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ROLE OF ARTIFICIAL INTELLIGENCE IN THE PROCESS OF INNOVATION MANAGEMENT: DIMENSIONS, THEMES AND EXAMPLES

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Abstract

This study aims to discuss the role of artificial intelligence (AI) in innovation management in a conceptual framework. In line with the purpose of the research, the conceptual analysis technique was used within the scope of qualitative research methods. In this context, the effects of AI on innovation management are explained based on relevant scientific research, reports and sectoral examples. How AI is integrated with innovation management processes, its application areas, and its potential future effects are examined. It has been concluded that AI affects important elements of organizations such as knowledge management, organizational flexibility, organizational innovation, decision-making, sustainable growth, organizational culture and strategic human resources management and that AI makes innovation management processes more efficient and effective with the opportunities it offers in areas such as big data analysis, machine learning and automation. The role of AI in innovation management stands out as an important element for modern organizations and reveals that research in this field should be examined in depth. This study examines the role of AI in innovation management processes within a conceptual framework and recommends that future studies conduct empirical research to *expand on this topic. This study provides important in terms of revealing the role of AI in innovation management based on the relevant literature and with examples and will contribute to the literature.*

Keywords: *Innovation, Management, Technology, Artificial Intelligence, Conceptual Analysis.*

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YENİLİK YÖNETİMİ SÜRECİNDE YAPAY ZEKÂNIN ROLÜ: BOYUTLAR, TEMALAR VE ÖRNEKLER

Öz

Bu çalışma, yapay zekânın (YZ) yenilik yönetimindeki rolünü kavramsal bir çerçevede ele almayı amaçlamaktadır. Araştırmanın amacı doğrultusunda, nitel araştırma yöntemi kapsamında kavramsal analiz tekniği kullanılmıştır. Bu kapsamda, ilgili bilimsel araştırmalar, raporlar ve sektörel örneklerden hareketle YZ'nin yenilik yönetimi üzerindeki etkileri açıklanmıştır. YZ'nin yenilik yönetimi süreçleriyle nasıl bütünleştirildiği, hangi alanlarda etkili olduğu ve gelecekteki potansiyel etkileri incelenmiştir. Çalışma sonucunda, YZ'nin örgütlerin bilgi yönetimi, örgütsel esneklik, örgütsel yenilik, karar verme, sürdürülebilir büyüme, örgütsel kültür ve stratejik insan kaynakları yönetimi gibi önemli unsurlarını etkilediği ayrıca büyük veri analizi, makine öğrenimi ve otomasyon gibi alanlarda sunduğu olanaklarla yenilik yönetimi süreçlerini daha verimli ve etkin hâle getirdiği tespit edilmiştir. YZ'nin yenilik yönetimindeki rolü, modern örgütler için önemli bir unsur olarak öne çıkmakta ve bu alandaki araştırmaların daha derinlemesine incelenmesi gerektiğini ortaya koymaktadır. Bu çalışmada YZ'nin yenilik yönetimi süreçlerindeki rolü kavramsal çerçevede ele alınmış olup, gelecekte yapılacak çalışmalarda bu konunun pekiştirilmesine yönelik ampirik araştırmaların gerçekleştirilmesi önerilmektedir. Çalışmanın, yenilik yönetiminde YZ'nin rolünü ilgili literatür ve örneklerle ortaya koyması açısından önemli olduğu ve literatüre katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: *Yenilik, Yönetim, Teknoloji, Yapay Zekâ, Kavramsal Analiz.*

Introduction

In today's rapidly digitizing and changing business world, innovation management is one of the most important strategic elements for achieving competitive advantage by ensuring sustainable growth and reaching organizational goals. Innovation management is the process of managing an organization's processes of discovering, developing and implementing innovative ideas. Innovation management is a phenomenon that combines productive thinking and strategic management to develop new products, processes or business models (Ventura and Soyuer, 2016, p. 43). This phenomenon is not only limited to the development of new products, but also involves organizations continuously renewing their existing processes and business models to increase their ability to respond to market demands. Therefore, the complex nature of innovation management requires the adoption of new technologies that will increase the efficiency of decision processes and the effectiveness of productive outcomes. At the forefront of these technologies is AI. AI is the ability of computers or computer-controlled systems to perform tasks usually associated with human intelligence. AI has technologies that can include intellectual processes such as reasoning, discovering meaning, generalizing and learning from past experiences (Britannica, 2025). Therefore, AI moves the cognitive functions of the human

mind to the digital environment, turning machines into intellectual actors in decision-making and learning processes.

AI has the power to shape industries, organizations and the daily lives of individuals and interest and investments in these technologies are increasing. As of 2024, the global AI industry is worth approximately $638.23 billion. In the future, the AI market is estimated to be $3,680.47 billion by 2034. The top countries investing the most in AI are the USA ($328.5 billion), China ($132.7 billion), the United Kingdom ($25.5 billion), India ($16.1 billion) and Germany ($14.3 billion) (Burmagina, 2025). In this context, AI has become a strategic investment area on a global scale, with countries like the USA and China, in particular, positioning this technology as a tool for economic and political power. The projected market size of $3.6 trillion by 2034 demonstrates that AI will be the fundamental driver of not only technological but also socio-economic transformation.

It can be said that AI technologies, with their computing power, machine learning, data analytics and automation capacity, have the potential to revolutionize innovation management in terms of optimizing innovation processes, accelerating decision-making mechanisms, developing innovative solutions and bringing them to the market. For example, while AI algorithms provide significant advantages to organizations in predicting market trends and understanding customer needs, they can also increase the continuity of innovation by accelerating research and development (R&D) processes (İnce et al., 2021, pp. 50-52; Sarnıç and Acar, 2024, pp. 172-174). On the other hand, the recent increase in scientific research on the relationship between AI, entrepreneurship and innovation concepts reveals the importance of the subject once again. Cockburn et al. (2018) examines the impact of AI on innovation management, Ekinci (2022) examines publications on digital technologies, AI, entrepreneurship and innovation, Berberoğlugil (2023) examines the impact of AI in business management, Kuzior et al. (2023) examined the use of AI in open innovation process and management, Yüksel and Demir (2024) examined the relationship between AI technologies and innovation management, Esmer and Yüksel (2024) examined the link between AI and entrepreneurship, Zencir (2024) examined the relationship between AI and innovation in knowledge centers such as libraries and Gao et al. (2025) examined AI and innovation capability from a dynamic capabilities perspective and Cankurtaran (2025) examined innovation management and AI applications in education. This literature suggests that AI is positioned as a catalyst that increases innovation capacity and strengthens interdisciplinary interactions. In this context, understanding the role of AI in innovation management is an important requirement for both academic and business world. Therefore, in this planned study, unlike previous studies in the literature, it is aimed to contribute to the literature in this context by focusing on the role of AI in innovation management.

This study examines the role of artificial intelligence in innovation management from a conceptual perspective, drawing on relevant research and addresses the potential contributions and possible applications of artificial intelligence in innovation processes. In this context, the main research question is defined as "Q_m: What is the role of AI in innovation management processes?"

Using conceptual analysis technique, the study comprehensively reveals the role and impact of AI in innovation management and establishes a framework for understanding how artificial intelligence shapes organizational performance and can be integrated into management practices. This study is considered significant because it conceptually investigates the role of AI in innovation management based on the relevant literature and fills gaps in the literature on this subject.

This study consists of four sections. The first section defines the concept of AI, its types and subfields under the heading of conceptual framework and explains innovation management and its dimensions with examples. The second section explains the methodology, the third section discusses the role of AI in innovation management based on relevant research and the final section presents the conclusions reached and recommendations developed. Thus, the role of AI in innovation management is presented in this study through a systematic and holistic approach, ranging from theoretical foundations to sectoral examples.

1. CONCEPTUAL FRAMEWORK

This section first explains the concept of AI, its types and areas of application with examples, followed by an explanation of innovation management and its dimensions.

1.1. AI and Types

AI is defined as the ability of a system to accurately interpret external data, learn from that data and use that learning to achieve specific goals and tasks through flexible adaptation. There are three types of AI: analytical, human-inspired and humanized. *(1) Analytical AI* is a technology that is frequently used by organizations in areas such as financial services and has features related only to human cognitive intelligence. *(2) Human-inspired AI* is a technology that has both human cognitive and emotional intelligence characteristics and can understand emotions such as joy, anger and surprise and use them in decision-making processes. *(3) Humanized AI* is a technology that has social intelligence characteristics as well as human cognitive and emotional intelligence characteristics and can recognize, understand and imitate humans (Kaplan and Haenlein, 2019, pp. 15-21). There are many application areas where AI has the potential to be used. These areas range from military applications such as autonomous control and target detection to

the world of entertainment such as computer games and robotic animals (UIB, 2017, p. 5). AI usage areas can be classified in 6 areas: gaming, expert systems, machine learning, robotics, natural language processing, machine vision and speech recognition (Ünal, 2020, pp. 535-536):

Expert systems: Systems that try to model the domain knowledge of experts, can substitute for experts or assist in decision-making. For example, ExperTAX is a widely used expert system in the business world.

Machine learning: The ability of a program to discover new knowledge and skills from data, focusing on developing computational methods to do so. For example, IBM Watson has acquired the ability to learn and improve itself, which is unique to humans.

Robotics: A field of AI that deals with the construction and control of robots. For example, the Pepper AI-powered robots developed by SoftBank Robotics have the ability to respond to human emotions.

Natural language processing: Programs that enable machines to understand and analyze language as humans use it. For example, natural language processing programs are used in email filters and search engines.

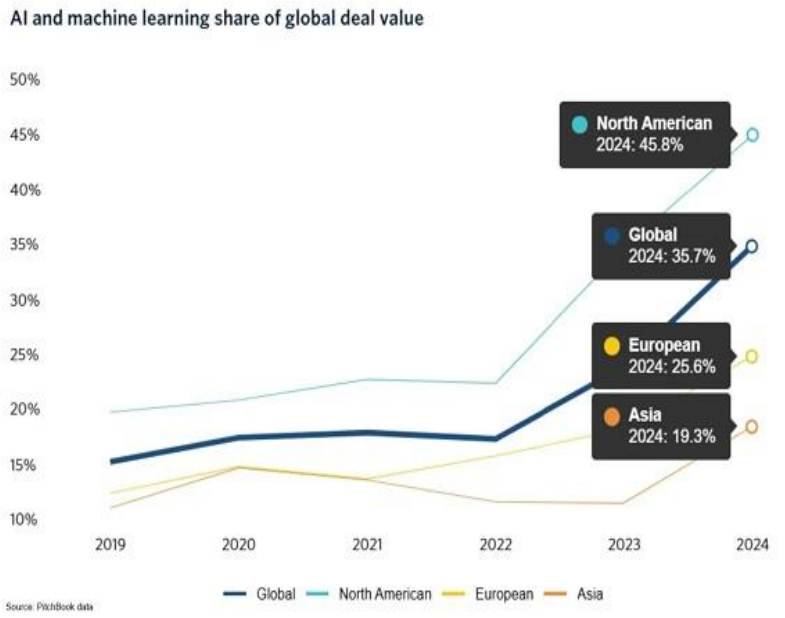
Machine vision: Algorithmic analysis of images. For example, facial recognition technology is used to ensure security and at payment points.

Speech recognition (automatic speech recognition): Software that deals with the process of segmenting an ongoing conversation into predefined words. For example, intelligent personal assistants such as Google Assistant are capable of completing tasks given by users, answering questions and making suggestions.

One of the areas of use of AI is entrepreneurship and it is predicted that in the near future, organizations can use this technology as a competitive tool in entrepreneurial activities (Mohapatra, 2019, pp. 177-178). Considering entrepreneurship as an innovation creation process (Esmer, 2024, p. 180), it can be said that AI is a decisive technology for innovation management today. In this context, AI can be seen not only as a tool, but also as a strategic information technology that determines the direction of innovation and increases its speed.

The demand for AI technologies has led to a significant increase in investments in AI initiatives and R&D. Organizations in sectors ranging from public and private healthcare to manufacturing are investing heavily in AI, recognizing its revolutionary potential. As seen in Figure 2, investments in 2024 are particularly large (Burmagina, 2025).

Figure 1. Global Value of AI and Machine Learning



Source: Burmagina, 2025.

Figure 1 reflects the growing confidence of global investors in the transformative potential of AI in North America, Europe and Asia. This situation quantitatively shows the impact of AI on innovation management. This result supports with quantitative data that AI has become not only a technical tool but also a driving force for economic and managerial transformation.

1.2. Innovation Management and Dimensions

Innovation is defined as innovation that provides added value and enables organizations to increase their competitiveness by producing different products from their competitors and gain significant advantages in the competition process (Esmer et al, 2020, p. 167). Innovation management is a management process that involves the systematic creation, development, implementation and commercialization of new ideas in order for organizations to gain competitive advantage and achieve sustainable growth. This process includes not only technological but also product, process, marketing and organizational innovations (Ventura and Soyuer, 2016, p. 42). Innovation management has many dimensions including strategic orientation, R&D and technology, knowledge and learning, leadership and culture, process management, marketing and commercialization, collaborations and networks, legal and institutional framework (Demirci, 2012, pp. 2-17; Karahan, 2019, pp. 29-72):

Strategic orientation: It refers to aligning innovation activities with the organization's overall strategy. For example, in line with Türkiye's goal of developing domestic and smart mobility solutions, TOGG not only produces electric vehicles but also develops digital platforms, battery technologies and smart transportation solutions (Togg, 2025).

R&D and technology: This means effectively utilizing R&D activities in the development of new products and processes. For example, ASELSAN's development of radar systems, electro-optical devices and communication technologies reduces external dependency by developing unique, advanced products that meet the needs of the national defense industry (Aselsan, 2025).

Knowledge and learning: This refers to collecting and sharing knowledge from internal and external sources and supporting organizational learning processes. For example, some cooperatives have created a common learning platform by combining academic knowledge from universities and farmers' field experience through regular trainings to improve their members' production efficiency.

Leadership and culture: An organizational culture that supports innovation includes open communication and transformational leadership. For example, to increase the participation of young producers and promote digitalization, some cooperative presidents have bridged the gap between traditional producers and young entrepreneurs, creating a shared vision.

Process management: The planning, implementation and evaluation of the innovation process. For example, through the process management steps of planning, implementation and evaluation, some cooperatives have been able to successfully position their products both in the local market and on e-commerce platforms, using resources efficiently and minimizing risks.

Marketing and commercialization: Bringing innovations to market and transforming them into added value by tailoring them to customer needs. For example, an organic honey cooperative branding a new honey blend containing royal jelly to appeal to the immune sensitivity of urban consumers and offering it for sale on e-commerce platforms.

Collaborations and networks: Strategic alliances with universities, suppliers, customers and other stakeholders. For example, a cooperative may develop strategic collaborations in R&D with a university, logistics with a local municipality and digital marketing with the private sector to improve product quality and open new markets (Zhou, 2021, pp. 855-859).

Legal and institutional framework: Creating the necessary legal infrastructure to protect (patents, inventions, etc.) and support innovation. For example, a cooperative can register its new propolis-based product formulation with the Turkish Patent and Trademark Office to gain legal protection and a competitive advantage in the commercialization process (Turkpatent, 2025).

Taşkın (2016) emphasizes that there are five fundamental components of innovation management, namely the processes of understanding customers and users, management's capacity to lead the company to its goals, employees' belief in productive innovation, the productive climate within the organization and the support of top management and that these components must be analyzed (Taşkın, 2016, p. 701).

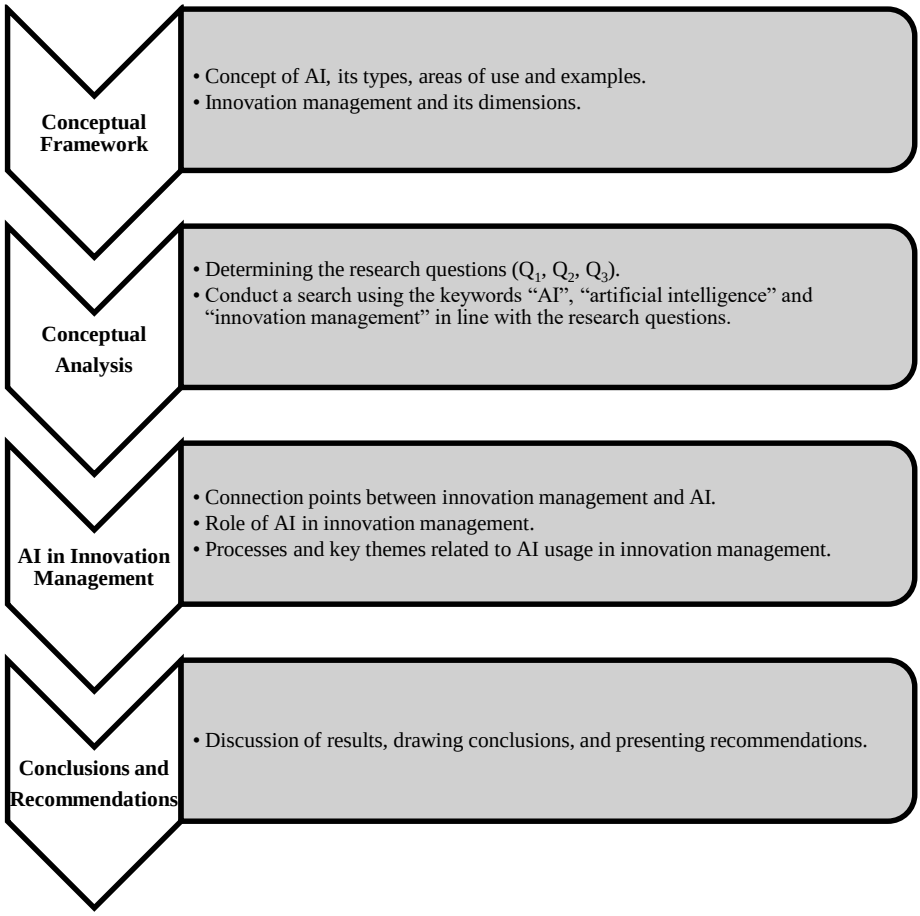
2. METHOD

In the study, it was deemed appropriate to use the conceptual analysis technique within the scope of qualitative research method and in line with the purpose of the research. Qualitative research method is the determination of known or undiscovered problems by using techniques such as interview, observation, content analysis, document analysis and conceptual analysis and interpreting the results about these problems by examining them in depth (Baltacı, 2019, p. 369). In this context, conceptual analysis is a research technique used to understand and explain a particular subject or phenomenon and focuses on defining and classifying concepts and examining the relationships between them (Furner, 2004, p. 233). In other words, conceptual analysis is a research technique that does not involve any application and is conducted by observing and analyzing the information available in the literature on a specific topic (Bhat, 2025). This type of analysis is widely used in fields such as social sciences and education to create theoretical frameworks and deepen knowledge on a particular topic and helps researchers better understand and explain complex issues (Sallan Gül and Kâhya Nizam, 2021, p. 182).

As in the studies of Demir (2023), Esmer and Yüksel (2024), in this research, answers to the questions “Q1: At which points there is a relationship between innovation management and AI technology, Q2: What role does AI play in the innovation management process, Q3: In which processes of innovation management AI is used and what are the important themes in this subject?” are sought based on secondary level data (books, articles, papers, reports, blog posts, etc.) in the relevant studies. In line with the research questions identified during the conceptual analysis process, a search was conducted using the keywords “AI”, “artificial intelligence” and “innovation management” and 56 sources relevant to the scope of the study over the past 15 years were examined. In this context, since not all sources on the relevant subject can be accessed, making an evaluation based on limited sources constitutes an important limitation of the research.

The research design developed in line with the purpose and method of the study is shown in Figure 2.

Figure 2. Research Design



Source: This research design was created by the author.

3. AI IN INNOVATION MANAGEMENT

This section is divided into three parts based on the research questions, with each part seeking to answer a different research question.

3.1. AI and Innovation Management Connection Points

In this section, the question "Q1: At which points is there a relationship between innovation management and AI technology?" is tried to be answered based on the relevant literature.

AI is a multidimensional technology that affects innovation management in organizations in terms of knowledge management, organizational learning, organizational innovation, decision making, collaboration, data analysis, forecasting, competition, productivity, organizational flexibility, sustainable growth, organizational culture and

strategic human resources management. The role of AI at these points becomes even stronger with the integration of technological as well as human factors (Esmer, 2024, p. 592).

Knowledge management and organizational learning: AI offers various facilities to accelerate and optimize the innovation processes of organizations. Technological advances in this direction greatly improve the ability of organizations to collect, process and analyze data, enabling the development of innovative ideas. For example, AI-enabled systems significantly improve decision-making processes by enabling meaningful inferences to be drawn from large data sets. Liao and Wu (2009) explain how organizational learning shapes innovation processes by demonstrating that knowledge management is a critical input for innovation. The integration of AI in knowledge management can help organizations gain competitive advantage by strengthening their ability to innovate. This shows that the integration of AI with knowledge management practices can support innovation processes and make these processes more efficient. According to Jarrahi et al. (2023), the role of AI in knowledge generation, storage, sharing and application processes supports strategic decision-making processes by making knowledge management activities of organizations more efficient.

Organizational innovation, decision making and collaboration: By increasing collaboration and interaction in innovation management, AI contributes significantly to organizations to develop more effective solutions. According to Jia and Xia (2008), AI's ability to facilitate collaboration processes, combined with its potential to increase knowledge sharing, enables organizations to manage knowledge flow more effectively. Through data analytics and machine learning techniques, AI can optimize interactions between organizations. This contributes to decision-making processes and innovative results in organizations. In addition, the automation and data analysis possibilities offered by AI-based systems enable employees to focus on productive thinking processes and prepare the environment for the development of innovative projects. Therefore, the role of AI in the business world goes beyond being just a technical tool and becomes an important element in terms of organizational innovation and competitive advantage. AI enables the personalization of public services and the development of strategic decision support systems through data analysis and predictive models, while increasing efficiency by accelerating routine automation processes (Demirkıran, 2025, p. 109).

Data analysis, prediction, competition and efficiency: AI plays an important role in innovation management in terms of automating processes and increasing efficiency. This technology is not only limited to the improvement of existing processes, but also enables the development of new business models. According to Wójcik-Czerniawska (2022), AI applications in the agricultural sector offer farmers the opportunity to make more accurate predictions and use their resources more efficiently thanks to the integration

of data analytics, machine learning and automation techniques. This shows that AI makes significant contributions in innovation management in terms of optimizing processes and developing more effective business models. For example, processing critical data such as weather forecasts and soil analysis improves farmers' decision-making processes, while ensuring sustainability and cost-effectiveness in production processes. In this context, AI applications help agricultural enterprises gain competitive advantage and increase agricultural productivity. There are many types of data analysis that AI can do. These are retrospection, insight, foresight, prediction, context, inference and sentiment analysis. Sentiment analysis in particular uses data to predict future customer trends. It can help organizations by recommending preferred products to users and analyzing customer demands and improving delivery and production. It also facilitates the interpretation of employee emotion to increase satisfaction in the workplace (Kulakauskaite, 2024).

Organizational flexibility and sustainable growth: The role of AI in innovation management has a deep relationship with organizational flexibility. Yu (2024) reveals how AI and organizational flexibility offer a strategic advantage in innovation management as well as the advantages of digital technologies. In particular, increasing organizational flexibility enables businesses to respond faster to changing market conditions and adopt innovative solutions more effectively. Organizations' adoption of AI contributes to their competitive advantage by making their innovation processes more dynamic and flexible. Therefore, integrating AI into business processes not only increases operational efficiency but also strengthens the innovation capacity of organizations. This development is becoming an important factor for sustainable growth and success in the modern business world.

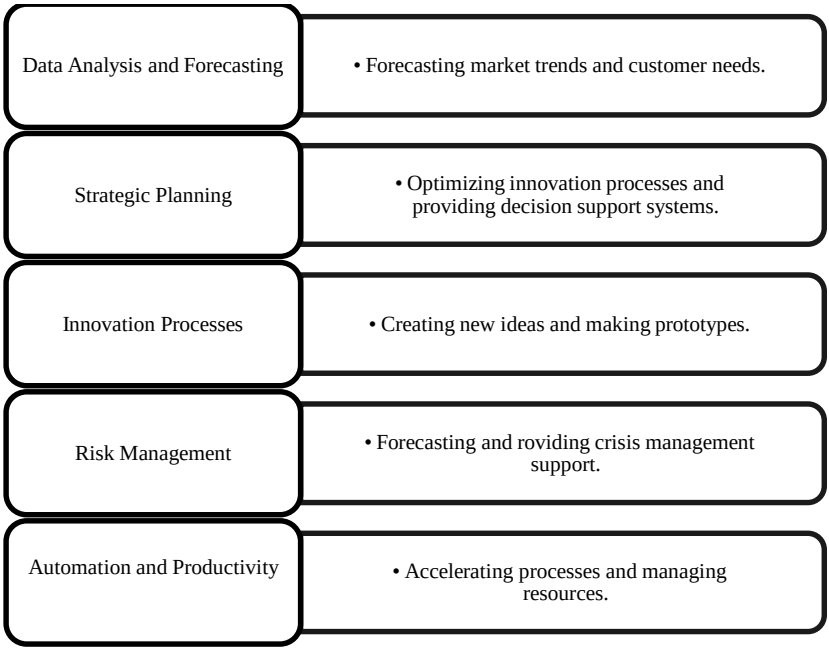
Organizational culture and strategic human resource management: The impact of AI in innovation management is not only limited to technological innovations, but is also deeply connected to the cultural and structural dynamics of organizations. According to Munteanu (2015), the ways in which AI shapes organizational culture and contributes to innovation processes play an important role in organizations' efforts to gain competitive advantage. AI applications have the potential to positively influence innovation processes by encouraging employees' productive thinking abilities and strengthening collaboration environments. This has a direct impact on the internal dynamics of organizations and the motivation levels of employees. Therefore, it creates an environment for restructuring innovation management strategies. In addition, the role of AI in data analysis and decision-making processes facilitates the integration of strategic human resource management with innovative practices and provides an important support for the purpose of increasing the innovative capacity of organizations. According to Mahmood (2022), the new trends of AI in the supply chain pose a number of challenges and a highly educated workforce is needed to overcome them.

3.2. Role of AI in Innovation Management

This section seeks to answer the question "Q2: What role does AI play in the innovation management process?" based on the relevant literature.

In line with the relevant literature (Jia and Xia, 2008, pp. 228-232; Liao and Wu, 2009, pp. 1850-1854; Munteanu, 2015, pp. 105-110; Wójcik-Czerniawska, 2022, pp. 147-160; Yu, 2024, pp. 430-436), a model showing the role of AI in innovation management can be drawn as in Figure 2.

Figure 3. Role of AI in Innovation Management



Source: This figure was created based on the relevant literature [Jia and Xia (2008), Liao and Wu (2009), Munteanu (2015,) Wójcik-Czerniawska (2022), Yu (2024)]

Figure 3 shows that the model consists of five components: data analysis and forecasting, strategic planning, innovation processes, risk management, automation and efficiency. In the context of data analysis and forecasting, market trends and customer requirements are predicted; in the context of strategic planning, innovation processes are optimized and decision support systems are provided; in the context of innovation processes, new original ideas are created and prototype products are produced; in the context of risk management, future predictions are made and crisis management support is provided; and in the context of automation and efficiency, transaction processes are accelerated and resources are managed efficiently.

3.3. Processes and Themes in the Use of AI in Innovation Management

This section seeks to answer the question "Q3: In which processes of innovation management is AI used and what are the important themes in this subject?" based on relevant literature and examples.

The relationship between innovation management and AI technology is quite strong in the modern business world and AI stands out as a tool that accelerates, improves and makes innovation management processes faster, better and more efficient. In this context, innovation management processes where AI is used are as follows (Burhan, 2014, pp. 52-60; Ventura and Soyuer, 2016, pp. 41-50; Karahan, 2019, pp. 29-72; BCG, 2023):

R&D: R&D processes are accelerated by testing new goods and service ideas with AI algorithms, thus reducing costs. Artificial neural networks provide technical insights in new product development processes by recognizing complex patterns (Karahan, 2019, pp. 29-72).

Strategic decision making and planning: AI helps companies gain competitive advantage by contributing to strategic decision-making processes. Machine learning, combined with big data analysis, anticipates innovation opportunities and accelerates decision-making processes (Spangler, 1991, pp. 149-159).

Market analysis and customer demands: Accurate targeting strategies are developed with AI in market segmentation and analysis of customer demands. Natural language processing provides user-focused innovation by analyzing customer feedback (Ventura and Soyuer, 2016, pp. 41-50).

Risk management and financial management: With AI, potential risks can be identified in advance, facilitating crisis management processes. Autonomous systems reduce costs by automating production processes and reduce risk by improving product quality. In addition, AI accelerates financial decision-making processes, helping to develop innovative solutions Veeraiah et al., 2022, pp. 1-5).

Collaborations and network management: AI techniques such as bibliometric analysis and network structuring are used to optimize academic and industrial collaborations. Deep learning contributes to the processes of creating strategic collaboration and competitive advantage by generating strategic insights from large and complex data sets (Zhou, 2021, pp. 855-859).

Efficiency and process automation: AI automates manual processes, enabling teams to focus on strategic tasks. For example, AI integration of project management tools facilitates task tracking and resource management. Expert systems use specialized knowledge in specific fields to increase efficiency and quality in processes (BCG, 2023).

Creativity and innovation: AI's natural language processing and machine learning capabilities can help teams develop innovative ideas. It offers support especially in the areas of idea generation, design processes and

prototyping. Deep learning generates strategic insights that create competitive advantages and supports radical innovations (Brem et al., 2023, pp. 770-776).

Educational administration: In educational administration, AI applications are used as an important tool to improve teaching quality and develop innovative teaching methods (Fengchao and Xuewen, 2020, pp. 310-317). For example, AI is used in areas such as checking homework, evaluating and monitoring student performance, preparing for lessons, gamifying lessons and facilitating learning (Cankurtaran, 2025, p. 128).

Various AI tools are used in AI, idea generation and development, creativity, problem solving, identifying customer trends and cost savings. For example; ChatGPT, developed by OpenAI, is a powerful language model that can be used to generate new ideas, create content and generate proposals and individuals can generate new ideas and discover new opportunities with this tool. Orchidea is an AI-enabled innovation platform that helps to generate and develop new ideas in a collaborative way, thus enabling brainstorming with Orchidea Workshop. However, there are also some challenges that AI poses in the innovation management process. For example, data privacy issues may arise when individual and organizational data are used to train AI models and ethical issues related to intellectual property rights may arise in idea generation as AI tools such as ChatGPT do not control patents and trademarks (Lahti, 2023). In this regard, organizations need to follow some guiding ethical principles. These include prioritizing transparent decision-making processes, promoting fairness in AI applications and protecting data privacy (Rahaman, 2023).

AI applications are used in healthcare, finance, manufacturing, retailing, sustainability and environment, creative industries. In this context, AI applications are used in precision medicine and drug discovery, fraud detection and risk management, personalized shopping experiences, predictive maintenance and production optimization, climate modeling and conservation efforts, content creation and entertainment. For example, DeepMind businesses use AI to predict the 3D structures of proteins, Siemens uses AI to monitor the health of its turbines, predict failures and proactively schedule maintenance and Visa uses AI to catch fraudulent transactions by analyzing more than 500 unique risk attributes (Almeida, 2024).

When the relevant literature is examined, the concepts that researchers concentrate on within the scope of the role of AI in innovation management are shown in Figure 4 with a word cloud. The word cloud was created using Word Art and the words in the image were selected from the most frequently recurring words (at least 5 times).

Figure 4. AI in Innovation Management Word Cloud

Source: This figure was created by the author using the Word Art program.

When Figure 4 is examined, it is seen that in the scientific studies conducted within the scope of AI in innovation management, researchers focused on the concepts of knowledge management, optimization, organizational learning, organizational innovation, decision making, data analytics, machine learning, process automation, organizational productivity, cooperation, organizational flexibility, business model, organizational culture, organizational creativity, strategic human resources management, network management, research and development, planning, data analysis, risk management. This result shows that the role of AI in innovation management is multidimensional. The fact that researchers focus on knowledge management, data analytics and machine learning reveals that data and knowledge management is a critical element in the innovation process. The concepts of optimization, process automation and organizational productivity, on the other hand, point to the efficiency-enhancing aspect of AI and it can be thought that the technology strengthens the applicability of innovation by accelerating the processes. Moreover, the consideration of factors such as organizational learning, organizational flexibility and cooperation shows that AI affects not only technical but also organizational and cultural transformation processes. It is possible to say that AI is not only a tool that supports decision-making processes in innovation management, but also an element that directly shapes areas such as business model, strategic human resources management and risk management (Han et al., 2025, p. 1).

Conclusion

The link between innovation management and AI is becoming increasingly important in today's business world. This study aims to examine

the role of AI in innovation management processes. It has been concluded that AI affects important elements of organizations such as knowledge management, organizational flexibility, sustainable growth, organizational culture and strategic human resources management. In particular, the data analytics and predictive modeling capabilities provided by AI in the field of knowledge management facilitate organizations to make knowledge-based decisions and make decision-making processes more effective. The capabilities of AI in this context can identify trends by analyzing large data sets and enable organizations to improve their strategic orientations. In this context, Brem et al. (2023) stated that AI is both a source of innovation and a facilitator of innovation. Haefner et al. (2021) stated that AI provides great benefit to organizations in overcoming the barriers to innovation by improving the process of generating and developing ideas.

In terms of collaboration, AI facilitates the emergence of innovative ideas by enabling more effective communication and interaction between employees in organizations. This interaction is enhanced through virtual assistants and communication platforms, optimizing teams' knowledge sharing and collaborative processes. Process automation also increases efficiency by automating repetitive tasks, allowing human resources to focus on more strategic tasks. Therefore, this automation reduces error rates and allows for more efficient use of resources. Organizational flexibility, on the other hand, helps organizations to adapt more easily to changing environments by strengthening their agility and ability to respond to changing market conditions with the rapid adaptation capabilities offered by AI. Along with all these advantages that AI provides in the innovation management process, it may also cause some disadvantages when it is not used correctly. Therefore, AI can be an opportunity as well as a threat for innovation management. If organizations depend entirely on AI in their innovation processes, productivity and innovation may atrophy and all organizations may become similar to each other by performing similar practices. At this point, it should not be forgotten that AI is a tool developed by humans for humans and that humans will always be at the center of production (Esmer and Yüksel, 2024, p. 185). In this context, it has been stated that AI cannot replace organizations that see it as a tool and benefit from it, but it can replace organizations that do not benefit from it (Brynjolfsson and McAfee, 2014, pp. 28-29). In this case, it can be said that when AI is used correctly, in the words of the Hager Group and Elon Musk, AI will continue to empower people instead of overpowering them and can be very beneficial for the world, but when used incorrectly, it can lead to irreversible disasters (Mert, 2023, p. 1; Kulakauskaite, 2023). In this context, AI can be a powerful tool that enhances humanity's potential when used ethically and responsibly. However, its unregulated or malicious use can lead to serious consequences that threaten social structures and security.

The fact that AI is a disruptive technology makes it difficult to deny its benefits (Kuzior et al., 2023, p. 12). Therefore, organizations need to prepare for an AI-oriented future. For this, it is important to cultivate an AI-ready culture (AI literacy, interdisciplinary collaboration), integrate AI into innovation processes (strategic alignment, agile implementation and experimentation), address ethical and regulatory issues (AI ethics) and leverage data and infrastructure (robust data ecosystems, scalable and secure infrastructure) (Almeida, 2024). However, it is not enough to consider the components separately; they need to function as a system in harmony with each other. Addressing these components in an integrated manner means not only adapting to technology but also creating an innovative and sustainable competitive advantage. On the other hand, AI is affecting and transforming the ways of doing business of states as well as individuals and organizations. It is obvious that states that cannot adapt to this transformation will lag behind in the innovation process and these states need to develop strategies related to AI (Gezici, 2021, p. 97). In this context, while AI redefines the functioning of all social actors, states' indifference to this change may weaken their competitive strength. Therefore, developing AI-focused strategies for sustainable development and technological leadership is no longer a choice but a necessity.

Consequently, understanding the role of AI in innovation management is critical for organizations to gain competitive advantage and achieve sustainable growth. The integration of AI not only improves existing processes but also enables the emergence of new business models and opportunities. This holistic approach prepares the environment for organizations to develop innovative solutions and respond faster to market demands. In particular, AI's data analytics and machine learning capabilities help organizations more accurately anticipate customer needs and develop effective strategies to address them. Moreover, the automation potential of AI increases the efficiency of business processes, allowing human resources to be more productive and focused on strategic tasks. This not only enables organizations to gain competitive advantage, but also contributes to more flexible adaptation to changes in market conditions. Therefore, the issue of the role of AI in innovation management stands out as a vital element for modern businesses and reveals the need for in-depth research in this field. The results of this study are generally consistent with existing research in the literature. However, a significant limitation of the study is its conceptual examination of the role of AI in innovation management processes. This limits its practical relevance. Therefore, it is important for future research to fill this gap with sector-specific applied analyses and contribute to the literature.

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