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**ARTIFICIAL INTELLIGENCE (AI) INTEGRATION IN
BUSINESS ENVIRONMENT AND PROCESSES:
PERCEPTION AMONG MANAGERS IN TURKEY**

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THESIS APPROVAL PAGE



DECLARATION

I hereby declare that this master's thesis titled as “Artificial Intelligence (AI) Integration in Business Environment and Processes: Perception Among Managers in Turkey” has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials benefited in this thesis consist of the mentioned resources in the reference list. I verify all these with my honour.

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Farhat RAHIMOV

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ABSTRACT

Master Thesis

Artificial Intelligence (AI) Integration in Business Environment and Processes: Perception Among Managers in Turkey

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From ancient to modern times, technological progress has been driving the overall progress of humankind. In order to be prepared for the future, it is important to research and gather relevant information to study trends. The trends of the past decades indicate a tendency towards services-oriented businesses. Studies have found that with the development of automation and Artificial Intelligence (AI) systems, the main focus would be on the jobs requiring creativity and socialization, which places talent management on a crucial position. Turkish community appears to be open for innovations and technology adoption. A survey study was conducted within the scope of this research among managers of various ranks in Turkey. Findings show that the overall perception towards AI integration in business environment is positive, despite some concerns, which should not be overlooked.

Keywords: Artificial Intelligence, AI, Technology Adoption, Future of Labor, Managers in Turkey

ÖZET

Yüksek Lisans Tezi

İş Ortamında ve Süreçlerinde Yapay Zeka (Artificial Intelligence - AI)

Entegrasyonu: Türkiye'deki Yöneticiler Arasındaki Algı

Farhat RAHİMOV

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Sosyal Bilimler Enstitüsü

İngilizce İşletme Anabilim Dalı

İngilizce İşletme Programı

Antik çağlardan modern zamanlara kadar, teknolojik ilerleme insanlığın genel gelişimini tetiklemektedir. Geleceğe hazırlıklı olmak için; trendlerin incelenmesi, araştırılmaların yapılması ve bilgilerin toplanması önemlidir. Son yılların eğilimleri, hizmet odaklı işlere yönelimini göstermektedir. Yapılan bazı araştırmalar, artan otomasyon ve Yapay Zeka sistemlerinin gelişmesiyle birlikte, yaratıcılığı ve sosyalleşmeyi gerektiren yeteneklerin daha ön planda olacağını gösterip, işgücü yönetiminin önemini vurguluyorlar. Türk toplumunun yeniliklere ve teknolojinin benimsenmesine açık olduğu görülüyor. Bu tez araştırması kapsamında, Türkiye'deki çeşitli kademelerdeki yöneticiler arasında bir anket çalışması yapılmıştır. Bulgular, göz ardı edilmemesi gereken bazı endişelere rağmen, iş ortamındaki Yapay Zeka entegrasyonuna yönelik genel algının olumlu olduğunu göstermektedir.

Anahtar Kelimeler: Yapay Zeka, AI, Teknoloji Benimsenmesi, İstihdamın Geleceği, Türkiye Yöneticileri

**ARTIFICIAL INTELLIGENCE (AI) INTEGRATION IN BUSINESS
ENVIRONMENT AND PROCESSES: PERCEPTION AMONG MANAGERS
IN TURKEY**

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ABBREVIATIONS

AGI	Artificial General Intelligence
AI	Artificial Intelligence
ARM	Advanced RISC Machines
EU	European Union
IBM	International Business Machines Corporation
NESTA	National Endowment for Science, Technology and the Arts
RISC	Reduced Instruction Set Computing
TOBB	Türkiye Odalar ve Borsalar Birliği
UK	United Kingdom
USA	United States of America

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INTRODUCTION

Background and General Overview

The progress of humankind and civilizations has been driven by the progress of technology. Though, perception of a word *technology* of a modern person might be associated more with a *digital technology*, such as computers, internet and smartphones, for the ancient people, their technology were invention of the wheel and utilization of simple tools. Palfrey and Gasser (2008) discuss about the causes of such perception transformation in younger generations, who they call *digital natives*, in the “Introduction” part of their book. They explore wide range of associated philosophical and practical issues and emphasize on the inevitable roles of digital natives in politics, economy and culture (Palfrey & Gasser, 2008). As we are already living in a digital age, it is crucial to study and research the related topics more and in the end, make logical predictions in order to be prepared for the future shifts in the industries.

Additional argument for the urge of those studies and adaptations comes from the increasing change of technology development pace. The more advanced the society is, the faster is the rate of an average progress (Kurzweil, 2005). Same applies to the rate of technological mass use, as it has already been increasing exponentially (Newburger, 2001). In his book, Kurzweil analyzes these tendencies and comes to a belief that technological progress in the 21st century will be equivalent to 200 centuries of progress (Kurzweil, 2005). Even if we assess some level of exaggeration to this claim, it is hard to deny the continuing high-end technology bloom and the changes that comes with it. They will affect every aspect of consumer behavior and business structures, as well as global economic and political developments (Dirican, 2015).

Businesses, as a driving force of global economics and economics in general, have been affected directly by the technological progress. Makridakis (2017) reviews that during Industrial Revolution, transition from man and tool dominated agriculture to man and machine dominated industry took place, where business exploited the power of machines to substitute, supplement and amplify the manual man work, increasing productivity. Similarly, during Digital Revolution, firms would use a power of computers to substitute, supplement and amplify the routine and arithmetic works, increasing productivity and reducing product prices. Now, we are in a transition to the

era of Artificial Intelligence (AI) - a technology that imitates capabilities of human mind and intelligence (Muggleton, 2014). AI revolution, potentially, can substitute or amplify practically all tasks, and even become a competitor to humans (Makridakis, 2017). Hence, humans should be more focused on the creativity, socialization and innovation – skills, a machine would hardly to achieve.

With the global technological growth, it is crucial for Turkey to keep the pace towards that direction. There has been significant investment and strategies for advanced military and space technologies, but it is also important to develop other areas and increase awareness of the people (Dede & Akçay, 2016). A study, analyzing small and medium sized manufacturing enterprises in Istanbul, Turkey, showed that they have basis for technological competencies (Bolukbas & Guneri, 2017). Another study among 542 counselors in Turkey showed that they favor the perspective of online counseling and think that it is applicable in Turkey (Bastemur & Bastemur, 2015). Finally, a study among primary school teachers in Gaziantep, Turkey, showed moderate readiness of technology usage in education (Summak, Baglibel & Samancioglu, 2010). Even though this study might have had its limitations, it still shows that community awareness should not be overlooked. The research of this thesis is of a similar fashion, focusing on the manager community in Turkey.

Even globally, most of the AI-related studies are technical, covering its technology and engineering. There are very few academic researches that investigate potential impacts of an AI integration in business environment and processes. However, there are abundance of the related informative studies that were conducted by private research organizations, notably Accenture Institute for High Performance; National Endowment for Science, Technology and the Arts, NESTA; Northstar; IBM Institute for Business Value. The current research was inspired by some of their studies, with the adaptation to focus on managers in Turkey. Author is hoping that designing and conducting such research within Turkish business environment would potentially bring a lot of insight not only for Turkish business community, but also that it could be a valuable addition to the relevant global research database. The sampling tool of the current research is a comprehensive survey that was distributed across the business network of the author.

Purpose of the Research

The world is moving towards incorporation of robots and AI in various industries (Klee, 2016). With the most advancement being observed in manufacturing and healthcare, technology is defining current innovation with algorithms used in various business functions. Moreover, Dysart (2017) elaborates that already in five years, most agencies and businesses will incorporate various tools for AI. He also suggests that AI-based technology will vastly infiltrate the public sector. There are some studies that discuss the possible effects of AI and automatization, but very few involve empirical data. Some of those studies have historical and informative aspects (Autor, 2015; James et al., 2017; Gürkaynak, G. et al, 2016), the others investigate economic and sustainability sides (Frey & Osborne, 2017; Ramchurn et al., 2012; Hengstler et al., 2016).

The notable empirical studies to measure the attitude towards an AI integration in business environment and processes are informative, and were conducted by the researchers of the private research organizations (Kolbjørnsrud, V. et al., 2016; Bakhshi, H. et al., 2015; ARM and Northstar, 2017). Those studies were conducted abroad, where the markets and working conditions are different from that of Turkey's. To author's knowledge, such a study hasn't been conducted within the scope of Turkish conditions. The main goal of this research is to contribute to both the local and global research pool with an empirical, informative study among managers in Turkey. The main objectives are:

- To get insights about the general level of familiarity of the managers with the cognitive computing technologies, such as AI, and their readiness to invest into gaining more knowledge in the near future;
- To get various insights about their attitude towards cognitive computing technologies in general and developed AI systems in particular;
- To get insights about their hopes and concerns regarding an implementation of a developed AI system into various business processes;
- To get insights about their opinions regarding future trends, such as for the labor shifts.

Significance of the Research

The focus of this research is not solely empirical, but also informative and comprehensive. The theoretical composition of this thesis consists of the fresh literature review and personal interpretations. Its interdisciplinary nature could provide many insights for the people with different backgrounds – academics, businesspeople, professionals and enthusiasts. The sets of discussed motivations and analyses are sought to help to increase awareness of the significance of the adoption of cognitive computing technologies in general and AI systems in particular.

The interpretations of the findings of this survey-based research were conducted to help to provide recommendations for the businesses by studying the insights of the managers in Turkey. Some of the findings might even help to provide bases for the implementation guidelines for the AI systems.

Due to the lack of empirical academic researches that investigate current or potential impacts of an AI integration within the business environments, this research can make a valuable contribution to the academic research pool. In addition, findings of this research open some possibilities for the future studies.

PART ONE

THEORETICAL REVIEW

1.1. ARTIFICIAL INTELLIGENCE (AI)

John McCarthy introduced the term “Artificial Intelligence” in 1955 in his summer research proposal that led to the famous 1956 Dartmouth Summer School (McCarthy et al. 1955). That study was aiming to proceed on the assumption that any type of learning or other features of intelligence can, in principle, be described in a way that a machine could be made to simulate it. Another pioneer of a machine intelligence was Alan Turing, who not only had laid the foundations for the fields of computer sciences, but also investigated the philosophical aspects of AI developments (Muggleton, 2014). His famous Turing Test is still considered to be the main tool in testing the intelligent machine’s ability to behave identically to humans. With the further studies of computer sciences and philosophy, along with the technological advancements, interest around AI had been increasing and a lot of definitions and concepts are continuing to branch out even today.

There are many definitions of AI, depending on the point of view, but they could be categorized into four: systems that think like humans; systems that act like humans; systems that think rationally; systems that act rationally (Sweeney, 2003). Alternative approach would be to define an AI as a system that learn, act, comprehend and sense on its own (Pan, 2016). Author is prone to refer to the origins of AI and Turing Test to summarize that a developed AI would be a system, actions of which would be indistinguishable from that of human.

1.1.1. History of AI

Makridakis highlights (2017) that the milestone of Industrial Revolution, probably, was the invention of the first practical steam engine in 1712 by Thomas Newcomen. But it was not until the mid 1800s, when first vehicles started to be produced using steam engines. With the popularization of electricity and invention of combustion engine in the late 1800s, the Industrial era had started solid foundation for the industrial transformation. As the electronics research lead to invention of semiconductors in the mid 1900s, it was not long before first military and business

computers were produced by companies, such as IBM. As semiconductor technology advanced to the stage of microprocessors and chips, mass production of personal computers dictated changes of lifestyle and pace of economics, defining a bloom of Digital Era. Development and widespread use of internet and internet systems completely changed almost every sector and led to the emergence and popularization of electronic gadget devices, such as smartphones and tablets. With machinery automation being continuously improved, industrial modernization facilitates holistic transitions into new era, of automation and Artificial Intelligence (Haton, 2006).

The works of Turing, McCarthy and other AI pioneers laid foundations for the further AI-related studies in the mid-20th century (Haton 2006). Researchers were seeking the ways to model operation of a human brain in order to apply them to machines (James et al., 2017). These studies lead to creating first artificial network systems and intelligent machines had started to achieve milestones by winning various logic games, such as checkers and mazes (McCarthy & Feigenbaum, 1990). More recent milestones include Deep Blue beating world chess champion in 1997, Watson winning contest show Jeopardy in 2011 and AlphaGo defeating Go champion in 2016 (Makridakis, 2017). The last achievement is especially notable as excelling at Go requires very advanced statistical calculations, which only possible by learning and applying strategies. It appears that it won't take long before AI reaches singularity or human-level intelligence (Kurzweil, 2005).

Advanced AI is usually portrayed by movies or science fictions, where humanity is either enslaved by intelligent machines, encounters the threat of imminent extinction at their hands or human race face their death at the hands of their own creations (Makridakis, 2017). It is a combination of hope and fear that drives the futuristic and novelty perceptions of AI integration that is popularized in various media outlets. In reality, there are the optimists, the pessimists, the pragmatists and the doubters of the AI domination. It's hard to deny, though, the promising improvements in technological progress, productivity and welfare in general that potentially could be brought by AI development.

1.1.2. Concepts, Related to AI

AI is a type of a Cognitive Computing System – an intelligent system that simulates human thought process (Haton, 2006). It is closely related to the Artificial Neural Networks - set of algorithms, modeled loosely after the human brain, that is designed to recognize patterns. One of the tools of learning is called Deep learning, which is part of a broad family of methods used for Machine Learning that are based on learning representations of data. One type of data, Big Data, describes a large volume of structured, semi-structured and unstructured data that has the potential to be mined for information to reveal patterns, trends, and associations, especially relating to human behavior and interactions (Schonberger and Cukier, 2014). For that reason, big data is valuable for the companies that offers the opportunity of developing successful algorithms to better understand what customers want and therefore be useful for decision makers.

Current trend of automation and data exchange in manufacturing technologies lead to the concept of Industry 4.0 – the term for the current industrial revolution with regard to the increased automation and legal frameworks (PWC, 2016). It is the leading application for the field of Robotics, which the branch of technology that deals with the design, construction, operation, and application of robots.

1.1.3. AI and labor

Byrum (2018) argues that within the next 20 years, artificial intelligence (AI) will be the key instrument in numerous tasks that cannot be performed by people. In the business world, individuals will be required to identify methods of retaining the control of artificial intelligence systems in addition to autonomous technology (Korinek, 2019). Moreover, individuals should decide the level of independence, based on the allowance of the development of artificial intelligence systems. Byrum also elaborates (2018) that the world is profoundly advanced in more than two times in the period of the lifetimes of the entire population globally. Technological advancements have been able to conquer numerous tasks in the past decades. Atkinson (2018) highlights that within the next decades, smart technology will be the driving force of numerous activities, which are beyond the limits of the people. It is evident

that smart technology will gradually outperform human labor and tasks performed by people (Perisic, 2018). However, human beings are still instrumental in handling complex issues and tasks (Frank et. al, 2019).

The workforces in organizations know the specifics of the business processes of the firm. Nonetheless, they might not have the talent required in the development of algorithms that incorporate machine learning (Byrum, 2018). As a result, hiring specialists to undertake such roles is imperative in the firm. Moreover, open innovation can allow managers to develop AI instruments with the incorporation of crowdsourcing (Frey & Osborne, 2017). Being patient is crucial to the success of the development of AI, since the process takes time to deliver (Atkinson, 2018). Moreover, it requires substantial time and resource management to effectively divide and share tasks before using crowdsourcing solutions and technology management. Technology management as a separate discipline and a profession has been trending since 1980s in developed and developing countries, with main focus on innovation and operational processes (Probert, Phaal, & Cetindamar, 2016).

Overall, open innovation might not be an easy task for businesses since AI is still in the development stage (Autor, 2015). Significant role of human resource departments, especially specializing on talent acquisition and management, will gain importance. Collings and Mellahi (2009) define a strategic talent management as the activities and processes that involve the systematic identification of key positions. With the increasing and well-established globalization, the need for international global managers will increase, urging organizations to begin to identify and prepare managers for global assignments (Burke & Ng, 2006).

1.1.4. Opinions and Trends

Direct predictions about the future and specific inventions are hard to make. Even harder is to predict the exact date. Even well known scientist and business persons can have misses in doing so. Predictions about the future trends, on the other hand, are easier to make by analyzing past trends. Makridakis (1995; 2017) tried to make predictions by analyzing past trends in his papers, as well as recent researches and survey reports. He summarizes transitions from Industrial Revolution into Digital Revolution and from Digital Revolution into AI Revolution. Digital Revolution bloom

started in the 70s, with the widespread use and modernization of semiconductors and continued in the 80s with spread of computer usage. Emergence and spread of internet in the 90s completely changed the industry and lifestyle. Continuing boost of software and hardware development transitioned digital era into popularized electronic device usage. Agreeing with Kurzweil (2005), Makridakis predicts widespread use of sophisticated computer translations, self-driving cars and deep neural learning to take place as near as in 2020s. He also predicts the reach of machines to human intelligence by the 2030s or by the late 2040s.

In 2009, Barrat and Goertzel asked 60 participants of an Artificial General Intelligence (AGI) Conference, which were mainly managers, to answer the question: “I believe that AGI will be effectively implemented in the following timeframe”. The answers and the corresponding percentages were: 43.3% believed it will be implemented before 2030, 25% believed it will be implemented between 2030 and 2049, 20% believed it will be implemented between 2050-2099, 10% believed it will be implemented after 2100 and only 1.7% or one person believed that it would never be achieved. On a separate question, 85% believed that AGI will be a net positive event for humankind, while only 15% believed it will not be a positive event.

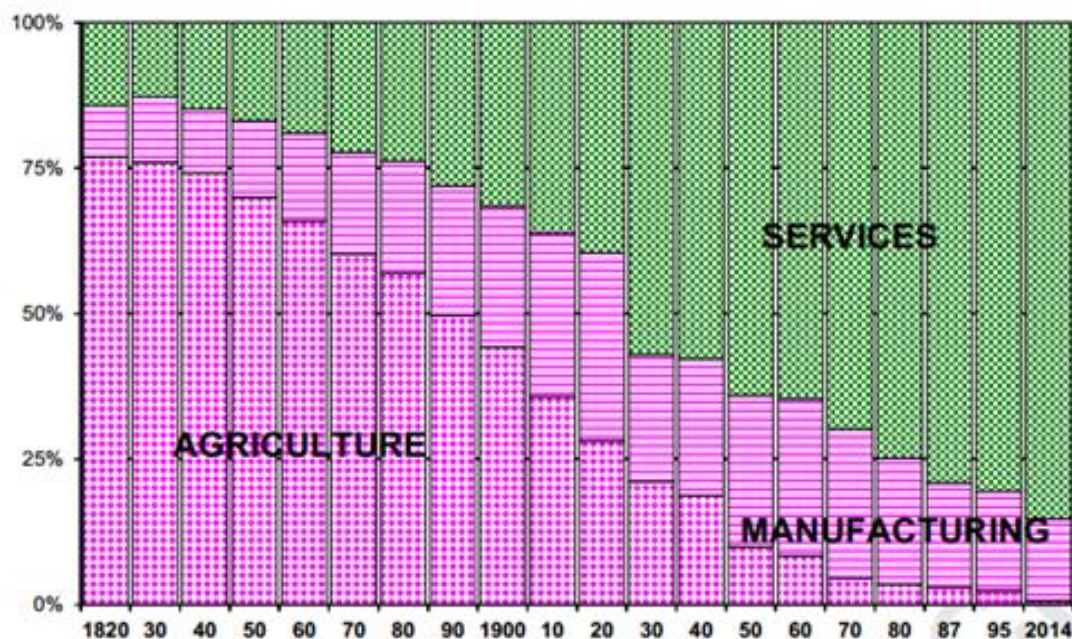
Public opinions are significant in analyzing and predicting trends, because society forms consumer pools and therefore such trends are of direct importance for businesses. A qualitative study, conducted by European Commission in 2015, aimed to better understand Europeans’ opinion about the innovations brought by science and technology, their preferences and reactions. They tested, through surveys, some innovations that could be applied in 15 years among small groups of citizens in 16 EU Member States. They found that, in general, participants from all countries were positive about innovations, understanding their potential benefits to the lifestyle and welfare, but also they showed some concerns regarding potential drawbacks of those innovations (European Commission, 2015). Participants mainly emphasized on two areas: homes and living, and health and healthcare. If for the first area they cared about general welfare and increase of home automation, for the second area they cared about current incurable diseases to become treatable in the future. Kolbjørnsrud and others (2016) conducted wide research among managers from different countries, to research their perception and readiness to the changes that AI potentially can bring. The overall

results were similar to the above-mentioned European Commission study, where managers mostly appreciated the potential changes and benefits.

1.2. CHANGE EXPECTATIONS FOR THE INDUSTRIES

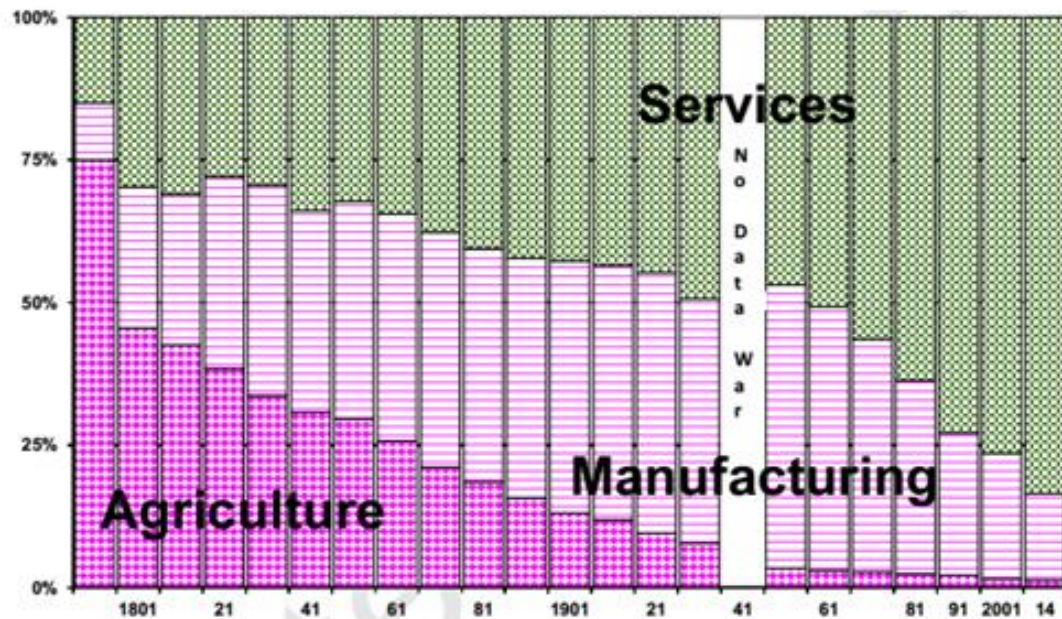
With these technological advancements, economy trends have also been viewed from different perspective and, in the various economy forums, the emerging Space Economy has been discussed (Dirican, 2015). It seems to be the new term that will go in parallel with advanced technological developments. The trend on a corporate level is that more technological and service companies have been dominated and produced more revenues, when compared situation in 2017, 2006 and 1995 (Makridakis, 2017). It is logical to assume that this trend will continue and future successful firms will be in these sectors as well. Likewise, there is a drift in labor force distribution towards services dominated sectors, as shown in Figures 1 and 2. In addition to that, trend of increasing home-office work preference can significantly reshape human resource industry in the future (Kolbjørnsrud et al., 2016). Increasing employment of more skilled and educated workforce has been observed (Burke & Ng, 2006).

Figure 1: Labor force distribution in USA since 1820.



Source: Makridakis, 2017.

Figure 2: Labor force distribution in UK since 1780.



Source: Makridakis, 2017.

1.3. ORGANIZATIONAL ADAPTATION TO AI TECHNOLOGIES

Competition is spurring organizations towards the incorporation of AI, and there is urgency in most industries to include the technology so that they are not left behind. More than one-third of respondents in a survey conducted by Berlucchi et al. (2016) believe that artificial intelligence will allow technology organizations to disrupt the operations of their industry. Furthermore, 44% of the respondents in the survey suggest that the implementation of AI will result in their enterprises being vulnerable to raiders that use technology. Moreover, up to 46% of the general respondents believe that start-ups will shake the markets on an upward scale. Notwithstanding, most of the respondents expect AI to benefit their crucial metrics of performance within five years that includes revenue, operationalization, decision making, and quality control. The most significant impact of AI is in user experience, while the use of AI causes efficient and productive interactions in customer service. On the other hand, the most significant rewards are in the products and services organizations issue based on data analysis gathered from clients of the company.

The implementation of artificial intelligence in a company in the current times is a critically involving strategy that requires solutions that are custom developed to

provide solutions to specific issues (Byrum, 2018). To develop specific tools for artificial intelligence, executive managers should assemble a particular team within their organization that can identify various elements required to address particular business issues. Such a move will involve gathering information and developing an algorithm that is required to make rational judgments because of statistics. With the incorporation of the above elements, AI can conduct numerous trial-error based experiments to focus on the most appropriate cause of action to be undertaken in a particular business operation. With current processing power systems, AI technology can undertake tasks performed by people in a short time (Autor, 2015). Building an artificial intelligence project includes experts for the particular business procedure, programmers and mathematicians that can work in cohesion to develop the elements that are needed (Frey & Osborne, 2017). Byrum (2018) asserts that such talent is often outsourced by organizations.

1.4. ACTIONS FOR TECHNOLOGY ADOPTION IN TURKEY

Turkey has been showing positive technological adoption and trade openness, especially with European Union countries, because technology adoption from more advanced countries effectively acts as a channel for technological upgrading (Meschi, Taymaz & Vivarelli, 2011). It is an important tendency, since it is crucial for Turkey to keep the pace along with the global technological growth. Even though most of the technological investments have been made for the advanced military and space technologies, it is also important to develop other sectors, as well as to increase awareness of the public (Dede & Akçay, 2016).

One of the actions with promising potential could be to support Industry 4.0 oriented enterprises. The initiatives have already been started with some Chambers of Commerce providing Industry 4.0 trainings; establishing several Industry 4.0 laboratories; autonomous truck production by Ford Otosan in Gebze; industrial robot production in Arçelik (Yüzak, 2016). With the right investments, Turkish production companies have strong potential to achieve full transition to Industry 4.0 (Şuman, 2017).

Some leading Turkish universities have made important steps for increasing education level towards AI and cognitive computing technologies, recently. New

undergraduate programs for Artificial Intelligence Engineering have been established in TOBB University of Economics and Technology (Yapay Zeka Mühendisliği Bölümü Hakkında, 2019) and Hacettepe University (Türkiye'nin ilk 'yapay zeka mühendisleri' geliyor, 2019). Graduate courses and laboratory classes for Artificial Intelligence are provided in Middle East Technical University (Bilgisayar Mühendisliği – Tanıtım, n.d.), Istanbul Technical University (Yapay Zeka ve Robotik, n.d.) and Bogazici University (Artificial Intelligence Lab, n.d.). Summer schools in Bilkent University (Bilkent Yapay Zeka Yaz Okulu, n.d.) and Koc University (Yapay Öğrenme Yaz Okulu 2019, n.d.). There are going to be more universities taking similar initiatives in the near future (Türkiye'nin ilk 'yapay zeka mühendisleri' geliyor, 2019).



PART TWO

METHODOLOGY AND RESEARCH DESIGN

2.1. BACKGROUND

Matters of technological developments, shifts in business environments, opinions about AI and tendency towards its integration in our lives were reviewed and discussed in previous sections. Various researches were conducted to measure technical and social parameters, related to AI developments and its inevitable impact on businesses. Still, there is a scarcity of empirical academic studies, especially in Turkey. Taking all of that into consideration, a survey-based exploratory research was conducted, inspired by several studies, which were carried out by private research organizations. Survey was designed based on the parameters, measured in those studies, but taking into account Turkish business environment. The main focus was to measure parameters and get insights of the general perception and readiness towards AI integration in business environment and processes of managers in Turkey. Questions and scales were prepared accordingly, as will be discussed in the upcoming sections.

Kolbjørnsrud and others (2016) from Accenture, a professional services company, conducted wide survey-based research among 1770 managers from 14 countries and 17 distinct industries, to investigate their perception and readiness to the changes that AI potentially can bring to the business environment. Perception was measured with regards to the various business processes, possible concerns for AI integration and future of labor. The overall results were mostly positive in a way that managers appreciated the potential changes and benefits. Interesting finding was that there is a difference in perception and readiness toward AI integration in business environment among different levels of management.

A 2015 study by Bakhshi and others of Nesta, a private innovation foundation, focused on the creative economy and the future of employment by classification of 702 different occupational categories in the US and 366 in the UK. They found out that the more creative a job is, the less is the possibility of its automatization. They provided a detailed classification of the occupational categories, generalizing them also to the various industries. A branching study of 2017 by the similar team focused

on the future of employment and skills, using more comprehensive, statistical approach. One of the main findings was that by the year of 2030, 9,6% (8%) of the current workforce in the US (UK) have occupations that are likely to have increase in share, while 18,7% (21,2%) are likely to have a decrease in share. They emphasize on the shift of skills that will be in demand in the future.

A wide study in collaboration of the semiconductor company, ARM and the research organization, Northstar, was conducted in 2017 among 3938 consumers in 4 Western and 4 Asian countries. The survey measured familiarity with cognitive computing concepts and direct comparison of the tasks executed by either AI or human. It also allowed to get insights about impacts of AI, as well as its appealing applications in the future.

2.2. SURVEY DESIGN AND STRUCTURE

The survey of the current research was composed based on the contents and parameters of the studies, described above. This survey is exploratory in nature and therefore has various types of questions, based on the measured parameters. The questions, which aim to measure attitude, were composed to be evaluated by Likert-type scale (Bayat, 2014). Initially, questions were composed in English and the general structure was settled, based on the feedbacks of author's academic supervisor. Then, survey was translated into Turkish and was transferred to an online survey tool with paid features, SurveyMonkey. The draft version was then shared with several suitable people from author's academic and business network for review and further feedbacks. After final revisions to the survey and approval from academic supervisor, it was ready for mass distribution. An example of this survey is shown in Figure 3.

Survey opens with an introductory screen to give brief information about the research and researcher. It consists of 3 distinct parts and 27 questions in total. First part consists of the questions to gather personal and corporate background information, such as respondent's age range or level of management. Second part aims to measure respondent's background and attitude for AI technology. Third part consists of the questions to evaluate respondent's opinions for forecasts and predictions. These parts were separated on the different pages, and respondents needed to press a button to

proceed to the next part. They also had to press a button in order to complete the survey. It was programmed so that respondent was not allowed to skip any question.

Figure 3: Example of the questions from the survey as they appear online.

10. Bildiğiniz kadarıyla, kognitif bilişim teknolojileri işletmenizde önümüzdeki 10 sene içerisinde ne ölçüde uygulanacak veya kullanılacak?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
AI	☐	☐	☐	☐	☐
Yapay sinir ağları	☐	☐	☐	☐	☐
Derin öğrenme	☐	☐	☐	☐	☐
Büyük veri & Analitiği	☐	☐	☐	☐	☐
Robotik & Robotlar	☐	☐	☐	☐	☐
Endüstri 4.0	☐	☐	☐	☐	☐

11. İşletmenizin AI gibi kognitif bilişim teknolojilerini benimseme konusundaki eylemlerinin ne kadar yeterli olduğunu düşünüyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

12. Sizce, Türk iş topluluğu, AI gibi kognitif bilişim teknolojilerini ne ölçüde benimsemekte?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

2.3. DATA COLLECTION AND SAMPLING

Since the target audience consists of strictly the representatives of various levels of management, author conducted distribution of the survey deliberately. He shared a post with a short introduction about this research, calling for the Turkish managers among his network of almost 600 professional connections in LinkedIn. However, no successful interactions were gained, mainly due to the fact that this post didn't have enough coverage for the network's online feed. Then author started to write direct messages, referring to this post and sharing online link for the survey. He also contacted his immediate connections, who could participate to the survey and spread the survey. To ensure that only managers were taken into consideration, the question with the choices of the management level was included a comment section to spot out ineligible respondents. As it turned out, all of the respondents were representing either of the management levels.

A total of 108 respondents participated to the survey in May 2019, but 2 of them skipped the survey after the first part and thus their responses were not analyzed at all. 10 respondents, on the other hand, skipped the survey after the second part, so their responses were analyzed only for the first and second parts. This could be either because they forgot to press the button at the end of the survey or got bored by the survey. As a result, along with the first part, which gathers personal and corporate background information, responses of 106 respondents were analyzed for the second part, which aims to measure respondent's background and attitude for AI technology and responses of 96 out of 106 respondents were analyzed for the third and final part as well, which aims to evaluate respondent's opinions for forecasts and predictions.

2.4. LIMITATIONS OF THE RESEARCH

One of the challenges that was encountered in the process of spreading the survey to reach eligible respondents was overall lack of the public interest to the topic. Along with the unwillingness to spare time for filling a survey, lack of interest is among the most frequent reasons of why respondents refuse to fill a survey (Menold & Zuell, 2016). This led to the relatively limited sample size of the research.

It also came to realization that the survey might have been too comprehensive, both based on the feedbacks of some of the respondents after completing the survey and the vastness of the emerged findings. One of the reasons is that it was hard to prioritize any of the measured parameters and author wanted the research to be extensive. On the other hand, the resulted findings could provide lots of insights for the future researches, which could be conducted in a more specific fashion.

PART THREE

RESEARCH FINDINGS

SurveyMonkey monthly package provides some analytical tools for descriptive and comparative analyses. In this section, the results are presented using the output of those tools with all essential information. The figures are cropped from original outputs, while the tables were reorganized to suit academic format.

3.1. SURVEY RESULTS AND DESCRIPTIVE ANALYSIS

3.1.1. Part-A: Personal and Corporate Background Information

Survey starts with demographic questions about respondent's gender and age ranges. As shown in the Figure 4, 69.44% (74) of respondents were male and 30.56% (32) respondents were female.

Figure 4: Gender distribution of respondents.

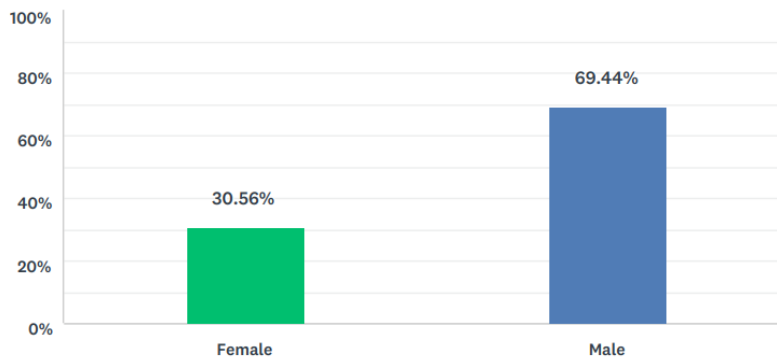


Figure 5 shows the age ranges of the managers.

Figure 5: Age range distribution of respondents.

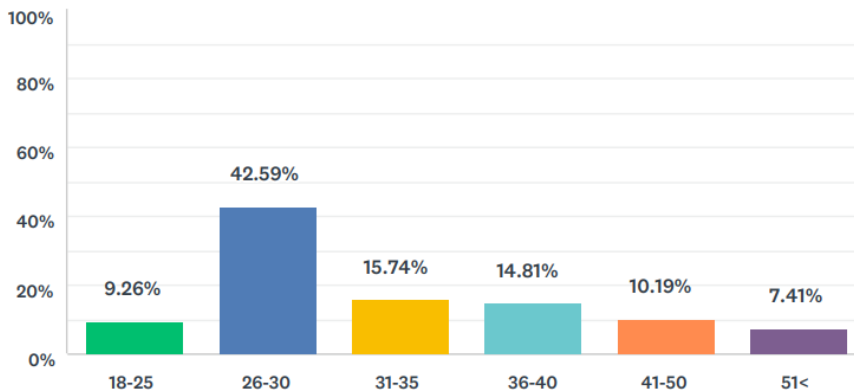
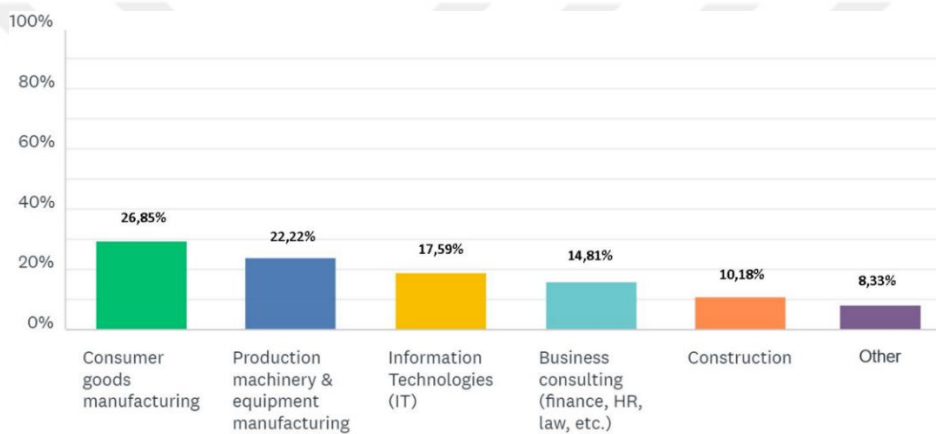


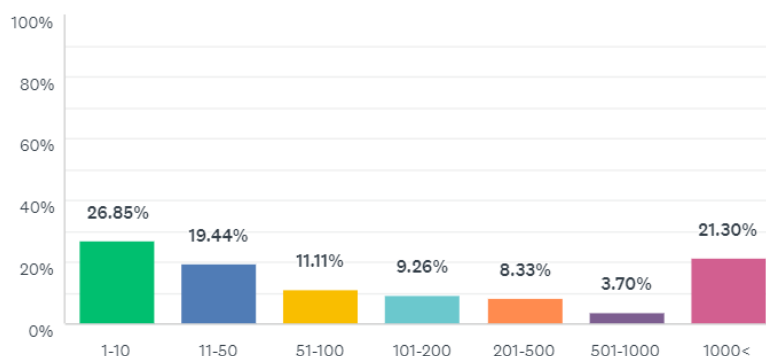
Figure 6.a shows distribution across the business sectors, in which participants' companies operate. 26,85% (28) of participants come from consumer goods manufacturing and 22,22% (23) of participants come from production machinery and equipment manufacturing, making roughly the half of the participant pool corresponding to the manufacturing and production sector. The other portion of the participants come from IT (19), business consulting (16) and construction (11). The remaining minority of the participants, who come from the public services, tourism, banking and health sectors, wrote the details in the comment section of the "other" choice (9).

Figure 6.a: Business sector distribution of respondents.



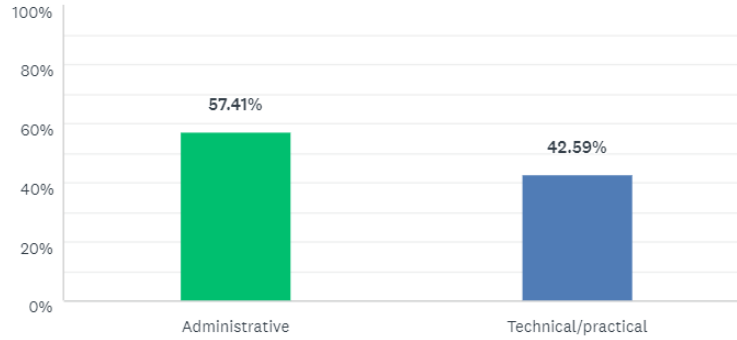
About half of the participants come from small-sized companies, while the other half is split between middle-sized and large-sized companies, as shown in the Figure 6.b below.

Figure 6.b: Distribution of respondents' companies, based on the number of employees.



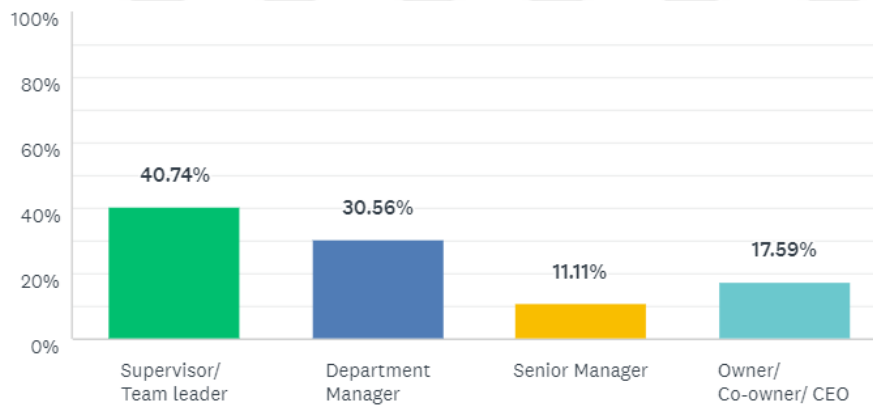
A slight majority or 57,41% (61) of managers occupy administrative positions, while 42,59% (45) occupy technical/practical positions, as shown in Figure 7.

Figure 7: Distribution of respondents' departments, which they occupy.



As for their management levels, 40,74% (43) are either supervisor or team leaders; 30,56% (32) are department managers; 11,11% (12) are senior managers; 17,59% (19) are either owners, co-owners or CEO of the company (Figure 8).

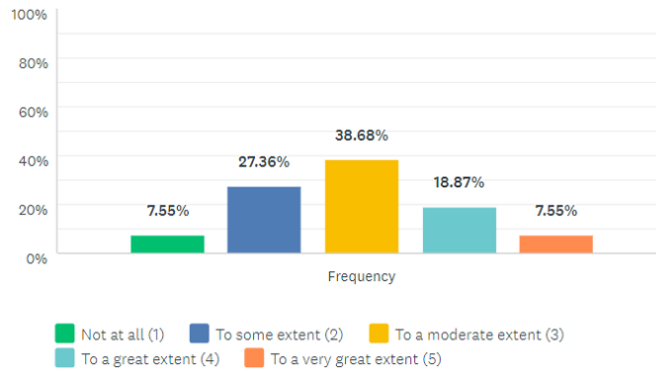
Figure 8: Distribution of respondents' management levels.



3.1.2. Part-B: Technology Background and Attitude

Second part of the survey starts with a short list of briefly explained cognitive computing concepts (AI, Artificial neural networks, Deep learning, Big data & Analytics, Robotics/Robots and Industry 4.0). Participants had to refer to them, when answering next few questions. Question 7 asked participants about the extent of their familiarity or involvement with at least some of those cognitive computing concepts and the distribution of their answers is shown in Figure 9.

Figure 9: Familiarity with cognitive computing concepts of participants.



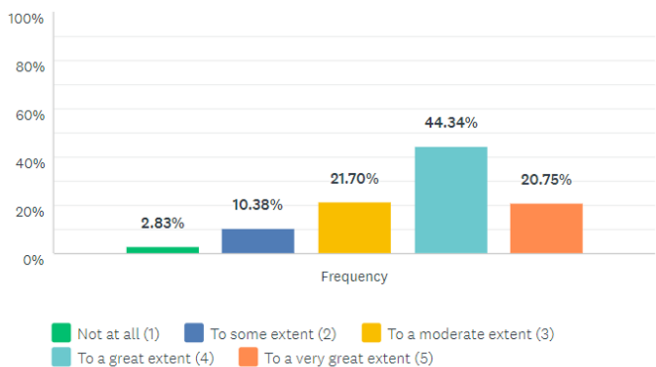
Distribution of the answers to the question 7 is also listed in Table 1 below. Almost everyone (92,55%) showed at least some extent of familiarity with cognitive computing concepts, but only 26,42% appear to have a familiarity of a great or a very great extent.

Table 1: Familiarity with cognitive computing concepts of participants.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	8	29	41	20	8	106	2,92
	%	7,55%	27,36%	38,68%	18,87%	7,55%	100,00%	

In the next question, the participants were asked to what extent they plan to invest into gaining knowledge with those cognitive computing concepts within the next 10 years and the distribution of their answers is shown in Figure 10 below.

Figure 10: Extent to which participants plan to invest into gaining knowledge of cognitive computing concepts within the next 10 years.



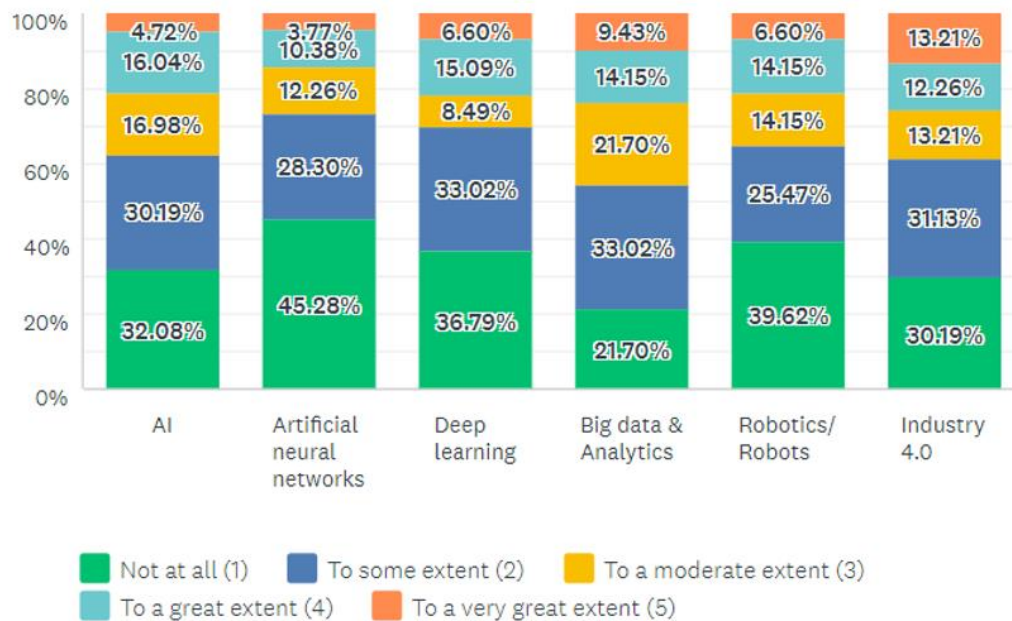
Distribution of the answers to the question 7 is also listed in Table 2 below. The majority of participants plan to invest into gaining knowledge to a moderate extent, to a great extent or to a very great extent, with respective percentages of 21,70%, 44,34% and 20,75%.

Table 2: Extent to which participants plan to invest into gaining knowledge of cognitive computing concepts within the next 10 years.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	3	11	23	47	22	106	
	%	2,83%	10,38%	21,70%	44,34%	20,75%	100,00%	3,70

In question 9, participants were asked about an extent of implementation of the cognitive computing technologies in their companies, within the scope of their knowledge. To gain more insights about implementation of each technology, they were listed under individual scale. Figure 11 shows distribution of responses.

Figure 11: Extent of implementation of the cognitive computing technologies in the companies of participants.



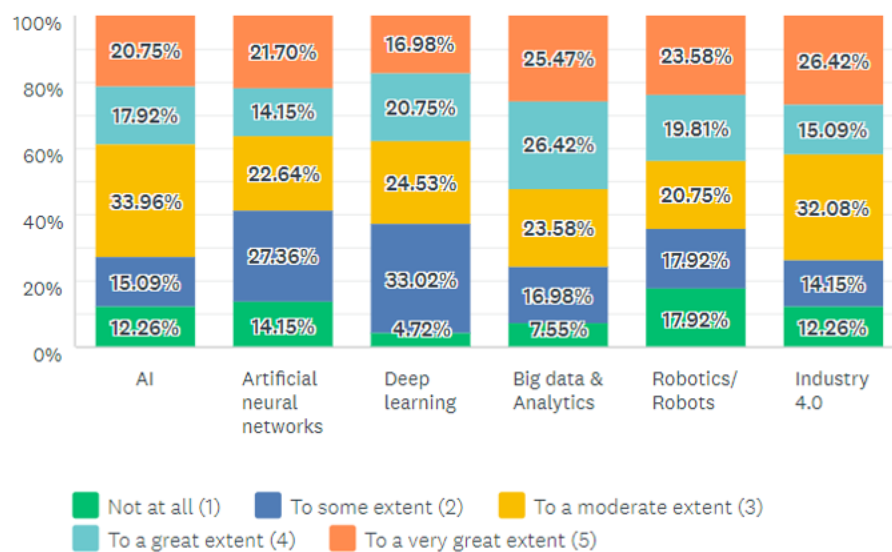
Distribution of the answers to the question 9 is also listed in Table 3 below. *Big Data & Analytics* and *Industry 4.0* appear to be the most implemented technology with the weighted means of 2,57 and 2,47, respectively.

Table 3: Extent of implementation of the cognitive computing technologies in the companies of participants.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Artificial Intelligence	<i>n</i>	34	32	18	17	5	106	2,31
	%	32,08%	30,19%	16,98%	16,04%	4,72%	100,00%	
Artificial Neural Networks	<i>n</i>	48	30	13	11	4	106	1,99
	%	45,28%	28,30%	12,26%	10,38%	3,77%	100,00%	
Deep Learning	<i>n</i>	39	35	9	16	7	106	2,22
	%	36,79%	33,02%	8,49%	15,09%	6,60%	100,00%	
Big Data & Analytics	<i>n</i>	23	35	23	15	10	106	2,57
	%	21,70%	33,02%	21,70%	14,15%	9,43%	100,00%	
Robotics/Robots	<i>n</i>	42	27	15	15	7	106	2,23
	%	39,62%	25,47%	14,15%	14,15%	6,60%	100,00%	
Industry 4.0	<i>n</i>	32	33	14	13	14	106	2,47
	%	30,19%	31,13%	13,21%	12,26%	13,21%	100,00%	

The next question was also asked within the scope of their knowledge about the plans of their companies to implement each of the cognitive computing technologies within the next 10 years. The response distribution is shown in Figure 12.

Figure 12: Extent of implementation of the cognitive computing technologies in the companies of participants within the next 10 years.



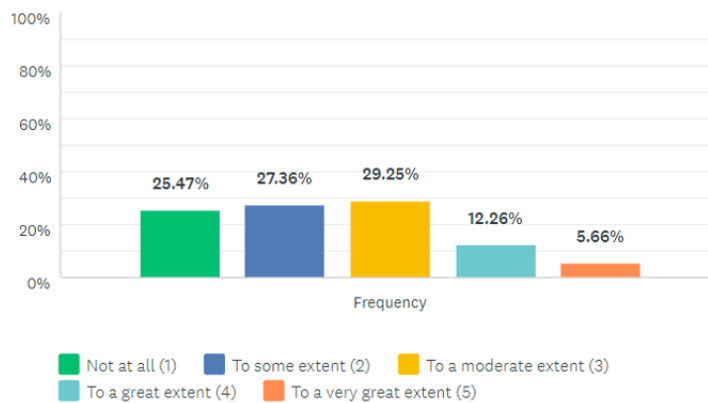
Distribution of the answers to the question 10 is also listed in Table 4. The weighted mean evenly increased for every cognitive computing technology, while ranking remained similar to the previous question.

Table 4: Extent of implementation of the cognitive computing technologies in the companies of participants within the next 10 years.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Artificial Intelligence	<i>n</i>	13	16	36	19	22	106	3,20
	%	12,26%	15,09%	33,96%	17,92%	20,75%	100,00%	
Artificial Neural Networks	<i>n</i>	15	29	24	15	23	106	3,02
	%	14,15%	27,36%	22,64%	14,15%	21,70%	100,00%	
Deep Learning	<i>n</i>	5	35	26	22	18	106	3,12
	%	4,72%	33,02%	24,53%	20,75%	16,98%	100,00%	
Big Data & Analytics	<i>n</i>	8	18	25	28	27	106	3,45
	%	7,55%	16,98%	23,58%	26,42%	25,47%	100,00%	
Robotics/Robots	<i>n</i>	19	19	22	21	25	106	3,13
	%	17,92%	17,92%	20,75%	19,81%	23,58%	100,00%	
Industry 4.0	<i>n</i>	13	15	34	16	28	106	3,29
	%	12,26%	14,15%	32,08%	15,09%	26,42%	100,00%	

In question 11, participants were asked about their opinions regarding sufficiency of their companies' actions in adopting cognitive computing technologies, such as AI. Figure 13 shows the distribution of their responses.

Figure 13: Extent to which participants think their company's actions in adopting cognitive computing technologies, such as AI, are enough.



Distribution of the answers to the question 11 is also listed in Table 5 below.

Table 5: Extent to which participants think their company's actions in adopting cognitive computing technologies, such as AI, are enough.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	27	29	31	13	6	106	
	%	25,47%	27,36%	29,25%	12,26%	5,66%	100,00%	2,45

The next question was similar, but asking about their opinions about sufficiency of the Turkish business community's actions in adopting cognitive computing technologies, such as AI. The distribution of the responses is shown in Figure 14 and Table 6 below.

Figure 14: Extent to which participants think the Turkish business community's actions in adopting cognitive computing technologies, such as AI, are enough.

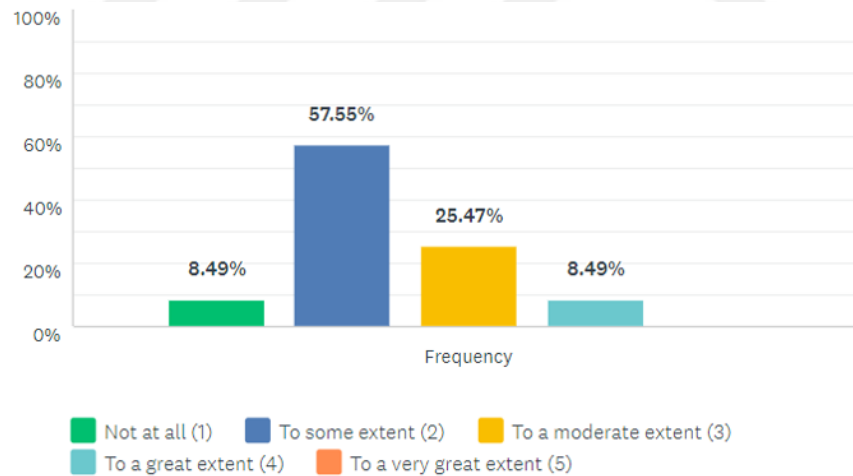


Table 6: Extent to which participants think the Turkish business community's actions in adopting cognitive computing technologies, such as AI, are enough.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	9	61	27	9	0	106	
	%	8,49%	57,55%	25,47%	8,49%	0,00%	100,00%	2,34

The question 13 was asked to measure the extent to which participants think Turkish business community should be more proactive in adopting cognitive computing technologies, such as AI. Figure 15 and Table 7 below show the distribution of their responses. The majority of managers think Turkish business community should be more proactive in adopting cognitive computing technologies to a moderate extent, to a great extent or to a very great extent, with respective percentages of 18,87%, 32,08% and 39,62%.

Figure 15: Extent to which participants think Turkish business community should be more proactive in adopting cognitive computing technologies, such as AI.

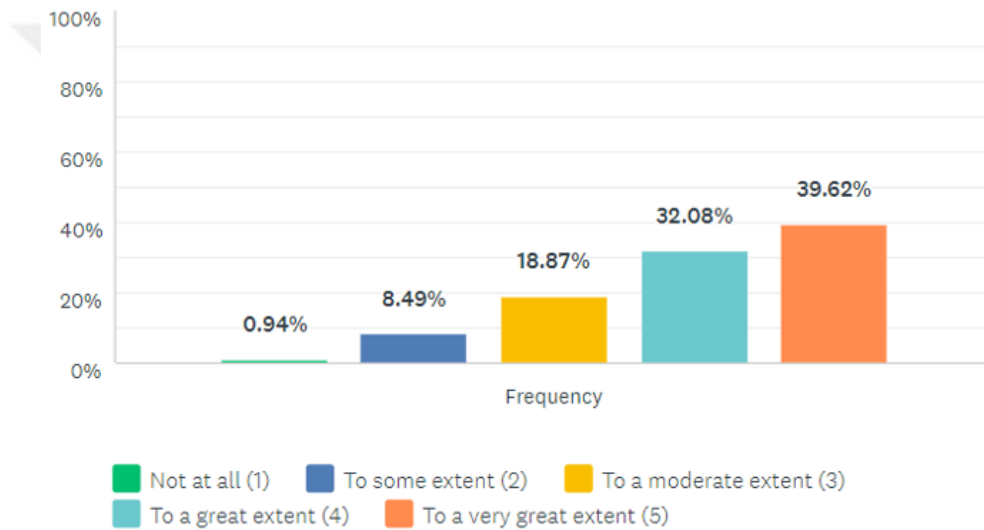


Table 7: Extent to which participants think Turkish business community should be more proactive in adopting cognitive computing technologies, such as AI.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	1	9	20	34	42	106	4,01
	%	0,94%	8,49%	18,87%	32,08%	39,62%	100,00%	

In question 14, participants were asked about their opinions regarding importance for the businesses to adopt cognitive computing technologies, such as AI. Figure 16 shows the distribution of their responses.

Figure 16: Opinions of participants about the importance for the businesses to adopt cognitive computing technologies, such as AI.

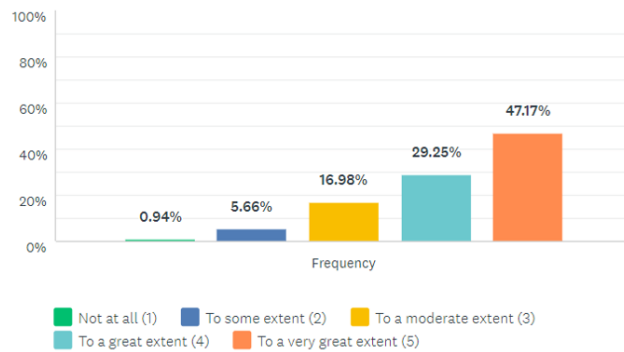


Table 8 below also shows the distribution of the responses to the question 14. The distribution shows similar trend to the previous question.

Table 8: Opinions of participants about the importance for the businesses to adopt cognitive computing technologies, such as AI.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	1	6	18	31	50	106	4,16
	%	0,94%	5,66%	16,98%	29,25%	47,17%	100,00%	

Participants were asked to what extent they currently use any type of intelligent assistant, such as Google Assistant, Siri, Nina, Amazon Echo or others, for their business activities in question 15. Figure 17 shows the distribution of their responses.

Figure 17: Extent to which participants currently use any type of intelligent assistant, such as Google Assistant, Siri, Nina, Amazon Echo or others.

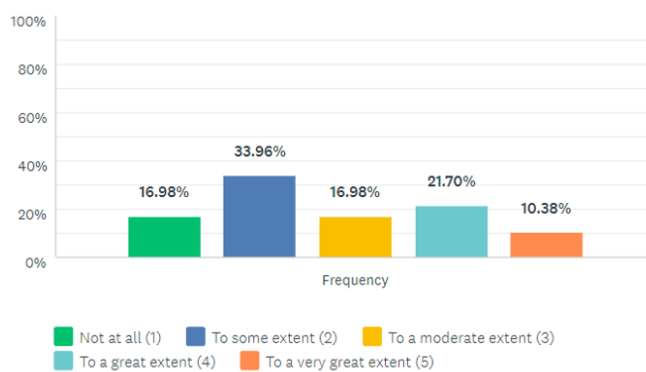


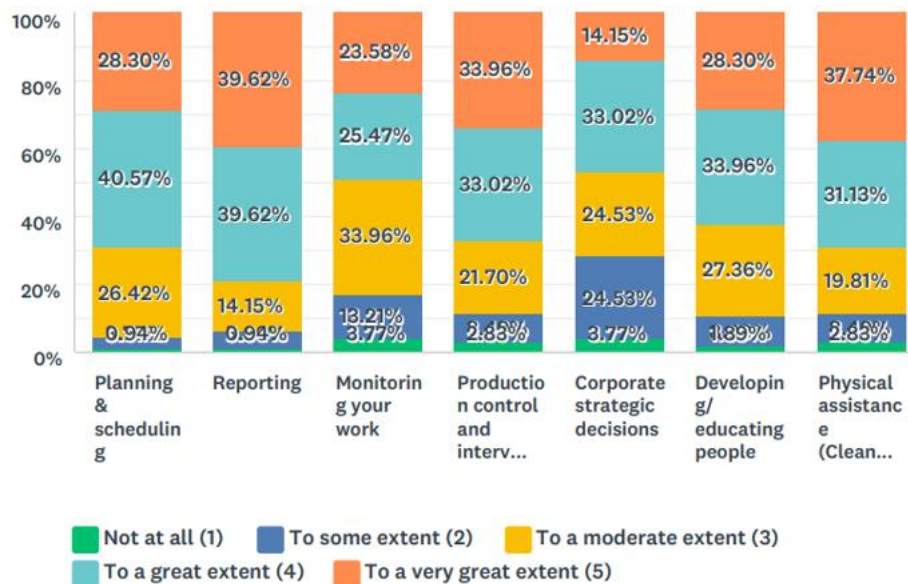
Table 9 below also shows the distribution of the responses to the question 15.

Table 9: Extent to which participants currently use any type of intelligent assistant, such as Google Assistant, Siri, Nina, Amazon Echo or others.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Frequency	<i>n</i>	18	36	18	23	11	106	2,75
	%	16,98%	33,96%	16,98%	21,70%	10,38%	100,00%	

In question 16, participants were asked about an extent to which they would like to have an involvement of a developed AI system in some business processes, namely: Planning & scheduling; Reporting; Monitoring your work; Production controlling and intervention; Corporate strategic decisions; Developing/education people; Physical assistance (Cleaning around, bringing beverages or food, etc.). To gain more insights about each of the process, they were listed under individual scale. Figure 18 shows distribution of responses accordingly.

Figure 18: Extent to which participants would like to have an involvement of a developed AI system in the listed business processes.



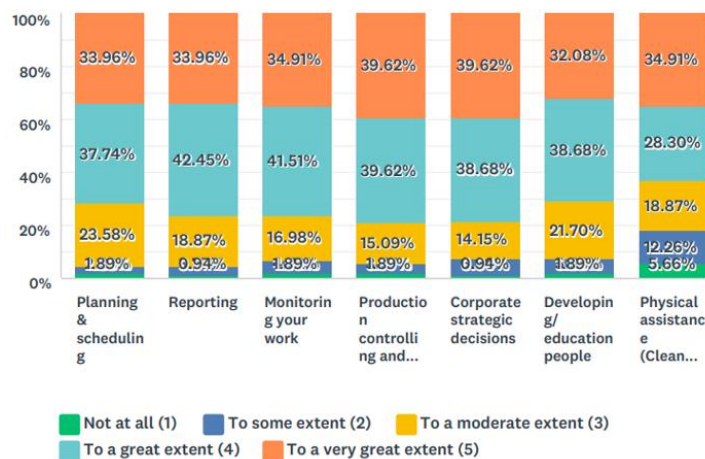
Distribution of the answers to the question 16 is also listed in Table 10 below. The most favorable business processes for an AI integration appear to be *Reporting*, *Planning & Scheduling* and *Physical Assistance*, with weighted means of 4,11, 3,92 and 3,92, respectively.

Table 10: Extent to which participants would like to have an involvement of a developed AI system in the listed business processes.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Planning & scheduling	<i>n</i>	1	4	28	43	30	106	3,92
	%	0,94%	3,77%	26,42%	40,57%	28,30%	100,00%	
Reporting	<i>n</i>	1	6	15	42	42	106	4,11
	%	0,94%	5,66%	14,15%	39,62%	39,62%	100,00%	
Monitoring your work	<i>n</i>	4	14	36	27	25	106	3,52
	%	3,77%	13,21%	33,96%	25,47%	23,58%	100,00%	
Production control and intervention	<i>n</i>	3	9	23	35	36	106	3,87
	%	2,83%	8,49%	21,70%	33,02%	33,96%	100,00%	
Corporate strategic decisions	<i>n</i>	4	26	26	35	15	106	3,29
	%	3,77%	24,53%	24,53%	33,02%	14,15%	100,00%	
Developing/educating people	<i>n</i>	2	9	29	36	30	106	3,78
	%	1,89%	8,49%	27,36%	33,96%	28,30%	100,00%	
Physical assistance (Cleaning around, bringing beverages or food, etc.)	<i>n</i>	3	9	21	33	40	106	3,92
	%	2,83%	8,49%	19,81%	31,13%	37,74%	100,00%	

In the next question, respondents were asked to which extent they would like to have a knowledge of how an AI system works in order to trust it with those business processes. Figure 19 below shows the distribution of responses.

Figure 19: Extent to which participants would like to have a knowledge of how an AI system works in order to trust it with the listed business processes.



More than half of the respondents think that they would like to have a knowledge of how an AI system works in order to trust it with any listed business process to either a great or a very great extent, as also listed in the Table 11 below.

Table 11: Extent to which participants would like to have a knowledge of how an AI system works in order to trust it with the listed business processes.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Planning & scheduling	<i>n</i>	2	3	25	40	36	106	3,99
	%	1,89%	2,83%	23,58%	37,74%	33,96%	100,00%	
Reporting	<i>n</i>	1	4	20	45	36	106	4,05
	%	0,94%	3,77%	18,87%	42,45%	33,96%	100,00%	
Monitoring your work	<i>n</i>	2	5	18	44	37	106	4,03
	%	1,89%	4,72%	16,98%	41,51%	34,91%	100,00%	
Production control and intervention	<i>n</i>	2	4	16	42	42	106	4,11
	%	1,89%	3,77%	15,09%	39,62%	39,62%	100,00%	
Corporate strategic decisions	<i>n</i>	1	7	15	41	42	106	4,09
	%	0,94%	6,60%	14,15%	38,68%	39,62%	100,00%	
Developing/educating people	<i>n</i>	2	6	23	41	34	106	3,93
	%	1,89%	5,66%	21,70%	38,68%	32,08%	100,00%	
Physical assistance (Cleaning around, bringing beverages or food, etc.)	<i>n</i>	6	13	20	30	37	106	3,75
	%	5,66%	12,26%	18,87%	28,30%	34,91%	100,00%	

The question 18 was asked to learn on what extent the managers have their concerns regarding involvement of a developed AI system in the listed business processes. Figure 20 shows the distribution of responses below.

Figure 20: Extent to which participants have concerns regarding involvement of a developed AI system in the listed business processes.

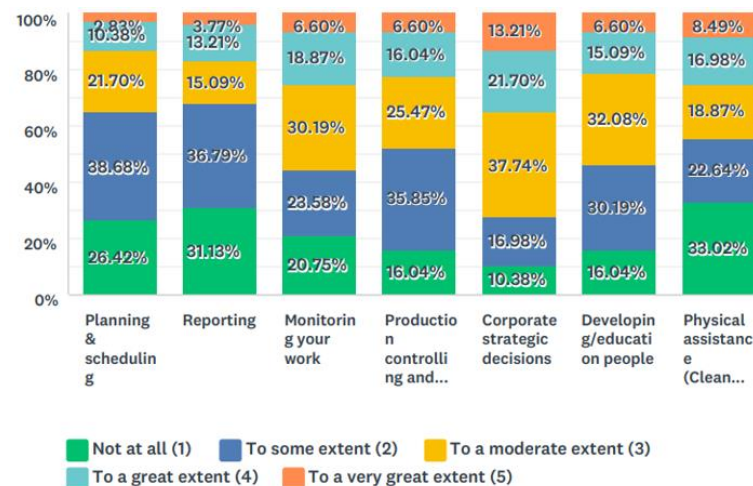


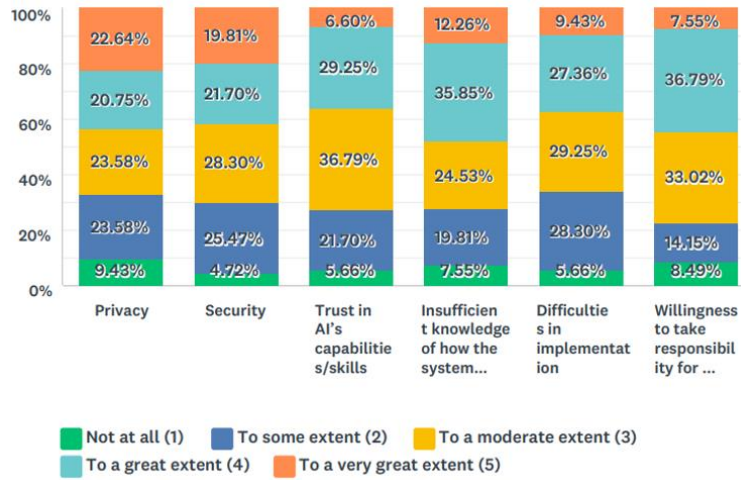
Table 12 below also shows the distribution of the responses to the question 18. With the Weighted Mean of 3,10, the most concern shown is for the involvement of a developed AI system in *Corporate strategic decisions*; only 10,38% of managers don't have any concerns. The least concern shown is for the *Reporting* and *Planning & Scheduling*, for which 31,13% and 26,42% of managers, respectively, don't have any concerns for the involvement of a developed AI system in those business processes.

Table 12: Extent to which participants have concerns regarding involvement of a developed AI system in the listed business processes.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Planning & scheduling	<i>n</i>	28	41	23	11	3	106	2,25
	%	26,42%	38,68%	21,70%	10,38%	2,83%	100,00%	
Reporting	<i>n</i>	33	39	16	14	4	106	2,22
	%	31,13%	36,79%	15,09%	13,21%	3,77%	100,00%	
Monitoring your work	<i>n</i>	22	25	32	20	7	106	2,67
	%	20,75%	23,58%	30,19%	18,87%	6,60%	100,00%	
Production control and intervention	<i>n</i>	17	38	27	17	7	106	2,61
	%	16,04%	35,85%	25,47%	16,04%	6,60%	100,00%	
Corporate strategic decisions	<i>n</i>	11	18	40	23	14	106	3,10
	%	10,38%	16,98%	37,74%	21,70%	13,21%	100,00%	
Developing/ educating people	<i>n</i>	17	32	34	16	7	106	2,66
	%	16,04%	30,19%	32,08%	15,09%	6,60%	100,00%	
Physical assistance (Cleaning around, bringing beverages or food, etc.)	<i>n</i>	35	24	20	18	9	106	2,45
	%	33,02%	22,64%	18,87%	16,98%	8,49%	100,00%	

In question 19, participants were asked about an extent to which they have concerns about involvement of a developed AI system in various business processes with relation to the following conditions, namely: Privacy; Security; Trust in AI's capabilities/skills; Insufficient knowledge of how the system works; Difficulties in implementation; Willingness to take responsibility for AI system's actions. To gain more insights about each of the process, they were listed under individual scale. Figure 21 shows the distribution of responses.

Figure 21: Extent to which participants have their concerns about involvement of a developed AI system in business processes with relation to the listed conditions.



Distribution of the answers to the question 19 is also listed in Table 13 below. The most concerns appear to be for the *Security*, *Privacy*, *Insufficient knowledge of how the AI system works* and *Privacy*, with the Weighted Means of 3,26, 3,25, 3,24 and 3,21, respectively.

Table 13: Extent to which participants have their concerns about involvement of a developed AI system in business processes with relation to the listed conditions.

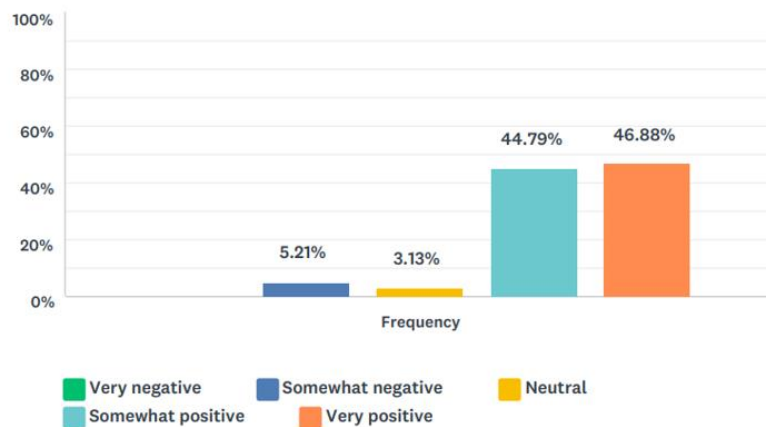
		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Privacy	n	10	25	25	22	24	106	3,24
	%	9,43%	23,58%	23,58%	20,75%	22,64%	100,00%	
Security	n	5	27	30	23	21	106	3,26
	%	4,72%	25,47%	28,30%	21,70%	19,81%	100,00%	
Trust in AI's capabilities/skills	n	6	23	39	31	7	106	3,09
	%	5,66%	21,70%	36,79%	29,25%	6,60%	100,00%	
Insufficient knowledge of how the system works	n	8	21	26	38	13	106	3,25
	%	7,55%	19,81%	24,53%	35,85%	12,26%	100,00%	
Difficulties in implementation	n	6	30	31	29	10	106	3,07
	%	5,66%	28,30%	29,25%	27,36%	9,43%	100,00%	
Willingness to take responsibility for AI system's actions	n	9	15	35	39	8	106	3,21
	%	8,49%	14,15%	33,02%	36,79%	7,55%	100,00%	

3.1.3. Part-C: Predictions and Forecasts

Third part of the survey starts with a question, which aims to get insights about participants' general opinion on how much positive or negative impact they think

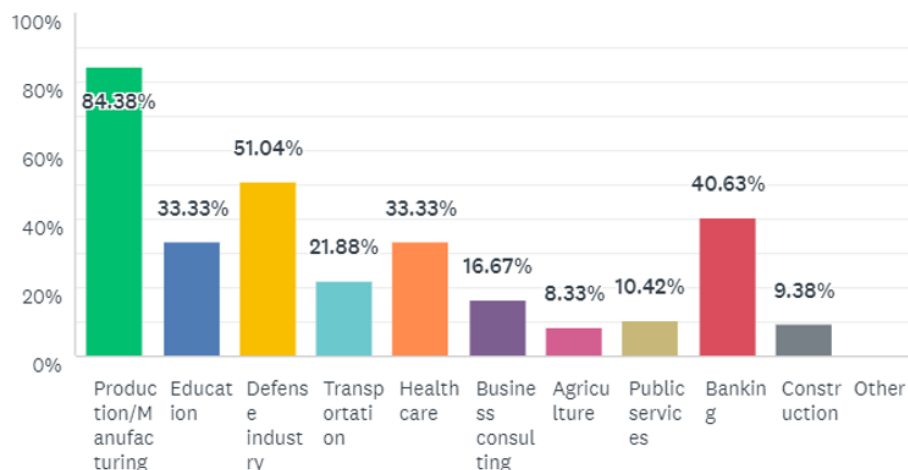
increased automation and AI systems would have on the businesses. The distribution of the managers' responses to the question 20 is shown in Figure 22 below. No one thinks it would have a very negative impact, while only 5,21% think it would have a somewhat negative impact and 3,13% think it would have a neutral impact.

Figure 22: General opinion of participants of how much positive or negative impact they think increased automation and AI systems would have on the businesses.



Question 21 was exploratory in a sense that it asked about respondents' opinions on where they think AI developments would have the first major impact and were asked to choose 3 fields from the list. The distribution of their choices is shown in Figure 23 below. The percentages indicate the portion of respondents, who chose that particular field among 3 of his/her choices.

Figure 23: Distribution of the fields that respondents chose as one of their three choices of where they think AI developments will have the first major impact.



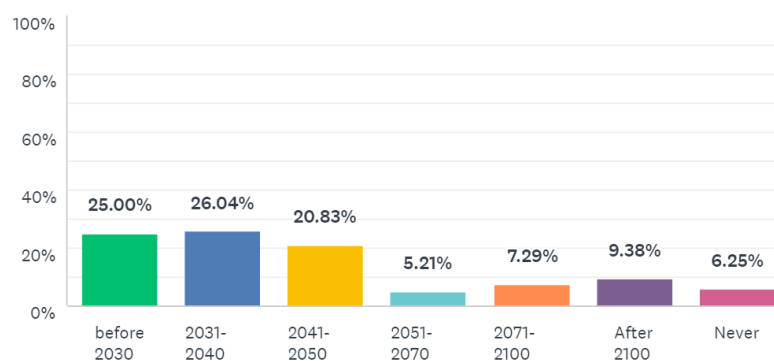
Distribution of their responses are also listed in Table 14 below. *Production/Manufacturing* appears to be the most common choice with 84,35% of respondents choosing this field.

Table 14: Distribution of the fields that respondents chose as one of their three choices of where they think AI developments will have the first major impact.

Business sector	Frequency	
	<i>n</i>	%
Production/Manufacturing	81	84,38%
Education	32	33,33%
Defense industry	49	51,04%
Transportation	21	21,88%
Healthcare	32	33,33%
Business consulting	16	16,67%
Agriculture	8	8,33%
Public services	10	10,42%
Banking	39	40,63%
Construction	9	9,38%
Other	0	0,00%

In question 22, respondents were asked to choose the period of when they think AI will reach human level-intelligence, after presenting them the concept of Artificial General Intelligence as follows: Artificial General Intelligence (AGI) is the intelligence of a machine that could successfully perform any intellectual task that a human being can (Kurzweil, 2005). The distribution of their answers is shown in Figure 24 below.

Figure 24: Respondents on when they think AI will reach human level intelligence.



For the next question, respondents were asked to choose 3 skills that they think should be prioritized for one to succeed in their role in the case of AI reaching human-level intelligence. The distribution of their choices is shown in Figure 25 and listed in Table 15 below. The percentages indicate the portion of respondents, who chose that particular skill among 3 of his/her choices. The most common choice is for the *Creativity and creative thinking*, as 69,79% of respondents chose this skill.

Figure 25: Distribution of the skills that respondents chose as one of the three choices of skills they think should be prioritized for one to succeed in their role in the future.

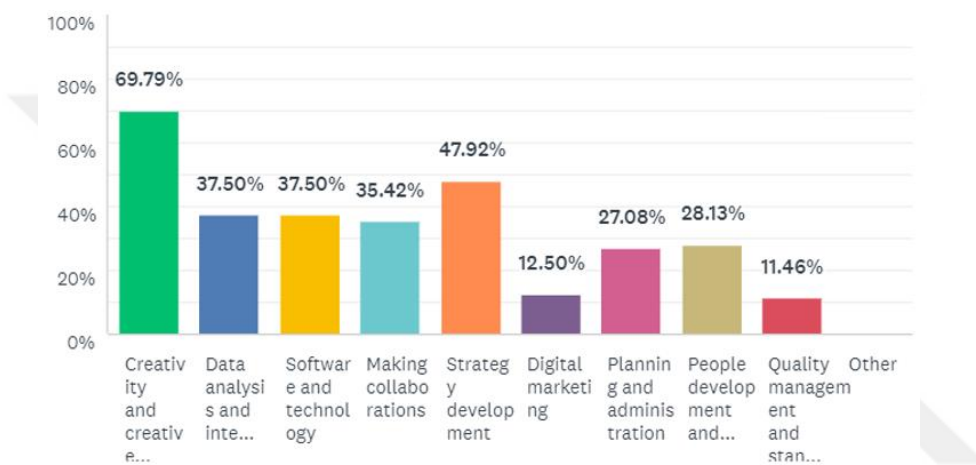


Table 15: Distribution of the skills that respondents chose as one of the three choices of skills they think should be prioritized for one to succeed in their role in the future.

Skills	Frequency	
	<i>n</i>	%
Creativity and creative thinking	67	69,79%
Data analysis and interpretation	36	37,50%
Software and technology	36	37,50%
Making collaborations	34	35,42%
Strategy development	46	47,92%
Digital marketing	12	12,50%
Planning and administration	26	27,08%
People development and coaching	27	28,13%
Quality management and standards	11	11,46%
Other	0	0,00%

In question 24, respondents were asked about their opinion on how the mass use of a developed AI systems will affect the labor. The distribution of their choices is shown in Figure 26 below.

Figure 26: Respondents on how they think the mass use of a developed AI systems will affect the labor.

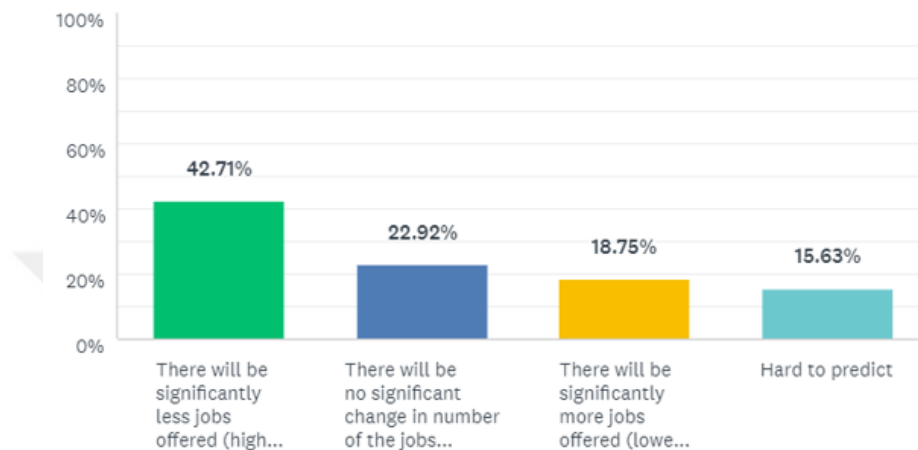


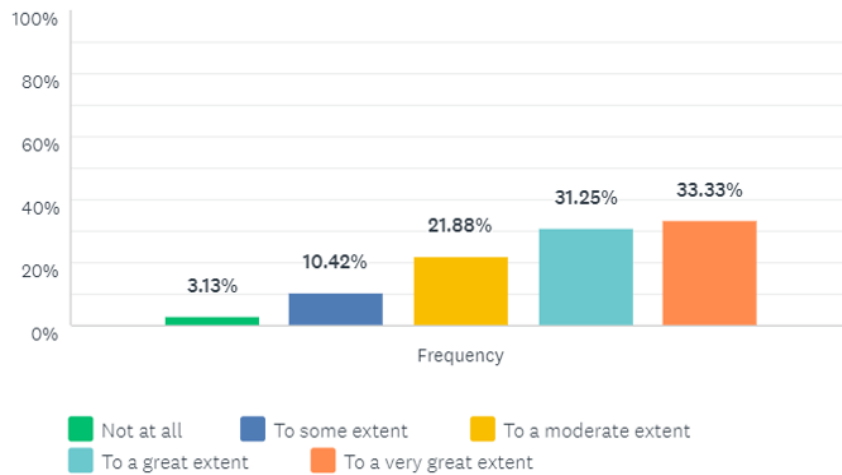
Table 16 below also shows the distribution of the responses to the question 24. 42,71% or 41 of participants think that there will be significantly less jobs offered or a higher unemployment rate, in an event of a mass use of a developed AI systems.

Table 16: Respondents on how they think the mass use of a developed AI systems will affect the labor.

Opinions	Frequency	
	<i>n</i>	%
There will be significantly less jobs offered (higher unemployment rate)	41	42,71%
There will be no significant change in number of the jobs offered (about the same unemployment rate)	22	22,92%
There will be significantly more jobs offered (lower unemployment rate)	18	18,75%
Hard to predict	15	15,63%
Other	0	0,00%
Total	96	100,00%

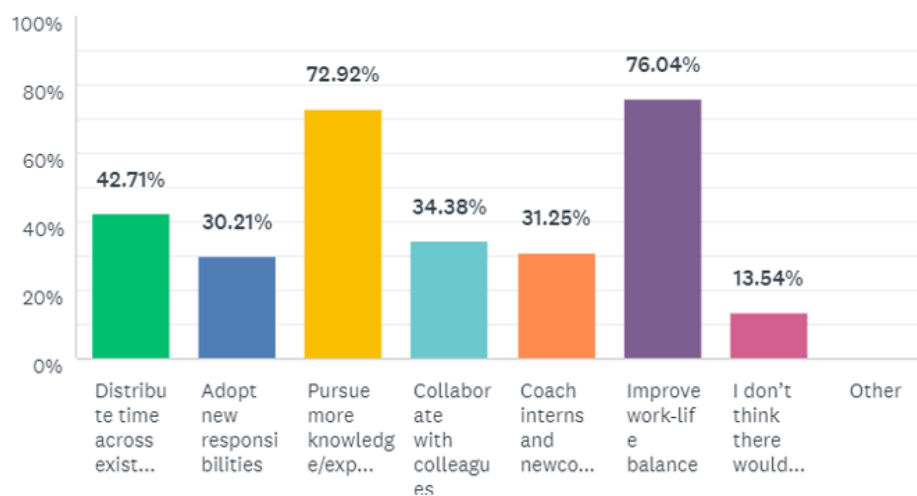
In the next question, respondents were asked to what extent they think there would be the need for the new strategies for recruitment and training, as AI systems develop and become more involved with the working environment. The distribution of their answers is shown in Figure 27.

Figure 27: Extent to which respondents think there would be the need for the new strategies for recruitment and training, as AI systems develop and become more involved with the working environment.



In the question 26, respondents were asked on which 3 of the listed activities they would spend their time on, assuming that a developed AI system could enable them to free their time at work. The distribution of their choices is shown in Figure 28. The percentages indicate the portion of respondents, who chose that particular activity among 3 of his/her choices.

Figure 28: Activities that respondents would spend their time on, assuming that a developed AI system could enable them to free their time at work.



Distribution of the answers to the question 26 is also listed in Table 17 below. The most common choices for the activities that managers would spend their time on, assuming that a developed AI system could enable them to free their time at work, are *Improve work-life balance* (72,92%) and *Pursue more knowledge/expertise* (76,04%).

Table 17: Activities that respondents would spend their time on, assuming that a developed AI system could enable them to free their time at work.

Business sector	Frequency	
	<i>n</i>	%
Distribute time across existing tasks	41	42,71%
Adopt new responsibilities	29	30,21%
Pursue more knowledge/expertise	70	72,92%
Collaborate with colleagues	33	34,38%
Coach interns and newcomers	30	31,25%
Improve work-life balance	73	76,04%
I don't think there would be significantly more free time	13	13,54%
Other	0	0,00%

In the 27th and the final question of the survey, respondents were presented a case, where they had to choose either an AI assistant or human assistant for the listed tasks or jobs. The distribution of their choices is shown in Figure 29 below.

Figure 29: Distribution of the respondents on which assistant, AI or human, they would prefer for the listed tasks or jobs.

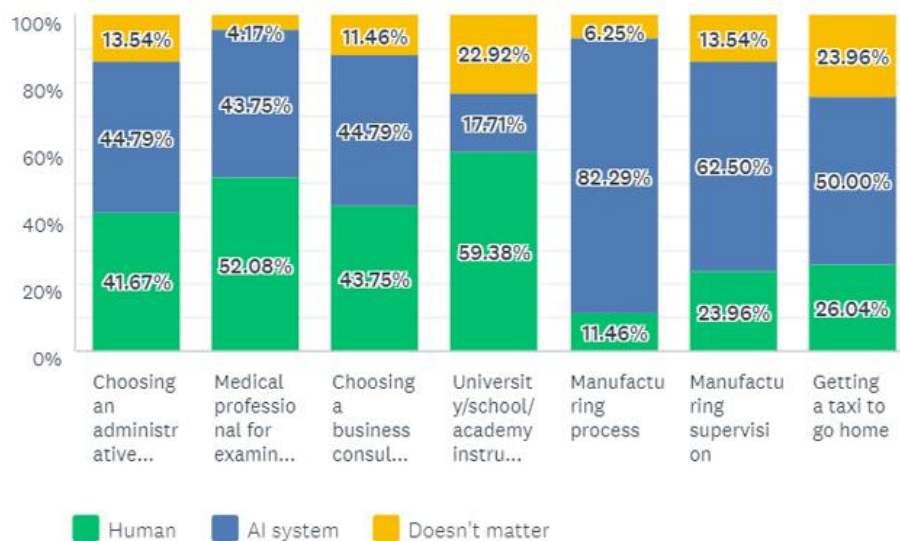


Table 18 below also shows the distribution of the responses to the question 27. The task/job that was trusted an AI system the most is the *Manufacturing process* (82,29%) and the task/job that was trusted a human the most is a *University/school/academy instructor/teacher* (59,38%).

Table 18: Distribution of the respondents on which assistant, AI or human, they would prefer for the listed tasks or jobs.

Job or task	Assistant			Total
	Human	AI system	Doesn't matter	
Choosing an administrative assistant/secretary	<i>n</i> 40	43	13	96
	% 41,67%	44,79%	13,54%	100,00%
Medical professional for examination and diagnosis	<i>n</i> 50	42	4	96
	% 52,08%	43,75%	4,17%	100,00%
Choosing a business consultant (financial, HR, law, etc.)	<i>n</i> 42	43	11	96
	% 43,75%	44,79%	11,46%	100,00%
University/school/academy instructor/teacher	<i>n</i> 57	17	22	96
	% 59,38%	17,71%	22,92%	100,00%
Manufacturing process	<i>n</i> 11	79	6	96
	% 11,46%	82,29%	6,25%	100,00%
Manufacturing supervision	<i>n</i> 23	60	13	96
	% 23,96%	62,50%	13,54%	100,00%
Getting a taxi to go home	<i>n</i> 25	48	23	96
	% 26,04%	50,00%	23,96%	100,00%

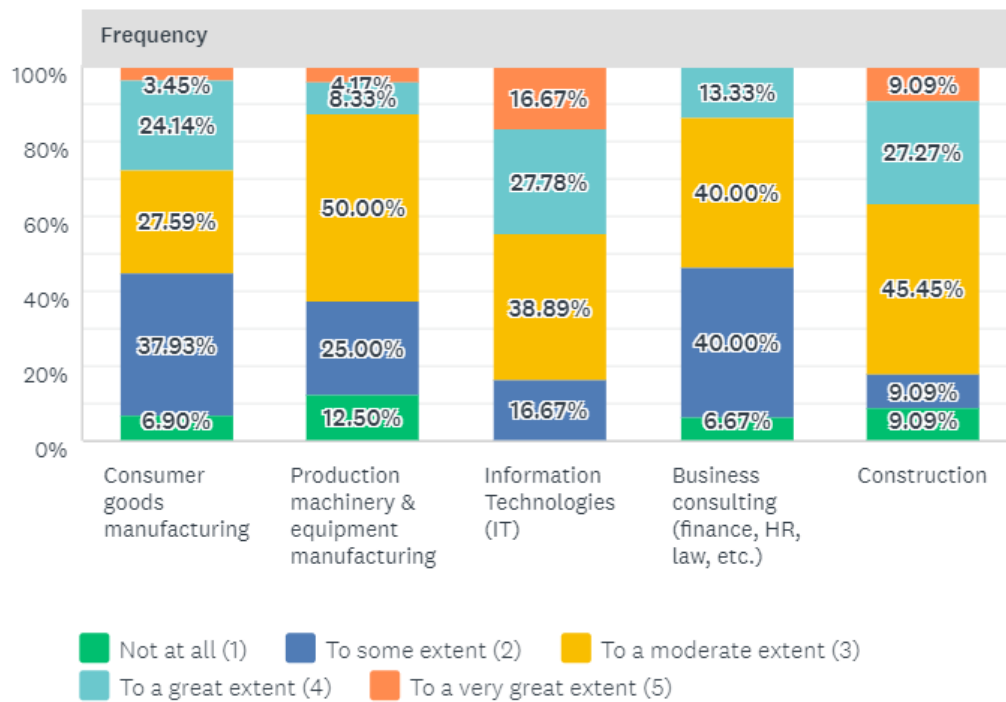
3.2. COMPARATIVE ANALYSIS

In this section, some comparative outputs will be provided to highlight how opinions of the respondents of various business sectors, departments and management levels compare. Providing outputs of all possible combinations of comparisons would be cumbersome, so only some of them were presented within the scope of this research to emphasize on main points. However, more focus was made for the comparison of the respondents' opinion with different management levels.

3.2.1. Business Sectors

Business sectors that the respondents come from are as follows: Consumer goods manufacturing; Production machinery & equipment manufacturing; Information Technologies (IT); Business consulting (finance, HR, law, etc.); Construction. Figure 30 shows how respondents from different business sectors responded to the question about their familiarity with cognitive computing concepts. The most familiarity is shown by the managers from *Information Technologies (IT)* sector, with 27,78% of them indicating that they are familiar with those concepts to a great extent and 16,67% of them indicating that they are familiar with those concepts to a very great extent.

Figure 30: Familiarity with cognitive computing concepts of respondents from different business sectors.



The response distribution is also listed in Table 19 below.

Table 19: Familiarity with cognitive computing concepts of respondents from different business sectors.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Consumer goods manufacturing	<i>n</i>	2	11	8	7	1	29	2,79
	%	6,90%	37,93%	27,59%	24,14%	3,45%	100,00%	
Production machinery & equipment manufacturing	<i>n</i>	3	6	12	2	1	24	2,67
	%	12,50%	25,00%	50,00%	8,33%	4,17%	100,00%	
Information Technologies	<i>n</i>	0	3	7	5	3	18	3,44
	%	0,00%	16,67%	38,89%	27,78%	16,67%	100,00%	
Business consulting (finance, HR, law, etc.)	<i>n</i>	1	6	6	2	0	15	2,60
	%	6,67%	40,00%	40,00%	13,33%	0,00%	100,00%	
Construction	<i>n</i>	1	1	5	3	1	11	3,18
	%	9,09%	9,09%	45,45%	27,27%	9,09%	100,00%	

3.2.2. Departments

There were 2 departments that the respondents come from: Administrative and Technical/Practical. Figure 31 shows how respondents from different departments responded to the question about to what extent they think the actions in adopting cognitive computing technologies, such as AI, are important for the businesses.

Figure 31: Respondents from different departments on how they think the actions in adopting cognitive computing technologies are important for the businesses.

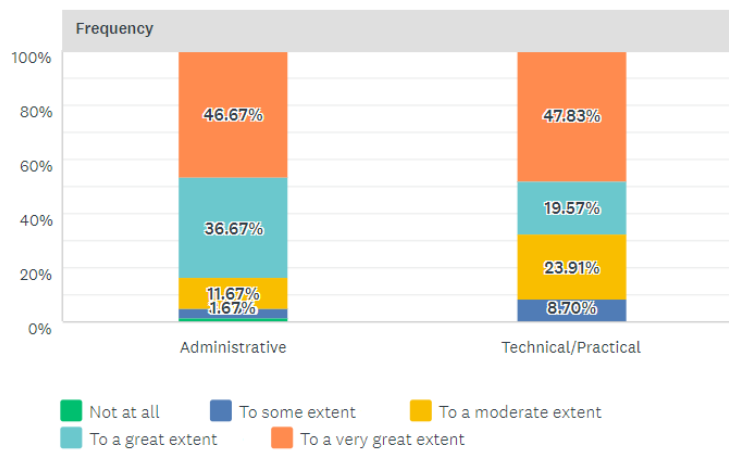


Figure 32 shows how respondents from different departments responded to the question about their general opinion of how much positive or negative impact increased automation and AI systems would have on the businesses.

Figure 32: Respondents from different departments on how much positive or negative impact they think increased automation and AI systems would have on the businesses.

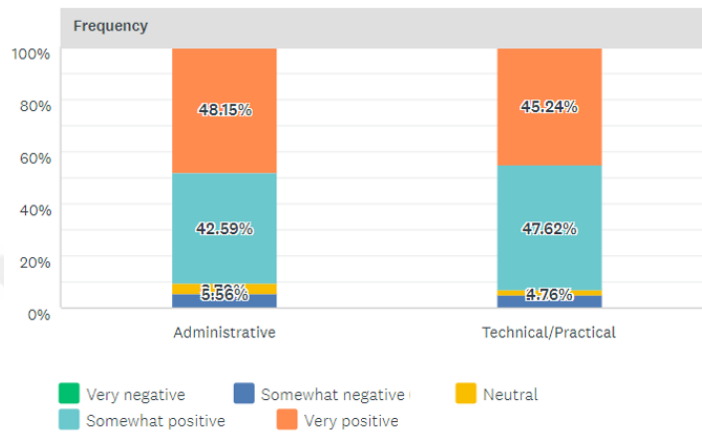
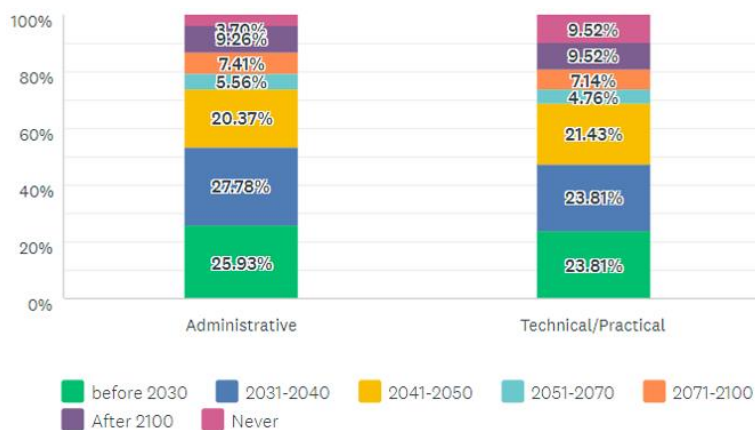


Figure 33 below shows how respondents from different departments responded to the question about their opinion on when AI will reach human-level intelligence. The responses appear to be similar for the managers of either departments.

Figure 33: Respondents from different departments on when AI will reach human-level intelligence.

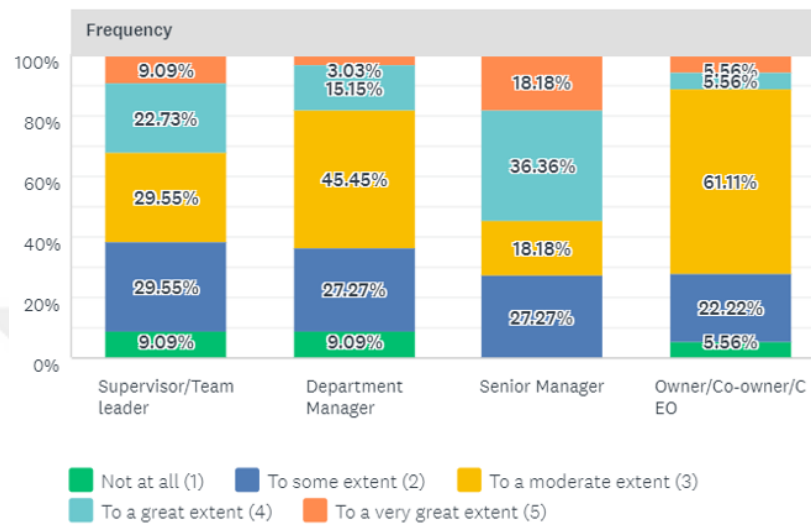


3.2.3. Management Levels

Management levels of the respondents are as follows: Supervisor/Team leader; Department Manager; Senior Manager; Owner/Co-owner/CEO. Figure 34 shows how

managers with different management levels responded to the question about their familiarity with cognitive computing concepts, like AI.

Figure 34: Familiarity with cognitive computing concepts, like AI, of managers with different management levels.



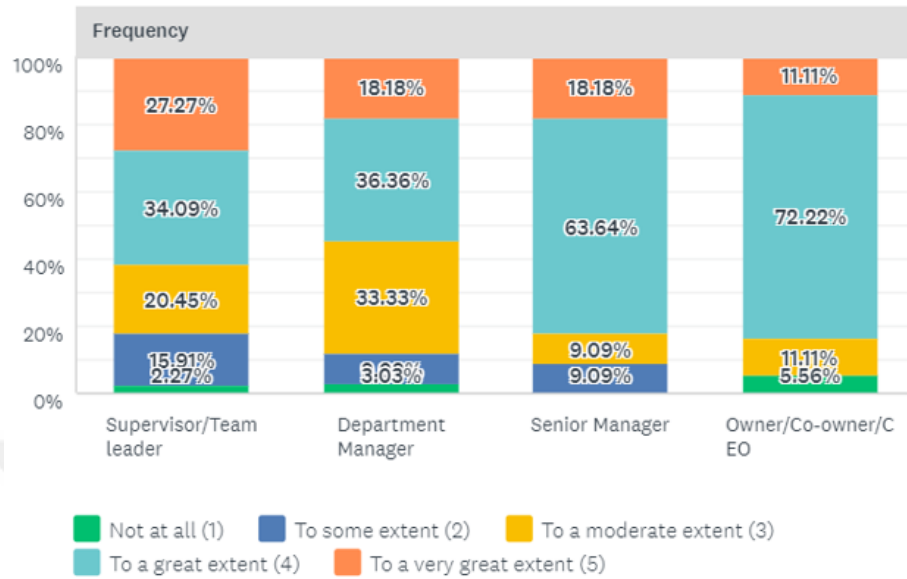
The comparison is also listed in Table 20 below. With the Weighted Mean of 3,45, Senior Managers appear to have the most familiarity with those concepts, followed by Supervisors/Team leaders, Owners/Co-owners/CEOs and Department Managers with Weighted Means of 2,93, 2,83 and 2,76, respectively.

Table 20: Familiarity with cognitive computing concepts, like AI, of managers with different management levels.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Supervisor/Team leader	n	4	13	13	10	4	44	2,93
	%	9,09%	29,55%	29,55%	22,73%	9,09%	100,00%	
Department Manager	n	3	9	15	5	1	33	2,76
	%	9,09%	27,27%	45,45%	15,15%	3,03%	100,00%	
Senior Manager	n	0	3	2	4	2	11	3,45
	%	0,00%	27,27%	18,18%	36,36%	18,18%	100,00%	
Owner/Co-owner/CEO	n	1	4	11	1	1	18	2,83
	%	5,56%	22,22%	61,11%	5,56%	5,56%	100,00%	

Similarly, the response distribution of the extent to which they plan to invest into gaining knowledge with those cognitive computing concepts, like AI, within the next 10 years is shown in Figure 35.

Figure 35: Extent to which managers with different management levels plan to invest into gaining knowledge with cognitive computing concepts within the next 10 years.



The response distribution of the managers with different management levels of the extent to which they plan to invest into gaining knowledge with those cognitive computing concepts, like AI, within the next 10 years is also listed in Table 21 below. The ranking and distribution is similar to the one of previous question.

Table 21: Extent to which managers with different management levels plan to invest into gaining knowledge with cognitive computing concepts within the next 10 years.

		Scale					Total	Weighted Mean
		Not at all (1)	To some extent (2)	To a moderate extent (3)	To a great extent (4)	To a very great extent (5)		
Supervisor/Team leader	n	1	7	9	15	12	44	3,68
	%	2,27%	15,91%	20,45%	34,09%	27,27%	100,00%	
Department Manager	n	1	3	11	12	6	33	3,58
	%	3,03%	9,09%	33,33%	36,36%	18,18%	100,00%	
Senior Manager	n	0	1	1	7	2	11	3,91
	%	0,00%	9,09%	9,09%	63,64%	18,18%	100,00%	
Owner/Co-owner/CEO	n	1	0	2	13	2	18	3,83
	%	5,56%	0,00%	11,11%	72,22%	11,11%	100,00%	

One of the key comparisons are the responses of the managers with different management levels to the question about the extent to which they would like to have an involvement of a developed AI system in various business processes. Figures from

36.a through 36.g show the distribution of the responses of the managers with different management levels with respect to each of the listed business process.

Planning & Scheduling and *Reporting* are the business processes with the similar response distribution, where Senior Managers showed the greatest eagerness of an involvement of an advanced AI system with those business processes among the managers of various ranks, as shown in the Figure 36.a and Figure 36.b below.

Figure 36.a: Managers with different management levels on the extent of an involvement of an advanced AI system with *Planning & Scheduling*.

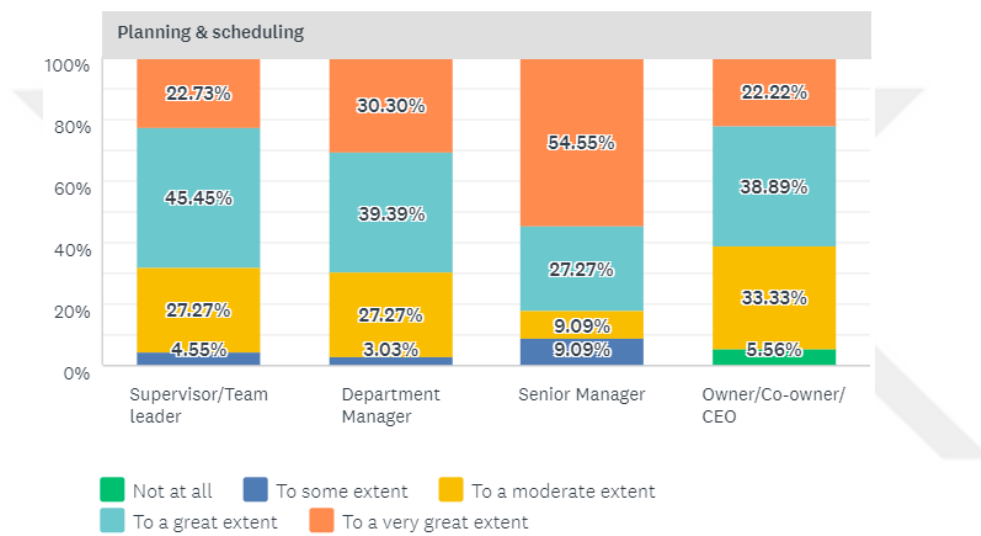
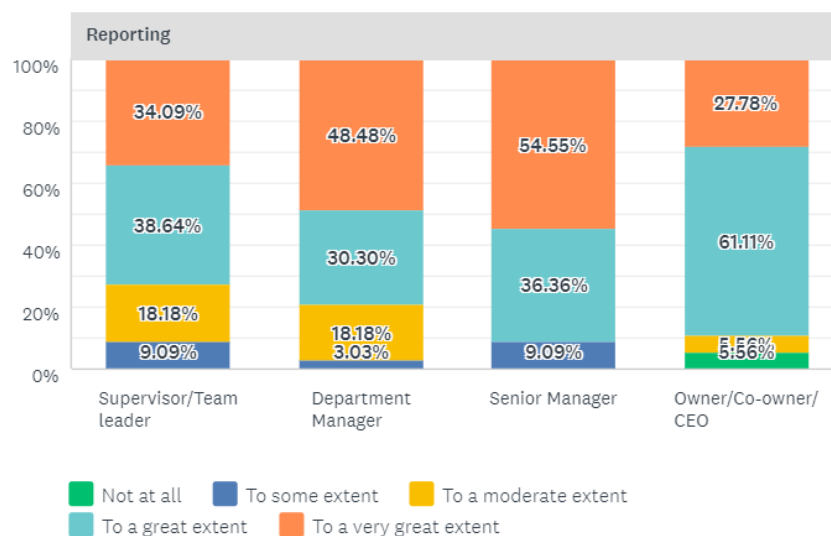
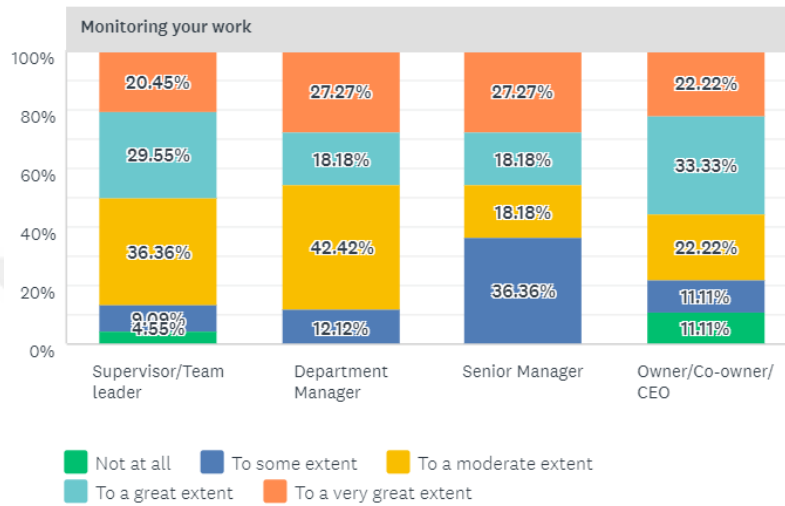


Figure 36.b: Managers with different management levels on the extent of an involvement of an advanced AI system with *Reporting*.



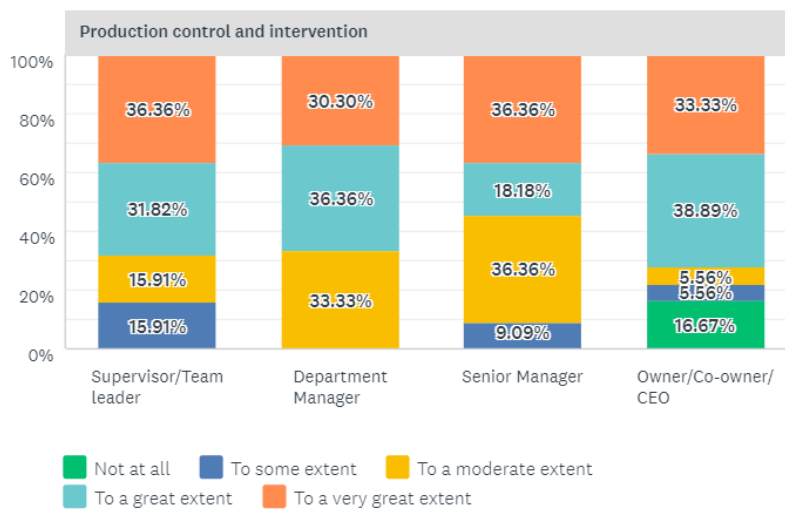
As for the AI system *Monitoring their work*, managers of all ranks showed similar responses for a great extent and a very great extent, as shown in Figure 36.c below.

Figure 36.c: Managers with different management levels on the extent of an involvement of an advanced AI system with *Monitoring their work*.



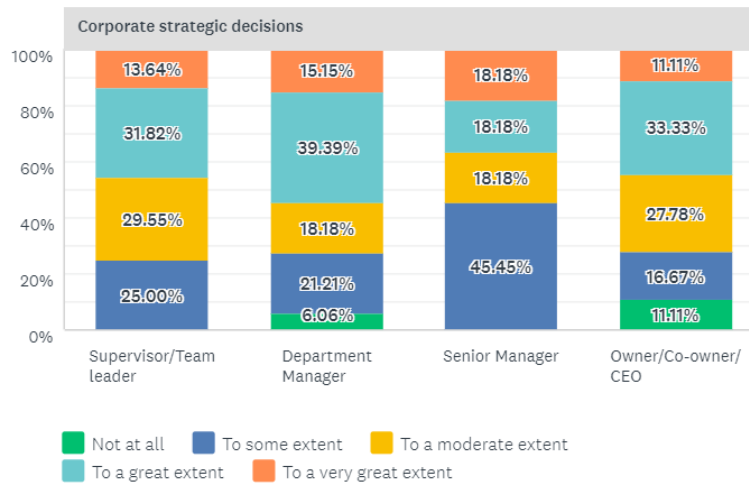
For the *Production control and intervention*, the similar eagerness to a great or a very great extent is shown by the Owners/Co-owners/CEOs, Department Managers and Supervisors/Team leaders, as shown in Figure 36.d below.

Figure 36.d: Managers with different management levels on the extent of an involvement of an advanced AI system with *Production control and intervention*.



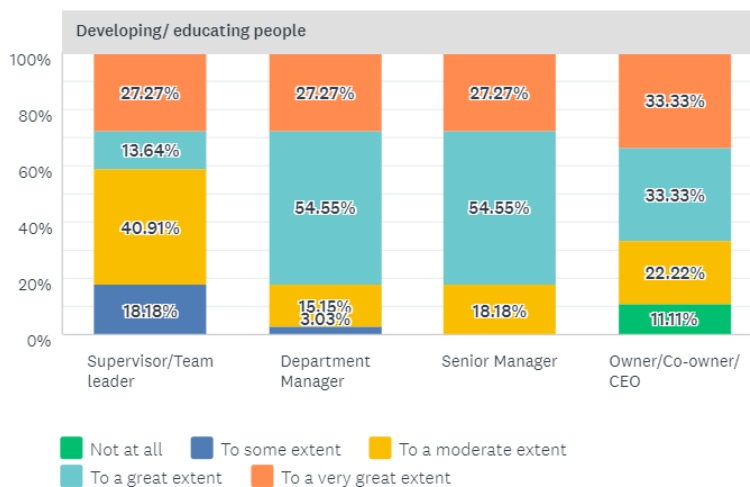
Department Managers appear to be more eager in an involvement of an advanced AI system with the *Corporate strategic decisions*, as 39,39% of them indicated a great extent and 15,15% a very great extent to it, as shown in Figure 36.d below.

Figure 36.e: Managers with different management levels on the extent of an involvement of an advanced AI system with *Corporate strategic decisions*.



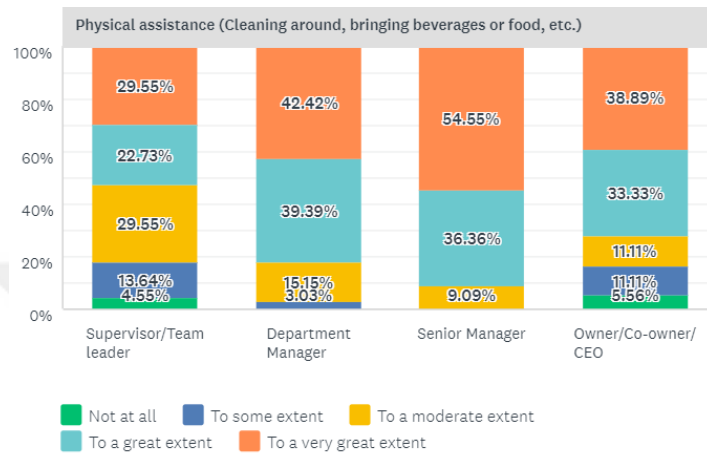
For an involvement of an advanced AI system with *Developing/educating people*, Department Managers and Senior managers appear to be more eager, as shown in Figure 36.f below.

Figure 36.f: Managers with different management levels on the extent of an involvement of an advanced AI system with *Developing/educating people*.



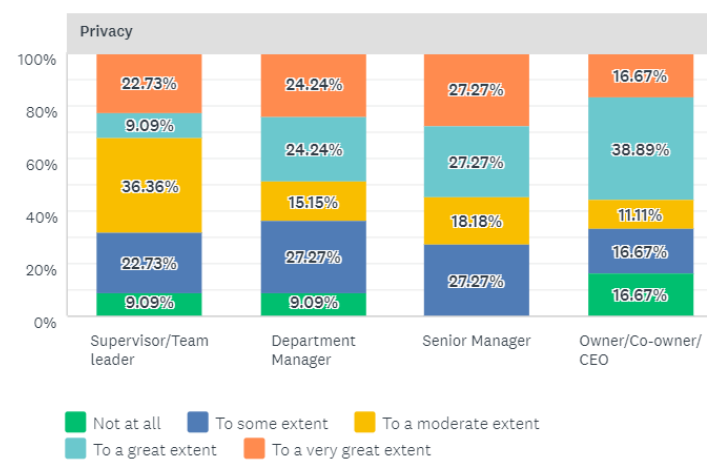
Physical assistance is a business process, for which Senior Managers showed the greater eagerness of an involvement of an advanced AI system with, as shown in the Figure 36.g below.

Figure 36.g: Managers with different management levels on the extent of an involvement of an advanced AI system with *Physical assistance*.



Another important comparison is the responses of the managers with different management levels to the question about the extent to which they have their concerns about an involvement of a developed AI system in various business processes. Figures from 37.a through 37.f show the distribution of the responses of the managers with different management levels with respect to each of the concern factors.

Figure 37.a: Managers with different management levels on the extent of their concerns for *Privacy*.



Owners/Co-owners/CEOs and Senior Managers showed greater extent of concerns among other managers for *Privacy*, *Security* and *Trust in AI's capabilities/skills*, if a developed AI system is involved in those business processes, as shown in Figures 37.a, 37.b and 37.c, respectively.

Figure 37.b: Managers with different management levels on the extent of their concerns for *Security*.

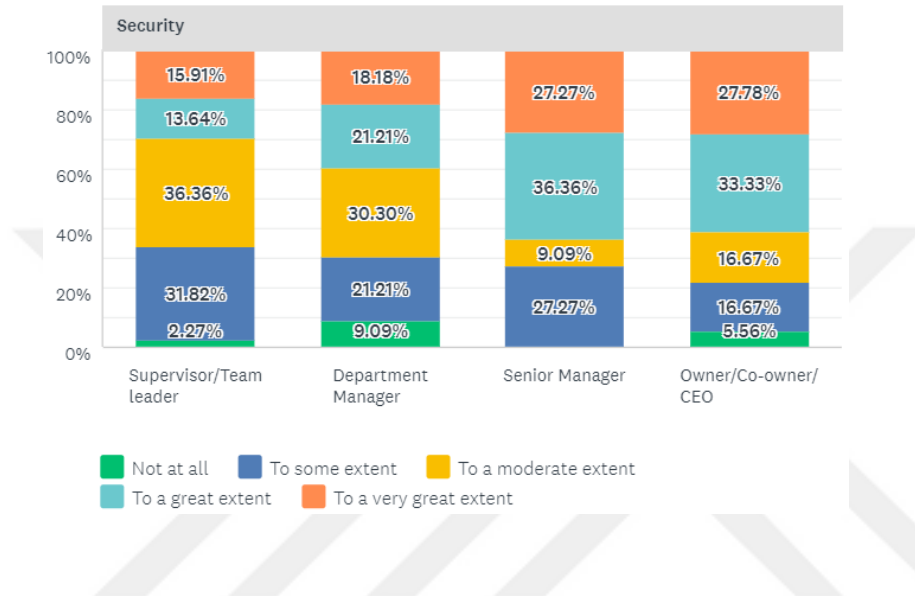
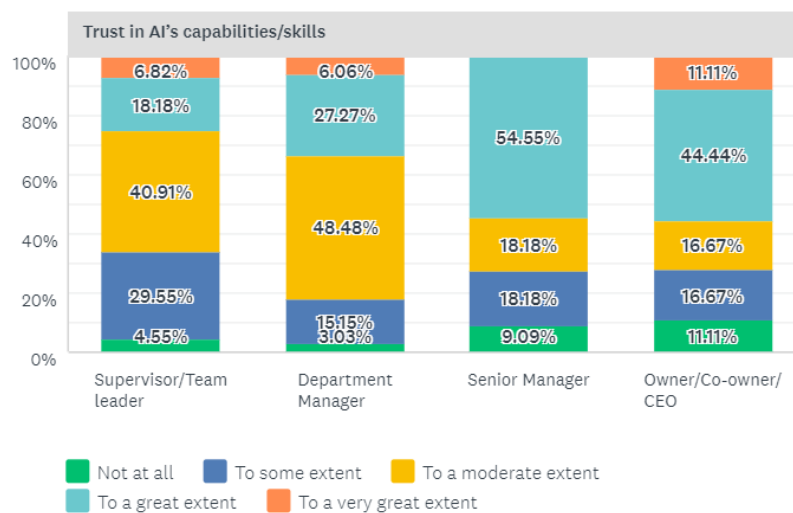


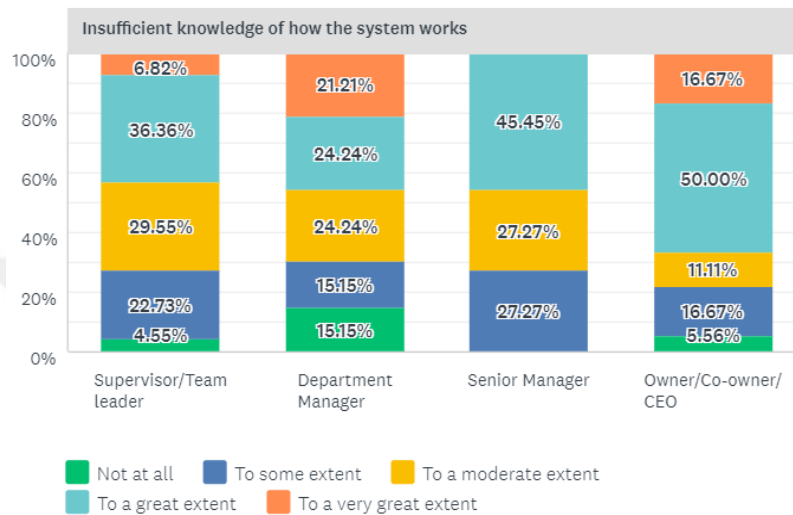
Figure 37.c: Managers with different management levels on the extent of their concerns for *Trust in AI's capabilities/skills*.



Owners/Co-owners/CEOs showed greater extent of concerns among other managers for *Insufficient knowledge of how the system works*, if a developed AI system

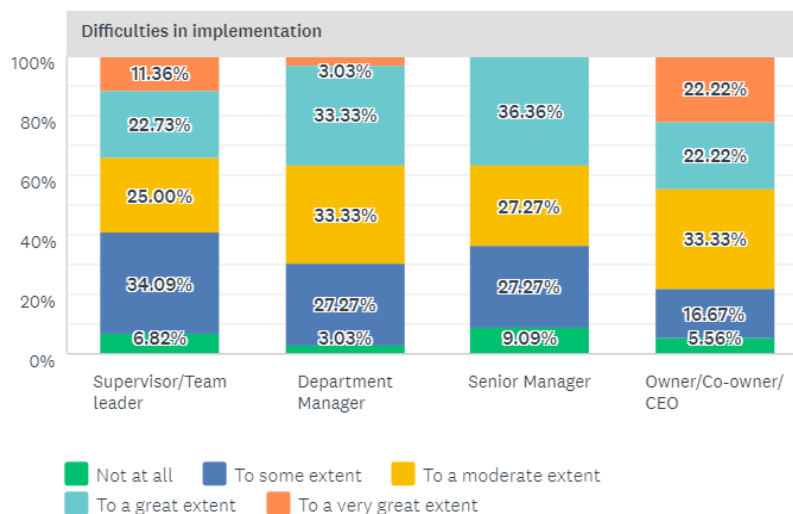
is involved in those business processes, as shown in Figures 37.d below. 50% of them had their concerns to a great extent and 16,67% of them had their concerns to a very great extent.

Figure 37.d: Managers with different management levels on the extent of their concerns for *Insufficient knowledge of how the system works*.



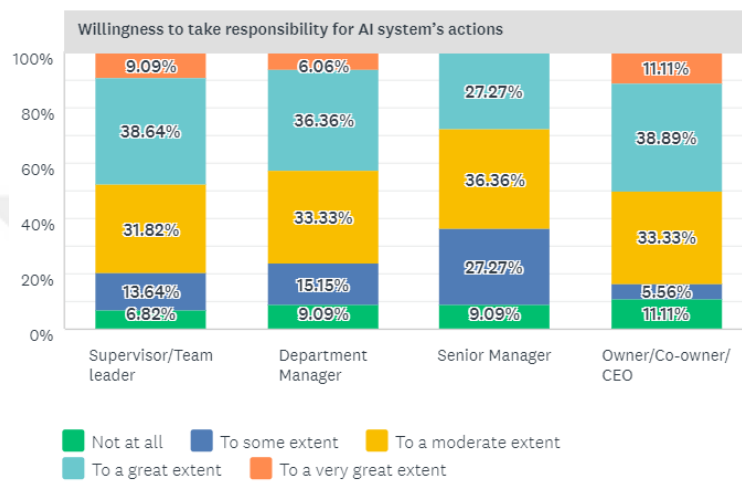
Managers of all ranks had more or less similar extents of their concerns for *Difficulties in implementation*, if a developed AI system is involved in various business processes, as shown in Figure 37.e below.

Figure 37.e: Managers with different management levels on the extent of their concerns for *Difficulties in implementation*.



Except for Senior Managers, other managers had similar extents of their concerns with the *Willingness to take responsibility for AI system's actions*, if a developed AI system is involved in various business processes, as shown in Figure 37.f below.

Figure 37.f: Managers with different management levels on the extent of their concerns with their *Willingness to take responsibility for AI system's actions*.



The next comparison is about how much positive or negative impact managers with different management levels think increased automation and usage of AI systems would have on businesses, among each other. Figure 38 below show the distribution of their responses.

Figure 38: Managers with different management levels on how much positive or negative impact increased automation and AI systems would have on the businesses.

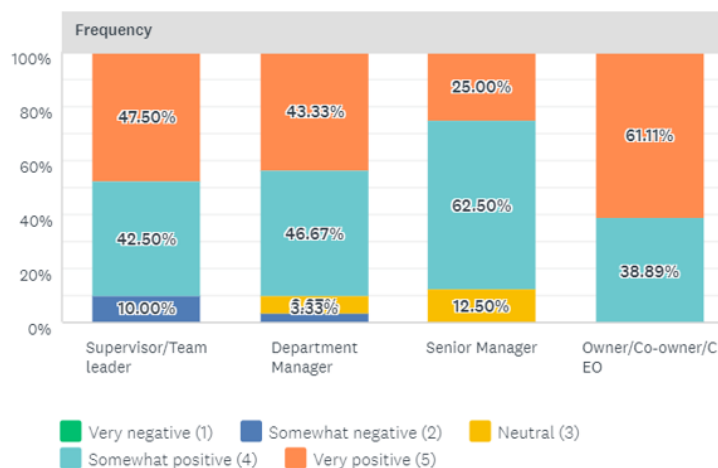


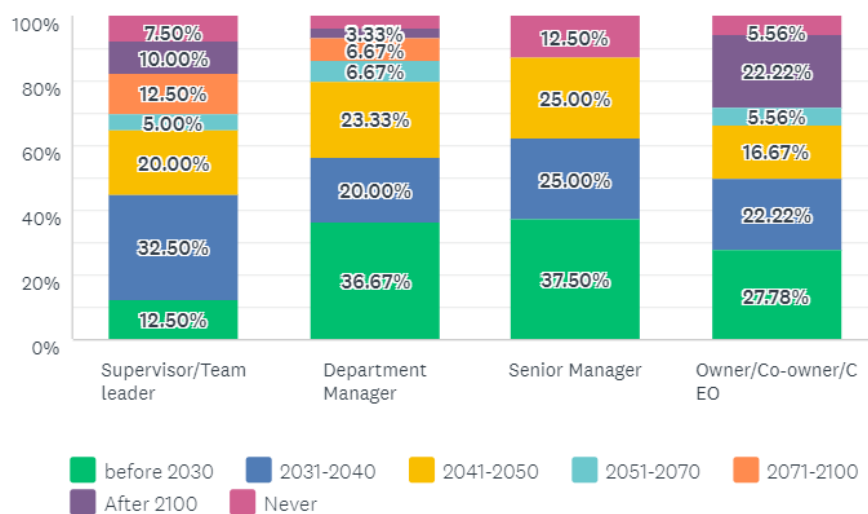
Table 22 also lists the distribution of how much positive or negative impact managers with different management levels think increased automation and AI systems would have on the businesses. Owners/Co-owners/CEOs are more positively inclined, with the Weighted Mean of 4,61.

Table 22: Managers with different management levels on how much positive or negative impact increased automation and AI systems would have on the businesses.

		Scale					Total	Weighted Mean
		Very negative (1)	Somewhat negative (2)	Neutral (3)	Somewhat positive (4)	Very positive (5)		
Supervisor/Team leader	<i>n</i>	0	4	0	17	19	40	4,28
	%	0,00%	10,00%	0,00%	42,50%	47,50%	100,00%	
Department Manager	<i>n</i>	0	1	2	14	13	30	4,30
	%	0,00%	3,33%	6,67%	46,67%	43,33%	100,00%	
Senior Manager	<i>n</i>	0	0	1	5	2	8	4,13
	%	0,00%	0,00%	12,50%	62,50%	25,00%	100,00%	
Owner/Co-owner/CEO	<i>n</i>	0	0	0	7	11	18	4,61
	%	0,00%	0,00%	0,00%	38,89%	61,11%	100,00%	

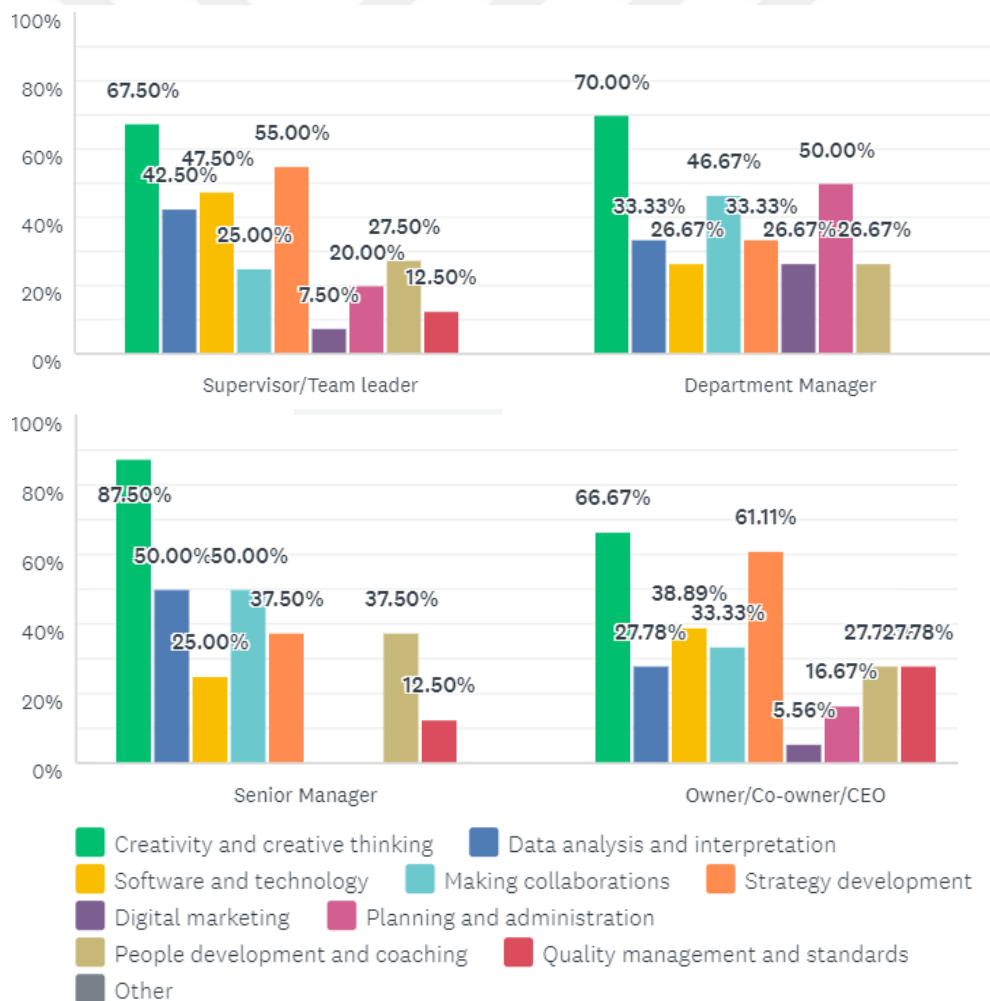
Figure 39 shows a comparison of the response distributions of the managers with different management levels about when they think AI will reach human-level intelligence. Majority of Senior Managers and Department Managers think it will happen before 2030, with 36,67% and 37,50% of them respectively choosing this period of timeframe.

Figure 39: Managers with different management levels on when they think AI will reach human-level intelligence.



Another key comparison is how the managers with different management levels differ in opinions regarding the top 3 skills that should be prioritized for one to succeed in their role, in the case of AI reaching human-level intelligence. Figure 40 below shows the distribution of the chosen skills with respect to each management level. *Creativity and Creative Thinking* is a most chosen skill among all the managers with different ranks. *Strategy Development* is a second most chosen skill among Owners/Co-owners/CEOs and Supervisors/Team leaders. Department Managers also prioritized *Planning and Administration* with *Making Collaborations*, while Senior Managers also favored *Data Analysis and Interpretation*.

Figure 40: The skills that managers with different ranks think should be prioritized for one to succeed in their role in the case of AI reaching human-level intelligence.



PART FOUR

DISCUSSION

4.1. TECHNOLOGY BACKGROUND AND ATTITUDE

Only 7,55% or 8 participants indicated that they are not familiar or involved with at least some of the cognitive computing concepts, like AI. More than 65% of participants indicated that they are familiar or involved with at least some of those cognitive computing concepts to a moderate or higher extent. On the other hand, the fraction of those, who plan to invest into gaining knowledge with those cognitive computing concepts within the next 10 years increased significantly, with about 87% indicating that they would invest into gaining knowledge to a moderate or higher extent. Similar results was obtained by the study of ARM with the collaboration of the research organization, Northstar, among 3938 consumers, where the majority of them indicating high familiarity with AI technologies (ARM and Northstar, 2017).

Big Data & Analytics appears to be the most implemented cognitive computing technology, with only 21,70% of respondents indicating that it has not been implemented in their company at all and more than 45% of respondents indicating that it has been implemented in their company to a moderate extent or higher. AI, Robotics & Robots and Industry 4.0 were indicated to have been implemented at around the same levels. Artificial Neural Networks and Deep Learning appear to be the least implemented cognitive computing technology with almost half of the respondents indicating that they have not been implemented in their company at all. As for the extent of their implementation within the next 10 years, the overall readiness is higher significantly, with more or less the same ranking for the cognitive computing technologies.

However, respondents appear to be only slightly satisfied with the actions of their companies in adopting cognitive computing technologies, such as AI, as almost half of the respondents thinking that their company's actions to adopt those technologies are enough only to some extent or not enough at all. Similar picture appears to be with the respondents' opinion regarding adoption of those technologies by Turkish business community in general, with 57,55% of respondents thinking the adoption is only to some extent and no one thinking that the adoption is to a very great

extent. These responses logically align with the opinion of the majority (about 90%) of the respondents that the Turkish business community should be more proactive in adopting cognitive computing technologies, such as AI, and that those actions are important for the businesses.

Managers in Turkey appear to be overall accepting of a developed AI system to be involved in the business processes, which also complies with the Western researches, such as of the Accenture Institute for High Performance (Kolbjørnsrud et. al, 2016) and ARM-Northstar (ARM and Northstar, 2017). Reporting, Physical assistance and Planning & Scheduling are the processes, most appealing to the respondents for an AI assistance. Corporate strategic decision, on the other hand, is the least appealing process, meaning that managers are not ready to trust AI with such a critical task, but more inclined to trust AI with routine and mundane tasks. Those findings also similar to the ones of Western studies.

4.2. PREDICTIONS AND FORECASTS

44,79% of respondents think that increased automation and usage of AI systems will have somewhat positive impact on the businesses and 46,88% of respondents think that the impact will be very positive. This is indicating a very high optimism for the upcoming AI integration in businesses. These results comply with the findings of ARM-Northstar research (ARM and Northstar, 2017), as well as with a small study of Barrat and Goertzel in 2009. Notably for Turkish business community, though, no one thinks that the impact will be a very negative. Top 3 fields that participants think AI developments will have the first major impact on, are Production or Manufacturing (84,38% of respondents chose it among their three choices), Defense Industry (51,04% of respondents chose it among their three choices) and Banking (40,63% of respondents chose it among their three choices). The top 3 fields for analogous question in ARM-Northstar research were Manufacturing, Banking and Construction (ARM and Northstar, 2017).

More than two-thirds of participants think that AI will reach human-level intelligence before 2050. While 25% participants thinking that it will happen within the next decade, 6,25% participants think it will never happen. Similar results were obtained by the study of Barrat and Goertzel (Barrat and Goertzel, 2009). Those results

reinforces the optimistic mood and acceptance of the respondents for the AI developments.

Assuming assistance of a developed AI system could enable them to free up their time at work, respondents' top activities to fill that gap would be to improve work-life balance and pursue more knowledge/expertise. The other preferred action would be to distribute freed time across existing tasks. Only 13,54% of respondents indicated that they don't think there would be significantly more free time. In contrast, managers that participated to the research of Accenture Institute for High Performance preferred activities such as to adopt new responsibilities and collaborate with colleagues (Kolbjørnsrud et. al, 2016).

Another interesting distribution of responses emerged for the respondents' preferences of choosing AI or human assistant for various tasks and jobs. A majority of respondents (82,29%) indicated that they would prefer an AI assistance to conduct a manufacturing process. Only 17,71% of respondents indicated that they would prefer an AI instructor over a human instructor, making it a least appealing case for AI. The job of an administrative assistant, the task of a medical examination and job of a business consultant had responses distributed almost evenly, dividing opinions. This distribution hints that people are more willing to greet AI assistance for the tasks that are prone to automatization and have already been applied some level of automatization. These results are very similar with the findings of ARM-Northstar research, suggesting a common tendency (ARM and Northstar, 2017).

4.3. DIFFERENT DEPARTMENTS AND BUSINESS SECTORS

Business sectors that the respondents came from are consumer goods manufacturing, production machinery & equipment manufacturing, IT, business consulting and construction. Not surprisingly, representatives of IT sector showed the most familiarity with cognitive computing technologies. Representatives of construction sector also showed a high familiarity in comparison with other sectors. The respondents from remaining sectors showed a moderate familiarity.

Respondents came from either Administrative or Technical/Practical departments. The comparisons of their responses for expected AI impact on businesses

and of when they think AI will reach human-level intelligence show that they have similar views.

4.4. DIFFERENT MANAGEMENT LEVELS

Respondents belonged to different management level, namely: Supervisor/Team leader; Department Manager; Senior Manager; Owner/Co-owner/CEO. The higher extents of familiarity with the cognitive computing concepts, such as AI, showed senior managers; followed by supervisors or team leaders. However, majority of each of the group showed at least a moderate extent of familiarity with those concepts, indicating a good awareness of the subject. Somewhat similar case appears on their willingness to invest into gaining knowledge of those concepts within the next 10 years, where owners/co-owners/CEOs and senior managers are showing a bit more willingness than their subordinates.

As for the differences in opinions of the managers with regards to the involvement of a developed AI system with the various business processes, senior managers appear to be the most accepting among other managers. They are also the most hesitant in the involvement of an AI system in monitoring their work and participating in taking corporate decisions. As for the concerns for a developed AI system involvement with the various business processes, it appears that the extent of overall concerns grows with the level of management in sense that owners/co-owners/CEOs express more concerns and supervisors/team leaders express less concerns than other managers. However, no specific trend was observed that would allow to strictly draw a conclusion for the preferences of the managers with different ranks, such as in the study of the Accenture Institute for High Performance, where more clear trends were found (Kolbjørnsrud et. al, 2016). This is partly due to the fact that more parameters were measured in the current research.

Managers with higher levels of management predicts more early development of an AI to reach a human-level intelligence, with about 27 through 37% of the higher managers thinking that it would happen before 2030. In such an event, all of the managers have a common opinion that the top skill to be prioritized for one to succeed in their role would be creativity and creative thinking. Top managers also prioritize other social and creative skills, such as strategy development or making collaborations,

but skills for the software and technology could also be considered. Those results comply with the findings of the researches of the Accenture Institute for High Performance (Kolbjørnsrud et. al, 2016) and NESTA (Bakhshi et. al, 2017).

4.5. FUTURE OF LABOR

Creative thinking and strategy development were chosen as the top skills that one should prioritize in order to succeed in their role, when AI reaches human-level intelligence. These skills are social and are least likely to be automated, which also matches the findings of the study by Accenture Institute for High Performance (Kolbjørnsrud et. al, 2016) and NESTA (Bakhshi et al, 2015). Data analysis, software/technology and making collaborations were the skills with about the same response frequency, indicating that technical skills should not be overlooked.

42,71% of respondents think that mass use of a developed AI system will result in a significantly less jobs offered, resulting in a higher unemployment rate. With that in mind, almost 65% of respondents think that as AI systems develop and become more involved with the business environment, the need for the new recruitment and training strategies will be either to a great or to a very great extent. This condition hints the upcoming talent recruit competition.

4.6. CONCERNS REGARDING AI INTEGRATION

While the managers appear to be mostly optimistic and accepting the AI integration in various business processes, they still have some concerns with relation to the factors, among which are Privacy; Security; Trust in AI's capabilities; Insufficient knowledge of how AI system works; Difficulties in implementation; Willingness to take responsibility for AI's actions. While all of them appear to be of equal significant concerns on average, about 20% of respondents indicated that they have their concerns with regard to Privacy and Security to a very great extent.

Regardless of the business process to trust AI with, having knowledge of how an AI system works appears to be a very important factor for the respondents, as 70 to 80% of the responses among the processes were that an extent is either great or a very great. This factor is also among the ones that respondents have the most concerns about, as indicated previously. Understanding how a system works was an important

factor for the participants of the Accenture Institute for High Performance study as well, with more than half of them indicating its significance (Kolbjørnsrud et. al, 2016).

4.7. POSSIBILITIES FOR THE FUTURE RESEARCHES

As was also stated among the research limitations, the complexity and extensiveness of the survey resulted in a vast output of the results. The highlighted and discussed findings were limited to the scope of the current research. Therefore, author believes that one could find many interesting topics to investigate further. For instance, the importance of knowing how an AI system works in order to trust it appears to be interesting finding and could be investigated further on its own. Or, the concern factors could be investigated as a whole.

Another approach for the future researches would be to conduct similar studies, but with the more simplified and focused survey, with more respondents to participate. The results could be then compared, and even more interesting findings might appear. In any case, it is important to continue to investigate this subject, as the AI technology is already emerging (Gurkaynak, 2016).

CONCLUSION

With various opinions revolving around the effects of AI integration in our daily lives and business environment, it is hard to deny that the technological advancements have already changed our lives a lot. For example, social media have become an important environment for interactions, especially for the younger groups (Bolton et. al, 2013). As a more recent example, one study found that consumers became more connected with the sellers due to popularity of social media and increased use of smartphones (Stephen, 2017). Therefore, it is important to increase awareness of the public by conducting related researches.

There were several wide studies to measure the attitude towards an AI integration in business environment and processes, as well as to predict future of labor, carried out by the researchers of some private organizations (Kolbjørnsrud et al., 2016; Bakhshi et al., 2015; ARM and Northstar, 2017). The current research was inspired by those studies was conducted within the scope of Turkish conditions among 106 managers in Turkey. The main goal was to contribute to both the local and global research pool with an empirical, informative study and analyze opinions of the managers.

It was found that the overall perception of AI and its integration in business environment is positive. Furthermore, managers are willing to learn and gain more professional expertise. They think that their companies and Turkish business environment should be more proactive in adopting cognitive computing technologies, such as AI, and that those actions are important. Integration of AI into various business process is mostly welcomed, especially for the routine tasks, such as reporting and planning. Senior managers appear to be the most accepting, among the managers of other ranks. However, there are some concerns, such as privacy, security and knowledge of how the system works, which should not be overlooked.

Managers think that AI is going to replace mainly automated jobs, such as manufacturing or administrative tasks. Similarly, the skills that require creativity and social interactions should be prioritized in the future. Notably, the jobs and tasks that require those skills are among the least likely to be replaced by the advanced AI systems (Bakhshi, 2015; Bakhshi, 2017; Makridakis, 2017).

Despite some limitations to the research, the findings are mostly confirming the aforementioned Western studies. Additionally, some possibilities for the future studies emerged from the current research. For example, the importance of knowing how an AI system works in order to trust it with the business processes could be investigated separately in the future. Or, the concern factors for an AI integration could be investigated as a whole as well. In any case, at this stage of the technological developments it is important to conduct more studies of social and professional awareness, increasing the global research pool.



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Appendix 1: Research Survey in English (original version)

Thank you for taking part in this survey!

This survey is presented to you within the scope of the master research thesis, named “Artificial Intelligence (AI) integration in business environment and processes: perception among managers in Turkey”. This survey is intended to be approached within the current social and economical state of Turkey, its position in international arena and your personal experience. Please fill out all the questions; in case you hesitate to provide a response, please choose the most appealing answer.

Farhat Rahimov

Dokuz Eylul University – Graduate School of Social Sciences - Department of Business Administration (English)

A- PERSONAL AND CORPORATE BACKGROUND

Please choose the choice that corresponds to you.

1- Gender:

☐ Female ☐ Male

2- Age range:

☐ 18-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-50 ☐ 51<

3- Business sector in which your company operates:

☐ Consumer goods manufacturing ☐ Business consulting (finance, HR, law, etc.)

☐ Production machinery & equipment manufacturing ☐ Construction

☐ Information Technologies (IT) ☐ Other _____

4- Number of employees in your company:

☐ 1-10 ☐ 11-50 ☐ 51-100 ☐ 101-200 ☐ 201-500 ☐ 501-1000 ☐ 1000 <

5- Your department:

☐ Administrative ☐ Technical/practical ☐ Other _____

6- Your level of management:

☐ Supervisor/Team leader ☐ Department Manager ☐ Senior Manager

☐ Owner/Co-owner/CEO ☐ Other _____

B- TECHNOLOGY BACKGROUND AND ATTITUDE

Below are abstract definitions of some concepts related to cognitive computing:

Cognitive computing – intelligent system that simulates human thought process.

Artificial Intelligence (AI) – a cognitive computing system that learn, act, comprehend and sense on its own.

Artificial neural networks - set of algorithms, modeled loosely after the human brain, that is designed to recognize patterns.

Deep learning – part of a broad family of methods used for machine learning that are based on learning representations of data. Used for building and training neural networks.

Big data - describes a large volume of structured, semi-structured and unstructured data that has the potential to be mined for information to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.

Robotics - the branch of technology that deals with the design, construction, operation, and application of robots - actuated mechanisms programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks.

Industry 4.0 - current trend of automation and data exchange in manufacturing technologies.

7- Please rate to what extent you are familiar with or involved with at least some of those cognitive computing concepts:				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

8- To what extent do you plan to invest into gaining knowledge with those cognitive computing concepts within the next 10 years?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

9- To your knowledge, to what extent have the cognitive computing technologies already been implemented or utilized in your company?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
AI	o	o	o	o	o
Artificial neural networks	o	o	o	o	o
Deep learning	o	o	o	o	o
Big data & Analytics	o	o	o	o	o
Robotics/Robots	o	o	o	o	o

10- To your knowledge, to what extent the cognitive computing technologies will be implemented or utilized in your company within the next 10 years?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
AI	o	o	o	o	o
Artificial neural networks	o	o	o	o	o
Deep learning	o	o	o	o	o
Big data & Analytics	o	o	o	o	o
Robotics/Robot s	o	o	o	o	o
Industry 4.0	o	o	o	o	o

11- To what extent you think your company's actions in adopting cognitive computing technologies, such as AI, are enough?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

12- To what extent do you think Turkish business community adopts cognitive computing technologies, such as AI?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

13- To what extent do you think Turkish business community should be more proactive in adopting cognitive computing technologies, such as AI?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

14- To what extent you think the actions in adopting cognitive computing technologies, such as AI, are important for the businesses?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

15- To what extent you currently use any type of intelligent assistant for your business activities (like Google Assistant, Siri, Nina, Amazon Echo or others):				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

16- To what extent would you like to have an involvement of a developed AI system in business processes, stated below?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
Planning & scheduling	☐	☐	☐	☐	☐
Reporting	☐	☐	☐	☐	☐
Monitoring your work	☐	☐	☐	☐	☐
Production controlling and intervention	☐	☐	☐	☐	☐
Corporate strategic decisions	☐	☐	☐	☐	☐
Developing/education people	☐	☐	☐	☐	☐
Physical assistance (Cleaning around, bringing beverages or food, etc.)	☐	☐	☐	☐	☐

17- To what extent would you like to have a knowledge of how an AI system works in order to trust it with the following business processes?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
Planning & scheduling	☐	☐	☐	☐	☐
Reporting	☐	☐	☐	☐	☐
Monitoring your work	☐	☐	☐	☐	☐
Production controlling and intervention	☐	☐	☐	☐	☐
Corporate strategic decisions	☐	☐	☐	☐	☐
Developing/education people	☐	☐	☐	☐	☐
Physical assistance (Cleaning around, bringing beverages or food, etc.)	☐	☐	☐	☐	☐

18- To what extent you have concerns regarding involvement of a developed AI system in business processes, stated below?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
Planning & scheduling	o	o	o	o	o
Reporting	o	o	o	o	o
Monitoring your work	o	o	o	o	o
Production controlling and intervention	o	o	o	o	o
Corporate strategic decisions	o	o	o	o	o
Developing/education people	o	o	o	o	o
Physical assistance (Cleaning around, bringing beverages or food, etc.)	o	o	o	o	o

19- To what extent you have your concerns about involvement of a developed AI system in various business processes with relation to the following conditions?					
	Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
Privacy	o	o	o	o	o
Security	o	o	o	o	o
Trust in AI's capabilities/skills	o	o	o	o	o
Insufficient knowledge of how the system works	o	o	o	o	o
Difficulties in implementation	o	o	o	o	o
Willingness to take responsibility for AI system's actions	o	o	o	o	o

C – FORECASTS AND PREDICTIONS

20- Generally speaking, how much positive or negative impact do you think increased automation and AI systems would have on the businesses?				
Very negative	Somewhat negative	Neutral	Somewhat positive	Very positive
☐	☐	☐	☐	☐

21- Choose 3 fields where you think AI developments will have the first major impact:

- ☐ Production/Manufacturing ☐ Education ☐ Defense industry
☐ Transportation
☐ Healthcare ☐ Business consulting ☐ Agriculture ☐ Public services
☐ Banking
☐ Construction ☐ Other _____

22- Artificial general intelligence (AGI) is the intelligence of a machine that could successfully perform any intellectual task that a human being can. When do you think AI will reach human-level intelligence?

- ☐ before 2030 ☐ 2031-2040 ☐ 2041-2050 ☐ 2051-2070 ☐ 2071-2100
☐ after 2100 ☐ Never

23- Considering the case of AI reaching human-level intelligence, choose 3 skills that you think should be prioritized for one to succeed in their role:

- ☐ Creativity and creative thinking ☐ Data analysis and interpretation
☐ Software and technology development ☐ Making collaborations ☐ Strategy development
☐ Digital marketing ☐ Planning and administration
☐ People development and coaching ☐ Quality management and standards
☐ Other _____

24- How do you think mass use of a developed AI systems will affect the labor?

- ☐ There will be significantly less jobs offered (higher unemployment rate)
☐ There will be no significant change in number of the jobs offered (about the same unemployment rate)
☐ There will be significantly more jobs offered (lower unemployment rate)
☐ Hard to predict
☐ Other _____

25- As AI systems develop and become more involved with the working environment, to what extent you think there will be the need for the new strategies for recruitment and training?				
Not at all	To some extent	To a moderate extent	To a great extent	To a very great extent
o	o	o	o	o

26- Assuming assistance of a developed AI system could enable you to free up your time at work, how would you spend it? Choose 3 activities from the list below:

- ☐ Distribute time across existing tasks ☐ Adopt new responsibilities
☐ Pursue more knowledge/expertise ☐ Collaborate with colleagues
☐ Coach interns and newcomers ☐ Improve work-life balance
☐ I don't think there would be significantly more free time ☐ Other _____

27- Considering the case of AI reaching human-level intelligence, which one would you prefer?			
	Human	AI system	Doesn't matter
Choosing an administrative assistant/secretary	o	o	o
Medical professional for examination and diagnosis	o	o	o
Choosing a business consultant (financial, HR, law, etc.)	o	o	o
University/school/academy instructor/teacher	o	o	o
Manufacturing process	o	o	o
Manufacturing supervision	o	o	o
Getting a taxi to go home	o	o	o

Appendix 2: Research Survey in Turkish (online version)

İş ortamında ve süreçlerinde Yapay Zeka (Artificial Intelligence - AI) entegrasyonu:
Türkiye'deki yöneticiler arasındaki algı

Ankete katılım sağladığınız için teşekkür ederim!

Bu anket size "İş ortamında ve süreçlerinde Yapay Zeka (Artificial Intelligence - AI) entegrasyonu: Türkiye'deki yöneticiler arasındaki algı" başlıklı yüksek lisans tezimin kapsamında sunulmuştur. Bu ankete, Türkiye'nin mevcut sosyal ve ekonomik durumu, uluslararası arenadaki konumu ve kişisel deneyimleriniz dahilinde yaklaşmanız amaçlanmıştır. Lütfen eksiksiz cevap veriniz; kararsız olduğunuz sorularda ise size en yakın olan seçeneği işaretleyiniz.

Farhat Rahimov.

İş ortamında ve süreçlerinde Yapay Zeka (Artificial Intelligence - AI) entegrasyonu:
Türkiye'deki yöneticiler arasındaki algı

A- KİŞİSEL VE KURUMSAL BİLGİLER

Lütfen ilgili seçeneği işaretleyiniz.

1. Cinsiyetiniz:

☐ Kadın ☐ Erkek

2. Yaş aralığınız:

☐ 18-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-50 ☐ 51<

3. İşletmenizin faaliyet gösterdiği sektör:

☐ Tüketim malları üretimi ☐ İş danışmanlıkları (finans, İK, hukuk, vb.)
☐ Ticari makina ve ekipman imalatı ☐ İnşaat
☐ Bilişim (IT)

Diğer (lütfen belirtin)

4. İşletmenizdeki toplam çalışan sayısı:

☐ 1-10 ☐ 11-50 ☐ 51-100 ☐ 101-200 ☐ 201-500 ☐ 501-1000 ☐ 1000 <

5. Departmanınız:

☐ İdari
☐ Teknik/Uygulamalı

6. İşletmenizdeki idari sorumluluğunuz:

☐ Proje yöneticisi/Takım lideri ☐ Üst Yönetici
☐ Departman Yöneticisi ☐ İşletme sahibi/İşletme ortağı/CEO

Diğer (lütfen belirtin)

İş ortamında ve süreçlerinde Yapay Zeka (Artificial Intelligence - AI) entegrasyonu:
Türkiye'deki yöneticiler arasındaki algı

B- TEKNOLOJİYE YÖNELİK TUTUM VE ALTYAPI

Aşağıda kognitif bilişim teknolojileri ile ilgili bazı genel kavram ve açıklamaları verilmiştir:

Kognitif (bilişsel) bilişim (Cognitive computing) – insanın düşünme sürecini taklid eden akıllı sistem;

Yapay Zeka (Artificial Intelligence – AI) – kendi kendine öğrenen, çalışan, kavrayan ve hisseden kognitif bilişim sistemidir;

Yapay sinir ağları (Artificial neural networks) – insan beyninden esinlenerek geliştirilmiş, ağırlıklı olarak bağlantılar aracılığıyla birbirine bağlanan, her biri kendi belleğine sahip işlem elemanlarından oluşan paralel ve dağıtılmış bilgi işleme algoritma sistemidir;

Derin öğrenme (Deep learning) – verinin temsilinden öğrenmeye dayanan, makine öğrenmesi için kullanılan geniş bir algoritma ailesinin parçasıdır. Yapay sinir ağları oluşturmak ve eğitmek için de kullanılır;

Büyük veri (Big data) – özellikle insan davranışı ve etkileşimleriyle ilgili örüntüleri, eğilimleri ve ilişkileri ortaya çıkarmak için bilgi edinme potansiyeline sahip çok sayıda yapılandırılmış veya yapılandırılmamış veri biçimidir;

Robotik (Robotics) - robotların tasarımı, yapımı, işletimi ve uygulamasıyla ilgilenen teknoloji dalıdır;

Endüstri 4.0 (Industry 4.0) - üretimle doğrudan ya da dolaylı olarak ilişkili olan bütün birimlerin birbiri ile ortak çalışmasını planlayan; dijital verilerin, yazılımın ve bilişim teknolojilerinin birbiri ile entegre olarak çalışmasını öngören 4. Sanayi Devrimidir.

7. Lütfen bu kognitif bilişim kavramlarının bir veya birkaç tanesine ne kadar aşina olduğunuzu veya bunlarla ne kadar ilgilendiğinizi değerlendirin:

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

8. Önümüzdeki 10 yıl içerisinde bu kognitif bilişim kavramlarının bir veya birkaç tanesiyle ilgili ne kadar bilgi edinmeyi planlıyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

9. Bildiğiniz kadarıyla, kognitif bilişim teknolojileri işletmenizde ne ölçüde uygulandı veya kullanıldı?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
AI	☐	☐	☐	☐	☐
Yapay sinir ağları	☐	☐	☐	☐	☐
Derin öğrenme	☐	☐	☐	☐	☐
Büyük veri & Analitiği	☐	☐	☐	☐	☐
Robotik & Robotlar	☐	☐	☐	☐	☐
Endüstri 4.0	☐	☐	☐	☐	☐

10. Bildiğiniz kadarıyla, kognitif bilişim teknolojileri işletmenizde önümüzdeki 10 sene içerisinde ne ölçüde uygulanacak veya kullanılacak?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
AI	☐	☐	☐	☐	☐
Yapay sinir ağları	☐	☐	☐	☐	☐
Derin öğrenme	☐	☐	☐	☐	☐
Büyük veri & Analitiği	☐	☐	☐	☐	☐
Robotik & Robotlar	☐	☐	☐	☐	☐
Endüstri 4.0	☐	☐	☐	☐	☐

11. İşletmenizin AI gibi kognitif bilişim teknolojilerini benimseme konusundaki eylemlerinin ne kadar yeterli olduğunu düşünüyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

12. Sizce, Türk iş topluluğu, AI gibi kognitif bilişim teknolojilerini ne ölçüde benimsemekte?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

13. Türk iş topluluğunun AI gibi kognitif bilişim teknolojilerini benimsemede ne kadar proaktif olması gerektiğini düşünüyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

14. AI gibi kognitif bilişim teknolojilerini benimseme eylemlerinin Türkiye'deki işletmeler için ne kadar önemli olduğunu düşünüyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

15. İş ile ilgili faaliyetleriniz için herhangi bir akıllı asistanını (Google Assistant, Siri, Nina, Amazon Echo, vb. gibi) ne ölçüde kullanıyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

16. Aşağıda belirtilen iş süreçlerine gelişmiş bir AI sisteminin dahil olmasını ne ölçüde isterdiniz?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
Planlama & çizelgeleme	☐	☐	☐	☐	☐
Raporlama	☐	☐	☐	☐	☐
İşinizin izlenmesi/denetilmesi	☐	☐	☐	☐	☐
Üretim kontrolü ve müdahale	☐	☐	☐	☐	☐
Kurumsal ve stratejik kararların alınması	☐	☐	☐	☐	☐
İnsanların eğitimi ve gelişimi	☐	☐	☐	☐	☐
Fiziki yardım (Etrafın temizliği, içecek veya yiyeceklerin getirilmesi, vb.)	☐	☐	☐	☐	☐

17. Aşağıda belirtilen iş süreçlerine gelişmiş bir AI sisteminin dahil olmasında ona güvenebilmeniz için, bu AI sisteminin nasıl çalıştığına ilişkin ne ölçüde bilgi sahibi olmak isterdiniz?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
Planlama & çizelgeleme	☐	☐	☐	☐	☐
Raporlama	☐	☐	☐	☐	☐
İşinizin izlenmesi/denetilmesi	☐	☐	☐	☐	☐
Üretim kontrolü ve müdahale	☐	☐	☐	☐	☐
Kurumsal ve stratejik kararların alınması	☐	☐	☐	☐	☐
İnsanların eğitimi ve gelişimi	☐	☐	☐	☐	☐
Fiziksel yardım (Etrafın temizliği, içecek veya yiyeceklerin getirilmesi, vb.)	☐	☐	☐	☐	☐

18. Aşağıda belirtilen iş süreçlerine gelişmiş bir AI sisteminin dahil olmasıyla ilgili ne ölçüde endişeleniyorsunuz?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
Planlama & çizelgeleme	☐	☐	☐	☐	☐
Raporlama	☐	☐	☐	☐	☐
İşinizin izlenmesi/denetilmesi	☐	☐	☐	☐	☐
Üretim kontrolü ve müdahale	☐	☐	☐	☐	☐
Kurumsal ve stratejik kararların alınması	☐	☐	☐	☐	☐
İnsanların eğitimi ve gelişimi	☐	☐	☐	☐	☐
Fiziksel yardım (Etrafın temizliği, içecek veya yiyeceklerin getirilmesi, vb.)	☐	☐	☐	☐	☐

19. Gelişmiş bir AI sisteminin çeşitli iş süreçlerine dahil olmasında, aşağıda belirtilen durumlarla ilişkin ne ölçüde endişeleniyorsunuz?

	Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
Gizlilik	☐	☐	☐	☐	☐
Güvenlik	☐	☐	☐	☐	☐
AI'nin kabiliyetlerine ve yeteneklerine güvenmek	☐	☐	☐	☐	☐
Sistemin nasıl çalıştığına dair yetersiz bilgiye sahip olmak	☐	☐	☐	☐	☐
Uygulama zorlukları	☐	☐	☐	☐	☐
AI sisteminin eylemlerine karşı sorumluluk alma isteği	☐	☐	☐	☐	☐

İş ortamında ve süreçlerinde Yapay Zeka (Artificial Intelligence - AI) entegrasyonu:
Türkiye'deki yöneticiler arasındaki algı

C – TAHMİN VE ÖNGÖRÜLER

20. Artan otomasyon ve AI sistemlerinin işletmeler üzerinde, genel anlamda, ne kadar olumlu veya olumsuz bir etkisi olacağını düşünüyorsunuz?

Çok olumsuz	Biraz olumsuz	Etkisiz	Biraz pozitif	Çok pozitif
☐	☐	☐	☐	☐

21. AI sistemlerinin gelişmesiyle, ilk önemli etkiye sahip olacağını düşündüğünüz 3 alanı seçin:

- | | |
|--|---|
| ☐ Üretim/İmalat | ☐ İş danışmanlıkları |
| ☐ Eğitim | ☐ Ziraat |
| ☐ Savunma sanayisi | ☐ Kamu hizmetleri |
| ☐ Ulaştırım | ☐ Bankacılık |
| ☐ Sağlık | ☐ İnşaat |
| ☐ Diğer (lütfen belirtin) | |

22. Yapay Genel Zeka (Artificial General Intelligence - AGI) - bir insanın yapabileceği herhangi bir zihinsel görevi başarıyla gerçekleştirebilecek bir makinenin zeka seviyesidir. Bir AI sisteminin, insanın zeka seviyesine ne zaman ulaşacağını düşünüyorsunuz?

- ☐ 2030'dan önce ☐ 2031-2040 ☐ 2041-2050 ☐ 2051-2070 ☐ 2071-2100 ☐ 2100'dan sonra ☐ Hiçbir zaman

23. Bir AI sisteminin insanın zeka seviyesine ulaşması durumunda, bir kişinin kendi alanında başarılı olması için gerekli olacağını düşündüğünüz 3 beceriyi seçin:

- | | |
|---|---|
| ☐ Yaratıcılık ve kreatif düşünme | ☐ Dijital pazarlama |
| ☐ Veri analizi ve yorumlama | ☐ Planlama ve yönetim |
| ☐ Yazılım ve teknoloji | ☐ İnsanları eğitme ve koçluk yapma |
| ☐ İşbirlikleri kurabilme | ☐ Kalite yönetimi ve standardizasyon |
| ☐ Strateji geliştirme | |
| ☐ Diğer (lütfen belirtin) | |

24. AI sistemlerinin gelişip, yaygınlaşması, işgücünü nasıl etkileyeceğini düşünüyorsunuz?

- ☐ Önemli ölçüde daha az iş imkanları sunulacak (daha yüksek bir işsizlik oranı)
- ☐ Sunulan iş imkanlarında önemli bir değişiklik olmayacak (hemen hemen aynı işsizlik oranı)
- ☐ Önemli ölçüde daha çok iş imkanları sunulacak (daha düşük bir işsizlik oranı)
- ☐ Tahmin etmekte zorlanıyorum

Diğer (lutfen belirtin)

25. AI sistemleri geliştikçe ve iş ortamlarına daha fazla dahil oldukça, işe alım ve eğitim süreçlerinde yeni stratejilere ne ölçüde ihtiyaç duyulacağını düşünüyorsunuz?

Hiçbir şekilde	Biraz	Makul düzeyde	Yeterince	Oldukça fazla
☐	☐	☐	☐	☐

26. Gelişmiş bir AI sisteminin işlerinizde yardımcı olup, zaman kazanmanızı sağlayabildiğini varsayarsak, bu zamanı nasıl harcamak isterdiniz? Aşağıda listelenen aktivitelerden 3'nü seçiniz:

- | | |
|--|--|
| ☐ Varolan işler arasında zamanı dağıtmak | ☐ Stajyerlere ve acemilere koçluk yapmak |
| ☐ Yeni iş ve sorumlulukları edinmek | ☐ İş-yaşam dengesini iyileştirmek |
| ☐ Daha fazla ekspertiz ve bilgi öğrenmek | ☐ Önemli ölçüde daha fazla boş zamanın olacağını sanmıyorum |
| ☐ Meslektaşlarla daha fazla işbirlik yapmak | |
| ☐ Diğer (lutfen belirtin) | |

27. Bir AI sisteminin insanın zeka seviyesine ulaştığını varsayarsak, aşağıdakilerden hangisini tercih ederdiniz?

	İnsan	AI sistemi	Farketmez
İdari işler için asistan	☐	☐	☐
Tıbbi tanı ve muayene için sağlık görevlisi	☐	☐	☐
İş danışmanı (finansal, İK, hukuk, vd.)	☐	☐	☐
Üniversitenin veya okulun öğretim görevlisi	☐	☐	☐
Üretimin bizzat yapılması	☐	☐	☐
Üretim denetimi	☐	☐	☐
Eve gitmek için taxi şoförü	☐	☐	☐