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The Contributions of Metaverse Technology on Management Information Systems in Strategic Planning and Decision-Making Processes of Businesses

İşletmelerin Stratejik Planlama ve Karar Alma Süreçlerinde Metaverse Teknolojisinin Yönetim Bilgi Sistemleri Üzerine Katkıları

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ÖZET

Dijital devrimin yaşandığı çağımızda yaşanan gelişmeler, günlük hayatı da hızlı bir şekilde farklılaştırmaktadır. Dijital platform kullanıcıları açısından, kişisel bilgisayarların, internet alt yapısının, mobil cihazların ve sensör teknolojilerinin yaygınlaşması, çalışma yaşamını ve günlük yaşamı etkilemiştir. Bu çalışmadaki temel amaç Metaverse teknolojisinin yönetim bilgi sistemleri üzerindeki etkisini araştırmak ve işletmelerde stratejik planlama ve karar alma süreçlerini nasıl etkileyeceğini ortaya koymaktır. Ayrıca metaverse teknolojilerinin çalışma yaşamında kullanımına dair örnekler vermek ve iş yapma şekillerinde yaratacağı değişiklikleri tespit etmektir. Çalışmada betimleme yöntemi kullanılmıştır. İşletmelerin yönetiminde, stratejik planlama ve karar alma süreçlerinde Metaverse teknolojisinden yararlanılması, işletmelere maliyet, zaman tasarrufu ve rekabet üstünlüğü sağlayacağı ve bu süreçlerin gerçekçi ve sağlıklı işlemesine neden olacağı ortaya konmuştur. İşletmelerin bu teknolojik gelişmeleri yakından takip etmesi ve bu teknolojilerden yararlanması onları stratejik hedeflere ulaştıracak en önemli unsurlardan biridir.

Keywords:

Strategic Planning,

Decision Making,

Metaverse,

Virtual Reality,

Management Information Systems,

ABSTRACT

In the age of the digital revolution, the developments that are taking place are rapidly transforming daily life as well. In terms of digital platform users, the spread of personal computers, internet infrastructure, mobile devices and sensor technologies has affected working life and daily life. The main purpose of this study is to investigate the effect of Metaverse technology on management information systems and to reveal how it will affect strategic planning and decision-making processes in businesses. Additionally, the aim is to provide examples of the use of Metaverse technologies in work life and to identify the changes they will bring to business operations. The descriptive method was used in the study. It has been revealed that the use of Metaverse technology in the management, strategic planning and decision-making processes of businesses will provide cost, time savings and competitive advantage to businesses and cause these processes to work realistically and healthily. It is one of the most important factors that will enable businesses to follow these technological developments and make use of these technologies.

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1. INTRODUCTION

The rapid and continuous change in technology has also changed the production, distribution, marketing and management systems in enterprises. As a result of this change, computer aided production was started in production and the use of robots in production started. With the development of information systems, businesses have the opportunity to access more information and use this information while making business decisions. Businesses that follow technology, developments in information and communication systems and use these developments in their activities work faster, more effectively and efficiently than their competitors. Today, the technological systems developed have started to be used in almost all functions of the enterprises (Damar,2021).

Business managers need real and timely information about events, resources and processes when making strategic planning and decisions about activities. Management information systems, which are used to obtain, process, organize and adapt the information needed by the managers in the best way, provide speed and time savings to the enterprises. By the use of these systems, the tasks of the management levels, which in most cases are impossible to get out of, are carried out with less effort and cost, and with better quality (Polat, 2007:190-193). In addition to these, computer and internet technologies are in constant change and progress. Every day, new technologies and new systems are developed and put into service. IoT technologies, Metaverse technologies and blockchain technologies are among the newest and most used technologies (Andrews et al., 2019:155-160).

Among these technological developments, Metawerse technologies have attracted great attention recently. Metawerse is a complex and interactive information and communication environment where the physical and virtual worlds come together (Kaya et al., 2022). These technologies have the potential to transform business processes and business management information systems of businesses by offering features such as augmented reality (AR), virtual reality (VR), mixed reality (MR). What processes do businesses go through when making strategic planning and decisions that are vital for the business, and how does Metaverse technology affect management information systems in these processes? In addition, the study reveals how the management systems of enterprises are going through a change and transformation. In this context, Metaverse technologies are discussed, strategic planning and decision-making processes in enterprises are examined, the effect of Metaverse technologies on business information systems are revealed. Afterwards, the results of the study are evaluated and suggestions that would be beneficial to businesses and economic units were done (Laudon and Laudon, 2018).

2. THE RESEARCH METHOD

By switching from traditional information systems to Metawerse-based systems, businesses can make their business processes more efficient, improve customer experience and gain competitive advantage. The scope of this article is to investigate the effects of Metawerse technologies on business management information systems and to evaluate the integration of these technologies into strategic planning and decision-making processes of businesses.

Descriptive method was used in the research and research information was determined as follows;

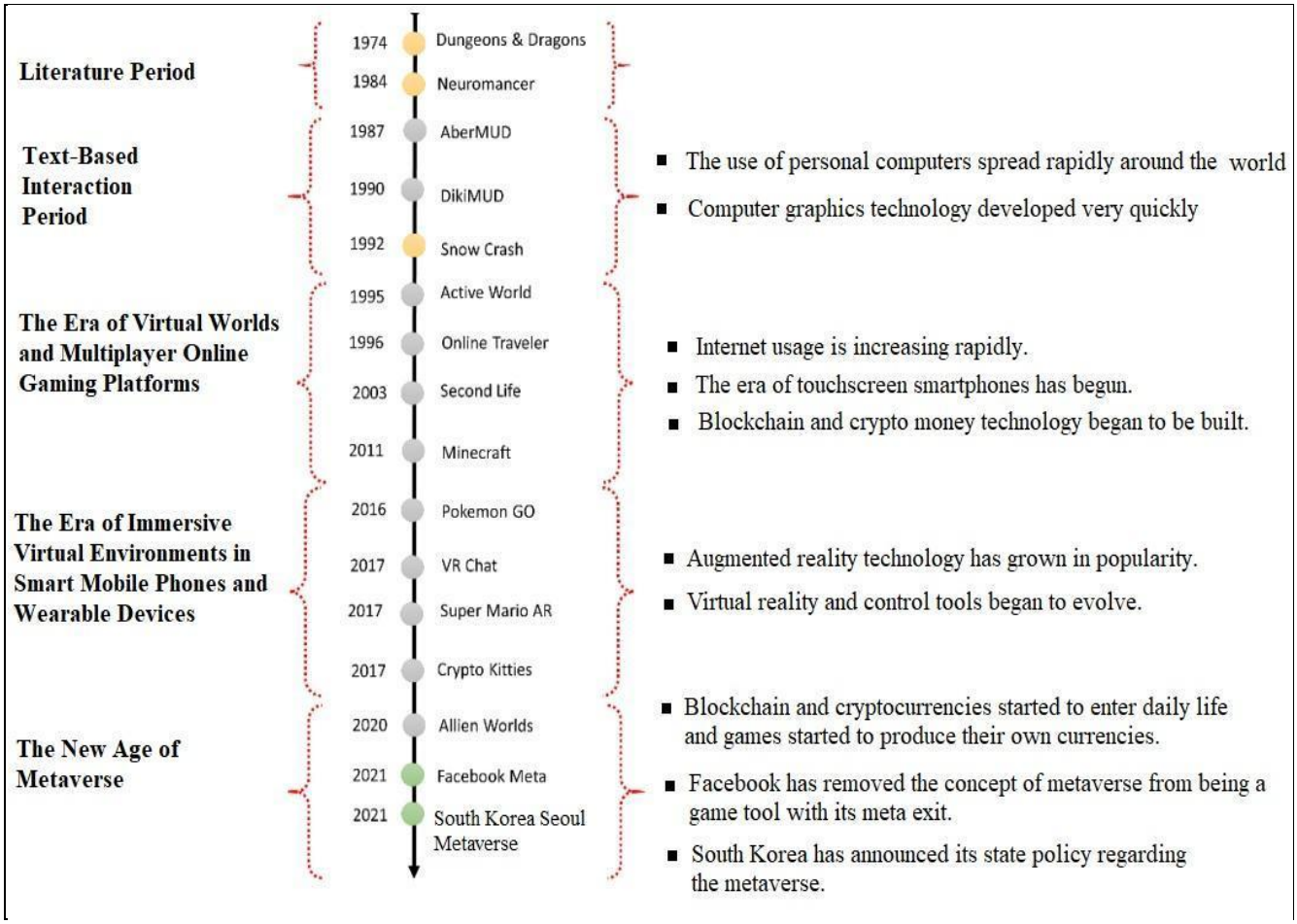
- What is the importance of Metaverse technologies for business management information systems?
- How do Metaverse technologies benefit businesses in their strategic planning and decision-making processes?
- What conclusions and suggestions can be made to the working life within the scope of the information obtained as a result of the research?

The study contributes to the existing literature by shedding light on the effects of Metaverse technologies in strategic planning and decision-making processes in business management, and provides valuable insights and recommendations for businesses.

3. THE TERMS: METAVERSE

The term "*Metaverse*" was first used in 1992 by science fiction writer Neal Stephenson in the cyberpunk novel "*Snow Crash*". In this novel, people in the physical world, digital avatars (similar to the user's physical self), enter the Metaverse (a parallel virtual world) and live there through virtual reality equipment (Mete, 2022:156-160). In the years that followed, many other meta-universes emerged, with Second Life, developed by Linden Lab 2003, very popular. However, in October 2021, Mark Zuckerberg's official announcement that the company's name was changed from Facebook to Meta created a lot of excitement and a wider audience. Several platforms such as Roblox, Sandbox and Omniverse, which have been recently developed by industry giants, have revealed their motivation and demands to create a Metaverse. Metaverse is an immersive virtual ecosystem that connects the physical and virtual worlds and spans Mixed Reality (MR), Augmented Reality (AR) and Virtual Reality (VR) facilitated by the convergence between the Internet, Web and Extended Reality (XR). In addition, Artificial Intelligence and Blockchain are recognized as key technologies to improve the metadata warehouse (Mitra, 2023:480-487).

Figure 1. Historical Development of Metaverse

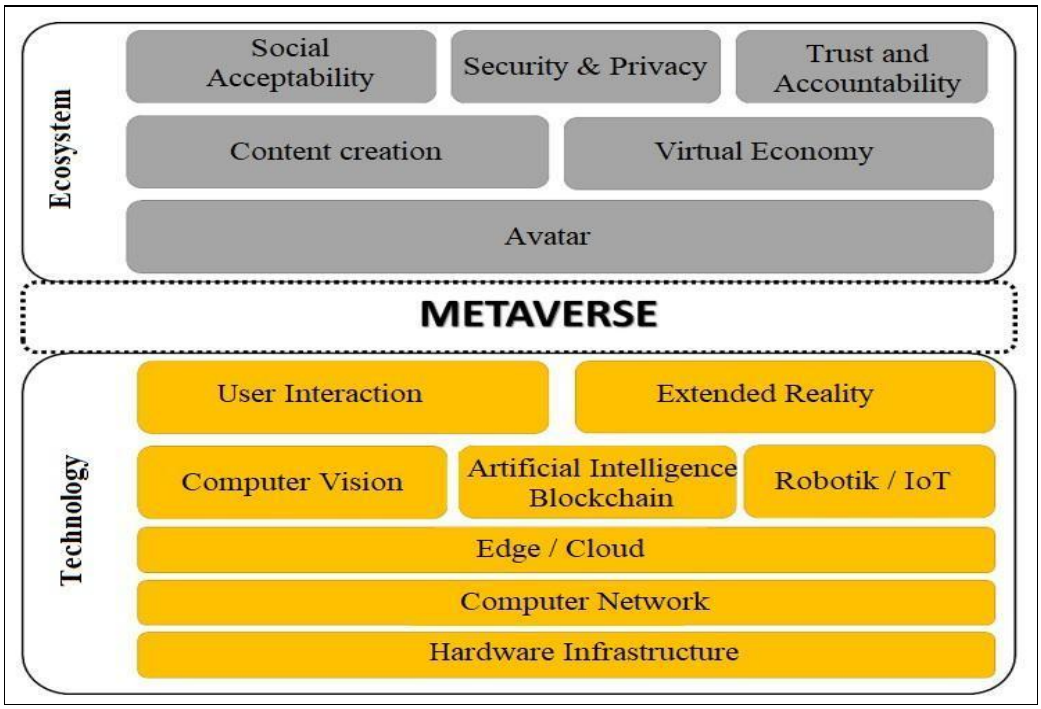


Source: Damar, 2021:173.

In the historical process presented in Figure 1, the impact of developments within the Metaverse on the Metaverse, the impact of book-type resources are shown with orange dots, the impact of game genre resources with gray dots, and the effects representing company and government statements with green dots. In her extensive work on the meta-universe in 2021, Lee traces the history of the meta-universe back to her 1974 book / game Dungeons & Dragons. The Dungeons & Dragons desktop role-playing game was developed by the Wizards of the Coast company, and the company has published several books with rules about the game (Lee, 2021:4-8).

In this historical process, the ecosystem that forms the Metaverse universe and the technologies used are developing rapidly. The Metaverse ecosystem and the basic technologies used are presented in Figure 2.

Figure 2. Metaverse Ecosystem and Technologies Used



Source: Damar, 2021:177.

The important and critical technologies for the Metaverse architecture are respectively; augmented reality technology, user interaction, computer vision, artificial intelligence and blockchain, robotics and the internet of things (IoT), edge computing, computer networks and hardware infrastructure (Damar, 2021:177). Augmented reality; Advances in imaging technology and information processing have led to the emergence of new devices that can embed digital information onto the physical world or incorporate features of the physical world into virtual scenes. These combinations of digital and physical environment are called augmented realities. Augmented reality (XR) devices find application in many fields from the education sector to the production sector through realistic three-dimensional visualization and touch interfaces (Andrews et al., 2019:155-160).

When research on the Metaverse is done in the literature, terms such as augmented reality, virtual reality and mixed reality are encountered, and the term augmented reality (XR) has recently been an umbrella term covering the words augmented reality (AR), virtual reality (VR), mixed reality (MR). It can be seen that it can be used as Lee (2021), in addition to Andrews et al. (2019), has included projection and hologram technology into the concept of augmented reality.

4. METAVERSE-BASED TECHNOLOGIES

While Metaverse is referred to as a new technology, it is actually a set of technologies. Metaverse is expressed as a platform where many new and advanced technologies come together. Statements show that augmented reality (AR), virtual reality (VR), artificial intelligence, neural interfaces, blockchain applications and wearable electronic products will play a major role in the establishment of the Metaverse universe. (Yılmaz, 2022:5-13).

- ***Extended Reality*:** Central to the concept of Metaverse is the concept of a virtual, three-dimensional environment where people can hold business meetings, socialize, shop and trade, conduct educational activities, and be accessible and interactive in real time. The combination of augmented reality (XR), augmented reality (AR), virtual reality (VR) and mixed reality (MR) play an important role in bringing the Metaverse to life (Damar, 2021:185).
- ***Virtual Reality (VR)*:** It is the most popular and known Metaverse technology. In technical terms, virtual reality refers to a three-dimensional environment created by computers. Virtual reality experience is explorable, interactable in an immersive and engaging virtual environment. A learning environment can be created where materials that can be developed with this technology and possible placements can be

completed. Unlike augmented reality, in virtual reality experience users will enter a fully simulated digital environment. (Liu, et.al., 2022:2-7).

- ***Augmented Reality (AR)*:** Transforms real-life objects and characters into Metaverses, or digital visual components. For example, interactive digital scenes are transferred to a live, real-world environment via a phone call. This experience displays the real world and enriches the environment with digital details such as text and animation. Augmented reality experience will be accessible through AR glasses or screens, tablets and smartphones (Carmigniani et al., 2011).
- ***Mixed Reality (MR)*:** Creates advanced computer technology, graphics and input systems to blend the physical and digital worlds. In mixed reality, digital and real-world objects coexist and can interact with each other in real time. Mixed reality is a mix of physical and digital worlds that unlocks natural and intuitive 3D human, computer and environmental interactions. This new reality is based on advances in computer vision, graphics processing, display technologies, input systems and cloud computing. (Damar, 2021:175-180).
- ***IoT (Internet of Things) Technology*:** An IoT ecosystem consists of web-enabled smart devices that use embedded systems such as processors, sensors, and communications hardware to collect, send, and act on data from environments. (Kaya, et.al., 2023:3-10).

5. BUSINESS MANAGEMENT INFORMATION SYSTEMS

An information system is a system that takes data sources as inputs and processes them and produces information products as outputs. Today, information systems are used in businesses as data processing systems, management information systems, decision support systems and office automation systems (Martin and Powell, 1991).

Business information systems are a set of technological tools, methods and processes that businesses use to manage business processes, collect, store, analyse and support decision making using information technologies. Business information systems are used to make businesses more efficient, gain competitive advantage and make strategic decisions (Özer and Kuşlu, 2012:393). These systems can support many business functions such as supply chain management, inventory control, financial management, customer relationship management, marketing, human resource management. It can also facilitate business-to-business communication, data sharing and collaboration.

Business information systems include hardware, software, data, users, and processes (Laurini Thompson, 1992). Business management information systems, in which these components are used, are the set of software and processes used to manage and optimize the operations of a business. These systems help businesses manage resources, data, processes and people (Emhan, 2007:215-218). Information systems used in business activities are used in management functions such as customer relationship management, supply chain management, human resources management, financial management, production management and stock management (Aydın, 2022:40-42). The historical development of information systems in businesses is presented below: (O'Brein, 1994:195; Güleş and Bülbül, 2004);

- 1950-1960- Electronic data processing systems,
- 1960-1970- Management information systems,
- 1970-1980- Decision support systems,
- 1980-1990- Strategic and End User Support; (1- end-user computer systems), (2- top manager information systems), (3-expert systems), (4-strategic information systems)

The innovations that have developed in management information systems in this historical development are discussed below:(Laudon and Laudon, 2018);

- ***Technology*:** The cloud computing platform is emerging as an important innovation used in businesses. Software as a service is growing. The mobile digital platform competes with the PC as a business system.
- ***Management*:** Managers have started using online collaboration and social networking software to improve coordination, collaboration and knowledge sharing. Business intelligence applications are increasing rapidly. Virtual meetings are proliferating.

- ***Organizations*:** Web 2.0 applications are increasingly used by businesses. Working from home is on the rise in the business world. Business value is re-formed.

Information systems are often presented as an integrated software platform and enable all departments of businesses to work together. Thus, businesses can increase their productivity, improve their decision-making processes and gain competitive advantage. Business management systems provide various benefits to businesses. Some of the main benefits of business management information systems to businesses are listed below (Polat, 2007:190-194; Fidan, 2009:2155-2160);

- ***Productivity Increase*:** Business management information systems increase productivity by automating business processes. Thanks to the technological infrastructure and software, businesses work more effectively and quickly, providing efficient resource use and time savings.
- ***Internal Control and Monitoring*:** Management information systems are an important tool for monitoring the activities of businesses and strengthening internal control mechanisms. It provides the opportunity to standardize processes, data analysis and reporting. This allows businesses to better manage their operations and identify problems quickly.
- ***Improving the Decision-Making Process*:** Business management systems provide managers with fast and accurate access to business data. Thus, it enables more informed and strategic decisions to be made. With data analytics, reporting and forecasting modules, businesses can follow market trends, manage costs and gain competitive advantage.
- ***Customer Relationship Management*:** Management information systems enable to track customer information, manage customer demands and monitor sales opportunities. Businesses are developing better customer relationship management to increase customer satisfaction and ensure customer loyalty.
- ***Business Continuity and Risk Management*:** Management information systems are an important tool for business continuity planning and risk management. With data backup and disaster recovery systems, businesses can be prepared for possible interruptions and ensure business continuity. At the same time, with risk management modules, businesses can identify and analyses risks and take appropriate measures.
- ***Collaboration and Communication*:** Management information systems increase cooperation between different departments and facilitate communication. With collaboration platforms, instant messaging, and collaboration tools, teams can efficiently share information, manage projects, and reduce errors in communication.
- ***Cost Savings*:** IYBS provides cost savings by optimizing business processes and increasing efficiency. Automatic collection and processing of data reduces human error and repetitive work costs. At the same time, inventory costs can be reduced through improvements in inventory management, purchasing and supply chain processes.
- ***Data Analysis and Reporting*:** ICES allows businesses to analyze large amounts of data and gain valuable insights. Businesses can gain competitive advantage by analyzing customer trends, market segmentation, inventory management and financial performance. In addition, it becomes easier to monitor and report business performance with standard and customizable reporting tools.

Business management systems enable businesses to be more efficient, strategic and competitive. These systems support the basic objectives of businesses such as improving processes, controlling costs, strengthening customer relations and managing risks. In addition, it can be said that these systems are an important tool to increase the competitiveness of national and international enterprises.

6. STRATEGIC PLANNING IN BUSINESSES

Strategic management is a management approach that determines the point that the business wants to reach in the future and the position it will take (Bryson, 1988:5). Thanks to strategic management, businesses carry out their resource planning, valuation and reporting activities in an integrated structure, keeping the effort of continuous improvement in quality at the forefront (Küçüksüleymanoğlu, 2008:405-408). In this context, businesses need to give importance to strategic planning in their strategic management studies.

The strategy is formed within the framework of long-term goals and objectives. The plan, on the other hand, consists of the process of determining the steps to be taken in order to achieve the business strategy. Strategies

that are finalized in writing are called strategic planning (Eren, 2010; Bay and Akpınar, 2016:360-363). At the same time, strategic planning is the process of developing the necessary procedures and operations by top management and business owners to achieve the goals of the business. Strategic planning is a process that will form the basis of all activities for all employees within the framework of the business vision, mission, goals and objectives. For this purpose, determining the priorities and directing the resources accordingly will be realized through strategic planning. It also contributes to creating effective decisions and practices for production and management processes (Bontempo et al., 2015:2963-2965; Kocaoğlu et al., 2020:227-230). Strategic planning consists of four main stages. These stages are described below (Ülgen and Mirze, 2004:32-33; Küçüksüleymanoğlu, 2008:405-408; Bontempo et al., 2015:2062-2966);

- The vision and mission of the organization should be determined in line with the basic principles and values that the employees of the business also participate in.
- Critical success factors that will enable the business to reach its goals should be determined and internal and external environment analyzes related to these should be done (SWOT analysis).
- Plan summaries should be made and processes should be designed by determining the objectives, strategies, policies and regulations of the business. and action plans should be established.
- Control and evaluation should be made whether the targeted level has been reached by implementing the planned activities.

Businesses provide the data and information they need while making strategic planning, using technological resources and programs today. Management information systems developed in this sense provide great opportunities for planning, control and forecasting activities in business activities. Management information systems support the planning, control and decision-making functions at the management level, especially in internal business activities (Tekin et al., 2003:189). One of these technologies is Metaverse technology.

7. DECISION-MAKING PROCESSES IN BUSINESSES

According to the Turkish Language Institution, a decision is defined as "*a final judgment given by thinking about a business or problem*" (Türk Dil Kurumu, 2019). Decision making is the process of choosing the most suitable one among more than one option in order to achieve the goals (Eren, 2010; Lamba, 2014:8-18; Tekin and Ehtiyar, 2010:3396-3405). In this process, different solution alternatives are determined for the solution of the problems, then they are evaluated and the appropriate alternative is selected. Decisions taken are actually made for future activities or to solve a particular problem (Daly et al., 2017). The success of the decision-making process directly affects the success of the organization. In the decision process, factors such as the time of communication of the decisions, the form and the anxiety of making good decisions affect the decisions. Businesses need to make the right decisions to achieve their strategic goals and be successful. Because a decision made affects the decisions to be taken later (Mykkänen, 2010; Altan, 2020:52-65).

Different decisions are taken by managers at different levels in businesses. These decisions can be grouped as structural, semi-structural and unstructured decisions. Non-structural decisions are strategic decisions without clear instructions/procedures, usually made by top managers and for long-term goals. *Semi-Structural Decisions* are tactical-level decisions made by middle and senior managers. Decision makers get support from instructions/procedures and use data analysis for the best alternative (Laudon and Laudon, 2018). *Structural decisions* are usually made for repetitive activities in the operations division of the business and decision makers create instructions/standards/procedures. These decisions are operational decisions made by individual employees/team leaders.

Decision making is a process and consists of some stages. The stages of this process can be mentioned as (Bakan and Büyükbeşe, 2008:31-35; Nickols, 2015; Altan, 2020:52-65; Dönerçark andTecim, 2020:79-85);

- Define the issue to be decided
- Gathering information about the subject to be decided
- Identifying alternatives
- Choosing one of the alternatives
- Implementation of the decision

- Evaluation of the decision

The most important strategic decisions for the enterprise are taken at the management level of the enterprise. Managers bring together various elements and coordinate these elements in order to achieve the goals or strategic goals of the enterprise. In order to ensure coordination in the management process, the necessary decisions should be taken in a way that will make the business successful, make a profit, and provide a competitive advantage. (Emhan, 2007:215-219). In addition, it is important to take and implement decisions on time and quickly (Tekin and Ehtiyar, 2010:3396-3399). There are factors that affect the speed and timing in the decision process: Data, information, storing information, processing, transmitting, distributing information, the specialist staff required for these, and the cost of this process (Daniela, 2019:76-82). In this context, the need to support the decision-making process by a technological system arises. Businesses and managers cannot carry out their decision-making processes as desired without data and information. For this reason, they have to constantly collect information from their internal and external environment. At the developing technological level, businesses can quickly access, process and use this data and information they need in their decision-making processes (Sucu, 2021:263-270).

8. THE BUSINESS APLLICATIONS OF METAVERSE TECHNOLOGIES

Metaverse is a three-dimensional and user-interactive virtual reality of a digital universe. Thus, Metaverse technologies establish a two-way connection between virtual and real world. In recent years, the digitization of services have been used as a tool to increase productivity in the fields of business, entertainment and education. When many studies in the literature are examined, we observe that virtual reality technologies are used in a wide range such as military, education, sports, tourism, gaming, medicine, astronomy (Kalkan, 2021:163-174).

While the Metaverse is developed and aims to expand the scope of capabilities in social media, the potential is huge for other industrial, commercial, social, education, medical, military and government. By using Metaverse technologies, real life simulation is provided and advantages and disadvantages that can be experienced in real life are determined. Thus, businesses will be able to make healthier decisions about their investments, new products to be produced or new markets. It is possible to shape, coordinate and plan managerial activities using these technologies. Metaverse is an endless interconnected digital world that can be used by users to work, transact sales, build cities, watch shows and play games. Metaverse is the first step towards realizing digital business in the future (Amirulloh and Mulqi, 2022:176-178).

Users can participate in cultural and artistic activities without restrictions of freedom, travel the world and even space as a tourist, do things that cannot be experienced in the real world, and go places they cannot go in real life. Everything in the Metaverse is up to the user's choice (Kye et al., 2021:1-13). In addition to these, another domain of Metaverse is that it enables virtual meetings by providing remote office facilities. In addition, new horizons can be opened regarding digital tourism and digital exhibition. The development of digital twin technology and interactive technology allows users to overcome the limitations of time, space and other factors, freely visit scenic spots around the world, and get an immersive experience. Building Metaverse can help support education with immersive simulation of realistic scenes to support understanding of learning content. Metaverse breaks the boundaries of time and space and eliminates the distance between people. People in Metaverse can communicate anytime and anywhere. Metaverse can thus provide various forms of social interaction (Narin, 2021:17-24; Mystakidis, 2022:486-487).

By using Metaverse technologies in businesses, platforms where management meetings and managerial activities can be carried out, strategic decisions can be taken and strategic planning can be made regardless of any location can be simulated. Multiple businesses can be established and managed virtually in national and international areas. Metaverse technologies offer platforms that can be interacted with from every country and region with a suitable network infrastructure. Large-scale organizations can carry out their activities by managing all their sub-units and branches on a local and international scale. In other words, a cross-border structure can be created by utilizing Metaverse technologies, and real economic units can be managed virtually without going to business units or branches. In addition, all of a real business, its sub-units or branches abroad can be visited virtually and coordinated as if it were real.

The business functions of a virtual business such as transportation, communication, production, marketing, human resources and logistics can be predicted with Metaverse technologies. Thus, it is possible with Metaverse technologies to make virtual SWOT analysis for entrepreneurs who want to establish a new business or production facility, and to reveal the opportunities and threats that may occur in case of an attempt.

Virtual market effects of a new product or products being produced can be seen and determined. In product development, prototypes can be developed without using any raw materials, tools and physical labor, and tests can be made regarding the use of the product. Defects and deficiencies of the product can be determined and rearrangements can be made.

It would be shortsighted to think that the Metaverse is limited to games only. Metaverse can have an all-encompassing effect. It is predicted to revolutionize the "value functions" of companies and almost every industry in the future, from healthcare to consumer products, entertainment and business-to-business technical solutions to payments. In addition, entirely new industries, markets and resources, as well as new types of skills, occupations and certifications will be created to enable this future (Hollensen et al., 2022:1-7). One of the most important areas that Metaverse will affect is the education sector (Damar, 2021; Kye et al., 2022:3-7). Education systems strive to prepare students for business life through technical courses. However, with digital games, there is the potential to develop special meta-universes that can help teach soft skills even in casual entertainment. By using Metaverse technologies in the education sector, the campus where the universities are located can be visited simultaneously.

Metaverse also has important potential applications in healthcare and its use is expanding rapidly. Some of the most important applications are remote monitoring of patients in need of intensive care, access to data, better understanding of clinical outcomes (such as blood glucose and heart rate monitoring), and virtual follow-up of patients. In medical images too, the Metaverse has many potential applications due to the fundamental change in the nature and quality of imaging (Garavand and Aslani, 2022:1-6). By simulating patient follow-up systems in the health sector, it will be possible for patients to be examined virtually without the need to come to the hospital. The potential of Metaverse in education and health could revolutionize student medical education and public health. The main advantages of Metaverse in health and patient care; increasing role of virtual reality in medical education, digital therapeutic applications of Metaverse and augmented reality used in surgical procedures (Kye et al., 2021:2-6). Metaverse offers various advantages, especially in the training of healthcare personnel. Experience-based, content and scenario-based learning, rich and user-interactive content, and simulation opportunities for the application of the acquired knowledge in the field are some of these advantages. (Damar, 2021). Another area of influence of Metaverse is the real estate sector. Lands that do not exist in the real world and exist only in the virtual world attract the attention of different investors.

Metaverse technology has the potential to transform social interactions, business dealings and the internet economy in general. Therefore, Metaverse has been receiving increasing attention from all over the world lately, and many technology giants such as Facebook, Microsoft, Tencent and Nvidia are announcing their Metaverse initiatives one after the other. The term Metaverse has become prominently featured in the discourse of technology executives as they outline the future trajectory of their respective companies (Jungherr and Schlarb, 2022:3-6).

One of the predictions about Metaverse is that it will bring more turnover and profit to the virtual product market. Accordingly, the virtual goods market, which is worth approximately 50 billion dollars by 2022, is expected to increase to 190 billion dollars by 2025. Metaverse also promotes rapid development of AR/VR technologies. The volume of the global AR/VR market, which was $12 billion in 2020, is expected to grow by 54 percent in the five years to 2024. Total AR/VR device shipments, which were 5.12 million units in 2020, are expected to reach 43.2 million units in 2025. Besides, the enormous data storage and computing requirements for the formation of the superuniverse further encourage the rapid development of cloud computing. With the expansion of the user value chain, the commercial value of Metaverse applications will grow geometrically (Cui et al., 2022:2167-2170).

9. RISKS AND THREATS OF METAVERSE TECHNOLOGIES

Addresses system errors of the Internet, cyberspace, and Meteverse. Accordingly, it is emphasized that good behavior and activities that are expected to be freely performed as type 1 and type 2 system errors are incorrectly over-restricted and cannot be prevented, bad behaviors and activities that should be controlled and prevented and controlled when necessary, and even punished (Medeni et al., 2008:993-996). Experts participating in the research conducted by Anderson and Rainie (2022), on the other hand, warn that these new worlds can dramatically amplify every human trait and tendency, both bad and good. Specialists focus their concerns specifically on the freedom of those who control these systems to redirect, restrict, or inhibit human

actions, and to suppress people's ability to self-actualize through their free will, and to expand people's natural capacities.

Similarly, according to Wang et al. (2022), a wide variety of security breaches and privacy breaches can occur in the Metaverse, from the management of large data flows, widespread user profiling activities, unfair consequences of artificial intelligence algorithms to the security of physical infrastructures and the human body. In addition, problems arising from Metaverse devices and psychology-based problem areas such as addiction are issuing those developers should consider. In addition to the many benefits that Metaverse technologies provide to businesses, there are also risks and threats. For this reason, it is necessary for businesses to ensure their own security and to take a series of precautions for this purpose. First of all, businesses need to take various measures by identifying possible risks that may develop while using internet technologies and systems. In addition, taking measures by preparing an action plan against a risk and threat situation will reduce the degree of damage.

Information security is one of the most important elements in the use of internet technologies. It is as important as accessing the information, protecting this information and preventing its misuse. Preventing unauthorized access to confidential information and activities of businesses by other individuals, institutions or groups depends on the functioning of a series of protection measures (Güredin, 2014). One of the most necessary measures is to ensure the security of the internal control systems in the information technology database of the enterprise. Information technologies used by businesses should be frequently audited and controlled (Gallegos and Manson, 2006). Acting confidently that information is securely stored and protected is vital for businesses (Demir Yalkın, 2011; Özbilgin, 2003:123-125). This protection is provided by the state as well as by various laws. The most well-known law among these laws is the Personal Data Protection Law. KVKK, which entered into force in Turkey in 2016, protects the fundamental rights and freedoms of individuals during the use of personal data, as well as regulates the obligations of businesses in this regard and the procedures and principles that they must comply with (Özcan and Bircan, 2023:749-753).

10. CONCLUSION

The age of digital revolution, as a result of the developments in the field of computer and information processing, the Metaverse universe is becoming a subject with different effects on daily life. It is possible to mention a few sample scientific studies and researches in different fields related to Metaverse, which has evolved from the physical world to creating a digital world with the concepts of virtual reality and augmented reality.

Mete (2022) examined the studies on Metaverse technologies and kept a projection for the future. Thus, Metaverse revealed the social and economic impact areas of technologies. Güler and Savaş (2022), using the descriptive research model, examined the studies on the Metaverse in the last 20 years. As a result of their study, they found that studies on Metaverse increased especially after the pandemic, and Metaverse technologies were used especially in the game industry and applied to an increasingly diversified area. Mystakidis (2022) sought to raise awareness about the origin and possibilities of the Metaverse in order to formulate a unified vision for Metaverse powered online distance education.

Izani et al. (2022) tried to identify potential opportunities and challenges that could benefit Metaverse technologies and design. To this end, they reviewed visual design areas and potential targets. In a different study, Özdemir et al. (2022) changed the name of Facebook, which is considered as a social media giant, to Meta in October 2021, and in addition to explaining its vision regarding the Metaverse, the interest in Metaverse technologies and this field increased and became a new focus. has arrived. This development has led to the acceleration of studies in the Metaverse field since 2021. The production of scientific studies in order to understand, explain, observe and analyses the Metaverse concept and the developments experienced in the business world is also gaining momentum.

Metaverse represents a virtual reality space that intertwines with the physical world, allowing users to interact and relate to digital content and experiences. Businesses can leverage the capabilities of Metaverse to create innovative business models, expand their reach and engage more deeply with customers. The use of Metaverse technologies in strategic planning and decision-making processes will increase the level of benefit to be obtained. They should assess the compatibility of the information systems used, the risks associated with data management and security, and invest in training programs to ensure that employees can use Metaverse effectively. In addition, businesses need to take ethical considerations and the protection of privacy seriously to

maintain trust and transparency. In addition, it should be examined how the innovations brought by Metawerse technologies affect the management strategies, workforce dynamics and data security of enterprises and what difficulties they bring.

When the literature review and the examined mataverse platforms are observed in the study, it is seen that businesses are directly affected by Metaverse technologies in their strategic planning and decision-making processes, and this situation will continue to progress rapidly. In order for businesses to control and manage these developments that will shape many of their activities, they need to update their management information systems and make them suitable for Metaverse-based technologies. In addition, in order for the transformative effect of Metaverse to be felt and widely felt in society, it must be good real-time, accurate, consistent, reliable. For the realization of these criteria, sufficient capabilities regarding network and hardware infrastructure should be expanded. Moreover, both hardware and software sides need to be well modeled and implemented. Another sensitive issue is the precautions to be taken and the activities to be carried out regarding data storage and confidentiality of this data.

Virtual addiction, cyberbullying, ethical and other psychological factors should be considered in all aspects in this new universe, which will be used by large masses and where there is a huge market volume in the economic sense. With well-designed standards and the right positioning of privacy and security principles, Metaverse can turn into a useful and indispensable tool for humanity.

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