus, the performance and productivity of the employees will increase. In the same time, human-oriented lighting will make the artificial environment offered to the person more comfortable and convenient for the user.

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APPENDIX A

KİŞİSEL BİLGİLER
Yaşınız? : **Cinsiyetiniz? :** ☐ Kadın ☐ Erkek ☐ Belirtmek İstemiyorum
Medeni durumunuz? : ☐ Evli ☐ Bekar
Eğitim durumunuz?: ☐ İlkokul ☐ Ortaokul ☐ Lise ☐ Lisans ☐ Yüksek Lisans ☐ Doktora
Şirketteki Çalışma Biçiminiz? : ☐ Yarı Zamanlı ☐ Tam Zamanlı **Şirkette Çalışma Süreniz? (Yıl, Ay)**
Genellikle Hangi Vardiyalarda Bulunursunuz? ☐ Sabah ☐ Öğlen ☐ Akşam ☐ Gece

1. VARDİYA PROGRAMINIZ

1) Geçen haftaki vardiyanızda ortalama kaç saat çalıştınız?

Haftaiçi + Haftasonu toplam saat:

2. DİNLENME OFİSİ TASARIMI/ ERGONOMİSİ

1) Dinlenme ofisinde günde ortalama kaç saat geçiriyorsunuz?

2) Dinlenme ofisinizin çalışmanıza ne derece etkisi olduğunu düşünüyorsunuz?

☐ Çok etkiliyor	☐ Bazen etkiliyor	☐ Kararsızım	☐ Etkilemiyor	☐ Hiç etkilemiyor

2.1 Kullandığınız dinlenme ofisini aşağıdaki aktivitelere ***uygunluğu*** açısından değerlendirir misiniz?

	Hiç Uygun Değil	**Uygun Değil**	**Kararsızım**	**Uygun**	**Tamamen Uygun**
Vardiyadan önce/sonra vakit geçirmek için;					
Yemek yiyebilmek için;					
Kurum personeli ile sosyalleşebilmek için;					
Uyumak için/Dinlenmek için;					
İşe hazırlık yapabilmek için;					

2.2 Dinlenme ofisinin ergonomisiyle ilgili aşağıda yer alan ifadelerden en uygun olanı seçiniz.

	Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Kesinlikle Katılıyorum**
Gün içerisinde ofiste rahatlıkla dinlenebiliyorum.					
Dinlenme ofisinde vakit geçirirken ihtiyaçlarımı karşılayabiliyorum.(mini mutfak, teras, televizyon..)					
Dinlenme ofisi ergonomisi işimi iyi yapabilmem için önemlidir.					
Dinlenme ofisinin iç mekânını beğeniyorum.					
Dinlenme ofisindeki mobilyalar bu ihtiyaca uygun olanlardan seçilmiştir.					
Koltuklar üzerindeki kumaş/ diğer kaplamalar uzun süre oturmak için idealdir.					
Mevcut dinlenme ofisinin mobilyaları sağlık sorunlarımı tetikliyor.					

3. FİZİKSEL KOŞULLAR

1) Kullandığımız dinlenme ofisinin ***fiziksel koşulları*** ile ilgili olan ifadelerden sizin için uygun olanları seçiniz.

DOĞAL IŞIK	**Kesinlikle Katılmıyorum**	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Kesinlikle Katılıyorum**
Dinlenme ofisinin gün ışığı alması ruhsal durumumu etkiler.					
Doğal ışık olduğu alanda kendimi rahat hissederim.					
Çalışmadan önce doğal ışık aldığımda işimi daha aktif bir şekilde yaparım.					

DİNLENME OFİSİNİN HAVA KALİTESİ	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
Ofisin genel sıcaklığı uygundur.					
Ofisin havalandırması yeterlidir.					
Havalandırma sistemi ortam ısısını ve şiddetini ayarlayabilmeme imkan verecek şekilde düzenlenmiştir.					
Kalabalık saatlerde (iş giriş/çıkış) havalandırma kalitesi iyidir.					
İklimlendirme sistemi rahatsız etmemektedir.					
AYDINLATMA KALİTESİ	**Kesinlikle Katılmıyorum**	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Kesinlikle Katılıyorum**
Aydınlık düzeyi buradaki aktiviteler için yeterlidir.					
Işığın rengi dinlenme ofisi için idealdir.					
Kullanılan ışığın rengi rahatsız etmektedir. (baş ağrısı, uyku hali)					
İç mekandaki aydınlık düzeyi rahatsız etmektedir. (baş ağrısı, göz kamaşması, uyku hali)					
Işığın rengi ve aydınlık düzeyi burada vakit geçirmem için önemli etmenlerden biridir.					

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