

The effects of Artificial Intelligence and Open Innovation on Businesses

Elvin Mammadli¹
Akademia WSB
Poland

Abstract

Artificial intelligence applications in the business sector are exciting and its impact is increasing day by day. People can solve their problems more easily, faster, and more effectively through robots. In the coming years, the impact of artificial intelligence on the business sector will increase greatly in two important areas. These will be smart speakers and chatbots, which provide communication via audio/voice or textual methods supported by a computer software. With the contributions of this technological innovation, it provides radical changes in logistics and distribution processes, as well as making revolutionary contributions in determining the profile and segmentation of its customers. In the years to come, the early adopters of the industry will gain huge advantages over the laggards. This research will examine the effectiveness of artificial intelligence open innovation in businesses.

Keywords: Open Innovation, Artificial Intelligence, Technology, Business Management, Digital Era.

JEL Code: O15, O16

¹ **Elvin Mammadi** is Master (candidate) of Akademia WSB. Contact: elvin.mammadli.ee@gmail.com

I. Introduction

The technology history of humanity has developed by experiencing some breaking points. If the first of these is accepted as the invention of fire, it will be possible to accept the last one as artificial intelligence integrated satellites and space observation tools. In the meantime, the invention of the printing press, the invention of electricity, the compass, transistor and steam engine are among the examples of some technological inventions. All these technological innovations and more have been turning points for the development of humanity in history. However, in this period from the invention of fire to space shuttles, humanity has been able to reach these great technological developments with the correct and effective use and sharing of knowledge and innovation.

With the technological developments experienced, information, services, needs and expectations have begun to show diversity for both individuals and sectors. With this increasing diversity, traditional methods of searching, finding and utilizing information have been abandoned, and short, fast, accurate and most effective ways to reach this information have begun to be sought. At this point, innovation emerges as an important concept and practice. With the concept of innovation, the information age, in which sophisticated and technological information-oriented products and services are produced, has begun. However, systemic difficulties such as the diversity, size, processing, storage, access and transmission of information have also emerged. Technologies used in the production of new products or services in the markets have provided the opportunity to make the financial performance and success of the enterprises superior to their competitors. This situation has started to directly affect the competition process in the developing markets with the innovative world. All these processes have required organizations to implement comprehensive innovation-oriented practices and to organize competitive strategies and information.

With the concept of open innovation, effective management of all these data within the organizational structure has made it possible to mobilize intangible company resources and human assets with high performance. Now, innovation processes have started to be carried out correctly by communicating and sharing information with other businesses and organizations in the market, and artificial intelligence technological products and services in today's conditions have begun to be produced. In this study, firstly, it has been tried to explain the approaches and knowledge that have been put forward in line with the innovative features and purposes of artificial intelligence, which is seen to have a function that supports open innovation.

Finally, in line with the main hypothesis of the study, the measurable methods and effects of artificial intelligence and open innovation at the level of sectors were explained with comparative data and tried to be evaluated through sample projects.

II. Research methodology

This research has tried to analyze the effectiveness of artificial intelligence and open innovation in business by using descriptive and secondary data methodology. The study is important in terms of increasing the existing theoretical and practical knowledge in the field, bringing the relevant phenomenon to the agenda of the national business sector, making predictions for the future, contributing to the practitioners to move forward in this regard and filling an important gap in the literature.

III. Literature review

If the basis of artificial intelligence and all technological developments is considered as knowledge and artificial intelligence is evaluated from today's scientific point of view, it will be concluded that the origin of this innovative development is as old as the history of humanity and this historical process dates back to approximately 3 million years ago. It has been observed that humanity, especially with the formation of settled life and order phenomenon, has to turn to more innovation in order to survive, benefit and produce, and aims to provide knowledge acquisition and production (Topdemir and Unat, 2009).

People inevitably need many techniques such as being able to treat their diseases under current conditions with changing and developing time conditions, constructing channels where they can irrigate for agricultural activities, hunting animals that they can eat and feed, being able to predict seasonal changes and take necessary precautions. Using learning and sharing as an argument, he almost entered technology and started all these activities (Türdeş,2004). Looking at the literature, it is seen that there are many definitions attributed to artificial intelligence. One of the most popular is artificial intelligence; It is defined as the fact that the activities called 'intelligence' can be performed by a machine when applied by a human being, an advanced creature.

In the simplest and easiest way, artificial intelligence in the dictionary is expressed as 'the ability of a computer or a computer-controlled robot to perform various activities similar to intelligent living things'. In other words, it is the ability of a system to collect and interpret external data correctly, to develop the ability to learn thanks to these data, and to fulfil the goals

and tasks determined by a human through a wide harmony of these learning styles (Dereli, 2020).

According to another definition, artificial intelligence is the ability of systems designed to be called intelligent to understand, keep in memory or record, learn, draw a conclusion from what it has learned, produce ideas by making any decision based on the result, and control these ideas again, just like a human. It is expressed as the whole of artificial systems that have the ability to control and control. In parallel with this concept, artificial intelligence systems are divided into two as redefinition, narrow and broad. While artificial intelligence, which is explained in a narrow sense, focuses only on a specific problem, artificial intelligence, which is explained in a broad sense, exhibits the ability to make decisions and act similar to the human mind. (<https://ayyucekizrak.medium.com/>).

Among Hawking's views on artificial intelligence, there is his concern that artificial intelligence is very developed and useful, but it has reached a level that can exceed human intelligence. Hawking stated, "Artificial intelligence can continue to develop itself and even reshape itself. Humans, who are limited to an extremely slow biological evolution, cannot compete with this kind of power" (Aydın and Değirmenci, 2018).

However, there are more views and perspectives in the literature than the definition regarding the purpose and scope of artificial intelligence. Some different approaches to artificial intelligence will be presented with the following general framework (Zambak, 2014).

a) Technological approach: According to the technological approach, artificial intelligence is a single and clear project that aims to produce a specific product in line with needs and desires. It deals with the problems and consequences that can arise from the endless consequences of the combination. Computer systems themselves design the techniques that may actually be necessary in the field of artificial intelligence. Artificial intelligence researchers, on the other hand, are working on problem-solving techniques.

b) Imitation approach: The positive perspective that dominated the early stages of artificial intelligence until the 1960s was also reflected in the approaches to artificial intelligence. According to this approach, it is possible for a machine to imitate a human's intelligence and replicate his psychological state. According to the positive approach in this direction, there is the assumption that human beings can be fully understood in all aspects.

Apart from these approaches, it is possible to approach artificial intelligence as a discipline that relates philosophy, mathematics, psychology, linguistics and computer science (McCorduck et al, 1977). Two more basic approaches of artificial intelligence emerged from the joint work of McCulloch and Pitts in parallel with this context. These are symbolic artificial

intelligence and cybernetic artificial intelligence. These two approaches are still considered today based on computational theory of mind and connectionism approaches (Boden, 1998).

Open innovation is a method of acquiring knowledge in which businesses apply external information to speed up the time spent improving and developing their internal innovation processes. In other words, it works in cooperation with all private and public organizations in the vicinity of the enterprise. The open innovation process can occur in the idea, R&D and commercialization stages of the product or service of the enterprise (Vrande, 2009).

According to Chesbrough, significant changes were observed in the processes of developing a new idea and bringing it to market, and it was stated that this situation caused internal R&D studies to lose their feature of being an important strategic asset. With this inference, it is suggested that companies develop their own technologies by using external knowledge as well as internally developed ideas. It is aimed to emphasize that an effective innovation process will become inevitable with Chesbrough open innovation practices (Chesbrough, 2003).

Open innovation is a broad concept that includes many dimensions of business. Businesses benefit from open innovation not only to improve and develop their internal and external innovation processes, but also to differentiate them. Of course, while developing internal and external processes, the main goal is to benefit from external know-how through open innovation. It can also be explained as external technological development moves those businesses have made for a specific purpose (Dries et al, 2013).

IV. Analysis of the total effects of AI and open innovation applications

With open innovation affecting many industries and business models in industry 4.0 and machine learning, there has been a growing interest in artificial intelligence. With its diversified technology products, artificial intelligence provides high-level benefits in many areas such as minimizing human errors, using energy and inputs more effectively, increasing production efficiency, which takes a very long time, and improving production conditions by observing environmental conditions.

With the increasing benefits thanks to artificial intelligence, it has now become easier to maximize profits by increasing efficiency and reducing costs in many sectors. It is also seen that it is beneficial for increasing social welfare in terms of managing public resources in the most effective way. Artificial intelligence has basic usage areas and functions in many different sectors. These are as follows (Marr, 2020):

- Information technologies
- Education
- Financial Technology
- Law
- Human Resources
- Operations and Automation
- Automotive and driverless vehicles
- Marketing And Sales
- Health
- Defence
- Sound and Image
- Agriculture
- Textile

To understand artificial intelligence and how it works, the artificial intelligence system can be shown as a whole in a big structure that includes big data (Big Data), machine learning and artificial intelligence functions as in Figure 1. (Shankar, 2018: 7).

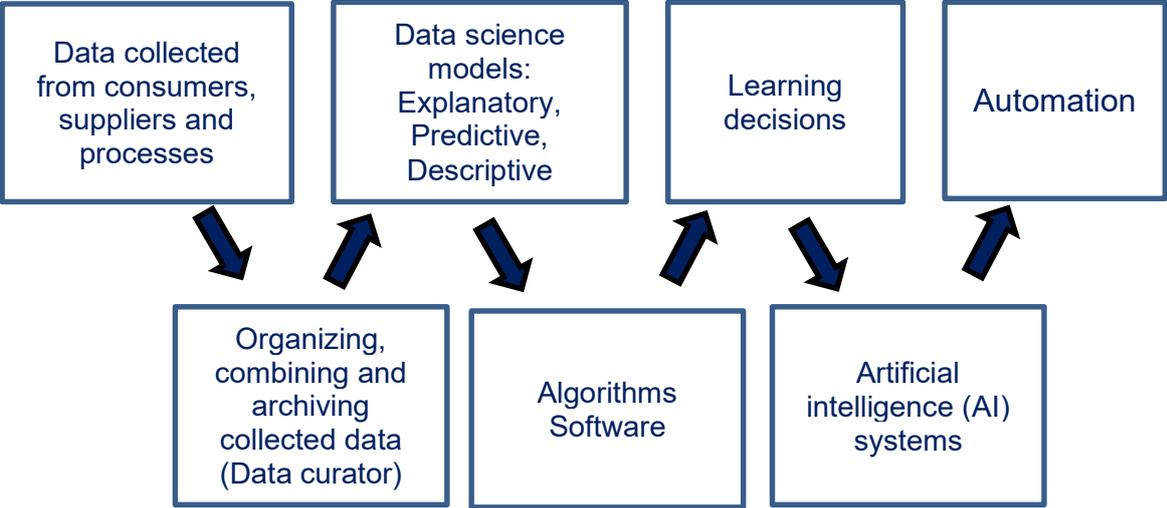


Figure 1: Structure of Artificial Intelligence System in Businesses
Source: Shankar, 2018: 7

At the same time, the benefits of artificial intelligence, which is the subject of the study, mostly to retail businesses and consumers, are compiled from the relevant literature and shown in Table 1 below.

Table 1: Benefits of Artificial Intelligence Applications in Business

Benefits to Retailer Business	Benefits to the Consumer
<ul style="list-style-type: none"> • It can automate processes • Increases efficiency and reduces costs • Increases sales • Provides competitive advantage • Improves customer satisfaction, loyalty and shopping experience • Provides supply chain and logistics optimization • Provides improved sales and stock management • It can make faster and more effective decisions on the collected big data. • Provides digital marketing optimization • Creates an unified channel experience 	<ul style="list-style-type: none"> • It can do unmanned shopping 24 hours a day, 7 days a week, anytime, anywhere and in any way. • Get service and shopping experience through chatbots, which are chatbots that communicate with audio/voice or textual methods. • You can do your shopping faster • Get an improved shopping experience • Provides improved service and convenience • Receive personalized marketing messages, coupons and price discounts

<ul style="list-style-type: none"> • Provides real-like retailing in the virtual environment • Provides recognition of customers entering the physical store through face recognition and mobile technologies. • Provides personalized marketing activities in the physical and electronic store environment • Faster service and reduces customer waiting times in-store • Provides more efficient and improved workforce allocation 	<ul style="list-style-type: none"> • Be aware of suggestions, additional information and similar product information • Get a real-life shopping experience in the virtual environment without going to the physical store • Before purchasing products, they can see their appearance and functions in a virtual environment close to reality • It can reach its needs more easily with its improved shelf layout and stock management. • The low costs that technology provides to the retailer can also be reflected in the product prices. • Over time, as the retail industry adopts artificial intelligence, it will provide different benefits.
--	---

Source: Gülşen and Özdemir (2018: 129)

When the benefits of artificial intelligence identified in Table 1 are examined, it has been determined that among the promises of artificial intelligence are improved customer loyalty, customer experience, customer satisfaction, as well as making more informed business decisions, reducing costs, increasing revenues, increasing productivity, automating processes and works.

V. Assessing the Industry Impacts of Artificial Intelligence and Open Innovation as a Holistic Competitive Tool

The world is currently undergoing a significant evolution, both economically and socially. As artificial intelligence and open innovation integrate and develop, it is seen that businesses in the sectors begin to take important steps towards serious transformations in this direction. Artificial intelligence and open innovation offer important and great opportunities to the sectors by eliminating the traditional constraints of size, breadth and learning skills. The first way to get ahead in the global competition is to go beyond producing low cost and top quality products and to offer innovative and different products or services in line with the expectations of potential buyers in the sector. Because buyers tend to buy the most technological and extraordinary product or service. At this point, innovative businesses in different sectors benefit from artificial intelligence and open innovation in order to get ahead of their competitors. There are examples in following charts about impact of AI to the different industry:

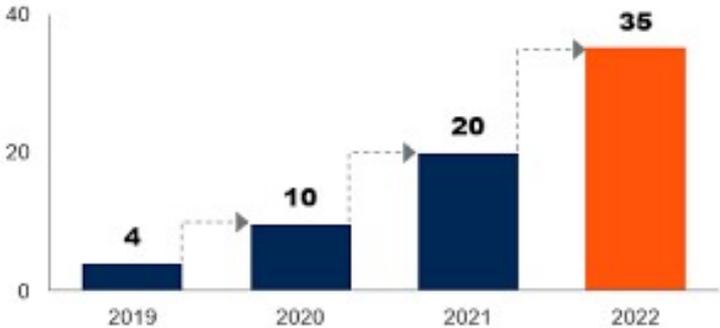


Chart 1. The Role of Artificial Intelligence in Logistics Management

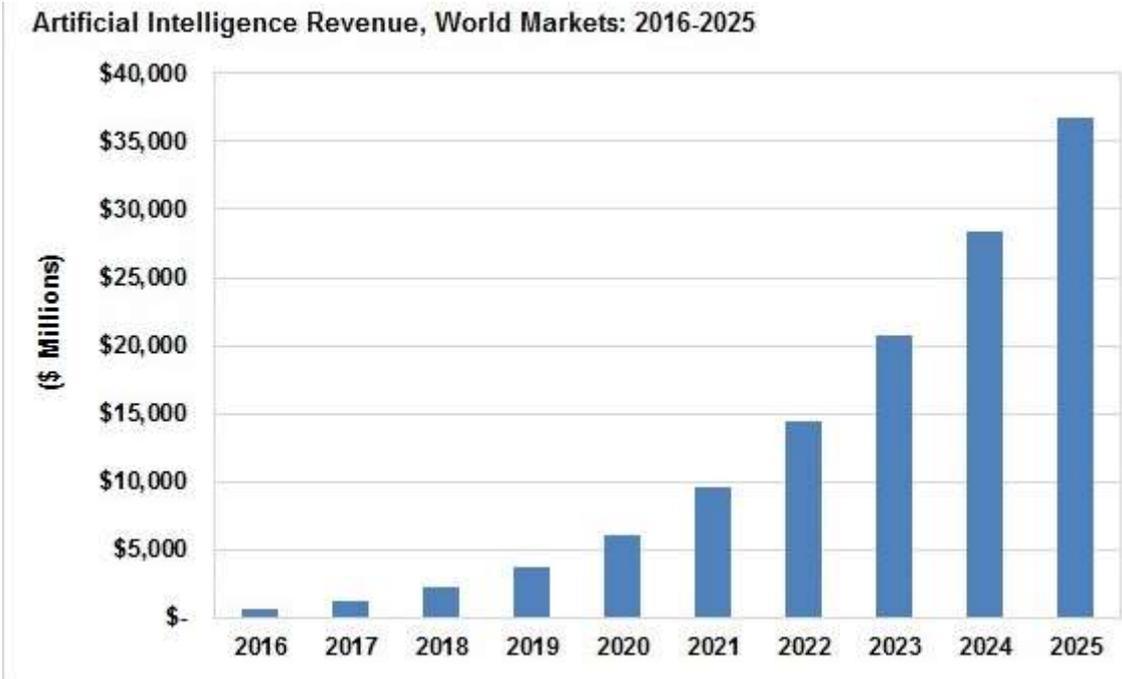


Chart 2. The impact of artificial intelligence on e-commerce

Source: Tractica

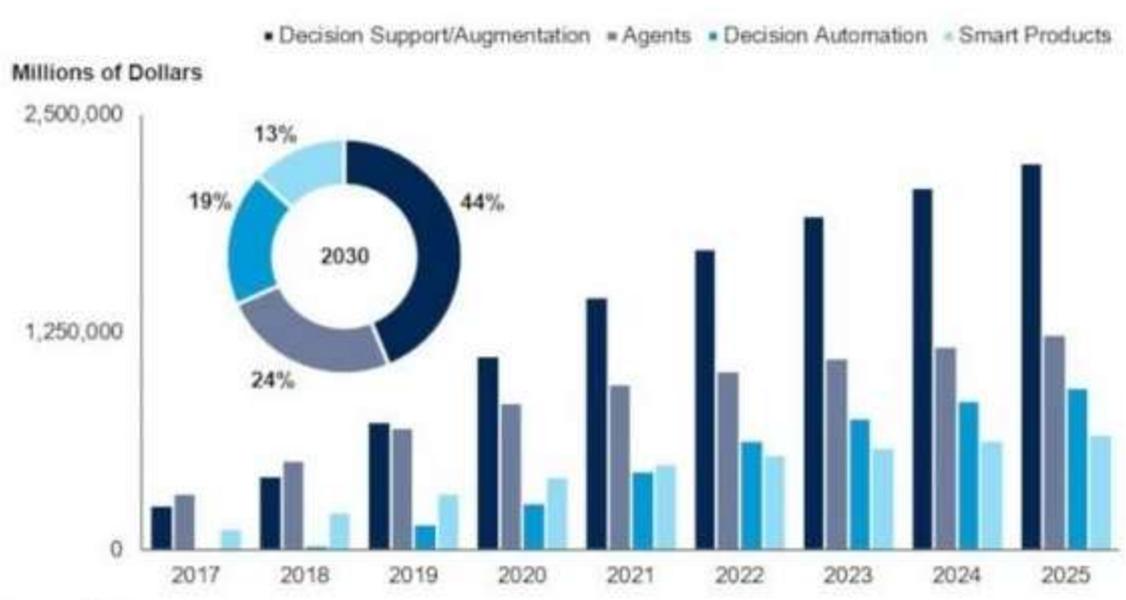


Chart 3. Business value forecast by AI type

Source: Gartner

Today, technology directs the functioning of the sectoral economy. All businesses, whether national or regional, make strategic business plans based on artificial intelligence and open innovation in order to exist in a competitive environment. Businesses in the sectors are planning to reach their social and economic goals by following the technology. Here, they accelerate the technology variable with artificial intelligence and open innovation (Atik, 2005). Businesses existing in the sectors accept cooperation as another important tool of competition. At this point, they take advantage of open innovation and create this situation as a platform. In this platform, variable mechanisms such as knowledge, talent and technology are used as a common advantage. Thanks to open innovation, businesses in the sectors are involved in the processes of connection, access, expansion and deepening. In this ecosystem, the competitive advantage is not in the leader, but in the enterprises that are at the centre of this whole process (Satell, 2017).

Another important competitive tool of businesses in the sectors is innovative technological moves that increase performance. Because in the past, businesses faced difficulties such as market entry conditions, labour costs and standard production routes. However, today, thanks to artificial intelligence applications and technologies, businesses are changing these challenging conditions by taking advantage of the open innovation method. Thanks to open innovation, it is now easy to access the information on how to access the opportunities that are necessary for entering the market. Labour costs are now cheaper and stronger thanks to artificial intelligence integrated autonomous bots (robots). The numbers and quality in the

production quantities of standard production techniques are increasing thanks to innovative artificial intelligence applications (Atik, 2005).

The reasons why artificial intelligence and open innovation are seen as a sustainable competitive advantage in businesses can be briefly listed as follows (Satell, 2017):

- *To manage the processes of entering the market, production, promotion and staying competitive in the most advantageous way,*
- *To be able to use production techniques that will make it difficult for competitors to imitate the product or service produced,*
- *To be able to enter the market at the right time and to dominate the continuous flow of information, thanks to open innovation,*
- *To be able to benefit from the developments and technologies of other companies competing in the sector, thanks to open innovation,*
- *It is the ability to benefit from the innovative change that occurs in one sector, as well as other sectors.*

VI. Conclusion and Discussion

Today, artificial intelligence and open innovation applications guide all industries that countries have by growing economically internally and externally and constantly developing with innovative technologies. These technological innovations not only open up new markets in the global economy, but also offer businesses the opportunity to compete in a sustainable way. Artificial intelligence and open innovation innovations play an effective role in facilitating businesses in the process from the design of a product to its production and promotion. Because processes are automated with artificial intelligence and open innovation applications. Automation of processes for businesses, including management, design, production, and promotion processes, provides the advantage of reducing costs, providing customers with the experience of offering more innovative services and products. Thanks to artificial intelligence and open innovation applications, businesses offer innovative solutions by eliminating many problems with new technologies such as the internet of things, virtual reality, augmented reality, robots, cyber security systems, learning algorithms, smart sensors and cloud computing. Artificial intelligence and open innovation applications to businesses; It also offers convenience and advantages in the fields of operational, storage, logistics, management and supply.

While technology is now objectifying, businesses must have the right skills, the right culture and the right technology while taking advantage of artificial intelligence and open innovation

applications, by paying attention to data collection and the methods in which this data is used. For this reason, it is very important for businesses to focus on creating a data-oriented culture based on open innovation in terms of expected innovations in the future. Creating a hybrid business environment where people work side by side with artificial intelligence and open innovation applications, and with this new model, people should correctly define their role in my site.

It is very important for the global economy that businesses formulate their responses to artificial intelligence and open innovation technology applications, in other words, they create their strategies. Businesses should establish the most suitable artificial intelligence and open innovation technologies under the management and control system. In this regard, one of the most important components should be to ensure transparency and gain people's trust. Considering that there is always a reputational risk in the businesses that use artificial intelligence applications, it is important to be very careful about managing risks well. At this point, artificial intelligence and open innovation applications should be determined and careful to eliminate all possibilities that may cause manipulation of the systems of enterprises while training them.

VII. References

1. Abbas, N.B. (2006). Thinking machines: discourses of artificial intelligence. LIT Verlag: Münster.
2. Adıgüzel, B. ,(2012).İnovasyon ve İnovasyon Yönetimi, Steve Jobs Örneği, Yüksek Lisans Tezi, Gazi Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.
3. Advice Manufacturing, (2019).Virtual and Augmented Reality, <http://www.advicemanufacturing.com/Virtual-and-Augmented-Reality.html> adresinden erişildi.
4. Akgün, A.E., Keskin, H. ve Byrne, J. (2009). “Outsourcing: Organizational Emotional Capability, Product and Process Innovation, and Firm Performance: An Emprical Analysis”, Journal of Engineering and Technology Management, 26, (p.100–130).
5. Akın, E. (1991) .'Türkiye’de ve Dünyada Teknoparkların Geleceği', (Editör: Melih Törel), TMMOB SanayiKongresi, (s.3-80).
6. Akis, E. (2015). Innovation and Competitive Power, World Conference on Technology, Innovation and Entrepreneurship, Social and Behavioral Sciences, 195, (p.1311- 1320).
7. Akkaya, G. ve Gökçen, T. (2006). Job-shop scheduling design with artificial neural networks, Journal of Engineering and Natural Sciences, Yıldız Teknik Üniversitesi, Makine Fakültesi, Endüstri Mühendisliği Bölümü, istanbul.
8. Bass, B. M. & Avolio, B. J., (2003). Multifactor Leadership Questionnaire Feedback Report prepared by Sandra Sample, www.theleadershipcollege.com/SamplePartialMLQReport.pdf adresinden erişildi.
9. Bass, B.M., (2003). New Paradigms in Leadership. “The New Paradigma and the Ethics of Authentic and Pseudotransfortional Leadership”. Safty, A. And Güven, H. (Ed.), (110–135). İstanbul, Bahçeşehir Üniversitesi Yayınları.
10. Başer, B.C. ve Yılmaz, A. (2012). Ekonomi Bakanlığı İhracat Genel Müdürlüğü Şube Müdürü, Ankara, (s.1-37).
11. Topdemir, H.G. ve Unat, Y. (2009). Bilim Tarihi, Ankara, Pagem Yayınları, 3, (s.13-15)
12. Dereli, T.(2020) Birey ve Toplum Güvenliği, Yapay Zeka ve İnsanlık, (Editör, Şeker M. Vd.) Bilişim Teknolojileri ve İletişim Dergisi, Ankara, (s.93-94).
13. Aydın, İ.H. ve Değirmenci, C.H. (2018). Yapay Zeka, İstanbul: Girdap Yayınları, (s.106-107).
14. Zambak, A. F. (2014). Artificial intelligence as a new metaphysical project. R. Hagengruber ve U. Riss (Der.). Philosophy, computing and information science, USA, (p.67-74).
15. McCorduck, P., Minsky, M., Selfridge, O. & Simon, H. (1977). History of artificial intelligence, IJCAI Proceedings, (p. 951-954).
16. Boden, M.A. (1998). “Artificial Intelligence”, Routledge Encyclopedia of Philosophy, Ed: Edward Craig, London, Routledge.
17. Vrande, V.V. vd. (2009). “Open Innovation in SMEs: Trend, Motives and Management Challenges, Technovation, 29, 6-7, (p.424).
18. Chesbrough, H. (2003). The era of open innovation. Sloan Management Review, 3,(p. 30-41).
19. Dries, L. & Pascucci, S. & Török, A.& Toth J. (2013). “Open Innovation: A Case-Study Of The Hungarian Wine Sector”, EuroChoices, 12, 1, (s. 54)
20. Marr, B. (2017). How BMW Uses Artificial Intelligence And Big Data To Design And Build Cars Of Tomorrow. Forbes: <https://www.forbes.com/sites/bernardmarr/2020/11/04/how->

bmw-uses-artificial-intelligence-and-big-data-to-design-andbuild-cars-of-tomorrow/#3e36a06d2b91 adresinden erişildi.

21. Shankar, Venkatesh (2018), "How Artificial Intelligence (AI) Is Reshaping Retailing", Journal of Retailing, 94 (4), 5–11.
22. Atik, H. (2005) Yenilik ve Ulusal Rekabet Gücü, Ankara, Detay Yayıncılık, (s.11).
23. Satell, G. (2017). İnovasyonu haritalamak: dijital çağda özgün inovasyon stratejileri, Çev. Taner Gezer, İstanbul: Optimist Yayınları, (s.239)
24. <https://ayyucekizrak.medium.com/>