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Artificial Intelligence Entrepreneurship: A Conceptual Research

Yapay Zeka Girişimciliği: Kavramsal Bir Araştırma

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ÖZ

Girişimcilik, teknoloji ile yakından ilişkili bir kavram olup, katma değer sağlayan bir yenilik oluşturulması sürecidir. Son yıllarda teknolojide meydana gelen gelişmeler girişimcilik olgusunu da etkilemiştir. Girişimciliği etkileyerek girişimciliği farklılaştıran teknolojilerin başında ise yapay zekâ gelmektedir. Dolayısıyla yapa zeka girişimciliği kavramından söz edilebilmektedir. Bu çalışmanın amacı, yapay zekâ girişimciliğine yönelik bir değerlendirme yapmaktır. Bu amaç doğrultusunda çalışmada kavramsal analiz tekniği kullanılmıştır. Bu bağlamda çalışmada öncelikle girişimcilik ve yapay zekâ teknolojisi hakkında bilgi verildikten sonra güncel örneklerden hareketle yapay zekâ girişimciliği açıklanmaya çalışılmaktadır. Sonuç olarak, otomotiv, sağlık, bankacılık, finans, eğitim, medya, enerji, lojistik, e-ticaret, güvenlik, savunma, hukuk olmak üzere birçok sektörde akıllı platformlar, makine öğrenmesi, optimizasyon, otonom araçlar, doğal dil işleme, nesnelerin interneti ve yapay görü gibi alanlarda çeşitli yapay zekâ girişimcilik uygulamalarının olduğu görülmektedir.

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ABSTRACT

Entrepreneurship is a concept closely related to technology and is the process of creating an innovation that provides added value. Developments in technology in recent years have also affected the phenomenon of entrepreneurship. One of the technologies that affect entrepreneurship and differentiate entrepreneurship is artificial intelligence. Therefore, the concept of artificial intelligence entrepreneurship can be mentioned. The aim of this study is to make an assessment of artificial intelligence entrepreneurship. For this purpose, conceptual analysis technique was used in the study. In this context, the study first provides information about entrepreneurship and artificial intelligence technology and then tries to explain artificial intelligence entrepreneurship based on current examples. As a result, it is seen that there are various artificial intelligence entrepreneurship applications in areas such as smart platforms, machine learning, optimization, autonomous vehicles, natural language processing, internet of things and artificial vision in many sectors including automotive, health, banking, finance, education, media, energy, logistics, e-commerce, security, defense and law.

1. Introduction

Significant transformations in technology have been analyzed in various phases, and the first official mention of these phases was made at the Hannover Fair in Germany in 2011. Considering that many technological inventions made before these revolutions,

which are accepted in the world literature, also contributed to the process, the results of the accumulated knowledge have emerged as revolutions over time. In this fair, four important phases were mentioned and the beginning of the first phase was accepted as the "Industrial Revolution". As a result of the naming of the periods

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with technological inventions, the period accepted as the fourth phase (Industry 4.0) contains many different innovations and topics compared to other revolutions. One of the most interesting of these topics and one of the concepts that deeply affects every aspect of human life is the concept of artificial intelligence (Yücel & Adiloğlu, 2019, p. 51; Vilone & Longo, 2021, p. 89). Artificial intelligence is a technology that enables machines to imitate human intelligence and finds application in many disciplines such as medicine, communication and production management (Dertli & Dertli, 2023, p. 129). Artificial intelligence can be briefly defined as systems that imitate the human brain and both renew and improve themselves through actions (İşler & Kılıç, 2021, p. 2). Since the effects of this concept on human life are quite high in every field, artificial intelligence attracts the attention of all organizational structures operating for humanity. Artificial intelligence also attracts the attention of individuals or organizations that accept themselves as entrepreneurs or pursue new initiatives, and the use of artificial intelligence applications in activities that will provide new initiatives can be seen as an opportunity. Although the foundations of the phenomenon of entrepreneurship were laid in Europe in the 18th century, this concept was fully introduced to the literature in the book *“The Theory of Economic Development”* written by Joseph Alois Schumpeter in 1911. In this book, Schumpeter defines entrepreneurship as the work of innovation, and entrepreneurs as people who see opportunities and improve existing ones by innovating on them (Naud, 2008, p. 3). Although the starting point of both artificial intelligence and entrepreneurship is innovation, it is usual for these two concepts to meet at a common point. From this point of view, the study aims to make a conceptual analysis of artificial intelligence entrepreneurship. This study is considered to be important in terms of revealing the role of artificial intelligence in entrepreneurship in the context of technology.

2. Method

In the study, conceptual analysis technique is used within the scope of qualitative research method. *“Conceptual analysis is a technique that treats concepts as classes of objects, events, properties or relationships”* (Furner, 2004, p. 233). As in Demir’s (2023) study, the research questions in this study were determined as “what kind of a connection there is between entrepreneurship and artificial intelligence technology, what role artificial intelligence has in the entrepreneurship process, how artificial intelligence entrepreneurship is defined and which artificial intelligence entrepreneurship practices are in which sector”. Answers to these questions were sought based on relevant research (books, articles, reports, etc.). In this context, the study consists of three parts. The first section explains the concept of entrepreneurship. In the second section, the concept of artificial intelligence and types of artificial intelligence are defined. In the third section, artificial intelligence entrepreneurship is explained based on current practices and examples.

3. Entrepreneurship

Artificial intelligence offers new ways for such activities to take place, as it not only facilitates those who want to engage in entrepreneurial activities, but also helps to minimize the increasing financing costs all over the world. Being innovative, which is considered one of the important characteristics of entrepreneurs, also shows that they should examine all kinds of new and useful activities (Schmitz et al., 2017, p. 370). While artificial intelligence and its uses attract the attention of entrepreneurs in this respect, the invention and use of artificial intelligence can also be considered as an example of entrepreneurship. Entrepreneurship is finding methods and ideas that were previously inconceivable and turning them into an opportunity (Yalçıntaş, 2010, p. 96).

Although there are many definitions of the concept of entrepreneurship, it is emphasized by managers that the concept of entrepreneurship should be examined within the framework of the concepts of risk, rationality, variability, creativity and innovation (Korkmaz, 2000, p. 166). While entrepreneurship emerges by examining the mentioned concepts and finding a field in the field of application of each of them, the individuals who enable entrepreneurship to be realized are called entrepreneurs (Hamilton & Haper, 1994, pp. 4-5). Although the question of who is an entrepreneur is one of the most curious issues, entrepreneurs can be considered as people who bring together the factors of production and take advantage of the opportunities that come their way or who create these opportunity areas themselves. In order for individuals to be considered entrepreneurs, they must have certain characteristics in their personality and behavior. These characteristics can be listed as imagination, communication skills, discipline, risk-taking, innovation, reliability, sensitivity, creativity, strategic thinking, management skills, change, learning and research, planning, authority, determination, patience, perseverance, honesty, self-confidence, opportunism, vision, focus, desire to succeed, independence, energetic, problem solving, flexibility, stress resistance, leadership and courage (Yüksel et al., 2015, p. 147).

The process of entrepreneurial individuals transforming new ideas into commercial ideas by using innovation opportunities effectively is called the entrepreneurship process. In this process, taking risks and having innovative thinking can be considered as the first step of entrepreneurial individuals, and the new concept that individuals with this idea have recently emerged both intellectually and practically is artificial intelligence (Zhu, 2020, p. 574). The increase in academic research on artificial intelligence, innovation and entrepreneurship shows the importance of the subject once again (Ekinci, 2022, p. 164). At the same time, while disciplines such as engineering, medicine, philosophy and informatics have embraced the concept of artificial intelligence in the early days, this issue has recently attracted attention in almost every discipline. Especially considering the breadth of the issues involved in entrepreneurship,

it becomes inevitable for entrepreneurs who think that they produce solutions to the problems of human life to come into contact with the concept of artificial intelligence, which directly or indirectly affects human life in many issues.

4. Artificial Intelligence

Artificial intelligence first came to the agenda with the “Boolean Circuit Model of the Brain” developed by McCulloch & Pitts in 1943, followed by Turing’s “Information Processing Machines and Intelligence” in 1950 and finally the term “Artificial Intelligence” was introduced by McCarty at the Dartmouth Conference in 1956. Artificial intelligence was explained by its namesake with the idea that there is intelligence in machines as well as in humans and animals. In short, artificial intelligence can be defined as the ability to make machines and especially intelligent computers and programs similar to human intelligence (Pirim, 2006, p. 83; Arslan, 2020, p. 76). Based on all these definitions, it is possible to say that artificial intelligence is a digital technology developed by utilizing human intelligence to facilitate human life. Table 1 presents the chronology of artificial intelligence.

Table 1: The Chronology of Artificial Intelligence

Period	Year	Emergence
Prehistoric Period	Thousands of Years Ago	Daedelus’ idea of an artificial human.
The Dark Period	1965-1970	Hopes for the development of smart computers
Renaissance Period	1970-1975	Artificial intelligence has played a fundamental role in the development of disease diagnosis systems and has accelerated the development of existing initiatives.
Partnership Period	1975-1980	Utilizing language and psychology.
Entrepreneurship Period	1980-Present	Complex artificial intelligence applications for real-world needs; ongoing process.

Source: (Dertli & Dertli, 2024, p. 152)

In fact, since the solution of problems or facilitating actions with artificial intelligence can be possible with the demonstration of human behaviors, the use of cognitive skills by computers or other technological devices can be accepted as artificial intelligence. Although this concept is not very old, it is possible to make different definitions in terms of each discipline. The ability to make human decision-making processes with fewer errors through the ability and mediation of computer programs is a situation that attracts the attention of researchers as well as organizational owners or

those who want to start a new business. This desire brings with it a number of problems and questions, as well as the concern that artificial intelligence will replace humanity, and then the end of humanity may come. While this issue brings a lot of discussion, according to the report prepared by the World Economic Forum, it is stated that artificial intelligence applications will find a place in senior management by 2026 (World Economic Forum, 2015, p. 6). The artificial intelligence applications developed in conjunction with such reports show that there will always be concerns about the outcome of this issue.

Artificial intelligence is divided into three types. (1) *Analytical artificial intelligence* has features that are exclusively related to cognitive intelligence. This type of artificial intelligence creates a cognitive representation of the world and utilizes learning based on past experiences to inform decisions about the future. Most artificial intelligence systems used by businesses fall under this group. Examples include systems used in financial services, image recognition, and fraud detection in self-driving cars. (2) *Human-inspired artificial intelligence* has characteristics of both cognitive and emotional intelligence. In addition to cognitive elements, this type of artificial intelligence can understand human emotions and take them into account in decision-making processes. For example, advanced vision systems are used to understand and recognize emotions such as joy, surprise and anger to the same level as humans (and often better). (3) *Humanized artificial intelligence* has the characteristics of all types of competencies, i.e. cognitive, emotional and social intelligence. While there has been progress in recognizing, understanding or imitating human activities, creating artificial intelligence systems that experience the world in a truly fundamental way may be a project for the future. Artificial intelligence types are used in different industries. For example, in human resources management, analytical artificial intelligence is used to screen and select candidates (Kaplan & Haenlein, 2019, pp.15-21). Analytical artificial intelligence facilitates the entrepreneurial process, especially in future planning and decision-making processes. Human-inspired artificial intelligence can bring about significant changes in the entrepreneurial process. For example, it can utilize human intuition as well as past experience in the planning and decision-making process. Thus, it can contribute to the development of more original strategies. Humanized artificial intelligence, on the other hand, raises concerns that entrepreneurs may be replaced by artificial intelligence. However, as long as artificial intelligence is seen as a tool that helps entrepreneurship and is used with this in mind, such a concern is unwarranted.

5. Entrepreneurship and Artificial Intelligence

In entrepreneurial activities, which are accepted as one of the areas of use of artificial intelligence, it is predicted that artificial intelligence applications can be used as a competitive tool in the near future. This idea also suggests that many entrepreneurial activities

that cannot take part in new technology may fail and be eliminated from the competition (Mohapatra, 2019, pp. 177-178). One of the most important issues for today's consumers is the pleasure they will experience as a result of the rapid fulfillment of their wishes. The need for a system where people can have fun, get easy service and use their time in the most efficient way, or for initiatives that use these systems, makes it easier for artificial intelligence to find a usage area. Although it did not take a long time for the business world to use this invention in its applications after the emergence of the concept of artificial intelligence, the first commercial use of artificial intelligence was realized in 1984 with the National Artificial Intelligence Conference at the University of Texas in the USA. Considering that this conference was held with the participation of many business people and the world's leading brands, it is clear that artificial intelligence applications will be one of the leading areas to be invested in future venture activities. As a matter of fact, artificial intelligence, which is used intensively not only in new initiatives but also in the running of businesses today, is used effectively in a wide range of areas from selecting financial products, making suggestions in accordance with the expectations of customers, making financial transactions, organizing every stage of the logistics process, management activities, production, treating patients, and making predictions about the future (Klumpp, 2018, pp. 225-227; Ünal & Kılınç, 2020, p. 63). This situation clearly shows that in the future, artificial intelligence will take place in all areas of our lives as systems that will be used more intensively by both new entrepreneurs and the business world that intends to add new initiatives to their activities.

The main goal of artificial intelligence in the entrepreneurial process is to free humans from mundane repetitive tasks and give them more time to grow human intelligence and business through more interesting, evolving actions. For example, in London, self-driving robots deliver food, and in Pasadena, California, a robot called Flippy can cook. Despite the progress artificial intelligence has made over the years, it is evident that it still underperforms humans in many tasks, especially in tasks that require decoding, imitating and responding to or feeling human emotions and other interpersonal cues (Vorobeva et al., 2022: 601-602).

6. Artificial Intelligence Entrepreneurship

In today's fast-paced business world, technological advances play an important role in business and entrepreneurship. Chief among these technologies is artificial intelligence, which has the potential to revolutionize the way businesses, managers and entrepreneurs do business. Artificial intelligence is the simulation of certain processes of human intelligence, usually through computer systems. For this reason, artificial intelligence takes place in various sectors with some special applications, changes business models by offering important opportunities to entrepreneurs, develops entrepreneurship on a digital basis, and enables the emergence of

different entrepreneurship practices such as artificial intelligence entrepreneurship (Education for Innovation Foundation, 2023, p. 1; Özcan & Yılmaz, 2023, p. 24). In this context, artificial intelligence entrepreneurship practices are encountered in different sectors such as health, finance, e-commerce, education, agriculture, energy and environment, transportation and logistics, and manufacturing (Upadhya et al., 2023, pp. 20-21):

- *Health:* Artificial intelligence is facilitating healthcare and accelerating drug discovery through techniques such as disease diagnosis, personalized medicine and remote patient monitoring.
- *Finance:* Artificial intelligence is driving algorithmic trading, fraud detection and robo-advisors, and improving credit scoring.
- *E-commerce:* Artificial intelligence is used for recommendations, chatbots, supply chain optimization and customer behavior analysis.
- *Manufacturing:* Artificial intelligence is driving efficiency in manufacturing with predictive maintenance, quality control, robots and energy optimization.
- *Education:* Artificial intelligence personalizes education through chatbots, grading automation and adaptive curricula.
- *Transportation and logistics:* Artificial intelligence is helping transportation and logistics by powering autonomous vehicles, traffic management, supply chains and predictive maintenance.
- *Energy and environment:* Artificial intelligence is optimizing energy grids, helping with climate modeling, smart cities and waste management.
- *Entertainment and media:* Artificial intelligence is enabling the entertainment and media industry by improving content recommendation, VR, AR and content creation.
- *Agriculture:* Artificial intelligence is revolutionizing the agriculture sector with tools such as organic farming, pest detection and automation.

It can be said that initiatives on artificial intelligence are developing day by day in the world. According to CBInsight's 2024 research report, it is understood that in many countries from the USA to France and South Africa, industry leaders such as Toyota, Netflix and the World Bank are engaged in artificial intelligence initiatives in the fields of virtual worlds, autonomous factories, language models for underrepresented languages and more (CBInsights, 2024, p. 1). In this context, it is seen that artificial intelligence initiatives are increasing in Türkiye as in the world. Table 2 shows the number of artificial intelligence initiatives in Türkiye for the years 2022, 2023 and 2024.

Table 2: Number of Artificial Intelligence Startups

Field of Startup/Year	2022	2023	2024
Smart Platforms	5	7	10
Search Engine and Search Assistant	6	5	4
Chatbot and Conversational Artificial Intelligence	20	21	21
Natural Language Processing	19	24	21
Machine Learning	43	53	53
Internet of Things	5	8	10
Forecasting and Data Analytics	37	53	62
Optimization	9	16	16
Autonomous Vehicles	9	15	15
RPA (Robotic Process Automation)	9	13	15
Productive Artificial Intelligence	–	5	13
Artificial Vision	64	80	80
Total	226	300	320

Source: (TRAI, 2024, p. 1; PARA, 2024, p. 1).

When Table 2 is examined, it is seen that there are artificial intelligence entrepreneurship applications in many areas such as smart platforms, machine learning, optimization, autonomous vehicles, natural language processing, internet of things and machine vision. On the other hand, it is understood that the number of artificial intelligence startups is 226 in 2022, 300 in 2023 and 320 in 2024, increasing year by year. This finding shows that the trend towards the use of artificial intelligence is increasing day by day. However, it is seen that the most startups are in the field of machine vision every year. The distribution of these initiatives in terms of sector, company and field of initiative is given in Table 3.

Table 3: Distribution of Artificial Intelligence Initiatives

Sector Name	Company Name	Field of Startup
Manufacturing, Energy, Logistics	AirGemba	Internet of Things
Manufacturing, Automotive, Defense, Security	AISOFT	Artificial Vision
Marketing, Startups	BeforeSunset AI	Productive Artificial Intelligence
General	Bottobo Robotics	Autonomous Vehicles
Automotive	CY Vision	Artificial Vision
Law	De Jure AI	Search Engine and Search Assistant
Energy, Sustainability, Defense	Hummingdrone	Smart Platforms
Health	Integrio	Forecasting and Data Analytics
General	Intelivus	Natural Language Processing
Banking, Finance	Intersection	Optimization

E-commerce	Juphy	Chatbot and Conversational Artificial Intelligence
Health, Biotechnology	PhiTech Bioinformatics	Forecasting and Data Analytics
General	PixlData	Machine Learning
Health	PONS	Forecasting and Data Analytics
General	Robbot	RPA (Robotic Process Automation)
Manufacturing, Retail, Health, Defense	Sorslab	Productive Artificial Intelligence
General	Stocking AI	Productive Artificial Intelligence

Source: (TRAI, 2024, p. 1; PARA, 2024, p. 1).

When Table 3 is examined, it is seen that many companies in a wide range of fields from production to health, finance to energy, education to media, defense to security are engaged in artificial intelligence initiatives in areas such as the Internet of Things, prediction and data analytics, smart platforms, optimization, natural language processing, machine vision, machine learning, and productive artificial intelligence. On the other hand, it is understood that the private sector’s interest in artificial intelligence has increased and the use of artificial intelligence in production processes is preferred. In this context, artificial intelligence should be seen as a strategic advantage for entrepreneurs, not just a technology. Artificial intelligence can make a difference in entrepreneurship by providing advantages in many areas such as data analysis and strategic decision making, customer service, marketing and sales strategy development, product development, operational efficiency and automation, innovation and competitive advantage, risk management and security, and customer experience (Ses, 2024, p.1).

Artificial intelligence-based entrepreneurship models have an important position in various sectors in terms of reducing costs and improving customer experience while increasing efficiency. Commonly used artificial intelligence-based entrepreneurship models can be summarized as follows (BTM, 2024, p.1):

- Autonomous systems (drones and vehicles)
- Health services (diagnosis, treatment and patient follow-up)
- Finance and insurance (risk analysis and management)
- Retail and e-commerce (personalized shopping experiences and inventory management)
- Production and industrial automation (quality Control)
- Human resources and recruitment (employee performance analysis)

- Customer service (chatbot and virtual assistants)
- Education and training (personalized learning)
- Energy management (sustainable energy solutions)

7. Discussion and Conclusion

Technological developments in the business world have affected the entrepreneurship approach and led to the emergence of different entrepreneurship practices in the context of digitalization depending on the available technology (Akkaya & Arica, 2024, p.33). Artificial intelligence entrepreneurship is one of the leading entrepreneurship practices that emerged based on current technologies. Artificial intelligence entrepreneurship is a type of technology entrepreneurship and a combination of entrepreneurship and artificial intelligence technology and can also be called artificial intelligence-enabled entrepreneurship. In this context, artificial intelligence entrepreneurship can be formulated as follows:

Artificial Intelligence Entrepreneurship=

f (Entrepreneurship, Artificial intelligence Technology)

Artificial intelligence entrepreneurship refers to the use of artificial intelligence technologies in the production and/or marketing of goods and services, as well as initiatives to develop artificial intelligence applications that will facilitate production or service delivery in direct sectors. In this context, with the applications developed within the scope of artificial intelligence, artificial intelligence is involved in various sectors and facilitates entrepreneurship processes. In this context, relevant research and sector reports show that artificial intelligence entrepreneurship applications are increasing in the world and in Türkiye, and it is seen that companies in many sectors such as production, health, finance, energy, education, media, defense and security are developing applications by making artificial intelligence initiatives in areas such as internet of things, prediction and data analytics, smart platforms, optimization, natural language processing, artificial vision, machine learning, productive artificial intelligence. It can be said that these applications facilitate business processes and increase productivity in these sectors.

Artificial intelligence can be both a threat and an opportunity for entrepreneurship. If entrepreneurs depend entirely on artificial intelligence in their decision-making processes, creativity and innovation may become limited and all entrepreneurs may perform similar practices. On the other hand, artificial intelligence enables entrepreneurs to make predictions on many issues such as market trends and consumer behavior through big data analysis. This can help entrepreneurs in areas that trigger creativity, such as personalization of products. For example, by analyzing the user behavior of an e-commerce site and determining which products

attract more attention, artificial intelligence can allow the entrepreneur to personalize the product range more effectively. By using artificial intelligence, entrepreneurs can increase their productivity, reduce costs and develop more effective marketing strategies. For example, an Artificial intelligence-supported software can save time and money by providing entrepreneurs with important information instantly, helping them make faster, more accurate and effective decisions (Education for Innovation Foundation, 2023, p. 1; Mert, 2023, p. 1). However, it is important to remember that artificial intelligence is a tool developed by humans for humans and that humans will always be at the center of production. In this context, Brynjolfsson and McAfee (2014) argue that Artificial intelligence cannot replace entrepreneurs who see it as a tool and utilize it, but it can replace entrepreneurs who do not utilize it. Upadhya, Kakade and Kale (2023), on the other hand, argue that the introduction of artificial intelligence in entrepreneurship will bring along some issues such as ethics, environment, security, labor force and data privacy. At this point, it can be said that artificial intelligence has two positive and negative aspects. The positive aspect is that artificial intelligence initiatives can prevent ethical violations and cybercrimes and ensure data and information security, while the negative aspect is that unethical and illegal artificial intelligence applications may emerge, the role of human resources in production may decrease over time and cause unemployment. This situation depends entirely on the intended use of artificial intelligence, and positive results can be obtained when used in good faith, and negative results can be obtained when used maliciously. In addition, it is seen that artificial intelligence can provide convenience in terms of production and employment when technology is kept up with.

In conclusion, the adoption of artificial intelligence, which has found its place in many business lines, by societies day by day and the use of artificial intelligence by all segments of society over time makes it inevitable for entrepreneurs to be more effective and active in this process. When the emergence of artificial intelligence and its use in the conduct of many business activities is accepted as a kind of entrepreneurial activity, it reveals the fact that entrepreneurs will play an active role in subsequent processes and in all kinds of work involving artificial intelligence. In this context, entrepreneurs or entrepreneur candidates should take into account the prediction that humanoid technological infrastructures can become autonomous in the processes of knowledge acquisition and value creation and should be involved in studies where bold steps are taken against the future. On the other hand, artificial intelligence entrepreneurship has been examined conceptually in this study, and it is thought that conducting an empirical research on artificial intelligence entrepreneurship and developing projects on the subject will make important contributions to the academia and the business world.

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