A SEARCH FOR A METHODOLOGY TO IDENTIFY THE EFFECT OF EMPLOYEE CHARACTERISTICS ON SPATIAL REQUIREMENTS AND EXPECTATIONS FROM MODERN OFFICE DESIGN

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

ZEYNEP KINA

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
BUILDING SCIENCE IN ARCHITECTURE

JANUARY 2020

Approval of the thesis:

A SEARCH FOR A METHODOLOGY TO IDENTIFY THE EFFECT OF EMPLOYEE CHARACTERISTICS ON SPATIAL REQUIREMENTS AND EXPECTATIONS FROM MODERN OFFICE DESIGN

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ABSTRACT

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January 2020, 133 pages

Dominance of the knowledge intensive sectors over the global economy, change in business nature and innovation becoming the main source of competition has affected also the physical workplaces. Eventually, 21st century office design concept has risen with the purpose of increasing collaboration, motivation and so creativity and innovation. However, there cannot be a standardized office design that is well suited to all companies due to three main factors, which are culture, sector and employee characteristics. In this thesis, as components of employee characteristics factor, the effects of gender, age, education level and profession on spatial requirements and expectations of the participants have been studied. A survey questioning the five main characteristics of modern offices was prepared and applied to the employees of PTTeM from four different departments, which are operations, finance, programming and sales and marketing. Based on the survey results, it has been discussed whether the spatial needs and expectations from the office design differ according to the gender, age, education level and department with the help of parametric and non-parametric analyses conducted through SPSS®. Department has been found to be a significant variable and spatial requirements of the investigated departments and the differences between them have been identified.

Keywords: Office design, Physical office space, Innovative offices, Workplace environment, Office management

ÖZ

ÇALIŞAN ÖZELLİKLERİNİN MEKANSAL GEREKSİNİMLERE VE MODERN OFİS TASARIMINDAN BEKLENTİLERE ETKİSİNİ TANIMLAMAK İÇİN BİR METODOLOJİ ARAYIŞI

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Ocak 2020, 133 sayfa

Bilgi yoğun sektörlerin ekonomideki payının artması, iş doğasının değişimi ve inovasyonun rekabet edebilirlikteki en büyük kaynak olması fiziksel ofis ortamını da etkiledi. İş birliğini ve motivasyonu dolayısıyla da yaratıcılık ve inovasyonu arttırmak amacıyla 21. yüzyıl ofis dizaynı doğdu. Ancak, kültür, sektör ve çalışan özellikleri faktörleri sebebiyle her şirkete uyabilecek standart bir ofis dizaynı yaratmak mümkün değildir. Bu tezde, çalışan özelliklerin bileşenleri olarak cinsiyet, yaş, eğitim seviyesi ve mesleğin çalışanların mekânsal gereksinim ve beklentilerine etkisi çalışılmıştır. Modern ofislerin beş ortak özelliğini sorgulayan bir anket hazırlanmış ve PTTeM şirketinde satış pazarlama, operasyon, yazılım ve finans departmanlarında çalışanlara bu anket uygulanmıştır. Anket sonuçları baz alınarak mekânsal gereksinimlerin ve beklentilerin cinsiyete, yaşa, eğitim seviyesine ve departmana göre değişip değişmediği SPSS® programında yürütülen parametrik ve parametrik olmayan analizler yardımıyla tartışılmıştır. Analizler sonucunda, departmanın anlamlı bir değişken olduğu bulunmuştur ve incelenen mesleklerin mekânsal gereksinimleri ve departmanlar arasındaki farklılıklar belirlenmiştir.

Anahtar Kelimeler: Ofis tasarımı, Fiziksel ofis alanı, İnovatif ofisler, Çalışma ortamı, Ofis yönetimi

“We shape our buildings thereafter they shape us”
Winston Churchill”

ACKNOWLEDGEMENTS

First of all, I would like to express my sincere thanks to my thesis supervisor, Prof. Dr. Ali Murat Tanyer for his guidance, support and patience in this long journey. I am really grateful for his valuable time and feedback. I consider being supervised by him as an honour. Without his understanding and calmness, I would never have completed my thesis.

In addition to my advisor, I would like to thank all members of the thesis examining committee, namely Assist. Prof. Dr. Mehmet Koray Pekeriçli, Prof. Dr. Arzu Gönenç Sorguç, Prof. Dr. Celal Abdi Güzer and Prof. Dr. Gülser Çelebi for accepting to be a part of the committee and their valuable time and feedbacks.

Moreover, I am indebted to my friends, especially Özge Eyyüpoğlu for motivating me to make a new start and complete my studies and Can Hatunoğlu for his help and support. Besides, with my whole heart, I want to thank Mertcan Cengiz who is always with me in this long journey with his endless support, constructiveness and never ending belief in me. This thesis could have remained as a dream without you.

Above all, I cannot find words for my deepest gratitude to my dear family, Elif Kına, Feray Kına and Fuat Kına for their encouragement, inspiration and love in my whole life, in particular for times when I lost my hope and confidence. I could never be who I am now without you.

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CHAPTER 1

INTRODUCTION

In the "Introduction" part of the thesis, firstly, the background information is given about the historical background of office design. Later on, the three main factors that have an influence on office design is presented and the reason for the selection of the topic for the thesis is explained. The chapter continues with the research objectives and questions and concludes with the brief information about the structure of the thesis.

1.1. Background Information

The percentage of knowledge intensive service sectors in the global economy is increasing day by day. The shift in major component of world's economy affects many things including the office design. Workplace design have evolved inevitably due to the change in three main factors: business nature, employee requirements/expectations and priorities of employers. Office design of a firm is expected to be shaped by these three fundamental aspects. For instance, 20th century's traditional office design was based on the division of labor and nature of the work flow. The work and information flows in 20th century were linear. In other words, the work was distributed among the employees and each individual work were added one after another to get the final service or product. It was like production line in the factories. Employees, except for the executives, were only responsible from their parts and did not have to know about the big picture (Allen & Henn, 2007). Therefore, executives did not feel obliged to consult the employees in decision making process of any issue. There was almost no communication between managers and workers and this situation reinforced hierarchy in organizations. Linear work and information flows, lack of communication and high level of hierarchy shaped the 20th century office design. Private rooms were common

for managers as they were believed to be the only ones with intellectual work responsibilities. Their offices were located far from the employees where the work could be superintended but communication was obstructed. On the other hand, people with mechanical work were seated in the same large room which was generally consisted of long rows of desks (Demaria, 2018).

However, in 21st century, business has become innovation-driven and competitive. The work and information flows are no longer linear. Adding individual works together is not sufficient to achieve the ultimate goal. Instead, the results of individual works should be communicated over the course of the process. All employees have to have information about the whole procedure to coordinate their works accordingly and participate in idea generation process. Communication between managers and subordinates has become important and hierarchy is lightened. Besides, this shift in economy and change in the business nature has created a need for employees with critical thinking, creativity and coordination skills. In addition to salary and fringe benefits, companies start having to offer a physical working environment which satisfies the needs and expectations of the employees in order to attract and keep talent. This whole situation acted as the driving force for organizations and they have begun to reconsider their office designs. Eventually, 21st century workplace concept has emerged and big technology companies based in United States are considered as the pioneers in the transition from traditional ones to the modern ones. The reason behind the transition to the 21st century office design is mainly increasing employee motivation, communication, collaboration and so innovation and competitiveness.

Nowadays, office design is used not only for increasing innovation but also as a way of marketing for partners, customers and potential employees since it reflects the organizational culture, company ethics, core values, priorities and attitude towards employees. Although it is relatively easy to convince an outsider that the organization is reputable and credible with well-appointed reception area and meeting rooms, the outstanding part of designing the workspace is being able to satisfy people who know the company well, mostly employees (Lovell, 2017). The point that needs attention is

that each employee is different from another and so as their expectations and motivating ways. Therefore, there cannot be a standardized office design that suits to all companies/employees and the "perfect" office design of one company might not work for another one. For this reason, creating a workspace has been considered as a challenging task and needed to be approached elaborately. Copying of an office's design and implementing it to another organization will not give the same results in terms of employee satisfaction and productivity, mainly because of the differences in culture, sector and employee characteristics such as age average and gender ratio. Each company should amend the 21st century office concept according to their own features and have a customized office design.

Although there are various companies with modern office design in various sectors throughout the world, the number of researches examining modern workplace designs outside of the United States is limited. Besides, factors affecting the office design, except for the space and budget, have not been studied academically. Previous academic studies about 21st century office design are mostly empirical, concentrating on the effect of modern office spaces on employee productivity or consisting of cost-benefit analyses. In addition, spatial requirements of employees are overlooked in the literature and even the pioneers implement more or less the same office design to all their offices regardless of the age average, gender ratio of office, departments or the culture. Based on above, it can be concluded that there is a gap in the literature about the potential effects of sector, national and organizational culture and employee characteristics on the 21st century office design.

In this thesis, the effect of employee characteristics on office design was studied. Considering the fact that gender, age, education level and profession, which are the components of employee characteristics, have an impact on spatial requirements and expectations from modern office design, determining significant variables, identifying the differences in spatial requirements/expectations and designing the office according to them is a crucial issue especially for the conglomerates in the 21st century as they employ large number of employees, incorporate different industries and business

units. Even if a company with many offices embraces the modern office concept, the way of motivating and satisfying the employees is not the same for every office as the needs and expectations of personnel of these offices differ. Therefore, for each office, the office design should be unique in certain aspects due to the employees working there. Although, as mentioned before, a standardized workplace design that fits to all employees cannot exist, the positive effects of the office design on employees can be maximized by creating office spaces considering the employee characteristics.

1.2. Research Questions and Objectives

The main goal of this thesis is to come up with a methodology to identify the effects of gender, age, educational level and department on spatial needs and expectations from modern office design and to show that the 21st century office design is not the optimal one for all employees by analyzing the effects of aforementioned sociodemographic features and identifying the differences between the employee groups, which are composed regarding the significant variables, in these aspects.

Based on the main goal explained above, the main research questions of this thesis are given as follows:

1) Do spatial requirements and expectations from modern office design differ according to gender, age, education level and department?
2) What kind of differences does the significant variables create in the employees' spatial requirements and expectations from the modern office design?

The work process is as follows:

1) identifying the common features of so called 21st century office designs by literature review
2) preparing a survey based on these common features and applying to the sample group
3) checking the survey and the data for validity and reliability

4) determining the significant variables among gender, age, education level and department by performing parametric and non-parametric analyses
5) identifying the differences created by the significant variables in the needs and expectations of the sample from an office space based on the five common features of modern offices

In order to provide answers of these questions, first a framework has been developed regarding the common features of modern office design identified in the literature and the components of employee characteristics factor. Based on this framework, a survey has been prepared and it was applied to a dot-com Turkish company, namely PTTeM. The data collected from the survey has been analyzed through SPSS®. The reliability and validity of the data has been tested and then the significant variables have been found. The methodology is further explained in the "Methodology" part of the thesis.

1.3. Thesis Structure

Thesis about effect of employee characteristics on office design is structured in below way.

Chapter 2 is the literature review part of the thesis. It is composed of four parts: power of office design, evolution of offices, common characteristics of 21st century offices and inferences drawn from the literature.

Chapter 3 is the methodology. The method and material to answer the research questions listed above are explained in this chapter. It includes the selection criteria of the company and brief information about the survey and survey participants including their job descriptions.

Chapter 4 is the results and discussion part of the thesis. The chapter includes the data collected through the survey and spatial requirements of occupational groups and their expectations from modern office design are identified. The performed statistical tests are explained and findings are presented.

Finally, Chapter 5 is the conclusion. The summary of the research findings, limitations of the study and recommendations for the future work can be found in this chapter.

CHAPTER 2

LITERATURE REVIEW

As can be understood from the name of the chapter, this part of the thesis presents a literature review on office design using various sources. During the research, office design, office design evolution, office layout, innovative space, physical office environment keywords were used. The chapter begins with the power of the office design and its effects on the organization itself. Later on, evolution of the offices describing 9 main stages from Taylorist office design to modern offices is explained. Then, 21st century office design is explained in detail and mandatory features in order to call an office "innovative" is presented. The inferences drawn from the literature constitutes the last part of the chapter.

2.1. The Power of Office Design

Understanding the power of design and the role it plays is a significant point in architecture. The ideas are framed by the places we inhabit. As Winston Churchill once said, "We shape our buildings; thereafter they shape us". Physical office environment is one of the most critical assets of the companies as it has a significant effect on functioning of an organization. Unfortunately, most of the times, companies are not aware of this asset and it is not used efficiently (McCoy, 2005).

First of all, the office setting affects the mood which plays a part in effectiveness and efficiency in business terms. 90% of American employees think that better office layout and design have a positive effect on their performances (Gensler, 2006). According to Leaman and Bordass (1999), physical working space can affect employee productivity by up to 20% both in negative or positive terms. As a matter of course, the productivity of an employee is expected to be lower when the office conditions obstruct doing his/her duty such as poor lighting. Besides, unfavorable

physical environment, like insufficient natural lighting and/or uncomfortable office furniture, may lead to dispiritedness and so low productivity. If these conditions persists, absenteeism due to physiological and psychological problems such as depression and high employee turnover rate can be seen. This can be considered as the direct effect of office design on employee productivity and organizational effectiveness.

Moreover, the design has an influence on the behavior and thinking process of occupants of that place. For instance, spaces with high ceiling increase the ability to think spatially and conceptually whereas spaces with low ceiling improve cognitive performance for mathematics (Wyatt, 2016). The relationship between nature and human beings is also an important dimension for design. Cognitive performance in the office tend to go up and stress is reduced in the presence of plants and trees.

In addition to these, office space has a non-ignorable effect on where and how employees interact and the quality of this interaction (Allen & Henn, 2007). Success and capacity to compete is highly linked with innovation and creativity in the 21st century and as there is 81% positive correlation between innovation and collaboration, it would not be wrong to say that workplace design which fosters collaboration and communication is a component of success (Herman Miller, 2015).

Furthermore, by 2020, generation Y will form over the 50% of the workforce whereas baby boomers will drop to 23% (PwC, 2011). This means that companies who cannot engage and attract millennials will lose their competitiveness. Work environment and office design is also used as a way to attract and keep talent. Several firms have started to use office design improvements as a source of extrinsic motivation like pay rise or bonus.

Last but not least, in many cultures, especially in hierarchical ones, office design is an indicator of title of its occupant in an organization. The hierarchy is signalized by the size of the office and the number of employees sharing the room. As the level of an employee increases, the physical environment conditions are improved. Therefore, it

would not be wrong to say that as the rank increases, so do the offices (Hall, 1976). The office of top manager or the owner is generally the largest in the company and located at the highest floor in multi-storey buildings. On the other hand, newly graduates and/or juniors do not have private offices as it is perceived as a privilege and the low level employees are not considered worthy. They share the office which is highly likely to be in the ground floor, with their peers. In addition to the working spaces, in some cases, the dining halls, toilets, coffee lounges and park areas are different for the high management (Pellegrini & Scandura, 2006). In the light of these, office design gain prominence, companies have started to rethink about their workspaces and 21st century office concept has arisen.

2.2. Evolution of the Offices

The first distinction between office and home was made by Witold Rybczynski in "Home: The Short History of an Idea". Ever since, workplace designs are constantly evolving and adapting. Offices have changed over time both in terms of design and technology, as a result of the alterations in nature of business, employee expectations and business owners' priorities. Officials of Morgan Lovell, which is a British leader and listed company in office interior design, stated that evolution process of offices is consisted of mainly 9 stages: Taylorist office, pre-war social democratic office, streamlined office, open plan office, Bürolandschaft, action office, cubicle farm, dot com bubble office and networked office. Frank Duffy, who is an architect and a theorist, argued that there are three main waves of change in the evolution process of offices which are Taylorist office, social democratic office and networked office and the other stages can be regarded as transitional stages.

2.2.1. Taylorist Office (1900)

Frederick Taylor, who was an American engineer and scientific management expert, can be considered as one of the first people to design an office place. His office design was named after him as "Taylorist Office". The main goal of the Taylorist offices was

to increase efficiency as a consequence of industrial revolution. Efficiency was tried to be increased by putting more desks and employees in an open area (Lovell, 2017).

Hierarchy was the central feature of Taylorist kind of offices. Each employee sat at an individual desk but they did not have any privacy. On the other hand, managers had individual rooms and office space was designed in a way that managers could watch their employees (Robinson, 2016). Privacy was something that only managers or people higher in the hierarchy could have; it was not for ordinary clerical workers. Notwithstanding criticisms of trade unions for not being humane and regarding workers as machines, Taylorist offices spread quickly to the rest of the world as it increased business productivity and so profitability (Derksen, 2014).

Figure 2.1. A typical Taylorist Office (Lovell, 2017)

2.2.2. Pre-War Social Democratic Office (1910-1930)

Pre-War Social Democratic offices can be considered as miniature Taylorist offices. Taylorist principles were followed. The only differences of Pre-War Social Democratic offices were applying Taylorist principles to smaller scales and giving much more importance to natural lighting.

2.2.3. The Streamlined Office (1930)

Like Pre-War Social Democratic offices, the Streamlined offices were also similar to Taylorist offices. However, in addition to increasing speed and efficiency, being aesthetically pleasing became one of the fundamental aims of the Streamlined offices in 1930s since companies started to see the office design as a part of their corporate image. People higher in the hierarchy still had private rooms away from the area for clerical work but interaction between employees were more encouraged when it is compared to Taylorist ones (Robinson, 2016). Moreover, as it can be understood from its name, streamlined materials were used in order to create warmer and modern spaces for employees (Lovell, 2017).

Figure 2.2. An example of Streamlined Office, Johnson Wax Building (Minner, 2010)

2.2.4. Open Plan Office (1950)

In 1950s, wider open layout offices were designed and they were frequently seen in new high-rise buildings. Clerical workers were placed in open spaces whereas managers had individual offices, usually at the top floor of the building reinforcing the hierarchy perception. Moreover, advanced air conditioning and fluorescent

lighting were integral for this kind of offices as they were isolated from the outside world (Lovell, 2017). Besides, modern materials like steel and glass were often used unlike Taylorist offices.

2.2.5. Bürolandschaft/Social Democratic Office (1950)

Bürolandschaft has a direct translation to English language as "office landscape". It can be considered as a reform in office design as it was a major departure from Taylorist offices. Bürolandschaft offices signalized "the rising power of the white collar unions in Germany and Scandinavia" (Myerson, 2013). Company owners came to realize the positive effect of employee well-being on productivity. With this awareness, the focus in designing an office was shifted towards employees for the first time in the history. Desks in Taylorist offices were lined up in a geometric order whereas desks in Bürolandschaft did not follow strict geometric pattern. The desks were placed irregularly. Managers and employees with clerical work occupied the same space. This allowed more interaction and so more efficient information and work flows when it is compared to Taylorist offices. Zones were created within the office with the help of partitions and/or plants and each zone had different layout based on the work done there. Employees with creative work were grouped more loosely to foster interaction while corporate employees were located in more rigid subdivided areas (Lovell, 2017). Before 1950s, employees were only seeing the back of their peers as all workers faced in the same direction. However, in Bürolandschaft, employees were facing each other. This situation also encouraged interaction and collaboration (Fantoni, 2014).

2.2.6. Action Office (1960)

George Nelson, Robert Probst and Herman Miller were the creators of Action Offices. The main goal of action offices was making social democratic offices more flexible and creative and the idea behind was motion. Privacy and openness were at the center of action office design. An employee could arrange the office components such as desk and chair in accordance with his/her preference so that that area could be an

individuated space for him/her. Panel system was a major constituent of action offices (Fantoni, 2014). The panel system provided privacy, flexibility, configurability and personalization (Lovell, 2017). Action offices were not adopted by many but they gave birth to cubicles.

Figure 2.3. A typical Bürolandschaft Office (Draskovic, 2013)

Figure 2.4. An Action Office (Lovell, 2017)

2.2.7. The Cubicle Farm (1980)

The cubicles were the sign of the rising of middle class and first personal computer (Fantoni, 2014). The cubicles were partially enclosed spaces which were separated from the side desk with partitions. The idea was to provide some privacy to employees. The cubicles were mainly created for middle managers, who were more "valuable" for the organization than the clerical workers with only desk but less "valuable" than the managers with individual rooms (Lovell, 2017). Moreover, cable systems had started to become the major source of communication rather than face-to-face meetings or verbal communication. Therefore, wide and open spaces or desks facing each other were believed not to be required. Although interaction and sense of community were lower in this type of office design, it has dominated the office landscape from 1980s onwards.

Figure 2.5. A Cubicle Farm (Van Hoven, 2014)

2.2.8. The Dot Com Bubble Office (1990)

As a consequence of increasing ease of internet access, technology was the central feature of dot com bubble offices and open office layout was adopted. One of the most significant goals of 1990s office designs was having fun while working. For this reason, they were also described as adult playgrounds. However, boundary between work and play was fuzzy and this situation made the office space more chaotic and less manageable by comparison with earlier offices in the evolution process. In

addition to technology and fun, flexibility was important. Everything relating to business was in the state of flux and technology was moving too fast to design an elaborate office space so the dot commers emphasis on adaptability and flexibility while designing their offices (Saval, 2014).

2.2.9. 21st Century Office (2000)

Digital marketing startups can be considered as the pioneers and early adopters of 21st century office spaces which are also known as casual offices, networked offices and innovative offices. The focus of casual offices is "effectiveness rather than efficiency" (Glynne, Hackney & Minton, 2009). Similar to Dot Com Bubble offices, technology is at the center of networked offices. Personalization is a key for 21st century offices and they are designed for employees who spend long hours in the office. The physical working environment is more flexible, multi-purposed, causal, informal and comfortable.

The offices in 21st century are designed in a way to assist the following:

i. Attracting and retaining talent
ii. Encouraging collaboration
iii. Fostering idea exchange
iv. Increasing employee motivation and satisfaction
v. Creating a sense of belonging for employees
vi. Accelerating creativity and innovation

2.3. Common Characteristics of 21st Century Offices

Common characteristics of modern offices can be categorized into five major features which are collaboration enabling, smartness, attractiveness, modifiability and value reflecting (Oksanen & Ståhle, 2013).

2.3.1. Enabling Collaboration

Without any doubt, innovation is a collaborative work and interaction between employees with different mindset and backgrounds is a must to increase

innovativeness of a company. As key of innovation is communication and collaboration, modern office's most important characteristic has become enabling collaboration. Collaboration is tried to be achieved mainly through using open office layout and designing informal collaborative spaces.

2.3.1.1. Open Office Layout

In average, an employee spends at least 40% of his/her office time with interactive and collaborative tasks (Davis, Leach and Clegg, 2011). In order to increase this percentage, knowledge transfer, interaction, collaboration and so innovation and competitiveness, 21st century offices usually have large communal working spaces instead of individual rooms. There are no physical barriers of communication like walls or partitions. For instance, long multifunctional desks, which encourages interaction among employees, are widely seen in modern offices (Brown, 2014).

In addition to employee collaboration, open office layout is also used for increasing the daylight exposure of employees. Offices generally require artificial lighting when cubicles and/or partitions are used, as some parts of the offices are obscured behind those cubicles and partitions.

2.3.1.2. Collaborative Spaces

As companies have understood that most fruitful ideas come up when hierarchical boundaries are minimized, modern offices include informal gathering spaces such as lounges, cafeterias and entertainment areas. This increases the living space of the employees and familiarity among employees which is a huge advantage especially for innovation in large organizations with several employees.

2.3.2. Smartness

21st century offices integrate and offer high technology usage to their employees. This constitutes the smartness dimension. Technology is used in various areas in the office such as communication, data gathering, data sharing and data protection. Wireless

communication, sensors, smart boards and cloud systems for data storage can be listed as examples of these technologies.

Technology usage clearly expedites the flow of information and information processing so it has a positive influence on innovation. However, considering the possibility that too much technology usage may cause alienation and loneliness among employees, smart systems that are used in modern offices are selected based on whether they enable interaction and connection.

2.3.3. Attractiveness

In 21st century business life, providing a healthy and safe work environment to the employees is not enough. One of the most important design goals of modern offices is to provide a comforting workplace. "Comforting" has two different meaning in terms of office design. One is being ergonomic. For instance, many offices use ergonomic chairs and desks which have adjustable height. Some companies even offer free massages, sports/entertainment facilities and healthy snacks in their offices. These opportunities also serve as a tool to attract and keep the talent.

Moreover, the offices are designed in a way that employees are exposed to natural light as much as possible throughout the day to promote office workers' mental and physical health. Employees working in a windowless environment with little or no natural light are more likely to experience some adverse effects, including reduced quality and quantity of sleep, being less active during the day, depression and anxiety, in and out of the office (Boubekri, Cheung, Reid, Wang & Zee, 2014).

The other meaning is being aesthetically pleasing. Considering the fact that employees spend at least 8 hours per day in the offices, having an aesthetic office is important. Incorporating art in a workplace, having furniture of good quality and creating an appealing atmosphere is a way to reduce the stress on the employees, strengthen concentration and increase wellbeing.

2.3.4. Modifiability

As stated before, innovation is a collaborative work and so includes people from different backgrounds and with different characteristics, working styles and motivating ways. Therefore, in order to satisfy the needs and foster innovation, the workplace should be flexible. “Modifiable spaces provide an experience of being allowed to, or empowered to, act differently and innovatively.” (Oksanen & Ståhle, 2013).

Modern offices usually do not have specific places like meeting rooms in contrast with traditional workspaces. They are flexible in the sense of intended usage, seating and lighting. Adjustable chairs and desks can be considered as another example of this feature. Besides, personalization is encouraged in order to make the employees feel that they belong to not only their desk but the whole office.

Technology giants lead the way in 21st century offices where employees help themselves instead of anyone else. For instance, there are vending machines for dispense keyboards, headphones and power sources in Facebook’s offices so that they can choose which model or brand they will use, which allows modifiability and increase productivity. (Brown, 2014)

2.3.5. Value Reflection

In 21st century, ideas alone are not sufficient to achieve the innovation goal. From idea to actualization, innovation is a long way which needs skilled workers, various resources and equipment. With the purpose of increasing the loyalty, sense of belonging and community, enhancing the company culture and always reminding where you are and what you strive for along the long way, companies in 21st century have started to tell their stories and/or visions by their office designs.

As stated in the introduction part of the thesis, office design is also used for marketing as it reflects the organizational culture, company ethics and values. For instance, Amazon is committed to sustainability and the company’s office designs are

consistent with this core value. Amazon uses recycled building materials, energy efficient systems, resource efficient plumbing fixtures and maximizes the use of natural lighting in its offices (Amazon, 2017).

2.4. Inferences Drawn from the Literature

Due to the increased importance of innovation on success and competitiveness, companies have sought ways to boost creativity and innovation since the late 90s. This was also reflected to the academic studies and the factors that have a positive influence on creativity and innovation has been studied a lot. In 1999, West and Rickards identified two main factors affecting innovation which are environment, both physical and behavioral, and personal qualities. Consequently, companies have begun to realize the link between innovation and office design and 21st century office concept rose as the latest stage of office evolution. As a natural consequence of this, innovative offices have also become an academic topic. In order to be able to describe the modern offices academically and have a common understanding, the must-have characteristics of modern offices were identified. In addition to Oksanen and Ståhle, Young S. Lee was studied this topic in 2016. According to him, the main three features of creative offices are collaborative spaces, technology interference and social areas, which are also consistent with the above mentioned ones. Besides, inspiring best practice innovative offices were collected by Thoring, Mueller, Badke-Schaub and Desmet to make the reader understand the ways of making an office creative and innovative (2019).

Moreover, as stated above in the "Introduction" chapter of the thesis, the papers, articles and theses on the innovative office design topic are mainly dealing with the effects of innovative design. Cost and benefit analyses were made. Freedom to choose where to work within the office and improved communication and so collaboration were considered as the positive effects of modern offices where as they have a negative influence on concentration and privacy (Voordt, 2003). In addition to these, according to the results of the pilot studies conducted by General Services

Administration of United States in 2006, modern offices increase employee productivity and motivation and decrease operating costs.

As in the market, the main concern of 21st century workplace design issue is whether it increases the productivity or not, there are several studies on the effect of innovative offices on productivity. Unlike the other related topics, this topic has been studied throughout the world and is not limited to the technology companies in United States. For instance, an article, which is written about the impact of office quality on performance of the employees in banking sector by Demet Leblebici, proved that offices with higher comfort level, aesthetics and proper furnishing increase employee performance. Same situation was also proved for the developers as well by Buğu Bayazıt Yıldırım and Uğur Renklibay in 2014.

However, so far only the effects of innovative offices were analyzed. It would not be wrong to say that the factors that are affecting the innovative design have not been studied yet. It can be considered as a gap in literature. To fill this gap, it was decided to concentrate on this topic and the effect of employee characteristics on office design was chosen as the focus. Since the features of each company are different from the other due to the characteristics of its workforce such as age average and embodied occupational groups, the physical office environment should be different as well. To increase the office efficiency, innovative office concept could be amended according to the significant components of employee characteristics factor. To study this topic, a questionnaire was prepared and conducted to 81 employees of PTTeM from four different departments, which are sales and marketing, programming, finance and operations. The detailed methodology can be found in the next chapter.

CHAPTER 3

MATERIAL AND METHOD

This chapter is about the research method and material. It will begin with explaining the survey conducted. Then, the selection criteria, selection process of the sample group and some background information will be presented.

3.1. Research Method

The starting point of the thesis was that the so-called 21st century office design would not be suitable for every company and employee due to sector, culture and employee characteristics factors. As the components of employee characteristics factor, the effects of gender, age, education level and occupation on office design are aimed to be studied in this thesis. First of all, in order to have the same understanding of "21st century offices", common fundamental features had been identified in the "Literature Review" part of the thesis, which are enabling collaboration, smartness, attractiveness, modifiability and value reflection. These traits differentiate the modern offices from the office designs of 80s and 90s, namely cubicle farm and dot com bubble offices.

The creators and pioneers of innovative offices have applied this office design everywhere in almost the same way, highlighting these five characteristics, regardless of department or location. However, these five features may not reflect the ideal office for each and every employee group due to differences in vocational needs and expectations. To analyze the effect of the mentioned employee characteristics on spatial needs and ideal office perception, comparative analysis was conducted as the methodology. The data for the analysis was collected through the survey prepared which specifies the spatial requirements and expectations and questions these common features. The validity and reliability of the collected data has been tested and among four variables, the significant ones have been determined with the help parametric and

non-parametric analyses conducted through SPSS®. The first research question was intended to be answered by this way. Based on the questionnaire and analyses results, the differences created by the significant variables have been identified in terms of needs, working style and expectations and presented in the "Results and Discussion" part of the thesis. It is strongly believed that being aware of these differences is highly beneficial for companies, especially conglomerates, in creating the optimal physical setting for its employees. As the next step, this ideal office of the subgroups of significant variables have been compared with the 21st century office design and to what extent these requirements and expectations are satisfied in 21st century office design, which feature should be kept and which one should be changed to reach the ideal office design for that employee group have understood. This section has constituted the answer of the second question, which can be found in the Results and Discussion chapter.

The survey is consisted of five demographic and 34 content related multiple choice questions. The language of the survey is Turkish in order to increase the applicability and avoid misunderstandings. The first six question was prepared to see the importance given by the participant to the office design and whether he/she is aware of the potential effects of it. The remaining 28 questions are about collaboration, smartness, attractiveness, value reflection and modifiability respectively although it was not stated to the participants. For each question, the justifications are made obligatory to understand the reasoning behind the answer. The last part of the survey includes a blank space for the participants to share their opinions, if requested. The questionnaire can be found in the Appendices.

The survey took place in July 2019. The survey was given to 89 employees of PTTeM from 4 different departments, namely sales and marketing, programming, finance and operation. However, 81 out of 89 were volunteered to participate. The details of the sample group, also known as the research material, will be explained in the below section.

3.2. Research Material

The most important point while selecting the sample group is focusing on the effect of employee characteristics and trying to keep the other factors constant. To minimize the effect of culture factor, both in national and organizational terms, the survey was decided to be applied to a group that is from the same company and nation because otherwise it would not be known whether the differences in ideal office perception are caused by culture or the features of office personnel. Besides, as the organizational culture is highly affected by the sector in which the company operates (Gordon, 1991), in order to be able to compare the results with modern office design, the range of industries is narrowed down based on the sectors that the pioneers are in. The "Big 4 tech" companies, which are Google, Apple, Facebook and Amazon, are considered as the founders of innovative offices. Due to the fact that the Big 4 technology companies only have sales and marketing offices in Turkey, which are not suitable for the survey, Turkish equivalents in the same sectors were identified. Among internet cloud computing, artificial intelligence, consumer electronics, social media advertising and electronic commerce industries where the pioneers operate, electronic commerce was selected to be the focus as the Turkish market is dominated by Turkish origin companies unlike the other stated industries.

After choosing the industry to be concentrated on, which is electronic commerce, the next step was selecting the company. Among its competitors, it was decided to conduct the survey in PTTeM due to the reasons listed below.

1) The company describes its online site, ePttAVM, as Turkey's national e-commerce platform. The company officials stated that PTTeM is a game changing firm in e-commerce sector by reaching locations where cargo companies do not go and with cargo fees far below the market average. The website is also Turkey's first virtual 3D shopping center while the opponents have offered 2D layout. As can be understood from the statement of company

officials and 3D example, innovation is the core of PTTeM like the pioneers of modern offices.

2) Like Amazon, ePttAVM has been supported financially and logistically by the state as it is fully owned by local capital, which is an important issue in finding the Turkish equivalents of the pioneers.
3) Although the volume and market penetration cannot compete with Amazon, the firm participates in the international market as it provides an electronic export platform for local brands and gives them oversea sales opportunity like Amazon.
4) The headquarters of the company is located in Ankara which has provided convenience.

Due to the reasons listed below, PTTeM was chosen to be the sample group. PTTeM is a subsidiary of Turkish Postal Telegraph and Telephone (PTT). The company's online shopping platform, ePttAVM, was established on 17 May 2012. It offers e-commerce services to the most remote parts of Turkey where no e-commerce company has ever been able to reach. The officials had realized that although there were more than 18.5 million broadband internet subscribers in Turkey in 2012, the portion of online consumers was low due to the trust issue. To overcome this trust issue and increase the e-commerce volume of Turkey, it was decided to establish an online shopping platform under the guarantee of Turkey's postal organization (Alkan, 2012).

Although the company has 110 employees in total, personnel who do not work in the office such as the drivers and cleaners, upper management (members of board) and warehouse attendants were excluded from the sample group. The firm is composed of four fundamental departments which are sales and marketing, programming, finance and operation. Human resources services were mainly outsourced but there are only two employee who are responsible for following the process and reporting to the relevant consultancy company. As two employees cannot be representative for the occupational group, they were also excluded from the sample.

In order to reach a common understanding about the roles of the departments, the major job responsibilities were identified. The sales and marketing department is mainly responsible from finding suppliers which provide high quality at low price, managing supplier relations and carrying out online and offline advertising activities whereas finance employees make financial planning, prepare budget, manage cash flow and perform financial analysis and audit. On the other hand, developers design, implement, improve and manage the software. Lastly, operations department's responsibilities include preparing and carrying out the operational plan and managing customer relations and logistics. The detailed version of job descriptions of each department can be found in the Appendices.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter constitutes the survey results and the answers of research questions. With the help of the survey, data about the demographics and the participants' perceptions about five main features of modern offices which are collaboration enabling, smartness, attractiveness, value reflecting and modifiability is collected. As the first step, the validity and reliability of the questionnaire is assessed and presented in the first subtitle of the chapter. Then, the survey results, which are categorized based on 7 dimensions: demographic characteristics, general opinions about office design, enabling collaboration, smartness, attractiveness, modifiability and value reflection, are introduced. As the next step, 4 variables, namely the effects of gender, age, education level and department on spatial needs and expectations are compared and the significant variables are determined. Thereafter, spatial requirements of employee groups, which are grouped by the significant variable, are identified based on the survey results. This section can be considered as a summary and an aggregated version of the collected data with justifications written by the survey participants.

4.1. Validity and Reliability of the Survey

In order to be scientifically acceptable, the questionnaire used in the thesis should be checked in terms of reliability and validity. Validity can be considered as the degree to which a measuring instrument, in this case a questionnaire, serves the purpose it is intended to measure. Validity is analyzed by factor analysis which reduces large number of variables/factors into a smaller group. There are two types of factor analysis, which are exploratory and confirmatory factor analysis. Exploratory factor analysis is a process for finding factors based on the relationships between variables. On the other hand, as can be understood by its name, confirmatory factor analysis is

used to test a previously established hypothesis about the relationship between variables. In order to be able to apply the factor analysis to data, the requirements are as follows (Büyüköztürk, 2004).

1. Accurate measurement of data
2. Data measured on an intermittent scale
3. Data satisfying the linearity conditions
4. Moderate or high correlation of variables with each other

The first step of the factor analysis is evaluating the suitability the data for factor analysis. It can be examined by Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. In this thesis, exploratory factor analysis was used. KMO provides information about the adequacy of the sample for factor extraction whereas Bartlett's Test of Sphericity examines whether the data matrix is suitable for factor analysis by testing correlation matrix is an identity matrix or not (Büyüköztürk, 2004). Correlation matrix being identity matrix signifies that the variables are independent and inappropriate for factor analysis. KMO value is expected to be higher than 0.6 for factorability (Tabachnick & Fidell, 2013). Values less than 0.05 of the significance level, which are obtained from Bartlett's test, indicate that the data matrix is suitable for factor analysis.

Table 4.1. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.733
Bartlett's Test of Sphericity	Approx. Chi-Square	979.068
	df	253
	Sig.	.000

For the validity of the questionnaire used in the thesis, structure validity analysis was performed. 1st, 5th, 6th, 7th, 8th, 9th, 10th, 13th and 14th questions in the questionnaire were not included in the analysis as they do not have an ordinal scale. As a result of the statistical tests conducted by the SPSS® program, the KMO value was found to be

0.733 (see Table 4.1). As the value is higher than 0.6, sampling adequacy can be considered as acceptable. Moreover, according to the result of Bartlett's Test of Sphericity, the correlation matrix obtained from the questionnaire form was found to be suitable for factor analysis since it is less than 0.05. After examining the sampling adequacy and data suitability, the next step was performing the exploratory factor analysis. According to the result of the exploratory factor analysis, the questionnaire examining the six dimensions, which are general opinion and demography, collaboration, smartness, attractiveness, value reflection and modifiability, explains 68.139% of the case examined. As in multi-factor designs like this, an explained variance between 40% and 60% is considered sufficient, it would not be wrong to say that the questionnaire is acceptable in terms of validity (Çokluk, Şekercioğlu & Büyüköztürk, 2012).

The other important dimension is reliability. Reliability is consistency and stability between the measurements obtained. One of the most frequently used analysis for reliability is Cronbach alpha coefficient. This method is appropriate to be used when the measurement scale of data is ordinal like Likert scale. For example, reliability analysis is not applied to the questions such as gender or salary. The Cronbach alpha coefficient calculates the internal consistency between the measurements. This coefficient ranges from 0 to 1 and is expected to be greater than 0.6. As can be seen from the below table, Cronbach alpha coefficients less than 0.6 indicate poor reliability of the questionnaire.

Table 4.2. *Reliability degree according to the value of Cronbach Alpha Coefficient (Kılıç, 2016).*

The value of Cronbach Alpha Coefficient	Reliability degree of the questionnaire
≥ 0.9	Excellent
$0.7 \leq \alpha \leq 0.9$	Good
$0.6 \leq \alpha \leq 0.7$	Acceptable
$0.5 \leq \alpha \leq 0.6$	Poor
$\alpha < 0.5$	Unacceptable

As a result of the statistical tests conducted by SPSS® program, the Cronbach alpha coefficient of the questionnaire used in the thesis was found to be 0.703. According to the above table, it can be concluded that the reliability of the questionnaire is good.

4.2. Survey Results

The main survey questions, excluding the demographic features, were categorized into 6 without informing the participants. The first six questions were about the general opinions of the respondents on office design. The questions 6-17 were prepared to understand the participants' thoughts about collaboration enabling characteristic of modern offices. The order of questions was arranged as follows; the questions 18-21 were about smartness, 22-26 attractiveness, 27-29 value reflection and finally 30-34 modifiability.

4.2.1. Demographic Characteristics

This section will constitute the background information about the survey participants including their demographic properties like age, gender and education level.

As stated before, 81 out of 89 employees volunteered to participate in the survey. The pie charts showing participants' departments and gender are shown below.

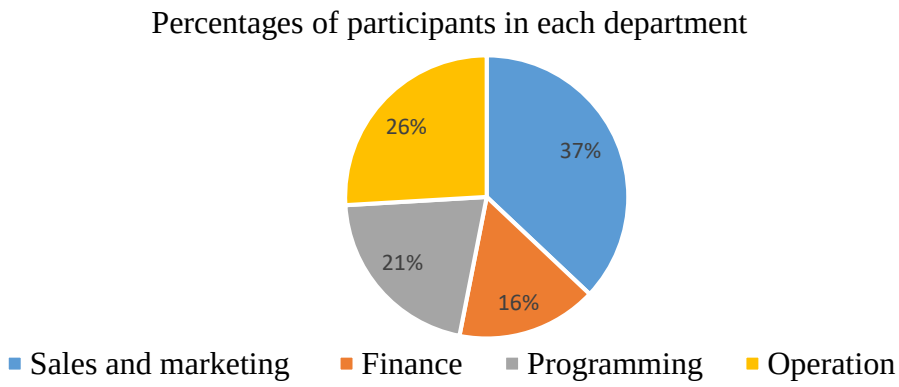

Figure 4.1. Pie chart showing the departments of the participants

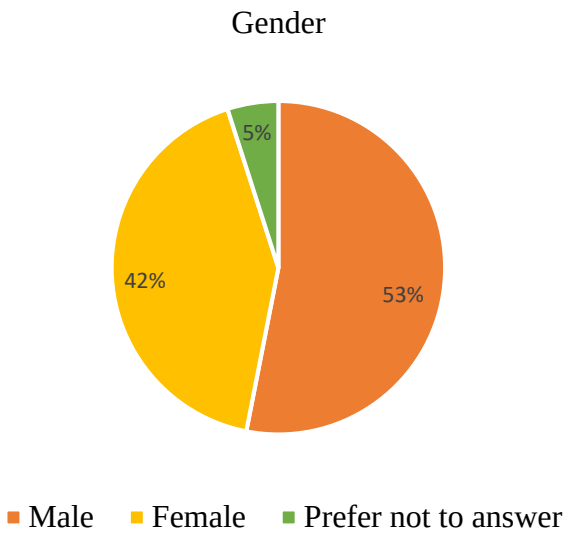

Figure 4.2. Pie chart showing the gender of the participants

As expected from the sector that the company is present, which is electronic commerce, the age average in PTTeM is relatively low. Similar to big companies in the sector such as Amazon and eBay whose median employee age is 31 and 32 relatively based on 2017 statistics, the median age of PTTeM is 30-34 (Pelisson & Hartmans, 2017). The age average is highest in the finance department with 40-44 and is lowest in the programming department with 25-29.

Table 4.3. *Age distribution in departments*

Age range	*Sales and marketing*	*Finance*	*Operation*	*Programming*
18-24	1	1	2	0
25-29	8	0	5	9
30-34	14	2	8	7
35-39	4	1	5	1
40-44	1	7	0	0
45-50	2	2	1	0
50+	0	0	0	0

Education level of employees is predominantly bachelor's degree. Employees with the doctoral degree are in programming department and master graduates can only be seen in programming and sales and marketing departments. As can be seen in Figure 4.3., the graduated department is various in sales and marketing including but not limited to management, economics, international relations and public relations whereas it is more uniform in programming department.

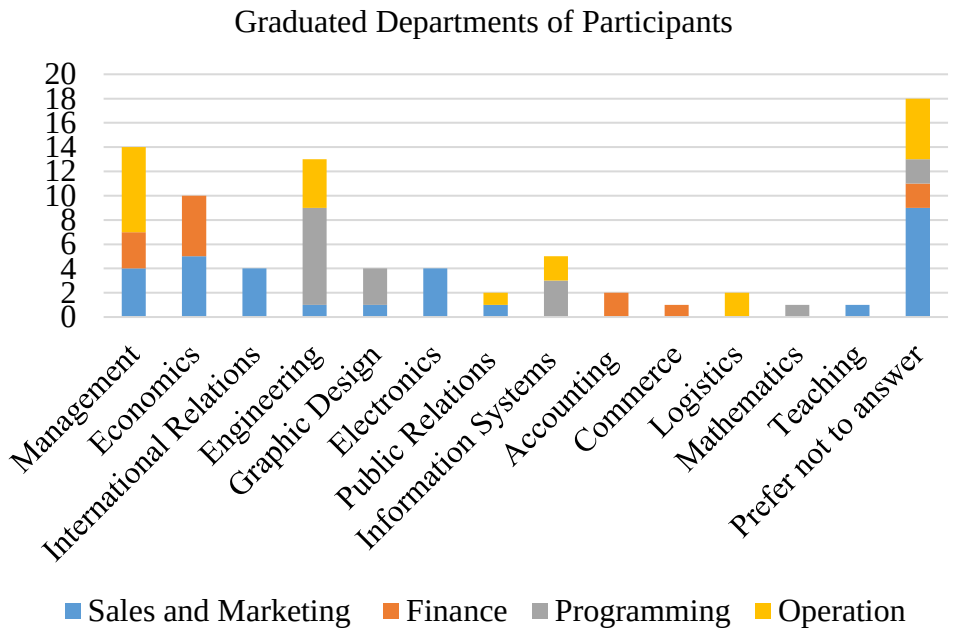

Figure 4.3. Graph showing the graduated departments of the respondents

4.2.2. General Opinions about Office Design

The first six questions of the survey are about the general opinions of the participants on the importance of office design. As can be predicted, the employees spend long time in their offices. There is no participant who works less than 6 hours in a normal office day. According to the survey results shown in the below table, 65 out of 81 employees corresponding to 81.5% of the participants spend 8-10 hours in the office and people who are in the office for 6-8 hours form the remaining 18.5%. This results clearly shows the importance of the office design as there is no place where the employees spend more time, including their homes.

Table 4.4. *Frequency of hours spent in the office*

Hours spent in the office	*0-2*	*2-4*	*4-6*	*6-8*	*8-10*
Sales and marketing	0	0	0	8	22
Operations	0	0	0	3	18
Programming	0	0	0	2	15
Finance	0	0	0	3	10
Total	0	0	0	16	65

The important point is whether they are satisfied with their offices or not. On the scale 1 to 5, 5 being the very satisfied, the overall office satisfaction of employees is 3.30. Being higher than 2.5 indicates that the employees are more or less satisfied with their physical environment. The lowest satisfaction has been seen in the operations department with the rate 3 and it is highest in sales and marketing with 3.47. When the issue is analyzed based on gender, it has been found that the average office satisfaction of the female participants, which is 3.35, is higher than the male ones, which is 3.23. Moreover, the lowest satisfaction has seen in the age group 18-24 with 2.75 and the employees older than 45 have the highest office satisfaction with 3.60. The satisfaction level of participants whose ages range between 25 and 45 is around 3.30. Finally, the office satisfaction results have been compared considering the education level. Respondents with bachelor's degree has the lowest average satisfaction with 3.19 and the highest value, which is 4.17, has been obtained from the employees with the two year degree. It could be stated that the collected data has not showed any relation between education level and satisfaction as no tendency has been observed in the scatter graph. Considering the range of average office satisfaction, it could be stated that age variable has the highest influence on the satisfaction dimension.

Moreover, there is no participant who does not believe that physical office conditions affect their productivity. 58% of the respondents strongly agree and 36% agree that

their productivity will increase markedly when the office design meets their expectations. Only 6% of the participants are indecisive about it. The agreement level is highest in the sales and marketing department and it is lowest in finance department. Besides, male respondents agree more strongly that the work efficiency can be increased by office design improvements than female ones. When the results are analyzed considering the age groups, it has been observed that the agreement level is decreasing with increasing age. Lastly, participants with two years degree have the highest agreement rate (doctorate group was excluded from the analysis as it consists of only one person) and the lowest rate has been obtained from the respondents with bachelor's degree. Similar to the results of previous question, considering the range of average agreement level, it could be stated that age variable has the highest influence on the answers of this question.

In addition to this, the respondents were asked whether the office environment could provide an advantage to the company over its competitors or not. There is nearly a consensus over this issue in sales and marketing, programming and operations departments. They believe that office design is way to attract talented employees and this situation certainly creates an upper hand. On the other hand, respondents from the finance department do not consider physical environment as a source of competitive advantage. In their point of view, in the electronic commerce sector, a company can possess a benefit over the rivals only by the quality and price of the products and logistic services. Moreover, male respondents agree more strongly that the office design can be a source of competitive advantage. When the results were analyzed on the basis of age, the highest agreement level has been seen in the 25-29 age group whereas the 40-44 years old participants have the lowest agreement level. Besides, participants with two years degree have the highest agreement rate when it is compared to the ones with different education levels (doctorate group was excluded from the analysis as it consists of only one person) and the lowest rate has been obtained from the respondents with high school degree. Unlike the 2nd and 3rd questions, the ranges of average agreement level show that the department variable

has the most effect on the opinions about physical environment being a competitive advantage.

In order to understand participants' general opinions about the importance of office design on innovation, they were asked "On a scale 1 to 5, 5 being very important, what is the importance of physical environment in increasing innovation and creativity?". The respondents regard workplace design as significant for innovation. The results of the question can be found in the below table. As can be seen from the table, the average numerical result of the question is 4.25. Although importance rankings in each department are in the "important" side in the spectrum, the lowest ranking was seen in the finance department with a numeric value of 3.46. Considering the fact that finance department do not believe that a company could gain an advantage over the opponents by the office design, finance department having the lowest importance ranking is not a surprise.

Table 4.5. *Frequency of importance of physical environment in increasing innovation and creativity on a scale 1 to 5*

	1	*2*	*3*	*4*	*5*	*Average value*
Sales and marketing	0	0	2	9	19	4.57
Operations	0	0	4	10	7	4.14
Programming	0	0	0	10	7	4.41
Finance	0	0	8	4	1	3.46
Total	0	0	14	33	34	4.25

The last question of the general information part of the survey was the importance of physical office environment in the job-hunting process. The gathered results for this question can be found in Table 4.6. As it can be seen from the below table, 5 being very important, the average result was 3.60. With the value 4.47, it has understood that workplace is one of the significant criteria in job selection for the sales and marketing employees. However, the importance ranking of the office design on job

selection in finance is 2.15. Participants from finance department state that no matter which company they work for, they do more or less the same job as accounting and finance is highly standardized. Therefore, the only thing that affect the job decision is the salary and fringe benefits.

Table 4.6. *Frequency of importance of physical environment in job hunting process on a scale 1 to 5*

	1	*2*	*3*	*4*	*5*	*Average value*
Sales and marketing	0	0	3	10	17	4.47
Operations	0	3	7	6	5	3.62
Programming	2	5	2	4	4	3.18
Finance	4	4	4	1	0	2.15
Total	6	12	16	21	26	3.60

4.2.3. Enabling Collaboration

As stated before in this chapter, almost all the employees spend more than 8 hours in the office per day. Most of the participants' time in the office is spent at their desks. The below table shows the percentage of time spent at the desk in an ordinary office day.

Table 4.7. *Time spent at the desk*

	0-20%	*20-40%*	*40-60%*	*60-80%*	*80-100%*
Sales and Marketing	0	1	2	13	14
Operations	0	0	1	6	14
Programming	0	0	3	1	13
Finance	0	0	1	2	10
Total	0	1	7	22	51

As can be seen from the table, 51 out of 81 participants, corresponding to 63%, spend almost of their office time at their desks. The number of employees working away

from their desks are highest in the sales and marketing department as a consequence of their job description. The 63% of the respondents stated that they are at their desks nearly all the time since there is no other place for them to work and the recreational areas are limited with cafeteria and the balcony.

In total 73 survey participants agreed with the 11th statement in the survey and expressed that the place in the office where they work most productively is their own desk. It is also linked with the absence of working place alternatives. Since there is no other option, the employees are more productive and efficient while working on their own desks. Without any exception, all the finance employees are the most productive while working at their desks whereas the percentage is relatively lower for the operations department. The results of the question show us that female respondents believe that they work more productively at their desks than the male respondents and for all the participants older than 34, the place where they work most efficiently is their own desk. Furthermore, employees with high school degree, master's degree and doctorate degree completely agree with the statement. On the other hand, the agreement level in respondents with two year degree is lower than the other groups. In this dimension, education level has the highest impact on the results.

On the contrary to the stated time spent at their desks, approximately 90% of the respondents expressed that they spent at least 2 hours corresponding to 20% of an ordinary office day with teamwork, which can be found in the below table.

Table 4.8. *Percentage of team work*

	0-20%	*20-40%*	*40-60%*	*60-80%*	*80-100%*
Sales and Marketing	7	6	8	5	4
Operations	0	3	11	2	5
Programming	1	8	8	0	0
Finance	1	8	2	0	2
Total	9	25	29	7	11

It can be seen from the table that collaboration is highest in the operations department whereas this percent is lowest in the programming in the line of the job. Programming department is working in teams and teams are responsible from different parts of the project. Then, the work is distributed among the team members and each employee is working on their own to accomplish the assigned task although they are constantly consulting and assisting each other.

Similarly, participants were asked "On a scale 1 to 5, 1 being never and 5 being always, how often do you take part in collaborative projects or activities in the company you work?". Highest collaboration has been seen in the programming department with an average of 3.47 and finance department has the lowest average value among the company, which is 2.54. The results of this question also show us that male respondents are participating in collaborative tasks 3.1% more than the female respondents. When the issue was analyzed on age dimension, it was observed that age groups 18-24 and 40-44 are more distant to the collaborative projects/activities with the average values 2.5 and 2.88 respectively whereas highest participation in collaborative tasks is seen in the 35-39 age group with an average of 3.45. The effect of education level on the result of 15^{th} question was also examined. Apparently, with an average of 3.5, employees with two year degree are the ones that take part in collaborative projects. On the other hand, high school graduates rarely participate in the collaborative tasks. For this question, there is not any dominant variable that have the greatest impact on the result as the ranges, in other words the difference between highest average and lowest average, are more or less the same. Besides, according to the survey results, only 2 participants work completely individually but as previously mentioned, more than 50 respondents stated that they are almost always at their desks while working. This situation clearly indicates a contradiction. Participating in teamwork but yet constantly being at their desks shows that there is a problem in in-office communication. Either the employees communicate verbally only with their peers who are physically close to them or there is a constant background noise in the office.

Moreover, the survey participants were asked whether they prefer to work alone or as a team in terms of productivity. There is no clear overall preference among the employees of PTTeM. The department preferences are examined. For sales and marketing, programing and finance departments, half of the respondents is more efficient while working alone and the other half is more productive in teams. However, unlike the other ones, operations department has a dominant preference. 62% of the operations department prefer working in teams. When the issue is analyzed considering the gender, it has been observed that 56% of female respondents tend to be more productive in teams whereas 53% of males are more efficient while working alone. Moreover, most of participants whose age are between 30 and 40 work more productively when alone but higher number of employees from other age groups prefer working as a team than working alone. 18-24 age group is remarkable for this issue since without any exception, all of them are more efficient in team work. Similarly, all the high school graduates prefer working in teams. As the education level increases, the percentage of respondents who are more productive in teams decreases.

Later on, the importance of teamwork in successfully fulfilling the job description was questioned. 61 out of 81 participants regarded teamwork as “important” or “very important” and only one employee stated that it is insignificant. The averages of sales and marketing, operations and programming departments are almost the same and around 3.9 whereas the average importance value given by the finance respondents is 3.31. In this question, female and male respondents think in the same way and scored importance of team work as 3.8 out of 5.0. Furthermore, the perceived importance of teamwork is lowest in high school graduates with a value of 3.5. The highest possible value, 5, has been given by the doctorate graduate but as the group is composed only by one person, it statistically does not mean anything. The next highest average, which is 4.17, belongs to the master’s degree graduates. In addition to this, the highest importance average, which is 4.6, has been obtained from 45-49 age group. On the other hand, participants whose ages are between 40 and 44 stated that the importance

of teamwork is 3.25 which is the lowest average gathered. This wide range of results show us that the perceived importance of teamwork in successfully fulfilling the job description is more affected by age when it is compared to department, gender and education level.

The results of this section indicate that teamwork efficiency should be improved as it is essential and important for their job and office design may be used as a way to increase it.

4.2.3.1. Open Office Layout

In the literature part of the thesis, it was explained that the collaboration in modern offices is tried to be increased by open office layout and in-office socializing areas. Collaboration, communication, employee satisfaction, privacy, tension/stress, concentration and motivation are identified as the significant issues about office design. The positive and negative effects of open office layout and socializing areas were also questioned around these issues in the survey.

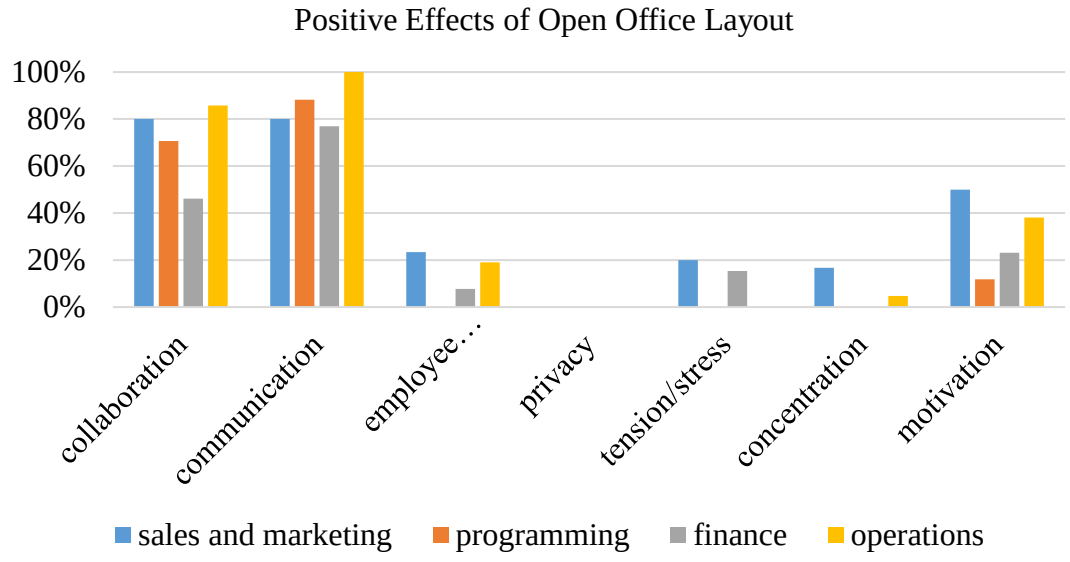

Figure 4.4. Graph showing the positive effects of open office layout

Figure 4.4 shows the percent of respondents in each department and factors which they think that open office layout has a positive influence on. As it can be seen from

the graph, the most positive effect of the open office layout is communication. Regardless of the department, most of the respondents believe that open office layout is good for communication. Based on the obtained comments, open offices ease the communication process. According to them, hearing people talking about the tasks, hearing business related phone conversations and seeing the documents on desks expedite the information flow and make employees familiar with the big picture without any effort, which is a huge benefit for innovativeness.

Considering the survey results, apart from the business purposes, open office layout is also advantageous for establishing the personal bonds among the employees since it increases interaction. The main justification written by the participants for stating that open office has a positive effect on motivation and employee satisfaction is this situation. As personal bonds improve, they become more motivated and satisfied. Similarly, 10% of the total respondents, mainly from sales and marketing and finance, believe that open office layout, in other words constantly being in contact, encourages employees to solve the problems as soon as possible and so it reduces the tension within the office. There are also some against opinions which is explained in the negative effects of open office part of the thesis.

In addition to communication, more than 70% of the survey participants in sales and marketing, programming and operations departments consider collaboration as a positive consequence of open office layout. They believe that efficiency can only be increased by more interaction. In their opinion, physical barriers like walls reduces the overall productivity since it slows down the information flow and feedback process. On the other hand, as mentioned earlier, finance department has less collaborative work when it is compared to the other departments. Respondents stated that each employee is responsible from a different task and so there is no need for collaboration within the department. Therefore, most of the participants in finance department could not observed the effect of the open office layout on collaboration. They are mostly neutral on this issue as it can be also seen in the Figure 4.5.

Moreover, increasing concentration is also regarded as a positive effect of open office layout by approximately 7% of the participants. They expressed that the main reason behind it is that seeing others working and feeling constantly supervised direct them to work and minimize distraction.

Last but not least, there is a consensus among the respondents for the privacy issue. They do not think that open office layout has a positive impact on the privacy.

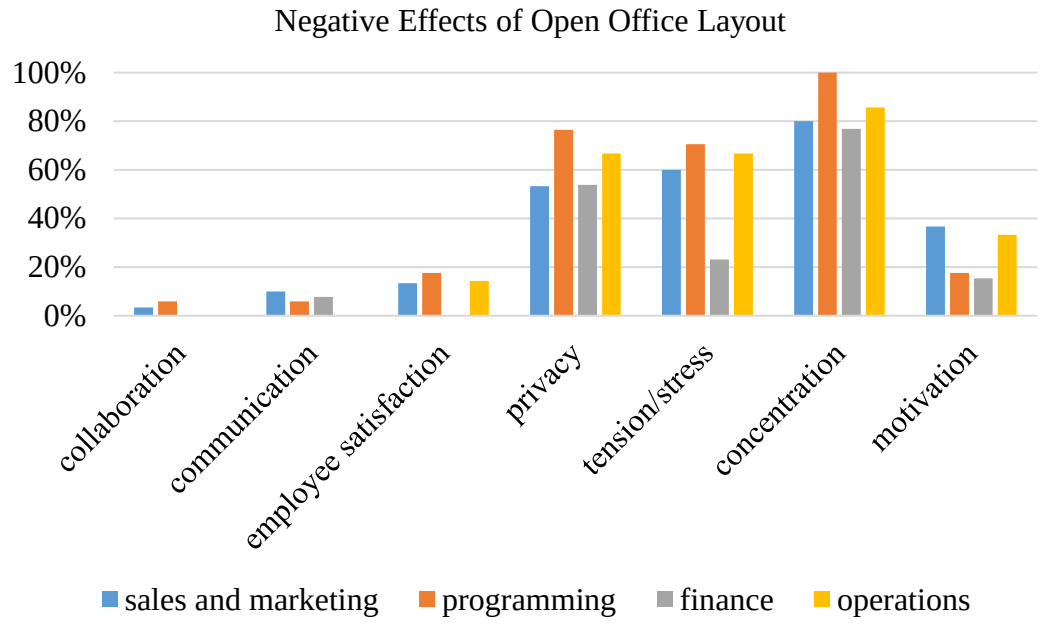

Figure 4.5. Graph showing the negative effects of open office layout

On the other hand, as can been in the above figure, there are some negative effects of open office layout as well according to the survey participants. First of all, it would not be wrong to say that respondents are almost in an agreement that open office layout has a negative impact on concentration. The downside of increasing interaction is constant ground noise which is the main reason for distraction. No matter which department it is, always being open to comments and questions while working especially on tricky tasks causes loss of concentration and reduces productivity. Participants stated that although the open office layout is good for collaborative tasks, it damages the individual work. Especially, all the programmers are complaining about

the distraction caused by hearing the conversations of other teams since the most concentration-needed tasks are seen in the programming department.

The second most significant factor that is negatively affected by the open office design is privacy. More than 60% of the total participants are criticizing the design due to the lack of privacy. Phone calls, both personal and business related, constitute the major problem of this issue. Participants do not feel comfortable while talking on the phone knowing that their managers and peers are listening. Similarly, the fact that the computer screen is visible to everyone annoys many respondents.

Furthermore, more than half of the respondents stated that being constantly supervised and having no privacy increase the stress level of employees. They become afraid of making mistakes and/or distracting others when surrounded by numerous amount of people and this situation is especially difficult for the introverts. In their opinion, high level of stress may decrease the employee satisfaction and productivity as it leads to diseases and turnovers. On the other hand, there is a significant difference between the opinions of finance employees and others in stress factor. Participants from finance department expressed that the main source of stress is their job description itself and office design is nothing to do with it.

Besides, according to 23 employees, which forms approximately 30% of the sample group explained that the lack of socializing areas combined with being constantly supervised decreases the motivation.

All in all, although there are many complaints and negative sides of open office layout, most of the respondents admit that open office layout is a must for their job. Sales and marketing, operations and programming employees need to constantly consult their colleagues and ask questions; and in their view open office layout is the only way to maintain this communication. Finance employees also consider open office layout as essential but for a completely different reason. They approach this problem realistically and pragmatically. They think that as finance employees, they need to care about the profit and providing individual offices to each employee in finance is

impossible in terms of both space and budget. In their opinion, open office design is the most cost-effective option for the company and it should be adopted. Plus, they believe that employees should be more sensitive and respectful for maintaining concentration rather than expecting it from the office design.

4.2.3.2. Collaborative Spaces

The other significant contributor to collaboration is recreational areas. The main purpose of them is increasing informal communication, diminishing the hierarchy and so fostering innovation. Although many companies prefer open office layout, socializing areas within the office are not quite common.

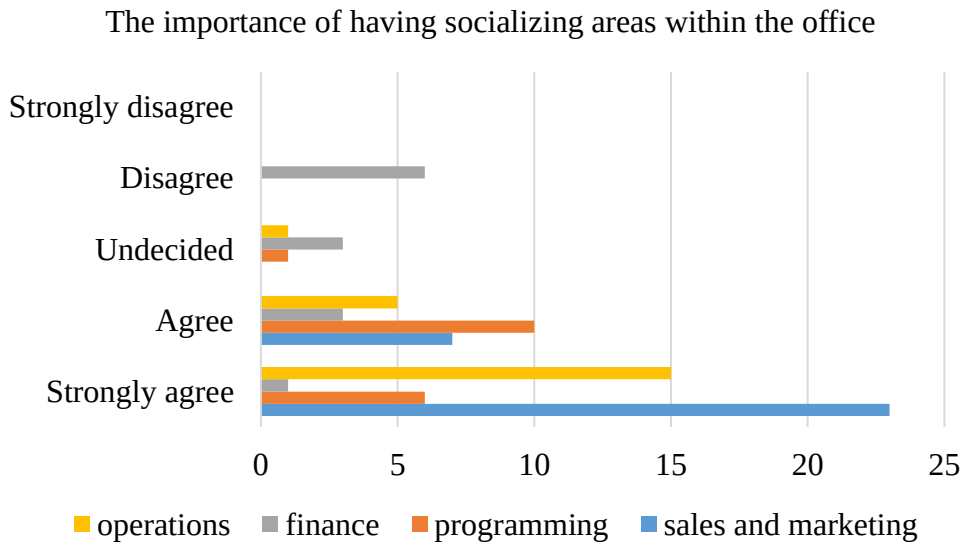

Figure 4.6. Graph showing the importance of having in-office socializing areas according to the respondents

The survey participants were asked whether having informal gathering spaces in the office is important for them or not. As can be seen in the above figure, almost all the respondents from sales and marketing, programming and operations departments stated that recreational areas are vital for them as they believe that motivation, communication and satisfaction are increased by this way. The reasons are further described in the following part of the chapter. On the other hand, most of the finance employees who were volunteered for the survey disagree with the statement.

According to them, although long hours are spent in the office, it is important to remember that the employees are there to work and social life and business life should not be overlapped. Moreover, the effect of gender on the result of this question is examined and it has been observed that male respondents agree slightly more strongly with the necessity of socializing areas than the females. Besides, when all age groups are taken into consideration, the age group with the highest agreement rate is the 25-29 age group. After the age of 40, the agreement level decreases significantly and lowest rate has been seen in 40-44 age group. Finally, based on the comparison between the participants with different education levels, it can be concluded that education level does not have much impact on this dimension as there is not any major difference between the groups when it is compared to other variables. Even so, the agreement level is highest in two year degree and master's degree graduates and it is lowest in high school graduates. Considering the averages of agreement levels, department variable has higher influence on the perceived importance of socializing areas dimension than age, gender and education level.

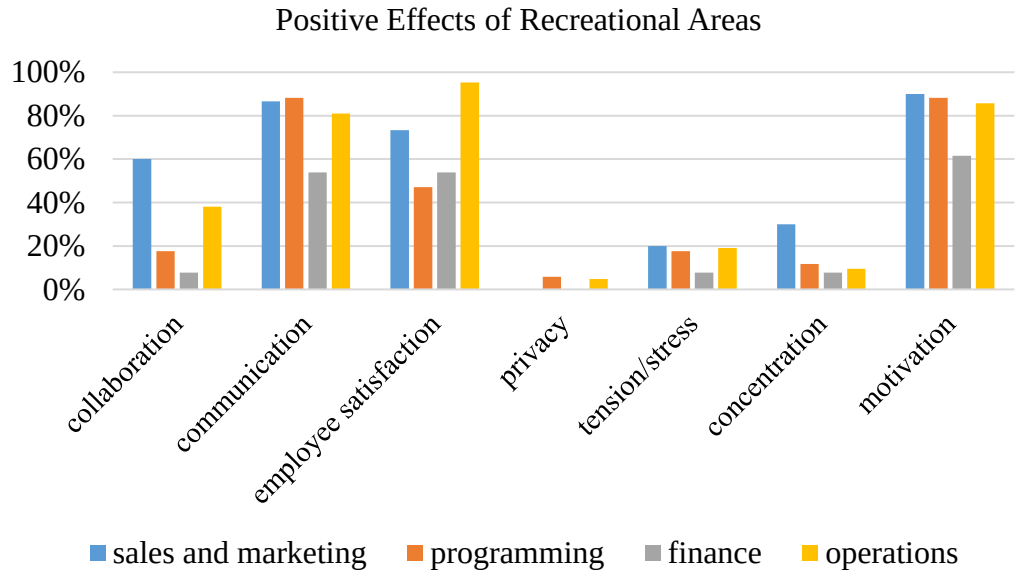

Figure 4.7. Graph showing the positive effects of recreational areas

As can be seen from the above graph, the positive effects of recreational areas that have the highest results are communication, motivation and employee satisfaction. More than 70% of the total participants agree with it. The three aspects seem to be linked with each other considering that the justifications written by respondents from sales and marketing, operations and programming departments are more or less the same. In their opinion, these kind of spaces improve personal bonds between the employees as a consequence of increased communication and establishing personal relationships in the office increases motivation to go to work, loyalty to the company and so overall satisfaction. However, since there are some respondents from finance department who think that social life and business life should be separated from each other, the percent in finance is lower than the other departments on these issues.

Moreover, 37% of the total participants, especially sales and marketing employees believe that recreational areas are also good for collaboration. According to them, collaboration is escalated with increased communication and motivation. Similarly, tension in the office and stress level of the employees are believed to be decreased with increased communication and motivation by the 14 respondents who marked the "tension/stress" option.

Additionally, according to 14 participants, which corresponds to the 17% of the total volunteers, socializing areas have a positive influence on concentration. In their eyes, as these kind of areas provide spaces for employees to chill out, the possibility of making mistakes and distraction are minimized. Lastly, only 2 employees of PTTeM selected "privacy" option thinking that lounges and halls are one of the most suitable places for personal phone calls. However, they can be considered as outliers considering the percent value, which is 2%.

On the other hand, based on the gathered data shown in the Figure 4.8., the main negative effect of socializing areas is concentration. Approximately half of the total respondents agreed that these spaces can distract the employees and cause loss of productivity. The main contributor of this result is the respondents from finance. As a

small mistake they make in recording financial transactions can lead to big problems, the discipline in the office and concentration are two most important things for them. They believe that recreational spaces blur the boundary between personal and professional lives and this results in indiscipline and loss of concentration. Besides, the participants from not only finance but also from other departments think that these kind of spaces are open to abuse.

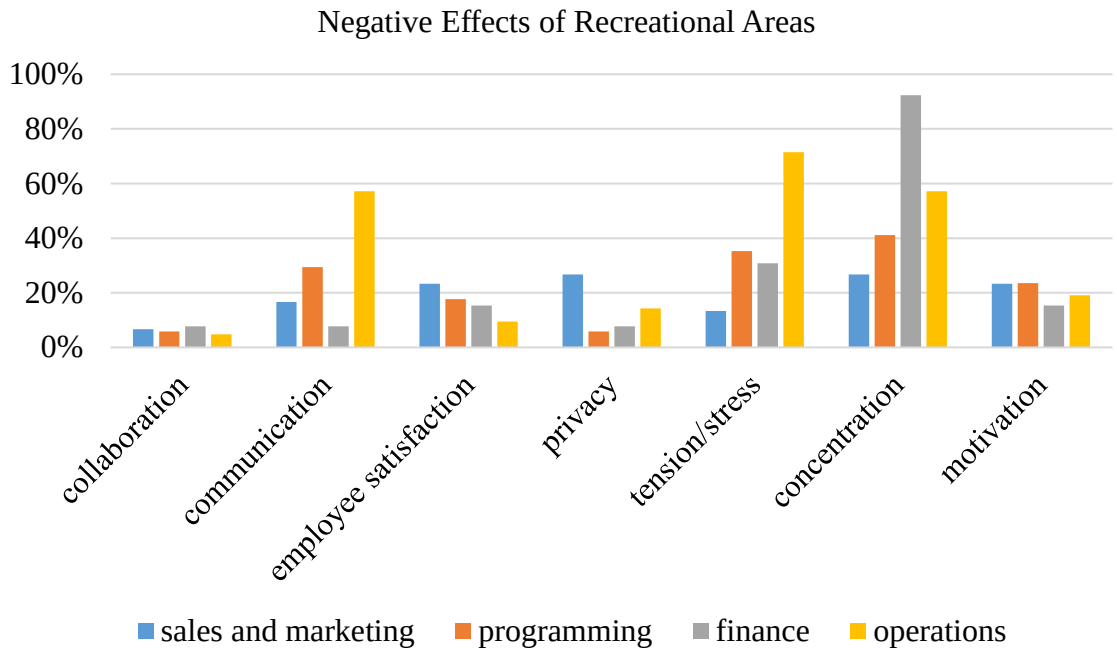

Figure 4.8. Graph showing the negative effects of recreational areas

The surprising result of this question is tension/stress. Although the main goal of these spaces is to provide a space for employees to relax, 29 out of 81 participants, mainly from the operations department, stated that socializing areas feed the rumor environment within the office and cause tensions between peers. 28% of the total participants expressed that they are hesitant to spend time in these places because of this and so communication is also negatively affected. Besides, according to them, as recreational spaces they use like cafeteria, balcony or hall are not utilized by the upper management, it is nearly impossible to have a dialogue with the managers apart from the business related talks. This situation keeps the stress level and tension between the

employees and managers high. Considering that the most fruitful ideas are generated when the hierarchy is diminished, it would not be wrong to say that innovation is hindered by this way. Plus, some of the participants believe that socializing areas indirectly affect employee satisfaction, privacy, motivation and collaboration negatively due to the rumor environment they fed.

To sum up, most of the participants give importance to in-office recreational spaces and think that they are beneficial especially for communication, employee satisfaction and motivation. However, they are also questioning the possible negative effects of socializing areas on concentration and rumor environment. Creating informal gathering spaces that attracts not only the employees but also the managers and demolishes the rumor environment is the only way to solve the problem and a suggestion related to it is offered in the "Data Discussion" part.

4.2.4. Smartness – Technology Usage

In 21st century, while conducting the business, technology is not a choice but a must. The results of the survey questions about smartness/technology usage also prove this situation. The respondents were given the following statement, "The use of technology is essential for fulfilling my current job description" and they were requested to rate the statement on the level of agreements. 100% of the survey participants agree that technology is vital for their job; 84% strongly agree and the remaining 16% agree with the statement. This 16% is mostly composed of finance employees and female respondents. Besides, it is well worth stating that the average agreement rate is decreasing with increasing age. The all members of 18-24 and 25-29 age groups strongly agree with the statement whereas 45-49 age group is leaning to "agree" option. When the results are further gone over, it has been seen that high school graduates have the lowest agreement rate and university graduates have the highest. Considering the results, it is apparent that an office without the use of internet is not possible as the employees cannot do their assigned tasks otherwise. Regardless of

gender, age, division and level of education of employees, the common answer is that technology is a must.

Another aspect of smartness/technology usage dimension is following the new technology trends and being adaptable to them. Technology usage is unquestionable but deciding which technology to be used, finding the most appropriate one and being open to changes is a further subject. 20th question of the survey was prepared in order to understand the importance given by the survey participants to this issue. More than 75% of the respondents stated that it is important for them that the company that they work for follows the technological developments and uses the latest products and/or systems. This group is mainly composed of employees from operations, programming and sales and marketing departments. On the contrary to this, more than 75% percent of the participants with financial responsibilities in the office expressed that products and/or systems that make them properly do their job are more than enough. They consider latest technology usage as a luxury, even an extravagance and do not expect their company to provide these kind of services. Another variable that was examined apart from department is gender. According to the results, for male employees, usage of latest products/systems are more important than the female employees. Besides, as can be predicted, the agreement level to the statement, "It is important for me that the company I work for follows the technological developments and uses the latest technology products and/or systems in the office." decreases significantly in 40+ age group. 25-29 age group has the highest agreement rate among the others. Finally, following technological developments and using latest products are less important for high school graduates when it is compared with the others having different education levels. Participants with two year degree are the ones who agree the most with the statement. Regarding the average agreement levels of groups of each variable, the highest difference has been seen for the department variable. This means that the answers to this particular statement has been principally affected by the departments' of the respondents.

Moreover, the survey participants were asked whether they believe that technology affects the office environment positively or not. Without any exception, all the volunteered employees in the programming department has agreed that its effect on the office is positive. The ultimate highest agreement for this question has been achieved by the programming department. Similar to programming, 97% of the participants who are responsible from sales and marketing has regarded the influence of technology as constructive. The agreement level is lower in the operations department when it is compared to programming and sales and marketing. Even so, a high percentage of agreement, like 81%, has been obtained. On the other hand, most of the employees in the finance are indecisive on this issue. They cannot decide whether the influence is positive or not as in their opinion the technology eases the communication and settlement processes but sometimes causes distraction and so loss of productivity. In addition to this, the results have shown us that male participants regard the effect of technology more positive than the females. When the answers were analyzed on the basis of age, it has been observed that the agreement rate is highest in 25-29 age group and it is followed by 18-24 age group. Like the previously mentioned question of smartness dimension, the agreement level decreases significantly when the age goes beyond 40. The last variable that has been studied is education level. As the education level of the respondents increases, the impact of technology on the office environment is perceived as more positive. The high school graduates are mostly neutral about this issue whereas participants with master's degree or doctorate strongly agree that technology affects the office environment constructively. Similar to the previous question, based on the results, it can be concluded that the answers has dominantly affected by departments' of the respondents.

The last dimension of smartness/technology usage dimension that was questioned in the survey was usage of technology in the office environment apart from the business purposes. Most of the participants who are working in programming and operations department argues that an office should have some entertainment facilities to motivate employees and increase employee satisfaction and technology such as PlayStation

should be a part of these facilities. By contrast with operations and programming, sales and marketing and finance departments predominantly states that technology should only be used for business as it may cause loss of concentration and productivity. Female participants mostly neutral about this issue considering the average results. However, male employees are prone to advocate the use of technology in the office not only for business but also for nonbusiness contexts. Another observation is that although 18-24 age group is an exception, from 25 onwards, the agreement to the idea that technology should only be used for business increases with increasing age. Lastly, the average results of each education level are almost the same; their averages are between "neutral" and "agree to use technology apart from business purposes" but more close to neutral. Regarding the data for each variable, it would not be wrong to say that age and department was the variables that have the largest impact on the answers for this question. Overall, for the smartness/technology usage dimension, it has been observed that department is the most significant variable.

4.2.5. Attractiveness

As mentioned earlier in the "Literature Review" chapter, the attractiveness dimension is mainly composed of providing a safe, healthy, ergonomic and aesthetically pleasing environment to the employees. First of all, the boundaries of company's responsibilities to ensure a healthy and safe office space for employees were questioned with the help of 25th and 26th statements of the survey which can be found in the Appendices.

Regardless of the department they are in, most of the respondents think that it is the company's duty to ensure the safety of employees and their personal belongings. They stated clearly that safety is their number one criterion in job selection and if they feel unsafe in an office environment, it will be a deal breaker as this is the basic right of all human beings. According to them, in the case of unsafe and unprotected space, motivation, satisfaction, collaboration or innovation cannot exist. Only 6 participant corresponding to 7% of the total participants disagree with the statement thinking that

it is the employees' responsibility to protect themselves and their belongings and behave decently in the office. This 7% is mainly composed of respondents from sales and marketing department and the average agreement rates of other departments are almost the same. Furthermore, females more strongly believe than the males that providing the security in the office environment is company's responsibility. Another point that needs to be emphasized is that the agreement level averages are more or less the same in each age group so it cannot be said that age is a significant variable for this issue. Though, the highest agreement level has been seen in 25-29 age group and the members of 18-24 age group are the ones who have the lowest average. However, education level has the highest impact on the answers. The ultimate disagreement and agreement levels has been obtained when the data is analyzed in respect to education level. Participants with two degree are mostly undecided about this issue and the highest agreement rate has been seen in university graduates. For this question, the answers can be considered as uniform, participants see this issue as a basic need. Changes in department, age, gender and education level do not create much changes in the answers.

Similarly, 88% of the total respondents believe that the company should be responsible for fulfilling health requirements of employees such as daylight exposure, ergonomic office furniture and healthy snacks. Operations and sales and marketing departments totally agree with the statement without any exception and there is one respondent in programming department who disagrees. The remaining 12% are participants from finance department. They stated that health should be under employees' own control and expecting the company to provide healthy snacks or carefully designed comfortable office furniture is unrealistic. In their opinion, these expectations in fact are the ones making employees unhappy and unmotivated as they are hard to meet. When other variables are examined, it has been observed that half of those who do not agree are men and half are women but overall the agreement level of the male participants are higher than the female ones. Besides, all of the members of 30-34 and 35-39 age groups agree with the statement and the majority of objectors are 40-44

years old. Last but not least, the ones who do not believe that it is the responsibility of the company to ensure that employees are healthy are all university graduates. All in all, it would not be wrong to say that the opinions about this issue has dominantly influenced by the departments of the respondents.

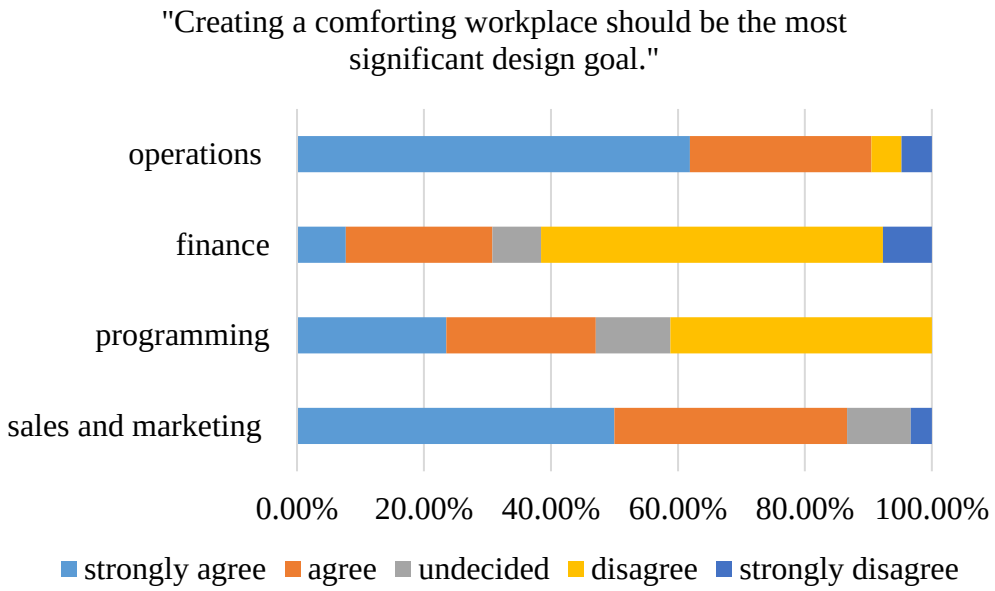

Figure 4.9. Level of agreement of the respondents on comfort being the most significant design goal

As written before in the "Common Characteristics of 21st Century Offices", creating a safe and healthy office environment is claimed to be not sufficient to satisfy the employees in 21st century. The office should be impressive and most importantly comforting. This proposition was examined among four different departments. Overall, 70% of the participants agree with the statement. They stated that they cannot work in a company for a long time if its workplace is not comforting and as this will lead to loss of time, talent and productivity, providing a comforting environment should be very important for the company. However, when looked deeply into the Figure 4.9., it is seen that the dominant opinion is the opposite in finance and programming departments. Most of the respondents from finance and programming expressed that although being comforting is also critical as it includes the ergonomics dimension, the most important design goal should be providing equal physical space

related conditions to every employee. In their opinion, having an employee working in basement with nearly no daylight exposure and another employee in the same position whose desk facing to the garden is not acceptable. Additionally, although the number of male respondents who disagree with the statement is slightly equal to the female opponents, the average agreement rate of female respondents to the statement, which is “Creating a comforting workplace should be the most significant design goal” is slightly higher than the male ones. When the issue is analyzed in terms of age, the data has shown that the agreement level increases with increasing age until 40 but a significant drop has been seen in the average agreement rate of the participants older than 40. Therefore, 35-39 age group agrees the most and 40-44 age group has the lowest agreement level among others. The final variable that was examined for this aspect is education level. All the respondents with two year degree believe that the biggest goal of the workplace design should be creating a comforting environment and they have the highest average whereas high school graduates have the lowest agreement level. As the sample size of some groups like doctorate graduates is too small, the averages are neglected and when these groups are excluded, the significant variable has become department like the previous aspect of attractiveness.

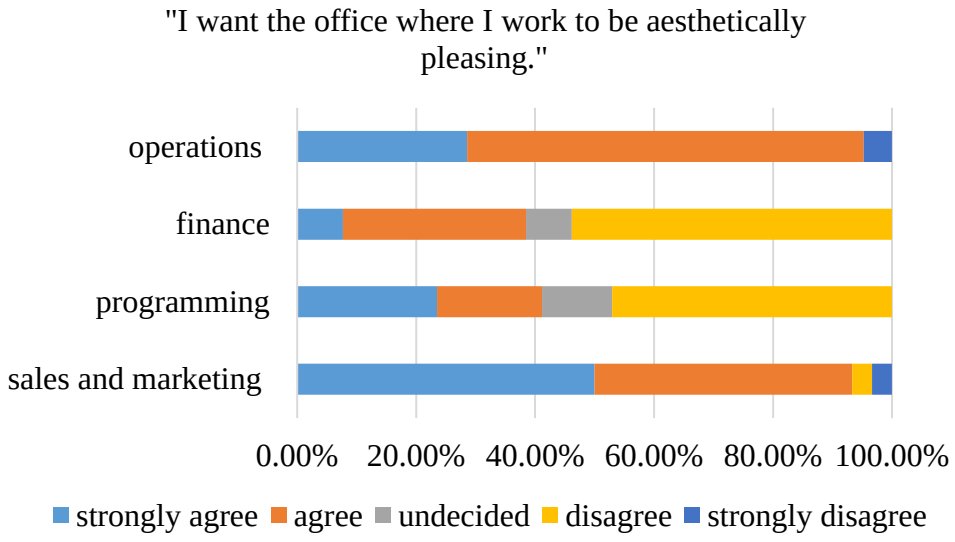

Figure 4.10. Level of agreement of the respondents on aesthetics dimension

Furthermore, the survey participants were asked about aesthetically pleasing dimension of attractiveness. As can be seen in the Figure 4.10., in sales and marketing and operations departments, almost all the respondents expect the office environment to be aesthetically satisfying. They believe that an office design is also a way of marketing so companies should create workplaces which are good looking. Surprisingly, these two departments are the only ones who have some employees strongly disagreeing with the statement. The main reasons of this strong disagreement is that each employee has different taste in design and an aesthetically pleasing office for one employee is not that satisfying for another one. Considering these differences, they stated that being aesthetic should not be a priority or an expectation. On the contrary to sales and marketing and operations, the participants who disagree with the statement is higher than the ones who agree in finance and programming departments. Survey volunteers from programming remarked that being aesthetically pleasing is a minor plus point for the office but the virtual work environment is what they really care about. A comfortable chair is allegedly more than enough for them. They do not expect more. As for respondents from finance department, they are on the same page with the ones who strongly disagree with the statement. In their opinion, pleasing every employee is not possible and there are more important issues than aesthetics in office design like lighting. Besides, the average agreement rate of female respondents on necessity of having an aesthetically pleasing office environment is higher than the male ones. The data has shown that females give importance to aesthetics more than the male respondents. 80% of the female participants want the office they work to be eye pleasing whereas the percent is 75 in the male group. Moreover, the agreement rate of the 18-24, 24-29, 30-34 and 35-39 age groups are almost the same and in around "agree" option. However, for the participants who are older than 40 are inclined to "undecided" option according to the group agreement averages. The lowest agreement rate has been seen in 45-49 group. The last variable that has been taken into consideration is the education level. Respondents with two year degree are the ones who agree the most and high school graduates have the lowest agreement level. All in all, considering the score ranges and the overall average, the significant variable

shaping the thoughts on this issue is department like the other elements of attractiveness.

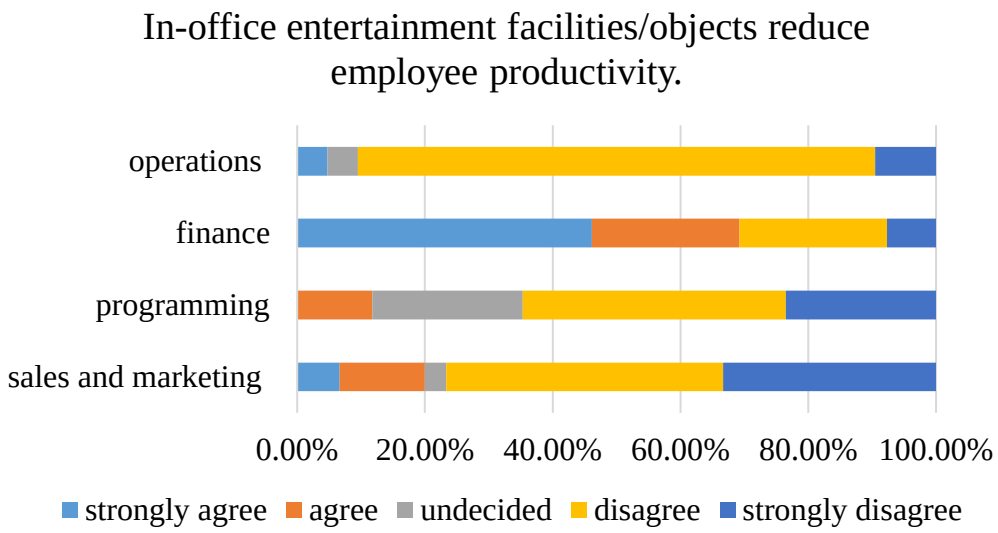

Figure 4.11. Level of agreement of the respondents on in-office entertainment objects reducing productivity

Lastly for the attractiveness feature, participants were asked whether in-office entertainment equipment like foosball table, darts, arcade games and ping-pong reduce productivity or not. 70% of the survey volunteers stated that entertainment facilities or objects increase efficiency as the more motivated they are, the more they work. Besides, most of the respondents from sales and marketing, programming and operations departments believe that constantly being in front of computers is tiring and having a place to chill out and relax not only motivates them but also minimizes the possibility to make a mistake. According to them, using these kind of areas and participating in games in the office is also good for demolishing the hierarchical structure, communication and collaboration which are the key elements of innovation. On the other hand, Figure 4.11 shows that the situation is different for the finance participants. What finance respondents think about the in-office entertainment objects such as foosball is in parallel with their opinions about informal gathering spaces. They believe that these kind of spaces or objects result in loss of discipline and concentration. In their point of view, employees should wait after work for having fun.

Furthermore, although the averages of both female and male respondents are close to the "disagree" option, male respondents more strongly disagree with the statement than the females according to the score averages. On the other hand, the objector percentage of females is higher than the male objector percentage. In addition to department and gender, the data is analyzed in respect of age. The averages of 25-29, 30-34, 35-39 and 45-49 age groups are more or less the same and around the disagree option. 25-29 age group are the ones who disagree the most among others. The average agreement level of 18-24 is between undecided and agree but closer to undecided option. However, participants who are between 40 and 44 are mostly agree that entertainment areas/objects in the office decreases the efficiency. Lastly, all of the master and doctorate graduates believe that office should have some places to chill out. In particular, master graduates have the highest disagreement rate. On the other hand, high school graduates tend to agree with the statement. When compared to age, gender and education level, department affects the score results of this aspect the most.

All in all, regarding the differences between highest and lowest average scores of groups for each variable and overall score averages of five questions, it has been observed that department has the highest effect on the answers. Therefore, it would not be wrong to say that department has the significant variable for the attractiveness dimension.

4.2.6. Modifiability

The other common feature of 21st century offices that were questioned in the survey was modifiability. The major components of modifiability are personalization, having multi-purposed areas and/or objects and adapting the office design according to user preference. Modifiability's main purpose is to raise the sense of belonging of employees. In order to evaluate the importance of sense of belonging in participants' eyes, 30th statement, which is "I would like to feel that I belong to the office where I work" was used. 74 respondents, which corresponds to 91%, agree with the statement expressing that it should be considered as humanitarian need. Pursuant to the

justifications written, employees need to feel that they belong to the company to maintain a long term business relationship and office space is an important factor in increasing this sense of belonging. Only 5% of the total respondents, mainly from programming department, stated that they do not have to feel that they belong to the physical office space and they can work from almost everywhere. Almost all of the members of this 5% are men and unsurprisingly the agreement rate of female respondents are higher than the males. Besides, the age effect has been studied. Although all the averages of age groups are in the "agree" side of the response spectrum, 73% of the participants who are older than 35 and younger 40 strongly agree with the statement and so the agreement rate is highest for 35-39 age group. On the other hand, respondents older than 40 are more neutral about this issue as their averages approach to the "undecided" answer. The lowest average for this variable has been seen in 45-49 age group. Furthermore, the averages of subgroups of the education level variable are nearly the same and are between "strongly agree" and "agree" options. Under these circumstances, it could be stated that education level has no effect on the need of sense of belonging to the office environment. The objectors are only seen in the university graduates. The participants with two year degree have relatively higher agreement rate than the others and the average is at its lowest in master's degree graduates. The results have shown that the differences in the sense of belonging needs of the survey participants can be explained by both department and age factors.

Furthermore, as the first step of personalization is having an assigned space, participants were asked whether having a space allocated only to them makes them feel better or not. One of the highest agreement rate is obtained from this question. There are no objectors. 96% of the total participants explained that owning a specific place in the office, either a desk or a room, is very important for them and they cannot endure in "hot desking" in other words "free address" type workplaces. The 4% who are undecided about this issue is all males. The females agree with the statement more strongly than the male employees. In addition to this, when the results are analyzed

with respect to age, it has been seen that 18-24, 30-34 and 35-39 age groups tend to agree strongly that having a space allocated only to them makes them feel good whereas the agreement level is relatively lower in 45-49 age group but still close to “agree” option. Similar to the other variables, education level differences also do not make much variation in answers. All the group averages are between “agree” and “strongly agree”. The average of high school graduates is closer to “agree” while mean of agreement levels of participants with two year degree is adjacent to strongly “agree”. For this question, the answers are uniform so changes in department, age, gender and education level do not create much changes in the answers.

Then, the personalization issue was addressed. Without any contrarians, 94% think that personalizing the office space they work make them feel better and only 5 out of 81 participants are indecisive about it. They noted that seeing some items from their personal life such as photographs, drawings of their kids develop sense of ownership, increase loyalty, motivation and so productivity. They also consider personalization as a way to cope with the privacy problem of open office layout. Besides, they believe that it is also good for communication especially for newly hired ones as the personal items can say more about them than the conversations. For instance, seeing a picture drawn by a kid on a desk can bond two people who have kids without much effort. 4 out of 5 indecisive participants are male and the remaining one prefers not to answer the gender question. The results have also showed that females want to personalize the office space more than males. Besides, although the need of personalization has relatively decreased for the participants older than 40, the averages of all age groups lay between “strongly agree” and “agree”. The highest agreement rate has been obtained from participants younger than 25 and 45-49 age group has the lowest average. The last variable that has been studied is the education level. The respondents who choose “undecided” option are all university graduates. The agreement average of employees with two year degree is closer to “strongly agree” than the other education level groups and master’s degree graduates tend to agree with the statement and so have the lowest agreement rate. Similar to the previous question, the averages

of all the subgroups are more or less the same therefore it could be stated that department, age, gender and education level do not have any effect on the personalization aspect. Personalization can be considered as a human need.

Moreover, flexibility in spaces and office furniture is widely seen in 21st century office design. Space flexibility is provided by not having a specified purpose, seating order, lighting or ventilation level and flexibility in furniture is achieved by using adjustable ones. To be able to understand the opinions of the occupational groups about flexibility, 32nd and 34th statements were asked. 64% of the participants think that office areas and furniture used should have a certain function and should not be used for other purposes. They believe that an area not having an intended usage can cause tension between the employees. According to them, it would be difficult to decide who will use the space, for instance, an employee who wants to use that area for his/her phone calls or another one who is there to concentrate. They believe that to prevent this kind of problems which will lead to loss of motivation and productivity in the long term, the office design including furniture, the functions and allocations of spaces should be predetermined. This 64% is mostly composed of sales and marketing, programming and finance respondents.

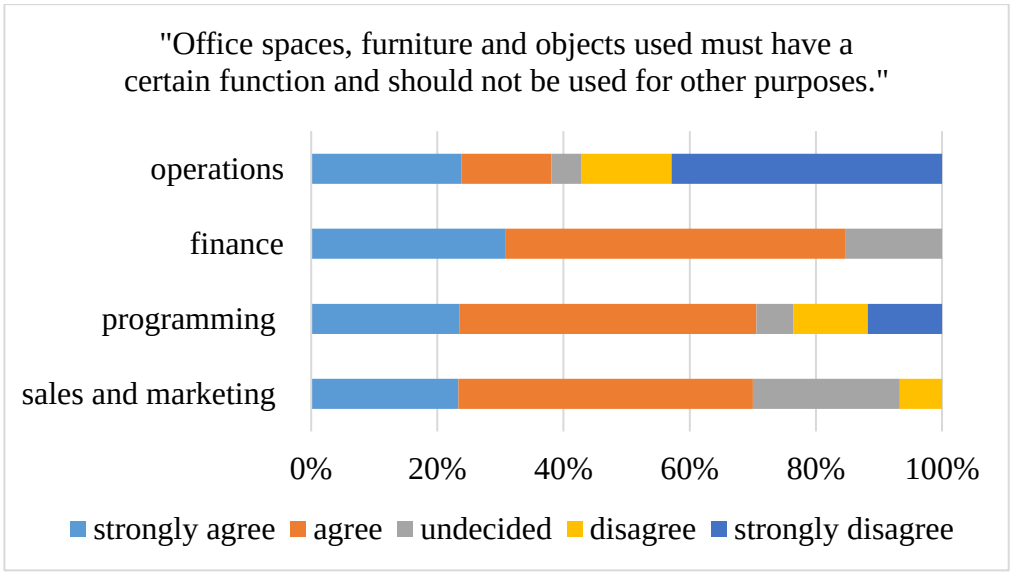

Figure 4.12. Opinions of participants about flexibility in office

However, as can be seen in the Figure 4.12., the response pattern is different in operations department. Operations department spends more time in the office when it is compared with other departments due to the night shift and their requirements are different accordingly. More than half of the department stated that they need flexible areas in terms of intended usage since a special area cannot be allocated for each need. For example, a relaxing space with comfortable armchairs is essential especially for the night shift. Additionally, they need a room for the in-department meetings, for collaboration just like the other departments. They believe that having a multi-purpose space would be very useful for them as it can address many needs in the same place. Besides, approximately 73% of the male respondents think that office areas and furniture used should have a definite function and should be utilized for other purposes. However, this percent is significantly lower in female participants. The percentage of females who agree with this statement is 47%. On the average, females are somewhere in between “agree” and “undecided” about this issue. The agreement average of women is lower than the men. In addition to this, the averages have demonstrated that all the age groups are in the “agree” side of the spectrum. All of the objectors are older than 25 and younger than 40. The members of other age groups are completely agree with the statement. The highest agreement rate has been seen in 40-44 age group whereas the average of 35-39 age group is much closer to “undecided” option. Similar to age and gender, there has not been much variation in the average scores when education level has changed. The averages of all the subgroups are more or less the same and tend to be “agree”, expect for the high school graduates. Unlike the participants with other education level, high school graduates strongly agree with the statement. The lowest agreement rate has been observed in university graduates. Considering the results of all the subgroups about this particular aspect, significant change has been observed only for the department variable.

Last but not least, the survey participants were asked whether adjustable furniture usage, moveable partitions panels, changeable ventilation and lighting levels according to the user create chaos in the office or not. The results can be seen in Figure

4.13. Although most of the respondents prefer areas and objects having a certain function in order to prevent tension and disorder within the office, approximately 60% of the total participants regard these as minor changes and they think that they do not create a chaotic atmosphere. Since one of the main problems about the open office layout are ventilation (especially in summer) and lighting (especially in winter), adjustable office items according to user preference are believed to be the solution. In opposition to the general thoughts of other departments, finance employees agree with the statement thinking that this kind of flexibility results in indiscipline. They also look this issue from outsiders' point of view and claim that office design without any order and uniformity signalizes organization problems of company and it is negative for the company image and so marketing.

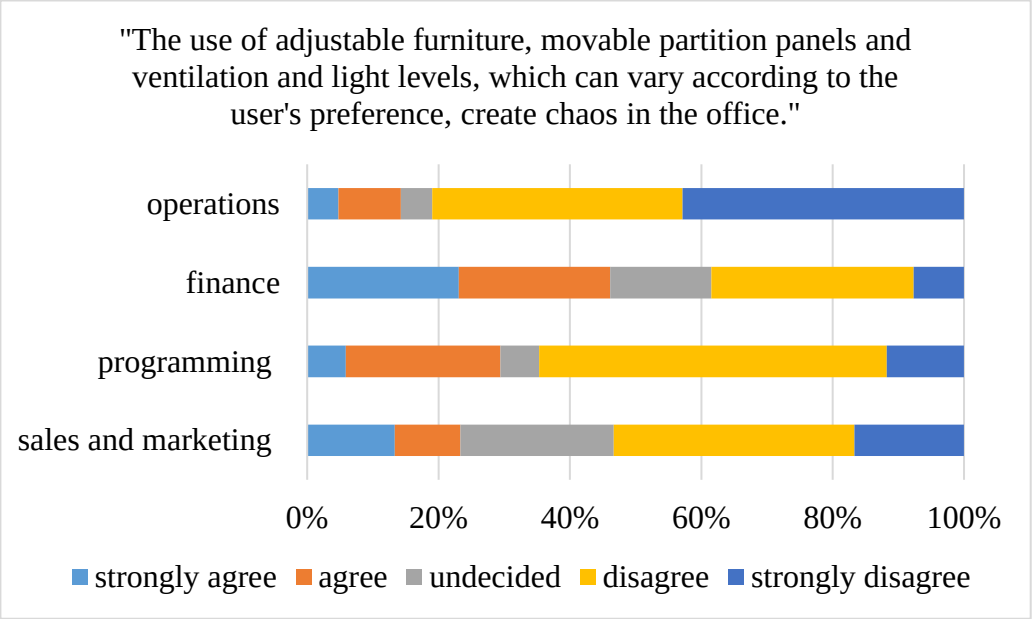

Figure 4.13. Opinions of participants about flexibility being a source of chaos

Like the other questions, the answers of the 34th question is analyzed with respect to gender, age and education level. It has been observed that gender has almost no effect on the opinions of participants on this issue since the averages of females and males are exactly the same. Besides, apart from the 40-44 age group, the averages of all age groups are almost the same and in between "undecided" and "disagree" options. The

highest disagreement has been seen in participants older than 45. On the other hand, 40-44 age group is in the other side of the response spectrum but much closer to the "undecided" option and so has the highest agreement rate. Like the most of the age groups, participants with different education level have similar opinions about this statement and so the averages are similar. Both the participants with two year degree and the ones with master's degree have the highest agreement rate and lowest has been obtained from the high school graduates. Considering that the agreement average of the operation department is much different/lower than all other subgroups, it could be concluded that the department variable has affected the answers the most.

4.2.7. Value Reflection

One of the most significant features of modern offices is being value reflecting. Company owners and/or upper management have begun thinking that their office space should send a message for the employees and customers about their core values and company culture. However, the important point here is whether the employees also consider it essential or not. In order to understand the opinions of the participants about value reflection, the following statement was given; "I think that the physical office environment should reflect the corporate culture, ethical values, vision and mission of the company". Nearly all the respondents in sales and marketing and operations departments regard value reflection as essential. Since they represent the company in front of suppliers and customers, they state that constantly remembering who they work for, their principles and priorities is important while building the relationships. In their point of view, by this way, the probability of making a mistake decreases. However, most of the participants in finance department disagree with the statement. As explained in the "smartness/technology usage" part of the chapter, finance employees think that their role/job description is regardless of the company in which they work, in other words no matter which company it is, they do the same thing. Therefore, seeing the company itself in the office design is not a priority for them. Lastly, the developers do not have a common view on this issue. Half of them believes that value reflection is necessary whereas the other half does not agree with

it. The data is also analyzed in respect of gender, age and education level. The results are as follows. Firstly, the average agreement rate of the female respondents are higher than both the overall average and male participants and similarly the percentage of objectors in female group are less than those in male group. In addition to this, the averages show us that 18-24 and 25-29 age groups agree with the statement and the averages of participants whose ages are between 30 and 39 lie between "strongly agree" and "agree" options. The highest agreement level has been seen in 35-39 age group. On the other hand, respondents who are older than 39 but younger than 45 mostly disagree with the statement and have the lowest agreement rate. Finally, the averages of all the groups under education level variable are in the agree side of the response spectrum. Respondents with two year degree, master's degree and doctorate completely agree with the statement without any exception and among the others participants graduated from two year programs are the ones who agree the most whereas high school graduates have the lowest agreement level. Based on the results, it can be said that department has dominantly affected the views of the participants on the value reflection necessity issue.

In parallel with the first statement of the value reflection part of the survey, the participants were also asked whether office colors, furniture, objects and materials used should be compatible with the corporate identity or not. Unsurprisingly, the results were similar to the previous statement. A high portion of the sales and marketing and operation teams agree that the whole office design should be well suited to the corporate identity items such as logo and corporate colors. However, finance and programming employees are uncertain about it. Moreover, the averages of males and females are exactly the same with each other and also with the overall average so it could be said that gender has no effect on this subject. In addition to gender and department, age variable has also been investigated. The ultimate highest agreement rate has been achieved by 18-24 age group and they mostly strongly agree with the statement. The averages of other age groups, excluding 40-44, lies between "agree" and "undecided" options and participants who are older than 39 but younger than 45

have the lowest agreement and they are mostly neutral about this statement. The effect of education level was the final variable examined. The averages of all groups are in the “agree” side of the results spectrum. Master’s degree graduates tend to strongly agree whereas participants with two year degree are more close to undecided option and have the lowest agreement rate. Based on the results, it could be stated that the variable that influence the results most is department.

Last but not least, the survey participants were questioned about the value reflection in their current office. Approximately 60% of the respondents from sales and marketing department, who believe that value reflection is essential, think that the office space where they work reflects the company culture and core values. Similar situation is seen in the operations department as well. On the other hand, employees who have programming and finance responsibilities are mostly indecisive about it. Additionally, for this aspect, there is not any observed difference on male and female respondents’ thoughts about value reflection in their current office. They have the same agreement rate and it would not be wrong to say that they are undecided about this issue. Moreover, all respondents who are older than 44 agree that their current office design reflects the company values and therefore the highest agreement level has been obtained from this age group. However, the averages of other age groups are close to the “undecided” option and the 25-29 age group are the ones who agree the least. Unlike the other aspects, the perceived value reflection in the current office of the participants differs more according to the education level. The average of respondents with two year degree is in between “strongly agree” and “agree” and they have the highest agreement rate among not only the others groups of education level dimension but also all the other groups of department, gender and age. On the opposite, the average of master graduates reflects that they are undecided and lowest agreement rate has been seen in this group.

To sum up, just like the other dimensions, which are collaboration enabling, smartness, attractiveness and modifiability, the results have shown that department is the variable that principally shapes the opinions of participants about value reflection.

4.3. Comparison According to Some Socio-Demographic Characteristics

In this part of the thesis, gender, age, education level and department variables were compared to observe whether the spatial needs and expectations differ according to these characteristics. For age, education level and department variables, ANOVA and Kruskal Wallis tests were applied. On the other hand, independent t test and Mann-Whitney U test were used for the gender variable.

As one of the most important assumptions of parametric statistical tests is the normal distribution of the data, the first step should be checking whether the data set is normally distributed or not. In this thesis, normality interpretations were made based on the skewness and kurtosis values for each category of the independent variables with the help of SPSS® program. Skewness can be considered as a symmetry measure in a distribution. The skewness value of a normal distribution is around 0. Negative skewness values indicate a skewed distribution to the right whereas positive ones refer to a skewed distribution to the left. The coefficient of kurtosis is also zero in the normal distribution. Positive kurtosis coefficients indicate a spike distribution and the negative kurtosis values are a sign of flattened distribution.

First of all, the data was divided into 6 regarding the dimensions, which are general opinion, collaboration enabling, smartness/technology usage, attractiveness, value reflection and modifiability. For each participant, an overall score, in other words the average of the related questions' scores, was obtained for each dimension. Then, the skewness and kurtosis value of the data were checked in order to understand whether it is approximately normally distributed for each category of the independent variables. The skewness values between -1.5 and +1.5 (Tabachnick & Fidell, 2013) and the kurtosis values between -2 and +2 (George & Mallery, 2012) are considered acceptable. Therefore, to apply the parametric tests, the skewness and kurtosis values for each category of each independent variable should be in these ranges.

As the next step, appropriate tests were performed and by this way, significant variables were found for each dimension. Regarding the ranges of the scores of

answers, it was stated that department is a significant variable unlike gender, age and education level. In this part of the thesis, statistical analyses were performed in order to prove this.

4.3.1. Gender

Since the gender variable includes two different groups, which are female and male, independent t-test or Mann Whitney test is performed to find whether it is significant or not. Independent t-test is a parametric analysis for normally distributed data whereas Mann Whitney test is a non-parametric test used when the data is not normally distributed.

As explained above, as a first step, skewness and kurtosis values were checked for both males and females and for each dimension. The descriptive statistics can be found below. The participants who prefer not to answer the gender question were excluded from the analyses.

Table 4.9. *The skewness and kurtosis values of the data for females and males*

Dimension	*Gender*		*Statistics*	*Std. Error*
General Opinion	Female	Skewness	0.349	0.403
		Kurtosis	0.371	0.788
	Male	Skewness	0.086	0.374
		Kurtosis	0.079	0.733
Enabling Collaboration	Female	Skewness	0.222	0.403
		Kurtosis	1.247	0.788
	Male	Skewness	0.285	0.374
		Kurtosis	-0.473	0.733
Smartness	Female	Skewness	0.060	0.403
		Kurtosis	-0.735	0.788
	Male	Skewness	0.976	0.374
		Kurtosis	1.705	0.733

Attractiveness	Female	Skewness	1.137	0.403
		Kurtosis	2.658	0.788
	Male	Skewness	0.157	0.374
		Kurtosis	0.363	0.733
Value Reflection	Female	Skewness	0.365	0.403
		Kurtosis	-0.536	0.788
	Male	Skewness	0.442	0.374
		Kurtosis	-0.799	0.733
Modifiability	Female	Skewness	-0.282	0.403
		Kurtosis	-0.798	0.788
	Male	Skewness	-0.275	0.374
		Kurtosis	0.430	0.733

As can be seen in the above table, for the general opinion, enabling collaboration, smartness, value reflection and modifiability dimensions, the data is approximately normally distributed for both female and male categories since the skewness and kurtosis values are in between -1.5 and +1.5 and -2 and +2 respectively. For these dimensions, independent t-test were used to see whether gender is a significant variable or not. The results of the independent t-test for each dimension are below. The detailed version of the results can be found in the Appendices.

Table 4.10. *Independent sample t-test result*

Dimension		*Levene's Test for Equality of Variances*		*t-test for Equality of Means*		
		F.	*Sig.*	*t*	*df*	*Sig. (2-tailed)*
General Opinion	Equal variances assumed	0.429	0.514	1.448	72	0.152
	Equal variances not assumed			1.426	64.199	0.159

Enabling Collaboration	Equal variances assumed	0.408	0.525	-0.732	72	0.466
	Equal variances not assumed			-0.735	70.908	0.465
Smartness	Equal variances assumed	0.046	0.831	0.836	72	0.406
	Equal variances not assumed			0.841	71.459	0.403
Value Reflection	Equal variances assumed	0.837	0.363	-0.240	72	0.811
	Equal variances not assumed			-0.242	71.754	0.810
Modifiability	Equal variances assumed	1.256	0.266	0.039	72	0.969
	Equal variances not assumed			0.040	71.320	0.968

Levene's test for equality of variances is used to test homogeneity of variances, in other words to test if samples have equal variance or not. Sig. values greater than 0.05 indicate that group variances are equal whereas for the Sig. values less than 0.05, group variances are not equal. In this case, for each dimension, Sig. value is higher than 0.05 and so equal variances assumption is correct. The values for "equal variances not assumed" are ignored.

After the Levene's test for equality of variances, the next step is t-test for equality of means. Sig. (2-tailed) values higher than 0.05 signify that there is no significant difference between two groups whereas for values less than 0.05, the difference is significant. As can be seen in the above table, Sig. values for each dimension is greater than 0.05. Therefore, it could be concluded that the differences between the men's and women's general opinions about office design and their requirements and expectations relating to collaboration, smartness, value reflection and modifiability are not significant.

On the other hand, as can be seen in the Table 4.9, the kurtosis value of female group in attractiveness dimension is 2.658, in other words larger than 2, which indicates that the data is not normally distributed. For the attractiveness dimension, the Mann-Whitney U test, which is a non-parametric equivalent of independent sample t-test, was performed. The result of the test is below.

Table 4.11. *Mann-Whitney U test result*

	Attractiveness dimension
Mann-Whitney U	607.000
Wilcoxon W	1202.000
Z	-0.798
Asymp. Sig. (2 tailed)	0.425

Similar to the independent sample t-test, Asymp. Sig. (2 tailed) values less than 0.05 indicates that there is significant difference between two groups whereas values higher than 0.05 is sign that the difference is not significant. In this case, the value is 0.425 bigger than 0.05. Therefore, there is no significant difference between female and male scores of attractiveness dimension.

All in all, according to the results of t-test and Mann-Whitney U test, gender is not a significant variable for the expectation and requirements of the participants relating to the six dimensions which the survey has questioned.

4.3.2. Age

Age is another independent variable that causes some changes in the answer of participants. However, the important point is whether these differences are significant or not. As the categories under age variable is more than two, t-test or Mann-Whitney U test cannot be performed. For the comparison of more than two groups, one-way ANOVA and Kruskal Wallis tests are used. ANOVA is a parametric test applied to

normally distributed data whereas Kruskal Wallis test is utilized when the data is not normally distributed.

As the first step, the skewness and kurtosis values of the data have been found for each category under the age variable. The descriptive statistics of the data are below.

Table 4.12. *The skewness and kurtosis values of the data for each age group*

Dimension	*Age*		*Statistics*	*Std. Error*
General Opinion	18-24	Skewness	-0.544	1.014
		Kurtosis	-2.944	2.619
	25-29	Skewness	0.262	0.481
		Kurtosis	0.036	0.935
	30-34	Skewness	0.483	0.427
		Kurtosis	2.103	0.833
	35-39	Skewness	0.599	0.661
		Kurtosis	0.601	1.279
	40-44	Skewness	-1.409	0.752
		Kurtosis	2.876	1.481
	45-49	Skewness	-0.166	0.913
		Kurtosis	-2.407	2.000
Enabling Collaboration	18-24	Skewness	0.000	1.014
		Kurtosis	0.391	2.619
	25-29	Skewness	0.582	0.481
		Kurtosis	-0.216	0.935
	30-34	Skewness	0.377	0.427
		Kurtosis	0.925	0.833
	35-39	Skewness	-0.074	0.661
		Kurtosis	-1.384	1.279
	40-44	Skewness	1.231	0.752
		Kurtosis	1.018	1.481
	45-49	Skewness	0.609	0.913
		Kurtosis	-3.333	2.000
Smartness	18-24	Skewness	1.846	1.014

		Kurtosis	3.412	2.619
	25-29	Skewness	1.298	0.481
		Kurtosis	3.116	0.935
	30-34	Skewness	0.983	0.427
		Kurtosis	2.419	0.833
	35-39	Skewness	0.161	0.661
		Kurtosis	-1.422	1.279
	40-44	Skewness	-1.198	0.752
		Kurtosis	0.004	1.481
	45-49	Skewness	0.578	0.913
		Kurtosis	-2.708	2.000
Attractiveness	18-24	Skewness	1.296	1.014
		Kurtosis	2.179	2.619
	25-29	Skewness	0.748	0.481
		Kurtosis	-0.203	0.935
	30-34	Skewness	0.481	0.427
		Kurtosis	-0.376	0.833
	35-39	Skewness	-0.823	0.661
		Kurtosis	-0.570	1.279
	40-44	Skewness	-0.750	0.752
		Kurtosis	-0.549	1.481
	45-49	Skewness	1.744	0.913
		Kurtosis	3.322	2.000
Value Reflection	18-24	Skewness	-0.560	1.014
		Kurtosis	0.928	2.619
	25-29	Skewness	0.302	0.481
		Kurtosis	-0.608	0.935
	30-34	Skewness	0.679	0.427
		Kurtosis	-0.300	0.833
	35-39	Skewness	0.963	0.661
		Kurtosis	1.890	1.279
	40-44	Skewness	-0.414	0.752
		Kurtosis	-1.783	1.481

	45-49	Skewness	2.032	0.913
		Kurtosis	4.151	2.000
Modifiability	18-24	Skewness	0.000	1.014
		Kurtosis	0.391	2.619
	25-29	Skewness	-0.712	0.481
		Kurtosis	-0.165	0.935
	30-34	Skewness	-0.030	0.427
		Kurtosis	0.994	0.833
	35-39	Skewness	-0.354	0.661
		Kurtosis	-1.127	1.279
	40-44	Skewness	0.461	0.752
		Kurtosis	-1.776	1.481
	45-49	Skewness	2.236	0.913
		Kurtosis	5.000	2.000

Based on the above results, as each dimension has kurtosis values higher than 2, it can be concluded that the data is not normally distributed. Therefore, for all the dimensions, Kruskal Wallis test has been performed. The results of the test are as follows.

Table 4.13. *The results of Kruskal Wallis test for age variable*

	General Opinion	*Enabling Collaboration*	*Smartness*
Kruskal Wallis H	10.079	4.124	4.177
df	5	5	5
Asymp. Sig.	0.073	0.532	0.524

	Attractiveness	*Value Reflection*	*Modifiability*
Kruskal Wallis H	4.812	8.403	4.834
df	5	5	5
Asymp. Sig.	0.439	0.135	0.437

As the Asymp. Sig. value of each dimension is higher than 0.05, it could be stated that the differences between the age groups are not significant, in other words, age is not a significant variable for the expectations and requirements of the participants about the innovative office design.

4.3.3. Education Level

Another variable that has evaluated is the education level. There are 5 different education level options in the survey, which are high school, two year degree, university, master's degree and doctorate. However, as there is only one participant with doctorate degree, doctorate group is excluded from the analysis. To decide which test to be used, the skewness and kurtosis values were checked. The results can be found in Table 4.13.

Table 4.14. *The skewness and kurtosis values of the data for each education level*

Dimension	*Education Level*		*Statistics*	*Std. Error*
General Opinion	High school	Skewness	1.129	1.014
		Kurtosis	2.227	2.619
	2 year degree	Skewness	0.857	0.845
		Kurtosis	-0.300	1.741
	University	Skewness	0.284	0.299
		Kurtosis	0.006	0.590
	Master's Degree	Skewness	-0.075	0.845
		Kurtosis	-1.550	1.741
Enabling Collaboration	High school	Skewness	-2.000	1.014
		Kurtosis	4.000	2.619
	2 year degree	Skewness	1.172	0.845
		Kurtosis	1.970	1.741
	University	Skewness	0.089	0.299
		Kurtosis	0.153	0.590
	Master's Degree	Skewness	1.586	0.845
		Kurtosis	2.552	1.741

Smartness	High school	Skewness	1.129	1.014
		Kurtosis	2.227	2.619
	2 year degree	Skewness	0.333	0.845
		Kurtosis	0.516	1.741
	University	Skewness	0.261	0.299
		Kurtosis	-0.720	0.590
	Master's Degree	Skewness	-1.270	0.845
		Kurtosis	1.531	1.741
Attractiveness	High school	Skewness	0.370	1.014
		Kurtosis	-3.901	2.619
	2 year degree	Skewness	-0.527	0.845
		Kurtosis	-0.093	1.741
	University	Skewness	0.875	0.299
		Kurtosis	1.717	0.590
	Master's Degree	Skewness	0.889	0.845
		Kurtosis	1.339	1.741
Value Reflection	High school	Skewness	1.219	1.014
		Kurtosis	2.227	2.619
	2 year degree	Skewness	1.102	0.845
		Kurtosis	-0.300	1.741
	University	Skewness	0.268	0.299
		Kurtosis	-0.767	0.590
	Master's Degree	Skewness	0.666	0.845
		Kurtosis	0.586	1.741
Modifiability	High school	Skewness	0.000	1.014
		Kurtosis	0.912	2.619
	2 year degree	Skewness	-0.304	0.845
		Kurtosis	-2.470	1.741
	University	Skewness	-0.289	0.299
		Kurtosis	0.509	0.590
	Master's Degree	Skewness	0.026	0.845

	Kurtosis	-2.367	1.741

Similar to the age variable, the above results have shown us that all the skewness and kurtosis values of the data are not in the acceptable range. For each dimension, there is a kurtosis value higher than 2. Regarding this, Kruskal Wallis test has been applied to each dimension to see whether the difference between the participants with different education level is significant or not. The results of the Kruskal Wallis test are below.

Table 4.15. *The results of Kruskal Wallis test for education level variable*

	General Opinion	*Enabling Collaboration*	*Smartness*
Kruskal Wallis H	0.468	5.520	3.941
df	3	3	3
Asymp. Sig.	0.926	0.137	0.268

	Attractiveness	*Value Reflection*	*Modifiability*
Kruskal Wallis H	3.502	3.634	4.274
df	3	3	3
Asymp. Sig.	0.320	0.304	0.233

The above results have shown that Asymp. Sig. values are higher than 0.05 for all dimensions. This situation indicates that there is no significant difference between the spatial expectations and requirements of participants with different education level. Like gender and age, education level cannot also be considered as a significant variable.

4.3.4. Department

The last variable that was analyzed is department. As in other variables, the data analysis has started with the normality tests in order to determine the test to be used. The skewness and kurtosis values of data for each department can be found below.

Table 4.16. *Skewness and kurtosis values of data for each department*

Dimension	*Department*		*Statistics*	*Std. Error*
General Opinion	Sales and Marketing	Skewness	0.804	0.427
		Kurtosis	2.132	0.833
	Operations	Skewness	0.515	0.501
		Kurtosis	2.421	0.972
	Programming	Skewness	0.070	0.550
		Kurtosis	-1.494	1.063
	Finance	Skewness	-1.428	0.616
		Kurtosis	4.266	1.191
Enabling Collaboration	Sales and Marketing	Skewness	0.044	0.427
		Kurtosis	0.023	0.833
	Operations	Skewness	0.877	0.501
		Kurtosis	0.435	0.972
	Programming	Skewness	0.095	0.550
		Kurtosis	-0.624	1.063
	Finance	Skewness	0.939	0.616
		Kurtosis	0.514	1.191
Smartness	Sales and Marketing	Skewness	2.007	0.427
		Kurtosis	7.087	0.833
	Operations	Skewness	0.154	0.501
		Kurtosis	-0.975	0.972
	Programming	Skewness	-0.980	0.550
		Kurtosis	0.542	1.063
	Finance	Skewness	-2.710	0.616
		Kurtosis	8.812	1.191
Attractiveness	Sales and Marketing	Skewness	-0.262	0.427
		Kurtosis	0.439	0.833

	Operations	Skewness	0.828	0.501
		Kurtosis	2.899	0.972
	Programming	Skewness	-0.340	0.550
		Kurtosis	-0.827	1.063
	Finance	Skewness	1.294	0.616
		Kurtosis	3.097	1.191
Value Reflection	Sales and Marketing	Skewness	-0.085	0.427
		Kurtosis	-0.221	0.833
	Operations	Skewness	0.258	0.501
		Kurtosis	0.035	0.972
	Programming	Skewness	-0.063	0.550
		Kurtosis	-1.687	1.063
	Finance	Skewness	-0.846	0.616
		Kurtosis	-0.552	1.191
Modifiability	Sales and Marketing	Skewness	-0.478	0.427
		Kurtosis	-0.526	0.833
	Operations	Skewness	-1.090	0.501
		Kurtosis	1.338	0.972
	Programming	Skewness	0.253	0.550
		Kurtosis	0.431	1.063
	Finance	Skewness	-0.113	0.616
		Kurtosis	-1.011	1.191

The above results has shown that the skewness and kurtosis values of general opinion, smartness and attractiveness data are out of the acceptable range and parametric analyses cannot be applied to these dimensions. The Kruskal-Wallis method was performed for general opinion, smartness and attractiveness. On the other hand, for collaboration, value reflection and modifiability, one way ANOVA has been applied due to the acceptable skewness and kurtosis values.

For the enabling collaboration, value reflection and modifiability, ANOVA test has been performed on the data. ANOVA has two assumptions, which are normally distributed data and equal variances. The skewness and kurtosis values indicates whether the data is normally distributed or not and collaboration, value reflection and modifiability are concordant with this assumption. The next step is to check the variances. Regarding this, Levene's test has been applied to the data. The results of the test are as follows.

Table 4.17. *Homogeneity of variances test results*

	M	*Levene statistics*	*df1*	*df2*	*Sig.*
Enabling Collaboration	Based on mean	1.480	3	77	0.227
	Based on median	1.402	3	77	0.249
	Based on median and with adjusted df	1.402	3	68.272	0.250
	Based on trimmed mean	1.390	3	77	0.252
Value Reflection	Based on mean	5.132	3	77	0.003
	Based on median	3.406	3	77	0.022
	Based on median and with adjusted df	3.406	3	70.147	0.022
	Based on trimmed mean	5.111	3	77	0.003
Modifiability	Based on mean	0.717	3	77	0.545
	Based on median	0.709	3	77	0.550
	Based on median and with adjusted df	0.709	3	67.817	0.550
	Based on trimmed mean	0.741	3	77	0.531

Having Sig. values less than 0.05 indicates that value reflection could not fulfill the equal variances condition of ANOVA whereas for enabling collaboration and modifiability dimensions, ANOVA can be performed. The findings of ANOVA test are as follows.

Table 4.18. *ANOVA test result for department variable*

		Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Collaboration	Between Groups	0.301	3	0.100	0.866	0.463
	Within Groups	8.934	77	0.116		
	Total	9.236	80			
Modifiability	Between Groups	1.274	3	0.425	1.741	0.166
	Within Groups	18.788	77	0.244		
	Total	20.062	80			

Considering the Sig values, it could be stated that the differences between the expectations and requirements of departments in collaboration and modifiability dimensions are not significant.

For value reflection dimension which has normally distributed data but unequal variances, Welch's ANOVA test has been used. For the value reflection dimension, the result is below.

Table 4.19. *Welch's ANOVA test result*

	Statistic	*df1*	*df2*	*Sig.*
Welch	13.390	3	33.889	0.000

As can be seen from Table 4.19, the Sig. value is less than 0.05. Therefore, it could be stated that there is a statistically significant difference between the departments in value reflection dimension.

In order to understand the departments that are significantly different from each other in value reflection dimension, Tamhane Post Hoc test has been applied to the data as the variances are not equal. According to the results of the test, which can be found in detail in the Appendices part of the thesis, it could be stated that sales and marketing department is significantly different from programming and finance departments and also the differences between operations and programming departments and operations and finance departments are significant.

On the other hand, as mentioned before, for general opinion, smartness and attractiveness dimensions, Kruskal Wallis test has been performed. The results can be found below.

Table 4.20. *The results of Kruskal Wallis test for department variable*

	General Opinion	*Smartness*	*Attractiveness*
Kruskal Wallis H	13.880	22.063	17.254
df	3	3	3
Asymp. Sig.	0.003	0.000	0.001

As can be seen from the above table, the statistical significance values (Asymp. Sig.) are less than 0.05 for general opinion, smartness and attractiveness, which indicates that there are statistically significant difference between the departments in these dimensions. In order to understand the departments that are significantly different from each other, pairwise comparisons of departments have been checked. According to the results, for general opinion dimension, finance department is statistically significantly different from sales and marketing, operations and programming departments. The same situation has also been observed in the smartness dimension. Apart from finance department being significantly different from the other three

departments, there is a significant difference between sales and marketing and operations departments in terms of smartness. Lastly, operations and sales and marketing departments are significantly different from finance and programming departments in respect of attractiveness. The pairwise comparisons can be found in the Appendices part of the thesis.

All in all, the results of the statistical tests performed by SPSS® has demonstrated that only the department variable, among gender, age and education level, affects the spatial requirements and expectations from the modern office design significantly. Department variable has a significant effect on general opinion, smartness, attractiveness and value reflection dimensions. The differences in needs and expectations due to the department can be found in the below part of the thesis.

4.4. Spatial Requirements of Each Department

This section constitutes the answer of the second research question. The spatial requirements of each department were identified and explained below. Although the statistical tests has shown that the departments are not significantly different from each other in collaboration and modifiability dimensions, the justifications provided for the answers constitute the qualitative analysis and the observed differences based on the justifications were also discussed in the following part of the thesis.

4.4.1. Sales and Marketing

First of all, based on the gathered results of the survey, it would not be wrong to say that open office layout is a must for sales and marketing department since the whole department need to be constantly in touch. The company expects innovative ideas from the department to draw away the competitors and this can only be achieved by involving every employee in idea generation processes rather than only the decision makers. Therefore, it is very important to create an environment where everyone can speak up. Individual rooms, walls, partitions are physical barriers which hinder the communicative atmosphere whereas open office layout encourages communication. Although each employee has his/her own sales target and category, they work in a

coordinated manner to create overall marketing strategy, decide what to be in the main page for what duration and achieve the department goal. For instance, before summer holiday, the glasses category officer and cosmetics officers work hand in hand and launch summer campaigns. This cooperation and collaboration is facilitated by the open office layout. When designing the open office, care must be taken to ensure that the office is not only safe and healthy but also aesthetically pleasing and comforting.

In addition to open office layout, department should have a close proximity to finance and operations departments for invoicing and logistics respectively as phone calls and e-mails prolongs the solution period. Being far from these departments may cause inconvenience and waste of time.

Moreover, for brainstorming sessions and department meetings, a long desk is required to gather around, write down the ideas, put down the documents and make them visible for everyone. However, innovative ideas not come not only from the official and formal meetings but also from informal conversations without the burden on hierarchy. To foster informal, non-business communication and to demolish the hierarchical structure, recreational areas are essential for sales and marketing employees. These recreational spaces can be in two form: gathering areas such as balcony and lounge and socializing areas with entertainment devices/objects like foosball. They are both necessary as the former one is good for communication and relaxation and the latter one has a positive influence on motivation, team spirit and satisfaction.

The sales and marketing department also requires external communication with possible suppliers and customers and establishing a long-term relationship with them is one of the most significant targets. Therefore, the employees need to keep the other parties pleasant without making compromises, tolerate them and overall have a good relation with them. The most important thing at this point is employees' moods and motivations. For this reason, in-office places to chill out, relax and have fun should be considered as a must for sales and marketing employees.

The survey results also show that one of the main complaints of the sales and marketing employees is the lack of privacy. Some private areas are required especially for the phone calls; both business and personal purposes. As stated before, one of the most important responsibilities of sales and marketing employees is finding new suppliers. This process requires communication and as all suppliers cannot be from Ankara, they frequently make phone calls. The employees stated in the survey that they feel uncomfortable while talking on the phone, even if it is for the business, because of two main reasons. Firstly, they are afraid of disturbing their coworkers as the phone calls happen to last longer than expected. Secondly, they feel watched by their managers while building relationships and concluding the deals. In some cases, the managers interfere and this situation makes employees unable to take initiatives.

The sales and marketing employees sometimes have difficulty in concentrating on their individual tasks due to the open office layout. In addition to private spaces, the employees need a place where they cannot be distracted or interrupted in order to work in a concentrated and efficient manner. However, the important point here is that these two areas should be separate. An interchangeable space which is suitable for both functions is not an option. Sales and marketing employees prefer areas whose functions/usage areas are predetermined in order to avoid tension.

Furthermore, smartness can be regarded as a technical requirement. The obtained survey results demonstrate that regardless of department each employee in electronic commerce sector need technology in order to fulfill their job responsibilities. Smart workplace environment ensures that the employees do not waste their valuable time, instead use this time to develop innovative ideas. For sales and marketing department, office environment should involve up to date devices and systems. Since they are working in a technology company, they want to see this reflected in the office design by keeping up with changing technological trends and incorporating latest technology in the workplace but only for the business purposes.

Apart from the reflections of being a technology company on office design, they need to see who they are working for from the physical environment. Sales and marketing department represents the company towards the external parties such as suppliers and the postal organization. Therefore, value reflecting is critical for them. By this way, they are more likely to behave in harmony with the organizational culture, core values, vision and mission of the company. Since constantly seeing the components of corporate identity such as logo and corporate colors in the office design reminds them who they represent, this decreases the error possibility and so value reflection is essential.

Last but not least, diversity is a significant issue for sales and marketing department. Having employees from different backgrounds and with different mindsets is beneficial in developing creative and innovative marketing campaigns and strategies. Therefore, employees need to be at peace with themselves and with their ideas. In order not to make employees monotype in the long run and to embrace diversity, allowing personalization of the assigned working area is vital. By this way, motivation can be increased and they can express their ideas more comfortably and confidently by accepting the differences. Besides, as stated before, sales and marketing is one of the most crowded department in an electronic commerce company. A large number of employees mean many working styles and preferences. As everyone is unlikely to have same preferences, central ventilation and lighting systems or office furniture with fixed features are not suitable for sales and marketing department in electronic commerce sector. Systems and objects which can vary according to the user preference is essential for the sales and marketing employees to work together efficiently.

4.4.2. Programming

Similar to sales and marketing, open office layout is essential for the programming department. Employees constantly consult and help each other. That's why they need to share the same office. It would be a waste of time without the common office.

However, open office layout give rise to concentration problems according to the results of the survey. As coding requires intensive concentration, the office design should prevent interruptions and distractions. The lack of concentration leads to the other problems such as high stress level and tension between the co-workers. Therefore, other negative effects of open office layout can be minimized by solving the concentration problem, for instance by placing concentration cabinets or providing open office layout not for the whole department for the teams.

In this open office layout, programming department requires larger desk than the other departments to fit at least two monitors, a keyboard and a mouse and to work efficiently and use the devices comfortably. In addition to large desks, the open office space should include some private areas especially for private phone calls. Although they do not conduct business over phone like sales and marketing department, they are still uncomfortable while talking on the phone in the office as they refrain from being heard by someone and/or distracting their co-workers. Besides, the private areas should be predetermined and should not be used for any other purpose like relaxing.

Due to the fact that they are constantly at their desks coding, especially the eyes of the developers get tired. In order to rest and freshen up, they need some recreational areas away from their desks and computers. These areas help employees to focus on other things like games and make them even concentrate more when they return back to work. Unlike sales and marketing department, they prefer to use technology not only for business but also for entertainment purposes. As technology is central for them, they want to see it in the office design in every possible way. However, unlike sales and marketing employees, they complain that these areas feed the rumor environment and they are not used by the upper management. Therefore, goal of establishing informal and nonhierarchical conversation to generate innovative ideas cannot be achieved. The managers should use same recreational areas with the employees and it would be better if these kind of areas include more team building or relaxing activities like foosball and adult coloring books to avoid gossips.

Moreover, according to the developers, the most important aspect in office design is ergonomics. As mentioned in the "Data Collection" chapter, they do not give importance to aesthetics as much as operations or sales and marketing department. For them, value reflection or being aesthetically pleasing is not a priority. They expect the office to be ergonomic, safe and healthy and to provide latest technology as they care much about the online environment than the physical one. They only need a comfortable office chair with adjustable features and latest technology devices/systems. As they spend most of their working time by using computers, they want to choose the devices they will use in order to be more productive. This can be considered as the developers' way of personalization. In their opinion, they have more knowledge on the technological products than the administration and should at least be consulted. In addition to the devices, they prefer adjusting the light and ventilation levels and these constitute the requirements and expectations of developers in modifiability aspect of 21st century offices.

4.4.3. Finance

In contrast with the other analyzed departments, finance is not a department that requires much collaboration. The survey results show that among 4 departments, finance requires the least teamwork. Therefore, it would be wrong to say that open office layout is essential for the finance employees. Considering that the finance employees currently work in open office layout in PTTeM, they do not have as much complaints as the other departments according to the survey responses. They are mostly neutral about this issue. However, finance is mostly composed of two different units: accounting and budget and management. For budget and management unit, confidentiality is significant as they are responsible from deals with banks, managing cash flow and investments. Consequently, not the accounting unit but the employees from budget and management need a private area due to the confidentiality obligations. Although teamwork within the department is not frequent, they need to work collaboratively with sales and marketing in invoicing and developing credit policies. As stated before in the spatial requirements of sales and marketing

department part of the thesis, it is important that these two departments are physically close to each other to avoid waste of time. In addition to this, finance employees have to constantly check even the minor financial data in financial statements and the slightest mistake on them can cause major problems. For this reason, an office layout where they cannot be distracted, where they can concentrate well is their fundamental necessity.

Moreover, finance employees can be defined as conservative when they are compared with the employees in other departments. “Have fun in the office” concept, which came in the world in 90s, is not suitable for them. They believe that private and business life should be separated from each other and employees should keep in mind that they are in the office to work. Therefore, socializing areas is not a requirement for them. In order to increase the motivation and employee satisfaction without the help of recreational spaces, each employee should have a dedicated space and personalization should be allowed for finance employees. These constitute the only expectation/requirement of the finance department in terms of modifiability.

Similarly, having an aesthetically pleasing, comforting and value reflecting office is not a priority or necessity for them. Their only expectation from workplace is to be safe and ergonomic. Finance employees keep a lot of records due to their job description and because of this situation, there are many files. These files are frequently used and going to the archive room every time they are needed is a waste of time. Besides, they are responsible from the company’s financial documents. Other departments also use them from time to time, for instance when applying to government incentives. When the files are away from them, it is difficult to track who took which document. For this reason, they need many and larger office cupboards in their dedicated areas unlike other employees. In addition, bigger monitors are required to see the data in the financial statement more comfortably and avoid tiring eyes. Apart from this, they have no other requests in terms of smartness. They do not look for the latest products. Devices that make them able to perform their work are sufficient for them.

4.4.4. Operations

As in the sales and marketing and programming departments, there is an open office requirement for the operations department since they should be constantly in touch with each other. The physical proximity to the sales and marketing employees can also be good, as they need to work in a cooperation for the logistics part of the business. On the other hand, personnel responsible from operations often use phones for business as too many telephone conversations are made with General Directorate of PTT and the customers. The frequency of phone calls is much more than the sales and marketing so they get used to the phone conversations within the office. Although they are not as hesitant as those in sales and marketing in the office to talk over the phone for work, they still need private areas for personal phone calls and quiet spaces where they can concentrate.

Furthermore, operations employees are in charge of the process from ordering to delivery and the main responsibility of them is handling and managing customer complaints. Without any doubt, this is one of the most stressful task in electronic commerce sector. However, they should not reflect stress to the customers. They should be calm and constructive as much as possible. Besides, unlike other departments, operation department is working 7/24 and there is also a night shift. Considering these, they need a comforting office space with recreational areas so that they can blow off steam, relax and motivate. Ergonomics is an important aspect in achieving a comforting workplace. Ergonomic and adjustable office furniture is required to prevent physiological problems such as back pain. By this way, sick leaves can be minimized and productivity can be increased. The other significant dimension of a comforting office for operations department is aesthetics. Since they spend more time in the office than anyone else, they expect the office to be eye pleasing and stylish. This also increases their motivation and satisfaction. The last component of a comforting workplace is the socializing areas. The operations employees need in-office spaces to chill out, rest and have fun and they do not have objection to use of technology in these areas. However, the important point here is that they are

complaining about the rumor mill that is fueled by the socializing areas. According to the statements of the operations employees, these spaces are used for gossiping instead of increasing fruitful communication and collaboration. This situation increases the stress level of the employees and its outcome has become the exact opposite of the intention. As mentioned before recreational areas including activities could be a way to solve this problem.

In addition to these, operations department represents the company and advocate for them against other parties. Therefore, similar to the case in sales and marketing department, the office environment should reflect the corporate identity and core values of the company so that the general principles of the company can be kept in the employees' minds. This not only minimizes the mistakes but also makes the employees feel that they are a part of the family and representation gets easier.

Finally, as they speak for the company and spend more time in the office, they need to feel that they own not just their desks but the whole office. One of the main ways to do this is allowing flexibility within the office. Employees should be given initiatives in designing the office. Personalization should be encouraged and ventilation and lighting levels should be changed according to the preference of employees rather than having a central system.

CHAPTER 5

CONCLUSION

The “Conclusion” chapter includes the brief summary of survey findings, main conclusions, limitations of the research and recommendations for future work on the topic.

5.1. Overview of the Study

The last stage of the evolution of the offices is 21st century offices, which can also be named as modern offices, casual offices or innovative offices. To describe an office as innovative, it should be collaborative enabling, smart, attractive, modifiable and value reflecting. These five main characteristics differentiate the innovative offices from traditional ones. As 21st century office concept is the new trend in office design and the pioneers use their office design as advertising material, companies throughout the world begin to apply this particular office design to their work place. However, simply copying the office design does not make sense as the office design is shaped by the three factors, which are culture, sector and employee characteristics. Studying the effects of the factors on office design was the main intention. After realizing that even the pioneers implement the same design to all their offices neglecting the differences in requirements and expectations of employees of these offices, the employee characteristics factor was chosen to be studied.

The method of the research was decided to be a quantitative survey. Interviews with the employees could be an alternative but since more people can be reached with the questionnaire, the survey was preferred over the interview as the methodology. The goal of the survey prepared was mainly observing whether the spatial needs and expectations from the office design differs according to gender, age, education level and department and identifying the spatial requirements of employee groups, which

are composed by significant variables, based on the five common characteristics of 21st century office design. The survey was composed of 5 demographic questions and 34 content related multiple choice questions. These content related questions were prepared to demonstrate the requirements and expectations of the respondents around the common features of modern offices and justifications were asked to be written in order to understand the reasons behind the preferences.

The next step was choosing the sample group to conduct the survey. In order to eliminate the culture effect, both in national and organizational terms, the sample group was decided to be a company composed of Turkish employees. If the participants were not from the same company, we would not have known whether the differences are because of the corporate culture or the employee features. Moreover, to keep the sector factor constant, pioneers' sectors were identified and possible Turkish equivalent companies were found. PTTeM, which is known by their market place ePttAVM, was selected to be the sample group. The survey was conducted to 81 volunteers in four departments, which are sales and marketing, programing, finance and operations.

The survey and the data was checked in terms of validity and reliability with the help of exploratory factor analysis and the Cronbach alpha coefficient respectively. The results have shown that the questionnaire and the data are acceptable in respect of validity and reliability. Besides, it was understood from the exploratory factor analysis that an overall score could be used for each factor/dimension which are general opinion, enabling collaboration, smartness/technology usage, attractiveness, modifiability and value reflection. Then, to understand the effects of gender, age, education level and department on spatial needs and expectations, some parametric and non-parametric analyses were conducted through SPSS®. For each variable and each dimension, in order to decide which analysis to be used, the data was checked for normal distribution. Normality interpretations were made based on skewness and kurtosis values. The data having skewness values between -1.5 and +1.5 and kurtosis values between -2 and +2 were considered normally distributed. For dimensions

having normally distributed data parametric tests were applied otherwise non-parametric analyses were conducted.

Gender has two different groups: males and females. Therefore, independent t-test or its non-parametric equivalent Mann-Whitney U test should be used. For general opinion, enabling collaboration, smartness, value reflection and modifiability dimensions, independent t-test were used as the data of these dimensions were normally distributed. On the other hand, for the attractiveness dimension, the Mann-Whitney U test was performed. The significance levels of all dimensions were higher 0.05 indicating that there is no significant differences between female and male in spatial needs and expectations.

Another variable age had 6 different groups so independent t-test or Mann-Whitney U test can not be applied. Instead, one way ANOVA or Kruskal Wallis methods can be used. The descriptive statistics of the data have showed that each dimension has kurtosis values out of the acceptable range. It was concluded that the data is not normally distributed so Kruskal Wallis analysis was conducted for all dimensions. The significance value of each dimension was found to be higher than 0.05 so the differences between the age groups were not significant.

Similar to the age variable, education level had more than 2 different groups. The data was checked for normal distribution and skewness and kurtosis values out of the acceptable range have demonstrated that the data was not normally distributed. For each dimension, Kruskal Wallis method has been performed. As the Asymp. Sig. value of each dimension was higher than 0.05, it could be stated that education level was not a significant variable.

The last variable that was analyzed was department. The skewness and kurtosis values of general opinion, smartness and attractiveness data were out of the acceptable range and parametric analyses could not be applied to these dimensions. For these dimensions, Kruskal Wallis method was used. In this case, the significance values of general opinion, smartness and attractiveness dimensions were less than 0.05.

Therefore, it would not be wrong to say that departments were significantly and statistically different from each other in these dimensions. To understand which department is different from which one, pairwise comparisons have been checked. In general opinion dimension, the finance department was different from all the other departments. The same situation has been observed in smartness dimension as well. In addition to this, there were significant differences between the sales and marketing and the operations departments in terms of smartness. Lastly, sales and marketing and operations departments were different from finance and programming departments in attractiveness dimension.

On the other hand, for the enabling collaboration, value reflection and modifiability, ANOVA test has been performed on the data. ANOVA has two assumptions, which are normally distributed data and equal variances. Regarding this, Levene's test has been applied to the data. The result has shown that value reflection dimension could not fulfill the equal variances condition of ANOVA. Therefore one way ANOVA has only been performed for enabling collaboration and modifiability dimensions. According to the one way ANOVA test results, the differences between the expectations and requirements of departments in collaboration and modifiability dimensions were not significant. Finally, for value reflection dimension which has normally distributed data but unequal variances, Welch's ANOVA test has been used. The result has displayed that there was a statistically significant difference between the departments in value reflection dimension. In order to understand the departments that are significantly different from each other in value reflection dimension, Tamhane Post Hoc test has been applied to the data as the variances are not equal. It was concluded that operations and sales and marketing departments were statistically and significantly different from finance and programming.

Constituting the methodology, including the analyzed dimensions, the choice of statistical tests used, the interpretations of the results of the tests was one of the main goals of the research. The results coming from the methodology formed the second part of the study. The performed analyses on the collected data has demonstrated that

gender, age and education level do not cause significant differences in spatial needs and expectations from modern office design whereas the occupation/department variable does. Therefore, as the answer of the first research question, it can be stated that the spatial requirements and expectations from office design differs according to only the department variable. When the data is analyzed regarding the common features, it has been observed that there are statistically significant differences between the departments only in general opinion, smartness, attractiveness and value reflection dimensions. However, for the collaboration and modifiability dimensions, qualitative comparison has been performed based on the justifications written for the answers.

Then, the spatial needs of the departments have been identified. Based on the survey results, it could be said that although these five features are more or less applicable to all analyzed departments, their content and implementation vary from department to department. For instance, what a developer understand from "modifiability" is not the same with a sales specialist. Therefore, these five common features form a framework but filling it should be made considering the occupational groups. The main conclusions drawn are listed below.

In 21st century, collaboration is a must for all the departments in order to involve every employee in decision making and idea generating processes. As a natural consequence of collaboration requirement, open office layout has become prominent. However, the open office layout should be amended according to the department in order to minimize its negative effects, especially loss of concentration.

Another greatest drawback of open offices is lack of privacy. A balance should be created between collaborative and personal spaces within the office. As one of the biggest complaint of employees about the privacy issue is phone calls, telephone booths could be placed for personal phone calls in every department in the office. However, for sales and marketing employees who conduct business over phone, a sound insulated room can provide privacy and independence.

Communication and collaboration can be increased by not only open office layout but also informal gathering spaces. This was also approved by the survey participants. For fostering the idea exchange, communication and so innovation, there should be a natural collusion between the employees with different positions and socializing areas provide this. However, the respondents believe that this kind of areas may have a negative influence on concentration and tension within the office due to the excess use and the gossip environment they feed. It has also realized that managers have private recreational areas like dining halls and lounges. In order to solve the mentioned problems, boost communication and minimize the hierarchy, private areas for managers could be removed. Involving more activities in socializing areas can be another way to solve the rumor issue. By placing amusement machines, comic books, adult coloring books, hammocks and examples like that, employees can be made to spend their in-office free time in participating in activities and relaxing rather than gossiping.

Like collaboration, smartness/technology usage is vital for fulling the job responsibilities of all departments in 21st century. For the technology companies like PTTeM, smartness should be thought as a part of value reflection. The company should follow the technological trends and implement them to the office. However, although technology is a requirement for all employees, this feature needs more emphasis for developers. Apparently, the online environment provided by the employer is more important than the physical one and adaption of each feature to the virtual environment should be considered.

The most changing feature according to the department is attractiveness. Although having a safe, healthy and ergonomic workplace is a basic requirement of all departments, ergonomics differ department to department. Therefore, using the same furniture in the whole company reduces efficiency. For sales and marketing and operations employees, it is having a comfortable office chair and a desk. However, finance employees require a large office cupboard with a lock system to keep the frequently used files in addition to chair and desk whereas developers need larger

desks than the other departments. Moreover, as stated before, the main attractiveness for developers should be in online environment. The other dimension of attractiveness feature is aesthetics which is not a key requirement of programming and finance departments. As the operations department spend the most time in the office, it is very important for their motivation that the office is appealing to the eye. Therefore, it would be better if more effort and money could be spent on the aesthetics of the office for the operations department when it is compared to other departments.

Furthermore, all the analyzed departments stay away from the hot desking concept. They prefer having an allocated space whether it is desk or a room. By this way, their sense of belonging is increased. Besides, personalization is also a significant requirement about modifiability for the employees regardless of department and so it should be allowed. However, the reasons behind the personalization allowance is different for each department and the companies should be aware of these differences in order to create efficient workplaces. For instance, personalization is being able to adjust the office furniture, hang pictures, drawing, and photographs and place personal items on desks for sales and marketing, finance and operations departments. The goal behind the allowance is making the employees be at peace with themselves and diversity for sales and marketing, increasing motivation for finance and making personnel feel at home for operations department. For developers, personalization is choosing the technological devices, systems and programs they use within the budget and online environment should be a part of personalization. Therefore, for programming department, modifiability should be considered with smartness. The last dimension of modifiability is flexibility. The functional flexibility, meaning that having multipurpose areas, should only be applied to the operations department whereas the other departments believe that it can cause chaos. However, flexibility in terms of user-adjustable furniture, ventilation and lighting levels can be applied to all departments unless it disrupts the uniformity.

Last not least, value reflection is highly significant for sales and marketing and operations departments as they represent the company towards other parties. It would

be beneficial if the corporate identity elements such as corporate colors and logo are used while designing their offices. The additional important point is being able to show that the company is in the technology sector by the office design.

5.2. Main Conclusions

The main conclusion drawn based on the data collected can be found below.

Spatial requirements and expectations from office design do not differ significantly according to gender, age and education level. The department is the only significant variable. The department variable causes statistically significant differences in general opinion, smartness/technology usage, attractiveness and value reflection dimensions. For general opinion and smartness dimensions, finance department is statistically significantly different from sales and marketing, operations and programming departments. In smartness dimension, there is a significant difference between sales and marketing and operations departments. Operations and sales and marketing departments are significantly different from finance and programming departments in respect of attractiveness and value reflection features.

The five characteristics of office design, namely enabling collaboration, smartness, attractiveness, modifiability and value reflection, should be approached as a framework to start the designing process. The outcome should be different for each department considering the requirements and expectations of the departments. Identifying and analyzing the requirements of each department is critical in the design process. In this way, sources can be spent more efficiently and wisely.

As mentioned before, collaboration is encouraged by two different ways in modern offices: open office layout and collaborative spaces. Open office layout is essential for all the departments; but it would be better if some amendments could be made in order to solve the concentration and privacy problems. Private and collaborative areas should be in balance. In order to provide this, concentration cabinets and telephone booths/rooms can be placed. Besides, managers should not have private socializing areas. Same recreational areas should be used by all the members of organization to

improve communication and foster idea exchange. This situation is also beneficial for excess use possibility and rumor environment.

In terms of smartness dimension, more emphasis should be placed on sales and marketing, operations and programming departments. Especially for the developers, the online space is much more important than the physical space for the developers so smartness should be the central feature while designing an office for the programming department. In addition to this, smartness should be considered as a part of value reflection for technology companies.

Providing safe, healthy and ergonomic office space to their employees should be the primary goal of the companies. However, as using same furniture in all departments of the company may harm efficiency and motivation, the choice of office furniture should be made considering the each department's own definition of "ergonomics". Moreover, while aesthetics is not a key requirement for programming and finance departments, efforts should be made to make the office appeal to the eye for especially the operations department since they spend more time in the office than the other departments. The last component of attractiveness dimension that was questioned through the survey was recreational areas. One of the biggest complaints about the in-office recreational areas is that they feed the rumor environment. In order to prevent this, there could be more activities in these areas. Amusement machines, comics, adult coloring books and examples like that can be a solution.

When it comes to the modifiability dimension, personalization and flexibility components are the main components. First of all, each employee should be allocated a dedicated space in the office. Hot-desking concept is not acceptable for the analyzed departments. Furthermore, multipurpose areas are not favorable for sales and marketing, finance and programming departments. The spaces should be separated according to the functions and the purposes of the spaces should be indicated in advance. On the other hand, flexibility in spaces, also known as multipurpose areas, should be provided to employees who are responsible from operations as it is difficult

to estimate their needs during an office day and night. In respect of functional flexibility, user-adjustable furniture, lighting and ventilation levels is essential for all the departments. However, for finance department, flexibility in office furniture should be provided without disrupting the uniformity. Last but not least, personalization should be allowed to increase the sense of belongings of the employees. However, what each department understands from the concept of personalization is different. For example, for developers, personalization is being able to choose the technological devices that they use and it should be considered together with the smartness dimension. On the other hand, finance employees want to put their personal items like their kids photos on their desk without harming the harmony of the office in respect of personalization. Being aware of these differences in personalization perception is important.

Finally, value reflection is vital for the sales and marketing and operations departments as they represent the company. It is important to be consistent with the organization culture, core values and corporate identity while designing an office.

5.3. Limitations of the Study

The limitations of the research is listed below.

1. The data was collected from a single company. In order to increase the reliability of the results, the scope of the questionnaire should be enlarged.
2. The findings of the study are valid for the departments who have the responsibilities written in previous chapters. While evaluating the survey results, the job descriptions written in previous chapters should be taken into consideration. The occupational requirements will not be the same if the job descriptions are different.
3. In the survey, there are some statements/questions about concepts whose definitions can vary from person to person such as aesthetics and corporate identity. The survey participants respond those questions according to their own perception.

5.4. Recommendations for Future Work

First of all, the prepared survey can be conducted to a higher number of employees. In this way, bigger sample group and so more data can be obtained. Accordingly, with more data, the accuracy of the research can be increased.

Moreover, the same subject can be retrospectively examined to cover the past experiences and habits of individuals. Similarly, the topic can be studied prospectively by focusing on dimensions such as work efficiency, psychosocial influences of employees.

Finally, as stated before, there are mainly three factors which have an influence on office design. This thesis was focused on the effect of some components of employee characteristics, which are gender, age, education level and department. Considering this, the other factors, which are sector, and culture, or the other components of employee characteristics like personality types or marital status can also be studied as future work. For instance, a company in manufacturing industry can be analyzed and so the results will demonstrate the effect of the sector on office design. These studies on the effect of factors on office design can be considered as puzzle pieces. If all other factors are examined, the big picture can be seen. The results can be compared and the knowledge concerning which factors affect office design more can be achieved.

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APPENDICES

A. The Job Responsibilities of Each Department

The job descriptions of the stated departments can be found below.

Responsibilities of sales and marketing department are as follows:

i. Finding suppliers that provides good quality products at lower prices to have an advantage over the competitors
ii. Managing the supplier relations and the contracts between them and PTTeM
iii. Ensuring the quality of the products in order to minimize the returns which has a significant negative effect on the cost
iv. Understanding the consumer habits, needs and shopping trends and widening the product and supplier range based on them
v. Evaluating the website data including the user online moves and arranging the category according to them. For instance, adding product suggestions, new filters and/or subcategories
vi. Accurately adding codes, titles, product features, photos and categories required for product upload to the site
vii. Conducting competitor analysis and market research and taking the necessary actions to provide more customer traffic
viii. Reporting the website data to the programming department when necessary to make the website more user-friendly
ix. Preparing daily, weekly and monthly reports in product, category and campaign basis to be submitted to the upper management
x. Ensuring that product information is explanatory enough for the end users to minimize the burden on the customer relations as the number of employees in that department is significantly lower than sales and marketing
xi. Organizing campaigns and providing special offers in order to achieve the sales targets set by the operation department considering the inventory and seasons. For example, highlighting candies and chocolates before religious festivals or winter sport equipment/accessories in march to finish the stocks
xii. Carrying out the brand's online advertising activities with tools such as Google AdWords and Facebook Business
xiii. Working in a coordinated manner with finance during the invoicing period and with operations department for the logistics

The job description of the finance department is given below.

i. Making financial planning and preparing budgets
ii. Balancing incomes and expenses and managing cash flow
iii. Managing relations with financial institutions and managing the capital of the company in the banks
iv. Performing financial analysis and audit
v. Making payment planning and arranging payment terms
vi. Supervising the whole process from invoicing to collection
vii. Preparing daily, monthly and annual cash flow statements and keeping all payment transactions in record
viii. Ensuring that company policies are functional and comply with legal regulations
ix. Preparing financial statements in accordance with the universally accepted accounting principles and ensuring that all accounting records are kept and filed
x. Preparing budget and expense reports to be submitted to the top management
xi. Fulfilling tax obligations
xii. Paying the insurance expenses to the relevant institutions
xiii. Making salary payments and ensuring that all transactions related to employee payrolls are carried out
xiv. Managing safe deposit and reporting input and output
xv. Transforming the strategic decisions into plans and budgets in line with macro and micro objectives of the company
xvi. Evaluating new investment opportunities and making and applying investment decisions
xvii. Balancing profitability and risk when investing in current and non-current assets
xviii. Controlling the performance of the firm and its employees with the help of financial statements
xix. Finding new financial resources and benefitting from the opportunities such as governmental incentives

Operations department has the following responsibilities:

i. Preparing and carrying out an operational plan to achieve the objectives set by the upper management
ii. Managing customer relations and logistics and ensuring the delivery of the product
iii. Supervising the process from placing an order to delivery
iv. Following up transactions such as updating, changing and cancelling of orders according to requests on the basis of customer satisfaction

v. Managing order return processes
vi. Entering orders to the system daily and tracking of products to be sent that day
vii. Answering customer questions in a solution oriented manner, directing potential customers to the platform and keeping customer records
viii. Providing support to the customers before and after the purchase
ix. Monitoring customer complaints and taking necessary actions in the follow-up of e-commerce operations
x. Preparing customer surveys to get feedback on company services and communicating the results to sales and marketing team in order to develop better service processes
xi. Preparing daily, weekly and monthly reports about customer satisfaction and supplier reviews

Finally, the programming department is responsible from the tasks listed below.

i. Designing, implementing, improving and managing software programs
ii. Writing and implementing codes using languages like Java
iii. Reviewing codes
iv. Testing and assessing new programs
v. Analyzing and solving technical problems
vi. Identifying the areas for modification and developing these modifications
vii. Improving the quality of the system and fixing bugs
viii. Developing backend and mobile applications

B. The Survey in Turkish

The survey conducted to 81 employees of PTTeM is below.

“Aşağıda yer alan sorulara vereceğiniz cevaplar Orta Doğu Teknik Üniversitesi Yapı Bilimleri Lisansüstü Programı bitirme tezi kapsamında kullanılacaktır. Anketin amacı, mesleklerin mekânsal gereksinimlerini ve meslek gruplarının fiziksel ofis ortamından beklentilerini ölçmektir. Elde edilen sonuçlar toplu olarak değerlendirileceğinden isim yazmanıza gerek yoktur. Vereceğiniz bilgiler gizli tutulacak ve bireysel olarak kullanılmayacaktır.

Araştırmama katkıda bulunduğunuz için teşekkür ederim.

Zeynep Kına – Orta Doğu Teknik Üniversitesi Yapı Bilimleri Yüksek Lisans Öğrencisi

Demografik Özellikler

Cinsiyetiniz : ☐Kadın ☐Erkek ☐Belirtmek istemiyorum

Yaşınız : ☐18-24 ☐25-29 ☐30-34

☐35-39 ☐40-44 ☐45-50 ☐50+

Eğitim durumunuz : ☐Lise ☐Ön lisans ☐Lisans ☐Yüksek lisans

☐Doktora

Mezun olduğunuz bölüm : ……...

Şirkette çalıştığınız departman : ☐Satış ve pazarlama ☐Yazılım ☐Finans

☐Operasyon

Anket Soruları

1-34 numaralı sorular ve ifadeler için aşağıdaki seçeneklerden, aksi belirtilmedikçe, size uyan yalnızca **bir** tanesini işaretleyiniz.

1) Bir iş gününüzün ne kadarı ofiste geçiyor?
- **a.** 0-2 saat
- **b.** 2-4 saat
- **c.** 4-6 saat
- **d.** 6-8 saat
- **e.** 8-10 saat

2) 1'den 5'e kadar olan bir ölçekte, 5 "çok memnun" olmak üzere, şu an çalıştığınız fiziksel ofis ortamından ne kadar memnunsunuz?
- **a.** 1
- **b.** 2
- **c.** 3
- **d.** 4
- **e.** 5

3) Daha iyi tasarlanmış bir ofis ortamı ile iş verimim artabilir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
- **a.** Kesinlikle katılıyorum.
- **b.** Katılıyorum.
- **c.** Kararsızım.
- **d.** Katılmıyorum.
- **e.** Kesinlikle katılmıyorum.

4) Daha iyi tasarlanmış bir ofis ortamı, çalıştığım şirkete rakiplerine karşı bir avantaj sağlayabilir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
- **a.** Kesinlikle katılıyorum.
- **b.** Katılıyorum.
- **c.** Kararsızım.
- **d.** Katılmıyorum.
- **e.** Kesinlikle katılmıyorum.

5) 1'den 5'e kadar olan bir ölçekte, 5 "çok önemli" olmak üzere, fiziksel çevrenin inovasyon ve yaratıcılık arttırmadaki önemi nedir? (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
- **a.** 1
- **b.** 2.

c. 3
d. 4
e. 5

6) 1'den 5'e kadar olan bir ölçekte, 5 "çok önemli" olmak üzere, iş seçiminde çalışacağınız mekânın önemi nedir? (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. 1
b. 2.
c. 3
d. 4
e. 5

7) İş tanımız gereği sıradan bir iş gününün yüzde kaçı takım çalışması ile geçiyor?
a. 0-20%
b. 20-40%
c. 40-60%
d. 60-80%
e. 80-100%

8) Açık ofis tasarımının aşağıdakilerden hangilerinin üzerinde **olumlu** etkisi olduğunu düşünüyorsunuz? (Uyan her seçeneği işaretleyebilirsiniz.)
a. İşbirliği
b. İletişim
c. Çalışan memnuniyeti
d. Mahremiyet
e. Stres/Ofis içi gerilim
f. Konsantrasyon
g. Motivasyon
h. Diğer (belirtiniz)

9) Açık ofis tasarımının aşağıdakilerden hangilerinin üzerinde **olumsuz** etkisi olduğunu düşünüyorsunuz? (Uyan her seçeneği işaretleyebilirsiniz.)
a. İşbirliği
b. İletişim
c. Çalışan memnuniyeti
d. Mahremiyet
e. Stres/Ofis içi gerilim
f. Konsantrasyon
g. Motivasyon

h. Diğer (belirtiniz)

10) Ofiste geçen zamanınızın yüzde kaçı masanızda geçiyor?

a. 0-20%
b. 20-40%
c. 40-65%
d. 60-80%
e. 80-100%

11) En verimli çalıştığım ofis içi yer kendi masamdır.

a. Doğru.
b. Yanlış.

12) Çalıştığım şirketin ofis içi sosyalleşme alanlarına (kafeterya, hol, balkon vs) sahip olması benim için önemlidir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

13) Size göre, ofis içi sosyalleşme alanlarının aşağıdakilerden hangilerinin üzerinde **olumlu** etkisi var? (Uyan her seçeneği işaretleyebilirsiniz.)

a. İşbirliği
b. İletişim
c. Çalışan memnuniyeti
d. Mahremiyet
e. Stres/Ofis içi gerilim
f. Konsantrasyon
g. Motivasyon
h. Diğer (belirtiniz)

14) Size göre, ofis içi gayri resmî toplanma alanlarının aşağıdakilerden hangilerinin üzerinde **olumsuz** etkisi var? (Uyan her seçeneği işaretleyebilirsiniz.)

- **a.** İşbirliği
- **b.** İletişim
- **c.** Çalışan memnuniyeti
- **d.** Mahremiyet
- **e.** Stres/Ofis içi gerilim
- **f.** Konsantrasyon
- **g.** Motivasyon
- **h.** Diğer (belirtiniz)

15) 1'den 5'e kadar olan bir ölçekte, 1 "hiçbir zaman", 5 "her zaman" olmak üzere, çalıştığınız şirkette ne sıklıkla ortak çalışmaya dayalı proje ve/veya aktivitelerde rol alıyorsunuz? (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

- **a.** 1
- **b.** 2
- **c.** 3
- **d.** 4
- **e.** 5

16) 1'den 5'e kadar olan bir ölçekte, 1 "önemsiz", 5 "çok önemli" olmak üzere, takım çalışmasının iş tanımınızı başarıyla yerine getirmeniz üzerindeki önemini nasıl değerlendirirsiniz? (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

- **a.** 1
- **b.** 2
- **c.** 3
- **d.** 4
- **e.** 5

17) Takım çalışması içindeyken yalnız çalışmama kıyasla daha verimliyim.

- **a.** Doğru.
- **b.** Yanlış.

18) Şu anki iş tanımımı eksiksiz yerine getirebilmem için teknoloji kullanımı şarttır.

- **a.** Kesinlikle katılıyorum.
- **b.** Katılıyorum.
- **c.** Kararsızım.

d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

19) Teknolojinin ofis ortamını **olumlu** yönde etkilediğine inanıyorum. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

20) Şirketin teknolojik gelişmeleri takip etmesi ve ofiste son teknoloji ürün ve/veya sistemlerin kullanımı benim için önemlidir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

21) Ofiste teknoloji yalnızca iş odaklı kullanılmalıdır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

22) Çalıştığım ofisin estetik açıdan tatmin edici olmasını isterim. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

23) Fiziksel çalışma ortamının rahatlatıcı olması en önemli tasarım hedefi olmalıdır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.

e. Kesinlikle katılmıyorum.

24) Ofis içindeki eğlence amaçlı alanlar ve/veya nesneler (masa tenisi, langırt vs.) iş verimini azaltır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

25) Çalışanların sağlıklı olmaları için gereklilikleri (gün ışığı, sağlıklı yemek ve atıştırmalıklar, ergonomik mobilyalar vs.) sağlamak şirketin görevidir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

26) Çalışanların ve kişisel eşyalarının güvenliği şirketin sorumluluğundadır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

27) Fiziksel ofis ortamının şirketin kurum kültürünü, etik değerlerini, vizyonunu ve misyonunu yansıtması gerektiğini düşünüyorum. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

28) İçinde bulunduğum fiziksel ofis ortamının çalıştığım şirketin kurum kültürünü, etik değerlerini, vizyonunu ve misyonunu yansıttığını düşünüyorum. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.

d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

29) Çalıştığım ofisin renkleri, mobilyaları, ofiste kullanılan nesne ve malzemeler kurum kimliği (isim, logo, kurumsal renkler vs.) ile uyum içerisinde olmalıdır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

30) Kendimi çalıştığım ofise/fiziksel çevreye ait hissetmek isterim. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

31) Çalıştığım ofiste yalnızca bana tahsis edilmiş bir alan (masa, oda, dolap vs) olması bana kendimi iyi hissettirir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

32) Ofis alanlarının, kullanılan mobilyaların ve objelerin belli birer fonksiyonu olması ve başka amaçlar için kullanılmaması gerekir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)
a. Kesinlikle katılıyorum.
b. Katılıyorum.
c. Kararsızım.
d. Katılmıyorum.
e. Kesinlikle katılmıyorum.

33) Çalıştığım fiziksel alanı kişiselleştirmek, orada kendimden izler görmek bana kendimi iyi hissettirir. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

- **a.** Kesinlikle katılıyorum.
- **b.** Katılıyorum.
- **c.** Kararsızım.
- **d.** Katılmıyorum.
- **e.** Kesinlikle katılmıyorum.

34) Ayarlanabilir mobilya kullanımı, hareketli bölme paneller, kullanıcının tercihine göre değişebilen havalandırma ve ışık seviyeleri ofis içinde kaos yaratır. (Cevabınızın gerekçesini bir cümle ile belirtiniz.)

- **a.** Kesinlikle katılıyorum.
- **b.** Katılıyorum.
- **c.** Kararsızım.
- **d.** Katılmıyorum.
- **e.** Kesinlikle katılmıyorum.

Anket bitmiştir. Konuyla ilgili eklemek istediklerinizi aşağıda boş bırakılan yere yazabilirsiniz. Katıldığınız için teşekkür eder, iyi günler dilerim.

……
…….....”

C. The Survey in English

The English version of the survey can be found below.

“Your answers to the following questions will be used within the framework of the graduation thesis of Middle East Technical University Building Sciences Master Degree Program. The purpose of the survey is to measure the spatial requirements of occupations and the expectations of occupational groups from the physical office environment. You do not need to write names as the results will be evaluated collectively. The information you provide will be kept confidential and will not be used individually.

Thank you for contributing to my research.

Zeynep Kına - Middle East Technical University Graduate Student

Demographic Features

Gender : ☐Female ☐Male ☐Prefer not to answer

Age : ☐18-24 ☐25-29 ☐30-34

☐35-39 ☐40-44 ☐45-50 ☐50+

Education Level : ☐High school ☐Associate ☐Bachelors

☐Masters ☐PhD

Graduated department : ……...

Department in the company : ☐Sales and marketing ☐Programming

☐Finance ☐Operation

Survey Questions:

For questions 1-34, please select only one of the following options, unless otherwise stated.

1) How much of a working day is spent in the office?1
   a. 0-2 hours
   b. 2-4 hours
   c. 4-6 hours
   d. 6-8 hours
   e. 8-10 hours

2) On a scale of 1 to 5, 5 being "very satisfied", how satisfied are you with the physical office environment in which you are currently working?
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

3) A better designed office environment can increase my productivity at work. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

4) A better designed office environment can provide an advantage to the company, that I work for, over its competitors. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

5) On a scale of 1 to 5, 5 being "very important", what is the importance of the physical environment in increasing innovation and creativity? (Please provide a justification for your answer.)
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

6) On a scale of 1 to 5, 5 being "very important", what is the importance of the office space that you will work in your job selection/job hunting process? (Please provide a justification for your answer.)

a. 1
b. 2
c. 3
d. 4
e. 5

7) According to your job description, what percentage of an ordinary working day is spent with teamwork?

a. 0-20%
b. 20-40%
c. 40-60%
d. 60-80%
e. 80-100%

8) Which of the following do you think open office design has a positive effect on? (You can select each option that fits.)

a. Collaboration
b. Communication
c. Employee satisfaction
d. Privacy
e. Tension/Stress
f. Concentration
g. Motivation
h. Other (please specify)

9) Which of the following do you think open office design has a negative effect on? (You can select each option that fits.)

a. Collaboration
b. Communication
c. Employee satisfaction
d. Privacy
e. Tension/Stress
f. Concentration
g. Motivation
h. Other (please specify)

10) What percentage of your time in the office is spent on your desk?

a. 0-20%
b. 20-40%
c. 40-60%
d. 60-80%

e. 80-100%

11) The place in the office where I work most productively is my own desk.
   a. True.
   b. False.

12) It is important for me that the company I work for has in-office socialization areas (cafeteria, hall, balcony, etc.). (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

13) Which of the following do you think in-office socialization areas have a positive effect on? (You can select each option that fits.)
   a. Collaboration
   b. Communication
   c. Employee satisfaction
   d. Privacy
   e. Tension/Stress
   f. Concentration
   g. Motivation
   h. Other (please specify)

14) Which of the following do you think in-office socialization areas have a negative effect on? (You can select each option that fits.)
   a. Collaboration
   b. Communication
   c. Employee satisfaction
   d. Privacy
   e. Tension/Stress
   f. Concentration
   g. Motivation
   h. Other (please specify)

15) On a scale 1 to 5, 1 being “never” and 5 being “always”, how often do you take part in collaborative projects and / or activities in your company? (Please provide a justification for your answer.)
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

16) On a scale 1 to 5, 1 being “not at all important” and 5 being “very important”, how do you evaluate the importance of teamwork on fulfilling your job description? (Please provide a justification for your answer.)

a. 1
b. 2
c. 3
d. 4
e. 5

17) I'm more productive when I work in teams than when I work alone.

a. True.
b. False.

18) The use of technology is essential for fulfilling my current job description.

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

19) I believe that technology has a positive effect on the office environment. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

20) It is important for me that the company I work for follows the technological developments and uses the latest technology products and/or systems in the office. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

21) Technology should only be used for business purposes in the office. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree

e. Strongly disagree

22) I want the office where I work to be aesthetically pleasing. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

23) Providing a comforting workplace should be the most important design objective. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

24) Recreational areas and entertainment facilities/objects such as table tennis and foosball in the office reduces employee productivity. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

25) It is the duty of the company to ensure that the requirements for employee health (daylight, healthy food and snacks, ergonomic furniture, etc.) are provided. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

26) Providing security of the employees and their personal belongings is company's responsibility. (Please provide a justification for your answer.)
   a. Strongly agree
   b. Agree
   c. Undecided
   d. Disagree
   e. Strongly disagree

27) I think that the physical office environment should reflect the corporate culture, ethical values, vision and mission of the company. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

28) I think that the office where I work reflects the corporate culture, ethical values, vision and mission of the company. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

29) The colors of the office, furniture, objects and materials used in the office should be in harmony with the corporate identity (name, logo, corporate colors, etc.). (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

30) I would like to feel that I belong to the office where I work. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

31) It makes me feel good to have a space (desk, room, cupboard, etc.) allocated only to me in the office. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

32) Office spaces, furniture and objects used must have a certain function and should not be used for other purposes. (Please provide a justification for your answer.)

a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

33) It makes me feel good to personalize the physical space I work. (Please provide a justification for your answer.)
a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

34) The use of adjustable furniture, movable partition panels and ventilation and light levels, which can vary according to the user's preference, create chaos in the office. (Please provide a justification for your answer.)
a. Strongly agree
b. Agree
c. Undecided
d. Disagree
e. Strongly disagree

The survey is over. If you have anything you want to add, please feel free to share them below. Thank you for taking part in this survey.

……
…….....”

D. The Statistics

Independent Samples Test Result:

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
general opinion average	Equal variances assumed	,429	,514	1,448	72	,152	,22254902	,15372470	-,08389556	,52899360
	Equal variances not assumed			1,426	64,199	,159	,22254902	,15610650	-,08929098	,53438902
collaboration average	Equal variances assumed	,408	,525	-,732	72	,466	-,0588	,0803	-,2190	,1013
	Equal variances not assumed			-,735	70,908	,465	-,0588	,0801	-,2185	,1008
smartness average	Equal variances assumed	,046	,831	,836	72	,406	,11728	,14031	-,16243	,39699
	Equal variances not assumed			,841	71,459	,403	,11728	,13942	-,16069	,39524
value reflection average	Equal variances assumed	,837	,363	-,240	72	,811	-,05196078	,21664507	-,48383484	,37991327
	Equal variances not assumed			-,242	71,754	,810	-,05196078	,21476761	-,48011723	,37619566
modifiability average	Equal variances assumed	1,256	,266	,039	72	,969	,0047	,1194	-,2332	,2427
	Equal variances not assumed			,040	71,320	,968	,0047	,1169	-,2283	,2377

The Tamhane Post Hoc test result for the value reflection dimension:

Multiple Comparisons

Dependent Variable: value reflection average

Tamhane

(I) department	(J) department	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
sales and marketing	operations	,0333333333	,1816173361	1,000	-,468687613	,5353542798
	programming	-,966666667*	,2667835556	,009	-1,73464055	-,198692784
	finance	-1,30000000*	,2347018936	,000	-1,98756763	-,612432374
operations	sales and marketing	-,033333333	,1816173361	1,000	-,535354280	,4686876131
	programming	-1,00000000*	,2818837527	,009	-1,80099409	-,199005909
	finance	-1,33333333*	,2517339138	,000	-2,05716575	-,609500918
programming	sales and marketing	,966666667*	,2667835556	,009	,1986927837	1,734640550
	operations	1,00000000*	,2818837527	,009	,1990059091	1,800994091
	finance	-,333333333	,3186825570	,887	-1,23526907	,5686024067
finance	sales and marketing	1,30000000*	,2347018936	,000	,6124323742	1,987567626
	operations	1,33333333*	,2517339138	,000	,6095009178	2,057165749
	programming	,3333333333	,3186825570	,887	-,568602407	1,235269073

*. The mean difference is significant at the 0.05 level.

Pairwise comparisons of departments in general opinion dimension:

Pairwise Comparisons of department

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
sales and marketing-operations	-1,393	6,596	-,211	,833	1,000
sales and marketing-programming	-4,779	7,037	-,679	,497	1,000
sales and marketing-finance	-27,327	7,698	-3,550	,000	,002
operations-programming	-3,387	7,563	-,448	,654	1,000
operations-finance	-25,934	8,181	-3,170	,002	,009
programming-finance	-22,548	8,541	-2,640	,008	,050

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Pairwise comparisons of departments in smartness dimension:

Pairwise Comparisons of department

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
sales and marketing-programming	-8,406	7,074	-1,188	,235	1,000
sales and marketing-operations	-16,510	6,630	-2,490	,013	,077
sales and marketing-finance	-35,238	7,737	-4,554	,000	,000
programming-operations	8,104	7,602	1,066	,286	1,000
programming-finance	-26,833	8,585	-3,125	,002	,011
operations-finance	-18,729	8,223	-2,278	,023	,137

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Pairwise comparisons of departments in attractiveness dimension:

Pairwise Comparisons of department

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
operations-sales and marketing	6,919	6,642	1,042	,298	1,000
operations-programming	-22,805	7,616	-2,994	,003	,016
operations-finance	-28,683	8,238	-3,482	,000	,003
sales and marketing-programming	-15,886	7,086	-2,242	,025	,150
sales and marketing-finance	-21,764	7,751	-2,808	,005	,030
programming-finance	-5,878	8,600	-,683	,494	1,000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.