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İŞ MODELLERİNDE YAPAY ZEKA KULLANIMINA DAİR KURAMSAL TARTIŞMA

Ayşe Meriç Yazıcı [1]

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Özet

Yapay zeka geliştikçe ve günlük hayatımızda daha yaygın hale geldikçe, kullanım alanı artmaktadır. Yapay zekanın yaygın olarak kullanıldığı alanlardan biriside işletmelerdir. İşletmeler arasında büyük bir rekabet vardır ve her işletme kendi alanında en iyisi olmak istemektedir. Birçok başarılı şirket, kendi işlerinde daha fazla bilgiye erişmek ve daha verimli müşteri veri tabanı oluşturmak istemektedir. Bu anlamda, işletmeler, yapay zekanın otomasyon, büyük veri analitiği, makine öğrenme ve derin öğrenme gibi özelliklerini kullanmaktadır. Yapay zekayı kullanan işletmeler ürünlerini yönetebilir, hizmetleri otomatikleştirebilir ve müşteri verileri ile proaktif olabilirler. Bu makalede, işletmelerin dijitalleşen dünyada yapay zekayı nasıl kullanması gerektiği ve yapay zekayı kullanan işletmelerin ne gibi faydalar sağlayabileceği teorik olarak değerlendirilmiştir.

Anahtar Kelimeler: Yapay zeka, işletme, dijitalleşme.

Jel Kodları: MO, M1

A THEORETICAL DISCUSSION ON THE USE OF ARTIFICIAL INTELLIGENCE IN BUSINESS MODELS

Abstract

Nowadays, artificial intelligence has been continuously advancing its technology and constitutes a more significant part of our lives. As a result, it has become more dominant in business world where the competition is fierce, and every enterprise aims at thriving in its own field. Successful companies are considered the ones with a capacity to access and control more information and the ones with a more efficient database. Hence, artificial intelligence offers a competitive advantage to the business enterprises thanks to its use in automation, big data analytics, machine learning and deep learning. Thanks to AI, businesses can manage their products, automate services, and be proactive with customer data. This article theoretically evaluates how businesses should use artificial intelligence in the digitalizing world and what benefits artificial intelligence can offer.

Keywords: BIST Food, Firm Performance Ratios, Panel Data Analysis
JEL Classification: MO, M1

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1. Introduction

Artificial intelligence is a leading technology trend today since it allows computers to solve complex problems as humans do. Technologies such as big data, cloud computing, the internet of things, blockchain and artificial intelligence are changing our life quality as well as the way we work. Artificial intelligence supported applications range from digital assistants, image processing applications, real-time translation services, driverless vehicles to personalized product recommendations. These technologies contribute to the development of Hyper-automation and hyper-connectivity of Industry 4.0. However, developments in artificial intelligence are the main key point of all other technologies as well as Industry 4.0. In this context, artificial intelligence will facilitate human-machine interaction and change the functioning of current business models (Park, 2017). The reshaping of organizations, industries, markets and societies, the emergence of innovative ecosystems and new business models include the role of open, collaborative and user-focused innovation as a driver of the adoption of AI-based technologies (Brodoni & Zaninotto, 2018).

In addition to this transformation, AI allows all production steps to be tracked, recorded, and analysed to so that problems in the production process can be identified and resolved, including problems unfamiliar to humans. As the driving force of digitalization, artificial intelligence is expected to challenge and transform some fundamental axioms and assumptions underlying the innovation process and management (Tekic et al., 2019).

Artificial intelligence is an intelligent system created to use data, analysis, and observations to perform specific tasks without programming and represent the most important technological development. Companies such as Tesla, Amazon, Google, Alibaba, UPS and Uber, and many others have used artificial intelligence as a competitive advantage to innovate their business model. Since senior managers need to adopt an entrepreneurial and innovative mindset, the use of artificial organization can contribute to their survival by offering a competitive advantage (Lee et al., 2019).

This study examines how artificial intelligence affects and transforms businesses because it is the key to developing technologies. The study will initially focus on understanding artificial intelligence and its two essential components - machine learning and deep learning. The rest of the study will address the digital platform business model, future trends in optimization, innovations in artificial intelligence business models, business model data challenges, and business model digital transformation. Finally, these all will be followed by a conclusion.

2. Understanding the Concept of Artificial Inteligence

Artificial intelligence is one of the most important issues discussed by different disciplines today with the advancement of technology. In general, artificial intelligence is a concept that aims to produce devices capable of learning, sensing, communicating, reasoning, using, and relocating historical information (Bayuk, 2019). Artificial intelligence refers to the simulation of human intelligence in machines programmed to think like a human and mimic human action. The ability to rationalize and perform actions that have a good chance of achieving a specific goal is the main feature of artificial intelligence. Artificial intelligence is a part of computer science that focuses on automating intelligent behaviours such as learning and problem-solving. Learning and adaptation, information representation,

language processing and speech, synthesis and image understanding, autonomous intelligent agents, robots, cognitive modelling and mathematical funding are the main areas of use of artificial intelligence (Demir, 2021).

They are unique technologies processing artificial intelligence, machine learning, natural language processing, perception, and reasoning (Nadimpalli, 2017). Artificial intelligence also means the software, algorithms, systems, or machines that make up artificial intelligence. In general, artificial intelligence is a technology used to indicate a set of tools that can increase the intelligence of a product, service, or solution (Shankar, 2018).

Artificial intelligence is a method that uses a data set to determine the correct value. AI is also not an end that will eliminate the role of human employees. Instead, it is a tool. There is a big gap between the rapidly growing number of companies operating on AI and the much smaller number of AI companies in production. When used and applied by businesses, Artificial intelligence provides significant financial gains in terms of sales and employment. For example, Starbucks is seen as an artificial intelligence pioneer with 15-17% growth in the last two years, despite only 8% store growth (Allam, 2016).

Using AI-based applications in businesses can be used to store data requirements or to control databases. Businesses with efficient artificial intelligence can quickly detect pre-employment cases and resolve possible errors. Businesses with AI can also discover new business meetings or other mixed data. It can also find information and predict the following outcomes for offers, promotions and functional exercises. Similarly, large companies can use AI technology to completely transform machine self-management nodes, surface enhancements, front-end applications, and data technology (Whig, 2019).

Artificial intelligence is a technology similar to human intelligence created with the help of computer programs. It is a concept that started the Fourth Industrial Revolution and needs to be addressed with an interdisciplinary approach. Within the scope of the concept of artificial intelligence, approaches such as machine learning and deep learning are reshaping data analysis (Önder, 2020). The main element in these definitions is the intelligence of machines. The phrase "intelligence of machines" is the most accepted and commonly used expressive phrasing in the literature. In addition, it is possible to explain the concepts of machine learning and deep learning - the subcategories of artificial intelligence- within the definitions of machine intelligence. Artificial intelligence emerged in 1950-1980, machine learning in 1980-2006, and deep learning between 2006-2017. Thanks to these concepts developed within the artificial intelligence framework, such applications as search suggestions, voice recognition, virtual assistants, and image recognition can be developed and used (Ercan, 2020).

2.1. Machine Learning

Machine learning refers to the paradigms capable of making predictions about the unknown by creating algorithms that can make inferences from the existing input data to solve the machine or software's problems. The concept of artificial intelligence is about the ability to learn. Machine learning is computer algorithms capable of modelling a problem based on the data relating to that problem. Although machine learning algorithms are not explicitly programmed to perform a given task, they work with statistics-based logic based on predictions to make decisions (İnce et al., 2021).

Machine learning has always been at the heart of artificial intelligence research (Maithili et al., 2012). Artificial intelligence is a broad field of research, and thus it needs to be discussed in such a broader context as understanding rational thinking and acting patterns. Most AI research sees rational thinking and acting as prerequisites for intelligent behaviour. Like the prediction-result-behaviour cycle suggested as an abstract model in business processes, artificial intelligence works on rational thinking, forecasting, acting within the decision and action cycle. These activities are intertwined in complex ways, and many of these cycles overlap in human behaviour. However, these activities should be considered individually for a deeper understanding to contribute to the development of supportive and automating technologies (Koehler, 2018). Machine learning is a subcategory of artificial intelligence in which the machines use acquired information to make predictions through inferences.

2.2. Deep Learning

Deep learning, also defined as hierarchical learning or deep structured learning, is a part of a large family of machine learning techniques based on learning data representations, unlike traditional methods (Doger & Kurgun, 2021). In deep learning, there is a structure based on learning more than one feature or data representation. Top-level properties derive from lower-level properties, creating a hierarchical representation. This representation learns multiple levels of representation corresponding to different levels of abstraction. Essentially, deep learning is based on data representation (Şeker et al., 2017). Deep learning is used in image acquisition, natural language processing and object detection. The purpose of deep learning is to get a good generalization. It is unnecessary to find the global minimum, but it is expected to find the closest result to the solution in a reasonable time. It achieves the result with optimization algorithms (Seyyarer et al., 2020).

Thanks to advancements in forecast performance as foreseen by deep learning, computed personal assistants such as Apple's Siri, Amazon's Alexa, Google Now, or Microsoft's Cortana heavily use deep neural networks. In 2016, Microsoft released a speech recognition system that can spell spoken words almost as accurately as professionally trained people. In 2016, Google launched an update to its translation system that uses deep learning to improve translation accuracy and get closer to human performance. Deep learning is in natural language processing and image classification, object detection, object localization, and image rendering. Alipay has introduced a mobile payment application in China that allows more than 120 million people to use facial recognition. This technology was rated as one of the ten breakthrough technologies of 2017 by Technology Review. In addition to these applications, deep learning has also been successfully applied to recommendation systems. In this context, both Amazon and Netflix use deep neural networks for personalized product recommendations (Kraus et al., 2020).

3. Future Trends of Digital Platform Business Model Optimization

The proliferation of digital technology has revealed the critical role of a platform in the innovation process and has made it the central focus of innovation activities in many companies (Ruggieri et al., 2018). A digital platform provides a fundamental function to a technological system and serves as a foundation for developing complementary products, technologies, or services (Asadullah et al., 2018). Digital platforms consist of three essential features: (i) being technologically mediating, (ii) enabling interaction between user groups and (iii) allowing these user groups to perform their defined tasks (Bonina et al., 2021).

The digital platform should become the critical tool for regional economic growth in current conditions. In the context of digital transformation, the digital platform concept should be understood as a hybrid, multifunctional virtual platform for the interaction of a wide range of socio-economic relations issues, which are interested in achieving common goals based on the application of multimedia interactive communication.

The use of artificial intelligence technology to store and process large amounts of data can provide a mutually beneficial creation process for commercial and non-profit organizations and public authorities (Bekbergeneva, 2020).

Software technology rapidly affects new business models, organizational culture, platform scaling, purchasing behaviour and communication trend.

The advancement of new information and communication technologies such as big data, cloud technology, the internet of things and artificial intelligence, their continuous in-depth applications in enterprises contribute to the development of smart production. Simulation optimization and scheduling in smart businesses are efficient in practice. AI also has a big role in the new business modelling and digital platform business (Mishra & Tripathi, 2021).

4. Innovations in Artificial Business Model

AI has become a dominant force in various industries and as a result, it has created a drastic impact on business models. Business models consider artificial intelligence as a tool and enable paradigmatic changes in business practices (Burström et al., 2021).

As AI becomes more common in the future, all stakeholders will likely learn about AI's positive and negative aspects. For example, in research in the manufacturing sector, artificial intelligence in automation/robotization and product development, visualization systems will try to find out how to predict and discover and learn the radical use of solutions. In addition, businesses need to understand how they can transform business models and innovate by placing artificial intelligence capabilities at the heart of their business process (Sjödin et al., 2021).

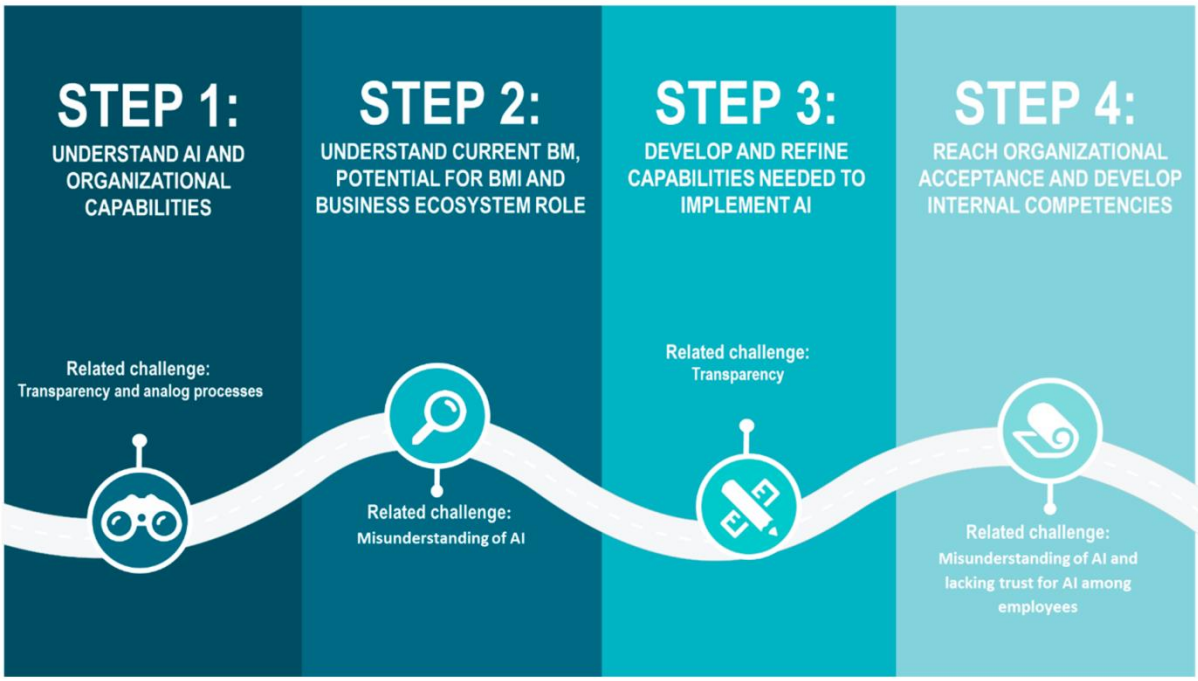

Figure 1. Roadmap for the implementation of the artificial intelligence business model

Source: (Reim et al., 2020: 187).

Artificial intelligence is a tool for businesses to perform various tasks. The use of artificial intelligence varies in several fields, such as recruiting new employees, underwriting, organizing complex logistics processes, diagnosing patients, advising customers on finance, and predicting technological developments. Artificial intelligence in businesses provides real-time, practical and active support to decision-makers, especially in the information processing process. Artificial intelligence demonstrates task performance through various systems such as machine learning, automatic reasoning, knowledge repository, image recognition, and natural language processing processes. This task performance process involves taking task input, processes, and output. Artificial intelligence needs qualified data as input to automate organizational tasks.

Systems need perfect data to learn task performance from their experiences and to receive feedback from their environment (Ünal & Kılınç, 2020).

4.1. Business Model Data Challenges

Artificial intelligence is rapidly taking its place in the digital world and is becoming the beating heart of all sectors. From Siri to Tesla's self-driving cars to video games to Google's fast-learning artificial intelligence, it has been revolutionizing a myriad of industries. Artificial intelligence analyses countless data on a business's servers, ranging from reducing market risks to improving customer service through virtual personal assistants. Artificial Intelligence uses data mining, pattern recognition, and natural language processing to take advantage of self-learning systems. Therefore, in terms of significant business advantages over human intelligence, artificial intelligence is highly scalable and relatively cost-effective for business enterprises. In addition, the consistency and rule-based programs of artificial intelligence allow businesses to minimize their mistakes (Kitsios & Kamariotou, 2021).

4.2. Business Model Digital Transformation

Companies in various industries use AI to transform their business strategies, business models and value creation processes (Teece, 2018). In recent years, artificial intelligence has penetrated many sectors such as manufacturing, logistics, financial markets (Truby et al., 2020). Artificial intelligence also offers a value proposition based on developing solutions for consumer behaviour to change both the inside of the market and the geographic location of stores by offering solutions to businesses to increase their turnover (Grewal et al., 2017). While the financial sector pioneered artificial intelligence to assess the possibility of fraud and reduce the consequences (O'Leary, 1995), urban planning and infrastructure development, collecting data on urban traffic, then analysed using artificial intelligence solutions and urban solutions in response to emerging needs. Artificial intelligence can benefit industries in many areas, including autonomous vehicles that offer suggestions for adapting infrastructure (Nallaperuma et al., 2019).

The use of digital technologies is leading to the emergence of a digital business, including the development of new business models that combine the physical and digital worlds (Nosova et al., 2020). Technologies such as big data, industrial internet, sensors, robotics, and artificial intelligence are central to digital businesses. The digital business has also influenced the emergence of an era of dramatic technological changes.

Digital transformation permeates all areas of economic activity through the introduction of advanced and often convergent technologies. Therefore, digital transformation aims to take advantage of digital opportunities to transform the traditional business into a leader in the digital economy. In digitally advanced industries such as Netflix, Uber, Google, and Airbnb, digitized, open and collaborative business models have been successfully developed and deployed in a unified ecosystem of producers and consumers (Sushkova et al., 2021).

Internet is used today by connecting all technologies with devices. The use of the internet in every technology has taken its place in businesses. Businesses have a chance to collect data and put it in the cloud and reinvent it as thinking in the digital revolution. In the coming years, it will be more likely to see self-motivated businesses with fast markets, increased returns and customers who are knowledgeable and aware. Accordingly, artificial intelligence can provide better products and more users, thanks to its capacity to generate more data, which is shown as a cycle (Mishra & Tripathi, 2021).

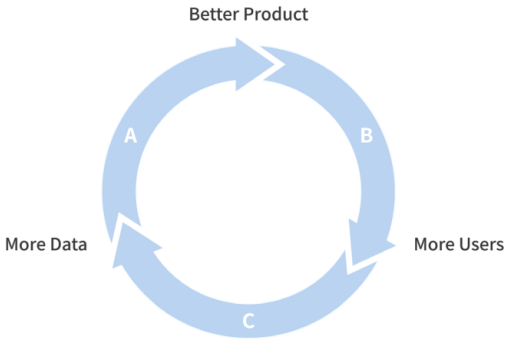

Figure 2. Cycle of AI

Source: (Mishra & Tripathi, 2021: 12).

A better understanding of the characteristics of artificial intelligence will form the basis of the plan for future applications. The aim here is to establish a conceptual framework for the use of artificial intelligence and evaluate businesses' capabilities. In addition to sound market research, research and development projects can be valuable for assessing the risks associated with AI. It will provide a further basis for identifying risks, challenges, and commitments to reduce them (Reim et al., 2020). The use of artificial intelligence in business applications is advancing rapidly.

Table 1. AI in Business Statistics

52% of executives say AI tools have boosted productivity.
48% of respondents handle data quality issues by using data analysis, machine learning, or AI tools.
25% of business executives state that adopting AI technology has fully enabled their business processes.
50% of business executives said that using AI has helped them achieve their cost savings goal.
53% of businesses have innovated their products and services using AI technology.
54% of company executives agree that AI plays a significant role in improving the decision-making process.
67% of US-based companies agree that adopting AI technology has helped them create better customer experiences.
86% of executives claim that AI is going to be a “mainstream technology” at their companies in 2021.
Falling behind AI adoption is one of the major concerns among 12% of CX leaders and 11% of mainstream companies in 2020.
39% of large organizations planned to invest in AI and/or machine learning tools in 2020 compared to 28% of mainstream companies.
39% of large organizations planned to invest in AI and machine learning in 2020 compared to 26% of mainstream organizations and 28% of CX leaders.

Source: (Finances Online Review for Business, 2020).

Businesses that use AI to solve problems are generally more productive and efficient. It is predicted that by 2035, businesses using artificial intelligence will double the economic growth rate and increase labour productivity by up to 40%. The following items are related to the benefits of using artificial intelligence (Verbeek & Lundqvist, 2021).

• Artificial intelligence accelerates decision making and enables early detection of the problem.

• AI can also enable more accurate decision making by detecting anomalies or long-term trends that are not easily detected by other methods.

• Artificial intelligence provides higher efficiency through automating manual processes

• Artificial intelligence can facilitate the automatic generation of machine-readable legal and compliance

documents and reduce the time required to prepare and analyse such documents.

• AI can also enable automatic language and speech recognition. In practice, businesses can use this functionality to deploy chatbots, thus reducing the time employees spend on calls.

5. Conclusion

Artificial intelligence has a wide range of uses in the business world. Artificial intelligence is a supporting tool rather than a replacement for human intelligence and creativity. Although artificial intelligence has some difficulty producing solutions to problems in the physical world, it can process and analyse any data faster than a human brain. Every future-oriented business must understand artificial intelligence and have an artificial intelligence strategy. Businesses with an understanding and strategy of artificial intelligence can achieve high goals and gain substantial competitive advantages. Artificial intelligence has many benefits and applications in the business world. It powers customer service, provides cybersecurity defence, analyses data, assists customer service, lowers energy costs, forecasts sales, and helps businesses become customer focused. Artificial intelligence will become more fluid and faster as its new technologies evolve in the coming years. Since AI offers unlimited benefits, the sooner they initiate the transition, the more competitive advantage they can retain.

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İŞLETME VE DENEYİM EKONOMİSİ KAPSAMINDA METAVERSE'E BAKIŞ

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Özet

Zuckerberg 'Horizon' projesini duyurduğu andan itibaren, metaverse hakkında en çok konuşulan konu oldu. Metaverse görece yeni bir kavram olması sebebiyle, işletme literatüründe halihazırda çalışma bulunmamaktadır. Bu çalışmanın amacı, metaverse evreninin işletmelere sunabileceklerinin bir analizini sunmaktadır. Metaverse, DNA'sında XR, yapay zekâ, 5G, kriptopara ve NFT bulundurmaktadır. Metaverse kavramını detaylı bir şekilde kavramak için, bu bileşenlere kavramsal çerçeve bölümünde değinilecek ve ardından metaverse fikrinin tarihi ve ardındaki motivasyon ele alınacaktır. Çalışmada, inovasyon, yayılım ve Mavi Okyanus stratejileri açısından metaverse endüstrisi değerlendirilecektir. Metaverse'in yeni bir işletme alanı olduğu dikkate alınırsa, bu alandaki ana oyuncuların, potansiyel endüstri olarak sahip olduğu güçlü ve zayıf yönlerinin, sunduğu fırsatların ve teşkil ettiği tehditlerin tanıtıldığı ve potansiyel pazarlama stratejileri ile deneyim ekonomisindeki rolüne değinildiği bir çalışma işletme literatürünün faydasına olacaktır. Metaverse, sunduğu değer önerisi ile bilgi çağını sanal çağa dönüştürmek üzere hazır bulunmaktadır. Bu nedenle, bu çalışma literatürdeki talebi karşılamanın yanı sıra metaverse ekosistemi için nöro-deneyim pazarlaması denilen yeni bir pazarlama kavramı da öne sürmektedir.

Anahtar Kelimeler: Metaverse, deneyim ekonomisi, nöro-deneyim pazarlama

JEL Kodu: Z30, Z33

AN INSIGHT INTO METAVERSE IN TERMS OF BUSINESS AND EXPERIENCE ECONOMY

Abstract

Since Zuckerberg's announced his project 'Horizon', the word 'metaverse' has been trending. Metaverse is a relatively new concept and hence, business literature currently lacks study on metaverse. This work plans to contribute to business literature through an analysis of metaverse business and what it offers. The DNA of the metaverse is composed of XR, artificial intelligence, 5G, cryptocurrency and NFT. To provide a thorough perception of metaverse concept, its components are introduced in the conceptual framework following an introduction into metaverse's history and the motivation behind the concept. This study will evaluate the metaverse industry in terms of innovation, diffusion, and Blue Ocean strategies. Considering metaverse is an emerging business field, business literature will benefit from a study introducing the key players in the business as well as this potential industry's strengths, weaknesses, opportunities, and threats in addition to potential marketing strategies and its role in experience economy. Metaverse is here to transform the information age into virtual age with its value proposal. Therefore, this study will meet the demand on metaverse in literature and suggests a new marketing concept for metaverse ecosystem called neuro-experience marketing.

Keywords: Metaverse, experience economy, neuro-experience marketing

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1. INTRODUCTION

The 20th century had been through a radical change when the internet was introduced to the world as the product of a considerable research development project. It transformed not just the physical world but also the world of business and finance. Since then, it has been playing a major role in any industry varying from defence to foreign trade.

Now, the first quarter of the 21st century is about to expand that technology to create a more immersive experience called "metaverse". This ground-breaking technology will have a similar impact to that of internet; yet even greater. It offers to be the next step in human knowledge in the information age. With the advent of metaverses, humans will not only access to information but also will live in information systems.

Metaverse and its key components will help humanity to step out of information age but into a new age. This new age might be called virtual age, an age of technology in which AR, VR, XR tools will peak thanks to 5G and artificial intelligence.

In order to understand this new age better, one must comprehend what metaverse is and what it offers for the future of business. Following chapters will handle the concept of metaverse within that respect.

1. Conceptual Framework

This section focuses on introducing the concept of 'metaverse' as well as the technologies it relies on. For a proper evaluation of its market potential, it is important to understand how and why the concept of metaverse emerges.

Metaverse is a virtual universe bringing several cutting-edge technologies together to create an immersive experience for the users. Its DNA is consisted of XR, artificial intelligence and 5G for virtual experience and NFT and Cryptocurrency for exchanging goods. A familiarity with these concepts and their market size will enable a better comprehension of metaverse market. As a result, the section will also provide a briefing on these key components.

1.1. Metaverse

Throughout history, humanity has been interested in recording and collecting knowledge since knowledge has always been regarded as the greatest power. The oldest known library in the world was created around 7th century BC in Koyuncuk by Ashurbanipal, the ruler of Assyria and Babylonia and it is assumed to have at least more than 26.000 tablets (Fincke, 2003).

Centuries later, when Alexander the Great wanted to be a world-leader and build a city at the heart of the world; he filled his capital with books to attract scientists all over the world. He designed a city of learning and culture, home to one of the most well-known libraries in history – the Library of Alexandria (Trumble, 2003). Access to knowledge became so important and reputable that the competition soon

started. The library of Pergamum emerged as a rival and suddenly, there was a larger market for papyrus and data. Libraries meant branding for these nations, so the competition became truly fierce when Cleopatra was given 200.000 scrolls from the library of Pergamum by Mark Antony (Canfora & Coleman,1999). Since scrolls from libraries were considered as politically important and valuable gifts, libraries started to play even a larger role in nations as a sign of civilization and growth.

Humanity's desire to know-it-all and to have-it-all eventually gave birth to its first unique creation: a network surrounding the seven continents. Thanks to this new technology, information has been no longer bound to geographical borders. It has now been accessible anytime anywhere. This is the world's first 'global information universe' (Berners-Lee, Cailliau, Groff & Pollermann, 2010: 461) – the worldwide web. This network soon spread its webs everywhere in the physical world. So far, it has helped building the most comprehensive data source ever known and it has been the crown jewel of human civilization.

The worldwide web started a new era in our history, triggering a digital revolution called Industry 4.0 where internet technologies are brought together with future technologies through smart objects to create more efficient production line and manufacturing process (Lasi, Fettke, Kemper, Feld & Hoffmann, 2014).

This trend was followed by another digital breakthrough: the Internet of Things. With digital age creating new opportunities for the smart objects, physical objects were integrated into information technologies so that everyday objects could communicate with one another (Weber & Weber, 2010).

Once man discovered that he is able to design information universes between objects, he wondered whether it would be possible to design more immersive universes for humans, as well. Thanks to improvements on XR, artificial intelligence and 5G technologies, scientists were able to create more realistic small worlds for humans to interact. Soon, they wanted to merge all these virtually realistic worlds into a universe: A universe that is similar to ours in terms of immersiveness but the one that is beyond the physical universe. The term 'metaverse' refers to this ambition to go beyond the physical universe. And this is how the information age is about to transform into virtual age.

Although it is a relatively popular term, it has been on the market as an idea for more than decades. The concept was first coined in 1992 by the science fiction author Neal Stephenson's Snow Crash with its own branding name "Street" (Stephenson, 2003) and later as the "Oasis" in the dystopian novel Ready Player One by Ernest Cline (Nordstrom, 2016). The idea found its true awakening when Hollywood launched such movies as Matrix, the 13th Floor and Vanilla Sky. Ever since, designing a life-like world has been one of the challenging dreams computer engineers and scientists felt obliged to realize.

Gaming industry has had its efforts to design virtual worlds for some Massively Multiplayer Online Roleplaying Games where the players can also socially interact with one another and do not hesitate to spend real money on virtual goods, tools, and devices either for their avatars or for moving onto the next level in the game. Second Life and Project Entropia are some of the finest examples (Schermer, 2007).

Nevertheless, it was the Mark Zuckerberg who placed the term at the top of every meeting agenda when he announced his project "Horizon" during Facebook's virtual Connect conference in 2021 (Roose, 2021).

Metaverse can be described as the virtual internet experience combining XR, artificial intelligence, 5G, NFT and cryptocurrency to create a more immersive experience for the users. This next generation internet technology not only removes the geographical boundaries for experiences but makes the information more accessible than ever. In layman's terms, it can be defined as an information technology system enabling the exchange of information between multiple virtual worlds within a larger virtual system, the universe. It is a universe with its own laws of physics, its own currency, and its own non-physical existence. This project of mimicking our universe in a virtual platform will certainly be widely used, not just by individuals but also by commercial users. Therefore, it is wise to assume that any business enterprise with a website address right now will feel obliged to exist in the metaverse. They will be opening stores, establishing virtual headquarters, having new branches, holding trade events and exhibitions, exchanging products, doing advertisement campaigns, and having business meetings within the non-physical virtual universe.

In a foreseeable future, existence in metaverse will offer competitive advantage as knowledge is still the greatest power. The companies interested in stepping into the metaverse has no choice but to invest in knowledge because it is the research and development that will enable the creation of humanity's next library of Alexandria.

Just like libraries and internet, metaverse will offer power to those who seek for it. It will add value to not just companies but also human interaction. It will be the ultimate signature product of civilization. And if it becomes successful, it will have destructive impact on the industries and change the way people do business.

According to Christensen (2013), in order to launch a destructive innovation, one must find a market to which it can add value. Thus, it might be safe to estimate that metaverse has a potential to transform into a destructive innovation if it ever reaches the same level of diffusion as the internet.

However, in Facebook case, metaverse might also be evaluated as a value innovation following Blue Ocean Strategy. The strategic approach to value innovation suggests sailing in the untapped waters when it is impossible to exist in the competitive market (Kim & Mauborgne, 2005). Considering Facebook's multiple failure to ensure user security, it might be possible to assume that the brand was no longer capable of competing in the competitive waters and it was time to set sail for the untapped waters. According to a report from Edison Research and Triton Digital (2019), Facebook lost its users to Instagram and Snapchat. While 58% of 12- to 34-year-old users preferred Facebook in 2015, this figure dropped to 29% within mere four years.

The brand also had several data breach, which initially cost the customer loyalty for the Zuckerberg's company – especially when 533 million Facebook users' data from 106 different countries was breached (Stokel-Walker, 2021).

However, there are others in the metaverse business who have already adopted the idea and even started to pave the way for it as the innovators and early adopters such as Second Life and Decentraland- each of which is currently a major player.

As an innovation, metaverse's success depends on its diffusion strategy for the future. Like any other innovation, its success will be determined by five criteria set by Rogers (2010). First of all, metaverse needs to be relatively advantageous over its competitor. In other words, it needs to create a relative advantage with its predecessor, the world wide web. It also needs to offer a relative advantage to users such as the idea of a virtual life better than the real one. It also must be compatible with current technologies and information systems. This will enable a smoother operation and contribute to its diffusion. Yet, it also needs to be compatible with universal values so that it can be adopted by a larger number of users soon. Complexity is also crucial. It needs complexity both to enhance immersive experience for the users and not to be imitated by the competitors very easily. However, it should balance this complexity in such a fine tuning that it remains user-friendly. It needs to be triable and observable since creating an immersive model of the physical universe will require expensive research and development studies. If potential users could experience the metaverse themselves or if they could see others experience it successfully, this will enhance its diffusion.

1.2. DNA of Metaverse

Just as the origin of life depends on the formation of co-dependent biological molecules in the form a three-dimensional helix (Pray, 2008); Metaverse relies on the co-existence of some technologies to operate as a three-dimensional life-like database. Its existence is dependent on such technologies as XR, NFT, artificial intelligence and cryptocurrency to operate. In the biological database DNA, hydrogen bonds are used to keep the molecules intact (Pray, 2008). In metaverse, 5G fills in that role by connecting the technologies in a virtual environment.

Technologies playing a role in formation of metaverse's DNA are introduced below to clarify how the building blocks of metaverse works.

1.2.1. XR

XR stands for extended realities offering immersive experiences. It is a term comprising a wide range of technologies such as virtual reality, augmented reality, mixed reality, augmented virtuality (Kwok & Moh, 2020). It is almost a decade-old technology introduced to the world with Oculus Rift VR headset prototype, followed by Microsoft's HoloLens headset. However, it became truly immersive and popular when Pokémon GO was brought into game. Because of game's success, business enterprises decided to adapt the mainstream technology into their marketing strategies such as IKEA Place app (Marr, 2021). When Covid-19 hit the world, XR technology helped the tourism enterprises survive the pandemic with its innovation through creative destruction (Kwok & Moh, 2020). With a market size of $26.05 billion in 2020; the XR market will have already be around $905.71 billion by 2027; which accounts for a compound annual growth rate of 66.02% from 2021 to 2027 (Businesswire, 2021).

1.2.2. 5G

5G is a fifth-generation wireless cellular communication network which will enable data transfer fast enough to support the use of previously unavailable applications such as virtual reality and driverless cars (Childres, 2021). Since its value chain is estimated to reach $3.5 trillion dollar in 2035, with $12.3 trillion of global economic output; its contribution to global GDP will match that of Indian economy (Campbell et al., 2017).

1.2.3. NFT

NFT stands for non-fungible tokens which can be used to trade with the rights for digital or physical assets via unique certificates of authenticity; therefore, it can be defined as technology based on blockchain and smart Ethereum contracts for creating not currencies but assets with unique values (Ante, 2021). This emerging technology is expected to make breakthroughs in gaming industry, virtual events, and protection of digital collectibles (Wang, Wang & Chen, 2021). Currently, it has a quite active market. The sales volume for this crypto asset reached to $10.7 billion from July to September 2021 (Howcroft, 2021).

1.2.4. Artificial Intelligence

Artificial intelligence is a technology enabling computers think, act, learn, reason and self-correct like humans would. The technology aims at creating computers capable of learning from and adapting to the environment so as to function more effectively. For a computer to be considered artificially intelligent, it must learn from its surroundings, store that information, reason through it while communicating with a human in a natural use of language (Kok, Boers, Kosters, Van der Putten & Poel, 2009). According to Grand View Research report (2021), the current market size of AI technology is $93.53 billion in 2021 and it is forecasted to have an income of some $997.77 billion by 2028.

1.2.5. Cryptocurrency

Cryptocurrency has a controversial definition due to its complex nature. It concurs with real money in terms of function. Yet, it differs in flexibility. It is not bound to either geographical or political borders. The European Banking Authority (EBA, 2014) emphasizes its independence from a central bank whereas FinCEN (2013) underlines its lack of monetary attributes. Even the way it is obtained is unusual to any monetary fund. Unique to its own nature, it is computed and manufactured.

Despite the lack of consensus on the definition, cryptocurrency is fine example of Christensen's disruptive innovation as it is a game changer with a potential to shift the balance and to trigger the emergence of new markets (Christensen, 2001). It has a market over $3 trillion now and is expected to grow even more (Ossinger, 2021).

2. Metaverse in Business

Since Mark Zuckerberg announced his metaverse project "Horizon" (Roose, 2021); there has been some significant business activities.

- Nike, the famous sportswear brand, created a metaverse world called NIKELAND where participants can play miniplays such as speed runs or long jumps designed by the creators using NIKELAND tool kit so that visitors will be physically active. Players can visit NIKELAND free of charge and are able to select sportswear from NIKE's collection for their avatars (NIKE, 2021)
- Microsoft launched a metaverse museum for the 20th anniversary of its Xbox consoles where visitors can explore the museum by selecting an Xbox console and learn Xbox's history (Warren, 2021).
- Pokemon Go creator Niantic stated that the company raised $300 million to build a real world metaverse (Adebajo, 2021).

These investments point out that more companies from technology and fashion industry will be flocking into the metaverse soon.

To exist in a metaverse, companies usually seek help from the more experienced metaverse creators. These Californian technology tycoons are current players and leaders in the industry: Roblox Corporation, Unity Software Incorporated, Fastly Incorporated, Autodesk Incorporated, NVIDIA Corporation. Although there are other metaverses available at the market such as Gather.town, Loom.ai, Teeoh, Virbela; Second Life, Roblox and Decentraland are the most notable ones.

Founded by Linden Lab – a San Francisco based company, Second Life is 'the world's biggest programming environment' offering a social environment as defined by Purbrick and Lentczner (2007). Established in 2003, Second Life had some 256k residents just in 4 years (Purbrick & Lentczner, 2007). It created a registered money service called Tilia in its 16th year and started its own virtual economy. Its value proposition is to make a difference in the world through respect, good intent, team building, diversity, and experimentation. Its CEO is Brad Oberwager who graduated from the MBA programme of the reputable business school Wharton in the United States (LindenLab, 2021).

The origin of Roblox dates to a page called Interactive Physics launched by David Baszucki – a Stanford engineering graduate- in 1989. The webpage's initial goal was to enable students learn Physics through experience. Baszucki decided to enhance the learner experience by creating a virtual platform where people can learn and share through experience, and he started Roblox in 2006 with a vision to connect people through shared experience (Roblox, 2021).

Founded by Argentine coders Esteban Ordano and Ari Meilich (The Irish Times, 2018), Decentraland is a virtual reality platform based on Ethereum blockchain. Its currency called MANA was almost about 1 billion dollars in 2021 and it can be described as virtual real estate market where users buy and sell lands over cryptocurrencies with an average land price of 1311 dollars (Dowling, 2021). Its concept is likely to be transformed into the real estate business in the metaverse future.

2.1. Strengths and opportunities

The market is already strong in the gaming industry. The Sandbox, Somnium Space and Cryptovoxels are some of the other platforms with their own cryptocurrencies (Morgan Stanley Research, 2021).

Metaverse offers innumerable opportunities to all industries from gaming to real estate, social networks to fashion. With Nike's entrance into the metaverse ecosystem, it is likely that more fashion companies, Nike's competitors, will be willing to be a part of that ecosystem. Sportswear aside, the metaverse business is an ideal marketplace particularly for luxury brands. First, since some luxury brands are not affordable to everyone, a segment of society will be willing to be engaged with the brand through a relatively more affordable metaverse products or lands. Secondly, luxury brands have customers with such a strong brand loyalty. Considering that 9 NFTs by the famous luxury brand Dolce & Gabbana were sold for almost $6 million, it is possible to foresee that luxury brand customers would be eager to shop in the metaverse ecosystem if offered collectibles. A report by Morgan Stanley (2021) forecasts that luxury groups participating in the metaverse ecosystem will have the opportunity to expand their market size more than 10 per cent.

So far, there have been several luxury brands who stepped into the metaverse ecosystem (Morgan Stanley Research, 2021): (1) Gucci's cooperation with a South Korean metaverse platform Zepeto to create a virtual villa selling products for avatar fashion, (2) Balenciaga's clothing line in Fornite, (3) Ralph Lauren's digital design sales with Zepeto and Bitmoji.

The music industry is also one of the potential markets for metaverse ecosystem. Ariana Grande and Muse are some of the artists whose concerts have been held in a metaverse platform (Morgan Stanley, 2021). These virtual celebrity events offer not only a great environment for advertising and product placement for the event sponsors but also a larger ticket sale since there is no travel restriction.

Metaverses may also open its doors to tourism activities. Those who are anxious to travel to undiscovered worlds or those who are physically or financially incapable of travelling to holiday destinations will be an ideal target audience for the virtual tourism companies in metaverse ecosystem. Space tourism, travelling to Mars are only for a small group of elitists who can physically and economically afford travelling. However, within a metaverse system, travelling to space, to the Moon or Mars will soon be available for everyone at the comfort of their home.

2.2. Weaknesses and Threats

Currently, the number of people who have comprehensive data on how to trade with NFTs and cryptocurrencies is limited. Therefore, it needs more time as a technology to transform into a business environment for small enterprises. Morgan Stanley Research report (2021) also suggests that this is currently a marketplace for luxury brands and since interoperability is years away, it will continue to remain as a marketplace for luxury goods for some time, as well.

As a platform, metaverse will probably be too difficult to comprehend for some generations. It is highly likely that baby boomers and generation X will not adopt the technology very quickly. Even, the

millennials might be late followers. Zoomers and Alphas is expected to be the early adopters. This could lower the market size for some brands unless they target the Alphas and Zoomers initially in virtual advertisement process. However, even the Zoomers may not be ready for a complete digital experience. This is also referred in a study by Wunderman Thompson Intelligence. Since the transition into metaverse ecosystem will still need some time, Wunderman Thompson Intelligence (2021) report suggest that shoppers are not ready to have completely digital shopping experience. According to the quantitative survey carried on 3,011 respondents from the UK, the US, and China in July 2021, 52% of Gen Z, 54% of Millennials, 54% of Gen X and 62% of Baby Boomers prefer to shop in person. Although the statistics point out to a correlation between older age and willingness to shop in person; the unwillingness to shop digitally is still more than 50 percent in all age groups.

Privacy laws and regulatory risks will also remain as a concern (Roose, 2021). Second Life has a contract recognizing user's property right for the avatar and virtual items. However, it is the only one (Roquilly, 2011). Metaverse companies may be facing with serious legal charges if their virtual properties or avatars are stolen or hacked. As the number of platform users increase, metaverse companies may need to expand their legal team in order to avoid financial losses. Ensuring the safety of cryptocurrency wallets may lead to extra costs. Therefore, financial strategies must be planned carefully.

Second Life has a contract recognizing user's property right for the avatar and virtual items. However, it is the only one. More metaverse platforms needs to embrace such contracts for a successful diffusion strategy.

3. Metaverse and The Experience Economy

Although there is no consensus on its definition, experience can be called a recollection of memories with an influence on people's decisions, thoughts, reactions, and identity. Therefore, it is necessary to define what memory is if the experience economy is to be defined.

Memory formation is a biological process. When exposed to a certain stimulus, neurons form new connections to store information and after remaining silent for some time, the information consolidated is stored for a longer period. This is how the experiences are formed in our brain. The hippocampus and neocortex in the brain are thought to oversee the process (Gravitz, 2019). Ekstrom and Ranganath (2018) put forward those experiences are classified into certain contextual categories thanks to space and time and hippocampus evaluates on its relevance. However, there are also engram networks all over the brain. Engrams are the memory tags, biochemical modifications in stimuli product that work like barcodes to trace memory (Semon, 1921). They are active or dormant but stable experience-induced long-term modifications resulting in retrieving the memory and adaptive behaviour when triggered (Josselyn, Kohler & Frankland, 2015). Consequently, memories are formed due to a complex systematic organization.

Despite not being completely understood, these complex memory-making mechanisms in our brain somehow cooperate to recollect all our memories to create experiences which have a deep impact on conscious and unconscious decision-making process. Therefore, in terms of experience economy, the word 'experience' refers to this cognitive reaction or impact triggered by an external stimulus (Pine &

Gilmore, 2011).

Coined by Joseph Pine and James Gilmore in 1999, the experience economy was put forward to suggest that companies can offer and sell more than mere goods and services and that experience is also something marketable and it has a financial value (Pine & Gilmore, 2011).

In the 21st century, experience can be more important to customers than goods and services. With the diffusion of social networking platforms, selfie museums opened in several metropolitan cities and many cafés and restaurants add selfie corners to attract more customers. A study by Mkwizu & Mtae (2018) refers to the correlation between selfie use and domestic tourism. Their research results reveal that selfies are used to promote domestic tourism and contributes to the diffusion of service and tourism industries. Exchanging travelling and dining experience on social media platform is the key reason that attracts the customers to the location in the first place. Experience can be marketed in any form varying from Disneyland to VR museums or from a book reading event to a music concert. Any industry can benefit from experience marketing. Yet, metaverse industry will certainly benefit more since it is all about experience.

Users do not hesitate to pay in cryptocurrencies to enhance their virtual experience in Second Life and Entropia (Schermer, 2007) or to log into a virtual Ariana Grande concert in Fortnite (Morgan Stanley, 2021). It will have massive contributions to experience economy through virtual concerts, museums, tourism activities and even avatar fashion.

Metaverse's success will also depend on its marketing strategies. Experience marketing will have a key role since it enables customers to interact through cross channel exposure and it creates value together with the customer (Petkus, 2004). Pine and Gilmore (1999) refers to experience marketing as a form of entertainment with an escape from the real world, which is directly what metaverse is and will be about.

Nevertheless, metaverse companies should not underestimate the power of neuromarketing, as well. Metaverses are designed to create a life-like world by evoking real life experience through AR, VR and XR technologies targeting five senses. Therefore, monitoring the neural activity of the users benefiting from the platforms will be decisive for the marketing campaigns.

Players will be wearing VR globes and hence, measuring heart rate variability over these gloves will provide data on the user's reaction throughout the platform. Other biometric measurement techniques such as measuring the user's breathing frequency, monitoring facial expressions or galvanic skin reactions (Massaro & Pecchia, 2019) can also give clues to the platform creators about the users' preferences.

Metaverse companies are designing VR headsets for the platform users to enhance the experience. These headsets can be quite beneficial to track the eye movement of the users. Eye tracking data from the headsets can be used to persuade and convince the platform users (Dooley, 2011).

As the concept of metaverse is relatively new in business world, the literature is lacking a marketing model for the metaverse industry. This work recommends a marketing strategy unique to metaverses: Neuro-experience marketing - a combination of experience marketing and neuromarketing techniques to express a unique marketing strategy model for metaverses.

With this combined marketing model, it will be possible to measure the level of user experience through monitoring cognitive and neural activity in live digital content.

Conclusion and Discussion

Metaverse is a relatively new concept in business world. The motivation behind the metaverse concept derives from the man's desire to know-it all and have-it-all. It is the man's utmost goal to store knowledge in a life-like environment. It is a technology which will transform information age into virtual age. Metaverse requires artificial intelligence and XR technologies for designing a universe beyond the physical one, cryptocurrency and NFT technologies for its financial transactions and 5G to keep all these technologies in operation. Therefore, it will be a new business industry with its own currency and trading activity, which will contribute significantly to the experience economy. Although it will be able to provide various industries with many opportunities, baby boomers and generation X will likely struggle to adapt, which would mean losing some potential customers. Moreover, consumers have second doubts about a100 % digital experience. One must also not ignore that cryptocurrency and NFT trading cannot be understood clearly by the public due to their complex nature. In addition to these challenges, creating metaverses is also costly for small enterprises. As a result, the metaverses may remain the zones for luxury brands for some time more. However, this would slow down the diffusion process. On the other hand, this potential drawback can be used as an opportunity. The metaverse platform is ideal for luxury brands who are interested in creating collectibles and will remain so as these brands have dedicated customers.

With a potential to become the future's largest industry, metaverse business needs its own unique marketing strategy called neuro-experience marketing, a combination of neuromarketing and experience marketing methods. With this marketing model, metaverse companies will be able to measure their user's reaction through such gadgets as headsets and gloves the platform users will already be wearing during their visit. This data will help the metaverse companies to create more engaging and immersive experiences for the users. This is how they might be able to fulfil their diffusion strategies, thrive as a new technology and start the virtual age.

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BİLGİ YÖNETİMİNDEN DİJİTAL BİLGİ SİSTEMLERİNE GEÇİŞTE SÜRDÜRÜLEBİLİRLİK VE İKTİSADİLİK

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Özet

Bilgi, insanlığın var oluşundan bu yana her zaman insanoğlu için önem arz etmektedir. Bu önemin temel amacı bilginin bireyden toplumlara kadar yol gösterici olmasıdır. İlkel çağdan günümüz dijital teknolojilerinin hakim olduğu bilgi süreçlerine kadar geçen zaman diliminde bilgi çeşitli amaçlar için kullanılarak hem süreklilik arz eden bir olgu hem de yeni kavramların ortaya çıkışıyla kümülatif bir ilerleme kaydetmektedir. Bilginin bugün geldiği süreçte insanlığa hizmet için kullanımı kadar farklı alanlarda kullanımı olsa da dijital bilginin bugünkü hakimiyeti ve sağladığı avantajların yanı sıra fayda-maliyet açısından ele alındığında iktisadilik boyutu ortaya çıkmaktadır. Örgütsel bilgiden yönetsel bilgiye kadar dijitalleşen tüm bilgi süreçlerinde öncelikle bilginin dijitalleşmesi ile elde edilen kazanımlar ele alınarak bu kazanımlardan hareketle bilginin dijital çağda iktisadilik boyutu bu çalışmada ele alınmaktadır. Çalışma, literatür taraması yapılarak elde edilen veriler ışığında bilginin olması gereken iktisadilik boyutuyla dijitalleşme süreçlerini bir araya getirmeyi amaçlamaktadır.

Anahtar Kelimeler: Bilgi yönetimi, dijital bilgi yönetimi, sürdürülebilirlik, bilginin iktisadiliği

Jel Kodları: O33, M, Y, Z

SUSTAINABILITY AND ECONOMICS IN THE TRANSITION FROM KNOWLEDGE MANAGEMENT TO DIGITAL INFORMATION SYSTEMS

Abstract

Information has always been important for human beings since the existence of humanity. The main purpose of this importance is that knowledge is a guide from individuals to societies. In the time period from the primitive age to the information processes dominated by today's digital technologies, information is used for various purposes, making a cumulative progress with the emergence of both a continuous phenomenon and new concepts. Although the use of information in different fields as well as its use for service to humanity in the process it has come to, today's dominance of digital information and the advantages it provides, when it is considered in terms of benefit-cost, the dimension of economy emerges. In this study, the economic dimension of information in the digital age is discussed, by first considering the gains obtained by the digitalization of information in all digitalized information processes from organizational information to managerial information. The study aims to bring together the economic dimension of knowledge and the digitalization processes in the light of the data obtained by scanning the literature.

Keywords: Information management, digital information management, sustainability, economics of knowledge

Jel Codes: O33, M, Y, Z

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1. GİRİŞ

Sanayi devriminden sonra yaşanan teknoloji devrimleri günümüzde büyük değişimlere zemin hazırlamıştır. Bu değişimlerin başında bilgi sistemlerinde yaşanan gelişme ve değişimler gelmektedir. Bilginin teknolojiyle birlikte geçirdiği süreç başlı başına bir devrim niteliğindedir. Özellikle bilgi ve iletişim teknolojileri, uydu teknolojileri, yapay zeka, üç boyutlu teknolojilerin kullanımı, nanoteknolojiler ve lazer sistemleri gibi gelişmeler bilgiyi önemli bir değer haline getirmiştir.

Yeni teknolojiler bilginin yayılmasını hızlandırmakta ve sınırları ortadan kaldırmaktadır. Küresel sistemlerin önemli bir girdisi haline gelen bilgi yönetimi, dijital bilgi sistemlerine geçişle birlikte beraberinde bazı gereklilikleri getirmiştir. Bir rekabet aracı olan bilgi, dijital olarak kolayca ulaşılabilir olduğu kadar karmaşık bir hal de almıştır. Bu nedenle bilginin sürdürülebilirliğinin sağlanması ve bu durumun rekabette üstünlük sağlamaya katkı sağlaması beklenmektedir. Bu da iyi bir dijital bilgi yönetimi sisteminin varlığına olan ihtiyacı doğurmaktadır. Dijital bilgi yönetimi sistemi oluşturulurken ekonomiklik ilkesi de göz önüne alındığında hem maliyet açısından bir kazanç elde edilmesi hem de sürdürülebilir bir yapıda bilginin iş süreçlerine hizmet etmesi beklenmektedir.

1.1. Bilgi Nedir?

Bilgi insanoğlunun var oluşundan bugüne değin insana yol gösteren ve bir değer olarak görülen bir olgudur. Bilginin terimsel olarak farklı anlamları vardır. Felsefik tanımına göre bilgi (knowledge), Kuçuradi (1995) tarafından "bilme etkinliği" ve bu etkinliğin sonucunda elde edilen "çıktı" olarak ifade edilmektedir (Kuçuradi, 1995). Ayrıca bilgi insana ait bir etkinlik olarak tanımlanırken algılama, düşünme ve muhakeme etme, yorumlama veya açıklama gibi etkinliklerden oluşur.

Bilgi araştırmacılarından Bucland'in (1991) tanımına göre; bilgi üç farklı anlamda ele alınır. İlk anlamı süreç olarak ifade edilen bilgi (informmation as process), ikincisi bilgi olarak bilgi (information as knowledge) ve üçüncüsü de nesne olarak (information as thing) bilgidir. Bilgi, yeni öğrenme süreciyle değişir ve zamanla gelişme gösterir. Buna bağlı olarak öğrenilen bilgide değişmeler olması mümkündür. Ayrıca bilgi kümülatif olarak ilerlememe olanak sağlayan öğrenmenin bir parçasıdır. Süreç olarak ifade edilen bilgi bu öğrenme sürecinin bir parçasıdır. Süreç içerisinde bilgi aktarımı yapıldığında bu nesne durumundaki bilgi sıfatı kazanmış olmaktadır. Bilgi, terimsel anlamıyla kullanıldığında taşınan bilgi anlamında yani kitap, dergi vs. içinde yer alan ve bir değeri olan bilgi anlamı kazanmaktadır (Buckland, 1991a).

Bilginin başka bir sınıflandırması da somut ve soyut bilgi şeklinde yapılmaktadır. Bilgi, varlık olarak ele alındığında soyut anlamı ifade ederken nesne olarak değerlendirildiğinde somut bir anlam kazanmaktadır. Önceki tanımlamada olduğu gibi bilgi olarak bilgi kavramı soyut, nesne olarak bilgi de bu bağlamda nesnelerin işlenip yeni bir form kazandırılması yani işlenmesi söz konusu olduğunda somut bir anlam yüklenmektedir (Buckland, 1991b). Soyut bilgi, varlık ve süreç olarak ifade edilen, bilişsel bilimlerin alanına girer ve dolayısıyla eğitimin de alanına girmiş olur. Somut olarak nitelendirilen bilgi ise işlenen, nesne bilgisi denilen ve bilgi yönetiminin alanına girer.

Bilgi, "belli bir düzen içindeki deneyimlerin, değerlerin, amaca yönelik enformasyonun, uzmanlığın,

yeni deneyimlerin bir araya getirilip değerlendirilmesi için bir çerçeve oluşturan esnek bir bileşim" olarak tanımlanabilmektedir. Bilginin çıkış noktası bireyin beynidir ve buradan yola çıkarak uygulamaya geçirilmektedir. Örgütsel açıdan bilgi ise genellikle depolanmış veri olarak değil, rutin çalışmalarda yer alan, uygulamalarda ve normlarda kendini gösteren bilgidir. Bilgi bu anlamda yalın ve basit değildir. Bilgiyi oluşturan çeşitli unsurlar vardır. Bu unsurlar esneklik gösterir. İşin içine sezgiler dahil dolduğunda bilgiyi mantık çerçevesinde açıklamak zorlaşır. Bilgi her zaman insanın içinde var olandır ve insanın doğası içinde karmaşık bir yapıda içindedir. Enformasyon bilgiden doğar ancak bu bir döngüdür çünkü bilgi de enformasyondan doğmaktadır. Amaç bilginin enformasyona dönüşmesi olduğunda burada insan faktörü etkin olur ve bilgiyi dönüştürme rolünü üstlenir (Davenport & Prusak, 1998).

Bilginin en belirgin özelliği veri tabanlarına doldurulup saklanmasından ziyade insan beyninde saklanmasıdır. Enformasyonun varlığı ise arşivlerde sürmektedir ve insan orada olmadığında da kayıtta olmaya devam eder. Bilgi, elde edilirken, paylaşılırken ve yayılırken belirli süreçlerden geçer. Bu süreçler formal ya da informal olarak devam eder ve gelişir. Enformasyon ise kimin elinde ise orada saklı kalmaya devam eder (Santoro, Vrontis, Thrassou , & Dezi, 2017).

1.2. Bilgi Türleri

1.2.1. Örtük Bilgi

Kişilerin zihninde olan, açık olarak belirtilmeyen, ima yoluyla belirtilen, bildikleri ama çoğu zaman ifade edemedikleri bilgi türü örtük bilgidir. Açık bilgiden ima ve önerilerle olması yönüyle kesin olarak ayrılır. Birey, her zaman bildiğinden daha azını ifade edip açıklama eğilimindedirler. Birey bilgilerini açıkça ifade etmek istemeyebilir. Ancak bazı hallerde bilgi sezgiye dayalı olarak ifade edilebilir, beyan edilerek belgelendirilebilir. Örtük bilgi, bu özelliği sebebiyle çoğu zaman rekabette önemli bir avantaj sağlar. Tepe yönetimin öncelikli amaçları arasında örtülü bilgiyi açığa çıkarma çabası da vardır. Bu bilginin yararı yöneticilere olağanüstü hallerde ve rasyonel karar almada yardımcı olur. Örtük bilgiyi açığa çıkarmada bilişim teknolojileri önemli rol oynar. Bireyler aracılığıyla bağlantı kurularak örtük bilgi açığa çıkarılabilir. Bu sayede örgüt içinde örtük bilgi biçim değiştirerek açık bilgiye dönüşmüş olur (Stankosky, 2004). Örtük bilgiyi etkileyen iki faktör vardır. Birincisi, bireysel tecrübeler ve farklılıkları ikincisi ise sahip olunan deneyimin kalitesi ile ilgilidir. Deneyim bilgisinin kalitesi demek birey ile bütünleşmesine bağlıdır. Bu da deneyimlerin iş süreçlerinde açıkça kullanılmasını ifade eder (Nonaka I. , 1994).

Örgütsel bilgiye katkı sağlayacak olan kurum ve kuruluşlardaki örtük bilginin, çalışanların sezgi ve deneyimlerinden yararlanılarak açığa çıkarılmasıdır. Ürün ve hizmetler konusunda problemlerim çözümü noktasında çalışanların sezgileri ve kanaatleri etkili olabilmektedir. Çalışanlara inisiyatif yetkisi vererek yöneticiler örtük bilginin açığa çıkmasını sağlarlar. Çalışan ise bu yetki ile örtük bilgiyi açığa çıkarmada inisiyatif kullanırlar ve kendilerine ait olan örtük bilgiyi kullanmaktan kaçınmazlar. Çünkü bu bilginin kullanımının başarıya katkı sağlayacağına inanılır. Bu nedenle çalışanlara yatıkları işte tam yetki vermenin avantajı onların bilgilerinden yararlanmak adına politik bir davranış olarak değerlendirilir (Durna & Demirel , 2008).

Örtük bilgi bir araya getirilerek ifade edilmemiş bilgidir. Bu bilgiyi açığa çıkarmakla anlamlı hale getirmek gerekir. Örtük bilgi genellikle davranışlardan, tepkilerden, gözlemlerden anlaşılabilir. Bir müşterinin dış görünüşünden veya yüz ifadelerinden davranışları hakkında bilgi edinilebilir. Burada hareketle örtük olan bilgi açığa çıkarılmış olmaktadır.

1.2.2. Açık Bilgi

Açık bilgi, bir araya getirilmiş, çoğunlukla detaylı olarak açıklanabilen, tablo ve metinlerle, şekil ve diyagramlarla ifade edilebilen bilgi türüdür. Nonaka (1994), açık bilgiyi "resmi ve sistematik olan bilgi" olarak ifade etmektedir. Buna ilişkin bilimsel bilgiler, formüller ve bilgisayar programları örnek olarak gösterilebilir. Ayrıca belgelenmiş uygulamalar, yazılı iş hedeflerinde sunulan bilgiler ve resmi beklentiler de açık bilgi örnekleridir (Nickols, 2000).

Açık bilgi, bilgi teknolojileri aracılığıyla doğruluğu genel kabul görmüş olarak paylaşılabilmektedir. Açık bilgi örgüt içinde herkes tarafından açıkça ifade edildiğinden ve anlaşıldığından dolayı bireyler arasında ve bölümler arasında aktarılması daha kolaydır. Açık bilginin önemli bir özelliği de yoruma açık ve objektif bir nitelikte olmasıdır. Buna örnek olarak işletmelerde müşteriler hakkında oluşturulan ve açık şeklide kullanılan bilgiler verilebilir. Veri tabanları aracılığıyla paylaşılan bu bilgiler karar alma süreçlerinde bilgiye dönüştürülerek kullanılmaktadır. Oluşturulan müşteri veri tabanı sayesinde müşteriler hakkında nerede, ne zaman, nasıl ve kim tarafından hangi kararların verileceği sorularına cevaplar bulunabilir. Örgüt içinde bilgi paylaşımına engel olan faktörler ortadan kaldırıldığında açık bilgi olarak kullanıldığında bu verilerden faydalanılmış olur (Durna & Demirel , 2008). Açık ve örtük bilgi arasındaki farklar aşağıdaki tabloda açıklanmıştır (Tiwana , 2001):

Tablo 1: Özellikleri Bakımından Örtük Bilgi ve Açık Bilgi Arasındaki Farklar

Özellik	Örtük Bilgi	Açık Bilgi
Doğası	Kişisel, özel davranışlarla anlam kazanmaktadır.	Kodlanabilir ve açıklanabilir.
Biçimselleştirme	Birleştirmek, kodlamak veya kayıt ve formülüze etmek zordur.	Kodlanabilir, sistematik bir biçime ve biçimsel bir dile çevrilebilir.
Gelişim süreci	Deneme ve uygulamada hatalarla karşılaşılabilir.	Enformasyonun yorumlanmasında ve anlaşılmasında kapalılığın açıklanması
Yer	İnsanın beyninde oluşur ve beyninde biter.	Dokümanlar, veri tabanları, web sayfaları, e-mail, kitaplar vs.
Değişim süreci	Dışa vurma yoluyla açığa çıkarılabilir.	Özümseme ve anlama yoluyla örtülüye çevrilir.
Enformasyon teknolojisi desteği	Enformasyon teknolojisi desteği veya paylaşımla yönetilmesi zordur.	Mevcut enformasyon teknolojileri tarafından desteklenir.
Ortalama ihtiyaç	Zengin bir iletişime ihtiyaç duymaktadır.	Geleneksel elektronik kanallarla aktarılabilir.

Kaynak: A. Tiwana (2001), The Essential Guide to Knowledge Management E-Business And CRM Applications, Prentice Hall PTR, Upper Saddle River, NJ, s. 39.

Tablo 1'de açık ve örtük bilgi karşılaştırılmıştır. Bu karşılaştırmaya göre bilgi yönetiminde bilginin açıkça ifade edilmesinde yöneticilere ip uçları verebilir. Örtük bilgi bireylerin davranışlarında anlam kazanırken açık bilgi herkes tarafından anlaşılabilen bir yapıda olmasıyla kodlanabilmekte ve açıklanması mümkün olmaktadır. Örtük bilginin biçimlendirilmesinde hatalarla karşılaşılabilir ancak açık bilgide bu hatalar söz konusu değildir. Açık bilgi ise her türlü yorum ve eleştiriye açık olması özelliğinden dolayı eksiklikler hemen müdahale edilerek düzeltebilmektedir. Örtük bilgiler bireylerle sınırlı iken açık bilgi hem kişide hem ortamlarda ve kaynaklarda yer alabilir. Örtük bilginin açığa çıkması daha zor olmasına rağmen açık bilgi kolaylıkla paylaşılabilir ve açığa çıkarılabilir. Yöneticiler, bilgi yönetiminde bilginin bu özelliklerinden dolayı kaynakları ve kullanım yerleri açısından bilinmesi gerekenler tabloda ifade edilmektedir (Parikh, 2001).

Tablo 2: Örtük Bilgi ve Açık Bilginin İçsel/Dışsal Kaynakları

Kullanım yeri	Açık Bilgi	Örtük Bilgi
İş süreci	Organize edilmiş görevler, rutin işlerde kullanılır.	Bireysel bilginin yaratılmasında, bireysel uzmanlık kanallarında, tahmin edilemeyen çevre ve değişime cevap vermede kullanılır.
Öğrenme	İşe dayalı, deneme-yanılma, en uzman olduğu alanlarda kendi kendini yönlendirme, organizasyon aracılığıyla iş amaç ve hedeflerinin karşılanması.	Tepe yönetici veya takım liderinin bilgi paylaşımında ve iş kararlarında güveni artırmak için sağlamış oldukları kolaylıklar ve güçlendirmeler.
Öğretmek	Örgüt amaç ve ihtiyaçlarına dayalı, örgüt tarafından seçilen biçim ve planın kullanımı	Bire bir, yeteneğe dayalı, kısa süreli öğrenme, işe ile ilişkili öğrenme, belli bir çıraklık döneminden geçerek rehber ve danışman aracılığıyla öğrenme.
Düşünme şekli	Mantıksal, gerçeklere dayalı, gerçek metotların kullanımı ve aynı düşünme yeteneği.	Yaratıcı, esnek, farklı düşünmeye dayalı ve bakış açısını geliştirici bir özelliğe sahip düşünme.
Bilgi paylaşımı	Müşteriler için gerekli olan, tekrar kullanılan, depo edilebilen, kodlanabilen, e-mail, elektronik tartışma ve biçimleri şeklinde paylaşılır.	Network, yüz yüze görüşme, videokonferans, sohbet, hikaye ve bireysel bilgilendirme şeklinde paylaşılır.
Motivasyon	Spesifik amaçları karşılamak için performans temeline dayalı motivasyona önem vermek.	Çalışanlara liderlik, vizyon ve sık sık temas kurmak yoluyla ilham kaynağı olmak.
Ödül	İş amaçlarıyla bağlantılı, çalışma ortamında rekabeti teşvik eden, seçici işler için rekabeti artırıcı ödüller.	Yenilik ve yaratıcılığı geliştirmek, doğrudan enformasyon paylaşımını için ödüllendirme ile rekabete ve parasal unsurlara dayalı bir ödüllendirme sistemi.
İlişkiler	Tepe yönetiminden orta kademe ve alt kademeye doğru bir ilişki.	Bilgi paylaşımına dayalı açık, anlaşılır, informal ve arkadaşça bir ilişki.
Teknoloji	İş ile ilişkili, maliyetleri en aza indiren ve mevcut bilginin kullanımını yaygınlaştıran enformasyon teknolojisi yatırımlarını geliştirmek.	Kişiler arasında iletişimi geliştiren, enformasyon akışına ve örtülü bilginin değişimine imkan tanıyan bir enformasyon teknolojisi yatırımını kurmak.
Değerlendirme	Somut iş başarısına dayalı, bilgi paylaşımı ve yaratıcılık gerekmez.	Performansa dayalı, sürekli ve kendiliğinden gerçekleşen bir değerlendirme.

Kaynak: M.Parikh (2001), "Knowledge Management Framework for High-Tech Research and Development", Engineering Management Journal, 13(3), September, s. 29.

Kullanım alanları açısından açık bilgi ve örtük bilgi birbirinden ayrılmaktadır. Bu farklar tabloda olduğu gibi açıklanmakta ve farklılıklar ile kolayca bu bilgileri ayırt etmek mümkündür (Smith, 2001).

Tablo 3: Açık Bilgi ve Örtük Bilginin Kullanım Yeri

Kullanım yeri	Açık Bilgi	Örtük Bilgi
İş süreci	Organize edilmiş görevler, rutin işlerde kullanılır.	Bireysel bilginin yaratılmasında, bireysel uzmanlık kanallarında, tahmin edilemeyen çevre ve değişime cevap vermede kullanılır.
Öğrenme	İşe dayalı, deneme-yanılma, en uzman olduğu alanlarda kendi kendini yönlendirme, organizasyon aracılığıyla iş amaç ve hedeflerinin karşılanması.	Tepe yönetici veya takım liderinin bilgi paylaşımında ve iş kararlarında güveni artırmak için sağlamış oldukları kolaylıklar ve güçlendirmeler.
Öğretmek	Örgüt amaç ve ihtiyaçlarına dayalı, örgüt tarafından seçilen biçim ve planın kullanımı	Bire bir, yeteneğe dayalı, kısa süreli öğrenme, işe ile ilişkili öğrenme, belli bir çıraklık döneminden geçerek rehber ve danışman aracılığıyla öğrenme.
Düşünme şekli	Mantıksal, gerçeklere dayalı, gerçek metotların kullanımı ve aynı düşünme yeteneği.	Yaratıcı, esnek, farklı düşünmeye dayalı ve bakış açısını geliştirici bir özelliğe sahip düşünme.
Bilgi paylaşımı	Müşteriler için gerekli olan, tekrar kullanılan, depo edilebilen, kodlanabilen, e-mail, elektronik tartışma ve biçimleri şeklinde paylaşılır.	Network, yüz yüze görüşme, videokonferans, sohbet, hikaye ve bireysel bilgilendirme şeklinde paylaşılır.
Motivasyon	Spesifik amaçları karşılamak için performans temeline dayalı motivasyona önem vermek.	Çalışanlara liderlik, vizyon ve sık sık temas kurmak yoluyla ilham kaynağı olmak.
Ödül	İş amaçlarıyla bağlantılı, çalışma ortamında rekabeti teşvik eden, seçici işler için rekabeti artırıcı ödüller.	Yenilik ve yaratıcılığı geliştirmek, doğrudan enformasyon paylaşımını için ödüllendirme ile rekabete ve parasal unsurlara dayalı bir ödüllendirme sistemi.
İlişkiler	Tepe yönetiminden orta kademe ve alt kademeye doğru bir ilişki.	Bilgi paylaşımına dayalı açık, anlaşılır, informal ve arkadaşça bir ilişki.
Teknoloji	İş ile ilişkili, maliyetleri en aza indiren ve mevcut bilginin kullanımını yaygınlaştıran enformasyon teknolojisi yatırımlarını geliştirmek.	Kişiler arasında iletişimi geliştiren, enformasyon akışına ve örtülü bilginin değişimine imkan tanıyan bir enformasyon teknolojisi yatırımını kurmak.
Değerlendirme	Somut iş başarısına dayalı, bilgi paylaşımı ve yaratıcılık gerekmez.	Performansa dayalı, sürekli ve kendiliğinden gerçekleşen bir değerlendirme.

Kaynak: E.A. Smith (2001), "The Role of Tacit and Explicit Knowledge in the Workplace", Journal of Knowledge Management, 5(4), s. 314.

1.2.3. Stratejik Bilgi

Stratejik bilgi, uzun dönemli bir süreci kapsayan yönetim faaliyetleri ile ilgili olan bilgidir. Bu bilgi, kararların alınmasında kullanıldığı gibi uygulanmasında ve kontrolünde de kullanılır. Belli bir düzene bağlı olmayan stratejik bilgi işletmeleri çevreleri ile bir bütün olarak kabul edildiğinden genellikle geniş çaplı ve özet şeklinde olan bilgidir. Stratejik bilgi çoğunlukla işletme dışı kaynaklardan elde edilir ve bu bilgi tahmini ve kolektif bir niteliğe sahiptir. Stratejik bilgi işletmelerin rakipleri ve onların stratejileri hakkında, Pazar durumu hakkında, değişen müşteri profilleri ve talepleri ile ilgili ya da teknolojik gelişmeleri kapsayabilir. Stratejik bilgi işletmeler için önemli olduğundan bu bilgi için işletmelerin yeterli kaynağı ayırması gereklidir. Stratejik bilgi, işletmeler nazarında sahip oldukları en kıt kaynaktır. Yeni ekonomik düzende sürekli rekabet üstünlüğünün sağlanabilmesi için bu bilgi tek ve güvenilir bilgi kaynağıdır (Karakaya, 2002).

Stratejik bilgi hem işletme içinden hem de işletme dışı kaynaklar vasıtasıyla sağlanabilir. İşletme tarafından oluşturulan veri tabanları işletmenin iç kaynaklarıdır. Bu veri tabanı işletme yöneticilerine

stratejik karar sürecinde enformasyona dönüşmüş bilgiyi sunmaktadır. Çeşitli kişi ve kuruluşlar tarafından yapılan araştırma ve incelemeler neticesinde elde edilen bilgiler ise işletme dışı kaynakları oluşturur. Bu iç ve dış kaynaklardan ede edilen bilgiler işletmeleri müşterilerle olan ilişkilerinde, ilişki düzeyinin belirlenmesinde ve yönetilmesinde, rekabet üstünlüğü sağlamak için, çevreye uyum sağlamada kullanılabilir.

1.2.4. Yöntemsel Bilgi

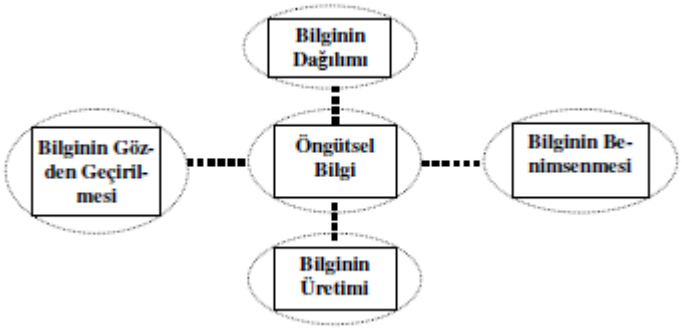
Yöntemsel bilgi, tam olarak net bir tanımı olmamakla birlikte iş yapma sırasında kendini gösteren genellikle motor beceri ve yetenekleri kapsayan bilgidir. Bu bilgi bilişsel ya da zihinsel yeteneklerde görülür. Düşünme, akıl yürütme, karar verme, bir işe dahil olma, müşterilerin yüz ifadelerini okuyabilme gibi çeşitli örnekler verilebilir. Bu bilgiler kağıda dökülerek ifade edilemese de bir olgunun, çabanın veya eylemin karşılığı olması sebebiyle değerli ve önemlidir. Gerçeklere dayalı olması ve mantıksal boyutu da buna dahildir (Nickols, 2000). Başka bir görüşe göre yöntemsel bilgi, bir eylemin veya işin nasıl yapılacağı konusunda yol gösterici olmasıdır.

1.2.5. Örgütsel Bilgi

Örgütsel bilgi günlük yaşamda yaygın olarak kullanılır ancak anlamı tam olarak bilinemez. İşletmelerin rekabet avantajı elde etmesine katkı sağlayan örgütler için hayati bir öneme sahiptir. İşletmelerin kuruluşundan fiziksel olarak var oluşunda bu bilgiye ihtiyaç duyulmaktadır. Örgüt içinde bu bilgiye daha çok ihtiyaç duyulur. Örgütsel açıdan stratejik bir bilgi statüsünde olan bu bilgi türü sonuçları itibariyle hem örgüt içine hem örgüt dışındaki faaliyetlerde örgütsel uyumun bir parçasıdır. Örgütsel bili ayrıca sonuçları itibariyle eşsiz ve değerlidir. Ayrıca her örgütün ihtiyacı olan bu bilgi farklıdır ve farklı amaçlar için kullanılabilir.

Örgütsel öğrenmenin sağlanabilmesi için örgütsel bilgiye ihtiyaç vardır. Çünkü örgütlerin ihtiyacı olan örgütsel bilgiye ulaşabilmeleri için öğrenme deneyimleri ve süreçleri de farklılık göstermektedir. Hem toplanma seviyesi olarak hem de örgüte uyumlaştırma açısından belirli yol ve yöntemler gerektirir. Bilgi örgütle bütünleştiğinde ve doğru kullanıldığında amacına hizmet etmiş olacaktır. Açık ve örtülü bilgi bu örgütsel bilginin varlığı içindedir. Ayrıca örgütsel bilgi bireysel farklılık ve deneyimler ışığında da şekillenerek örgüte hizmet etmeye devam eder. Bu nedenle kültürel farklılıklardan coğrafi farklılıklara kadar her unsur örgütsel bilgiye hem katkı sağlar hem de bu bilginin gelişmesine destek olmaktadır (Cabrera & Cabrera, 2002). Aşağıdaki şekilde örgütsel bilginin oluşumu görülmektedir.

Tablo 4: Örgütsel Bilginin Oluşumu



Bilgi üretimi: Herhangi bir konuda ortaya çıkarılan yeni fikirler, çözümler ve yenilikler bilginin üretim sürecidir. Bireysel boyutta ve bireysel arasında gerçekleşebilen bilgi üretimi örgütsel boyutta da mümkündür (Durna & Demirel, 2008). Bireylerin sahip olduğu bilgiler bütünü de örgütsel bilginin üretilmesinde rol oynar. Bilgi üretim süreci sürekli gelişen ve değişen, motivasyon kaynağı olabilen, değişik problemlerin çözümüne hizmet eden ve sonuçlara götüren bir üretimdir. Bu bilgi uyumlu, esnek ve kolayca anlaşılabilir bir yapıda olmalıdır.

Bilginin benimsenmesi: oldukça güç olan bilgi üretimi sürecinden sonra bu bilginin işletmelerce kabul edilmesi aşaması gelmektedir. Bilginin benimsenmesi demek bilginin yayılması anlamına gelmektedir. Bu yayılma süreci bilginin benimsenmesi ile doğrudan ilişkili olabilir. İşletmeler çoğu zaman bilginin kullanımını gizlice yürütmektedir. Bilgiyi benimseme süreci farklılıklar içerse de bilgi benimseme stratejisi işletmeler açısından bazen riskli durumlar içerebilmektedir. Bilginin üretimi ve kaynakların kullanımı bilginin benimsenmesine destek olan adımlardır. İşletmeler bilgiyi benimsemem aşamasında hem dikkatli davranmak hem de gerekli risk faktörlerini değerlendirmek durumundadırlar. Var olan bilgiye yeni bir boyut kazandırmak ve kullanıma uygun hale getirdikten sonra benimsenmesi uygun olmaktadır.

Bilginin dağılımı: örgütsel bilginin bütün seviyesinde bilgi kullanılmadan önce bilginin örgüt içinde paylaşılması ve dağıtılması gerekmektedir. Bilginin dağıtılması ve paylaşımı zorlu bir süreçtir. Bu nedenle işletmenin başarısı, kültürel yapısı ve açık bilginin ulaşımı etkin rol oynamaktadır. Tepe yönetimi bilginin dağıtımında rol oynarken örgütsel bilginin dönüşümünde, iş birliğinin sağlanmasında ve gruplar arasında yayılmasından da sorumludur. Organizasyon yapısı bilginin dağıtımında ve yayılmasında etkili rol üstlenmektedir.

Bilginin gözden geçirilmesi: Bilgi dağıtım sisteminden önce örgütlerde öncelikle bilginin bir araya getirilmesi gereklidir. Bu durumda tepe yönetim sürekli olarak bilgiyi gözden geçirilmelidir. Bu sürekli gözden geçirme ile bilginin paylaşımı, örgütsel boyutta ve çevresel problemlerin çözümünde önemli bir rol oynar (Durna & Demirel, 2008).

1.3. Bilgi Hiyerarşisi

Bilgi hiyerarşik olarak dört basamakta bir piramit modeli olarak ifade edilir. Piramidin en altında basamağında temel gerçekler ve düşüncelerden oluşan birbirinden bağımsız ve anlamsız veriler yer alır. İkinci basamakta verilere kıyasla daha üstte olan aralarında ilişkilerin bulunduğu enformasyon bulunur. Üçüncü basamakta yüksek anlama ve değere sahip olan gelecekteki kararları etkileyen ve karar almada potansiyel oluşturan düzenlenmiş enformasyonlardan oluşan bilgi yer almaktadır. En üstte yer alan ise bilgeliği ifade eden nasıl ve nerede kullanılacağı bilinen bilgi yer alır (Cooper, 2010).

1.4. Bilgi Yönetimi

1.4.1. Bilgi Yönetiminin Tanımı

Bilgi yönetimi, "organizasyon içinde en iyi ve doğru kararların alınıp, rekabet üstünlüğü yaratmak için açık ve kapalı bilgilerin sistematik ve planlı bir biçimde oluşturulması, depolanması, gerekli kişi ve birimlerle paylaşılarak bilginin organizasyon içerisinde maksimum değeri yaratacak şekilde kullanılması" olarak tanımlanmaktadır (Durna & Demirel , 2008). Yönetimsel açıdan bilginin değeri miktarı ile değil niteliği ile ölçülür. Bilgi yönetimi (BY) ile ilgili bazı önemli görüşler ileri sürülmektedir. Awad ve Ghaziri (2004) 'ye göre bilgi yönetimi, örgütsel yapının içinde bilgiyi taşıyan disiplinlerarası bir iş modeli olarak ifade edilir. Bilgi yönetimi, pek çok disiplinin temeline dayanır. Bunlar özellikle ekonomi, psikoloji ve enformasyon yönetimi gibi disiplinlerdir. Bilgi yönetiminin bölümleri içinde insan unsuru, teknolojiler buna bağlı süreçler, entelektüel sermayeye yönelik süreçler, ölçümlemeler, değerlendirmeler ve yatırımlar gibi konular odak noktası olarak yer alır. Nonaka (1994) ise bilgiyi, sürekli rekabet üstünlüğü sağlamada belirsizlikler içinde tek güvenilir kaynağın yalnızca bilgi olduğunu öne sürmektedir. Teknolojilerin hızla değiştiği, ekonomilerin sürekli rekabetin odak noktası olduğu, rakiplerin sürekli arttığı ve ürünlerin neredeyse anlık olarak değişip yenilendiği bir çağda bilginin yönetimi yönetsel açıdan stratejik bir karar ve süreçtir. Başarılı firmaların başarılarının ardındaki en önemli belirteç sahip oldukları bilgiyi en iyi şekilde yönetmeleri ve işlerini şansa teslim etmeyecek kadar önemli bir şekilde takip etmeleridir. Bilgiyi sadece elde etmek değil, onu işlemek, kullanmak, saklamak ve dönüştürmek, sonrasında da yayılması ve benimsenmesinin sağlanması bilgi yönetimi olarak görülen bütünsel bir sürecin ifadesidir. İşlemeleri başarıya götüren olan sahip oldukları fiziksel varlıklarla beraber bilgiyi kullanma kapasiteleri ve bunu rekabette en iyi konuma taşımalarında yatar.

Bilgi sabit ve durağan bir yapıda değildir. Bilgi değişir, gelişir ve büyümeye devam eder. Tıpkı işletmeler gibi bilginin de bir kapasitesi, etkililiği ve kullanım rolü vardır. Bu nedenle bilgi yönetimi de bir disiplin olarak kabul edilmektedir. Hibbard (1997) ise bilgi yönetimini, "Organizasyonun kolektif tecrübelerinin bulunduğu yerden toplanması, elde edilmesi ve sonuca ulaşacak şekilde paylaşılması süreci" şeklinde tanımlamaktadır. Yani bilginin kümülatif olarak ilerlemesi ve faydalı hale getirilerek kullanılabilmesi de bilgi yönetiminin bir parçasıdır. Dolayısıyla bilgi sürekli olarak güncellenmesi gereken, elde edilen bilgileri ulaşılabilir kılan, ihtiyaç duyulan bilgiye gerekli olan süreçleri tanımlayan ve gerek duyulan bilginin işletme çalışanlarına iletilmesi de bilgi yönetimi sürecinin başka bir tanımıdır (Harrison, 2003). Buckman (2004) bilgi yönetimini "Bilginin ortaya çıkması ve değer yaratması için doğru zamanda ve doğru insana yayılmasını sağlamak için sistematik bir yaklaşım" olarak tanımlamıştır. Bu tanımda bilgi sistematik bir yaklaşımın içinde ele alınmaktadır. Yani bilgi ihtiyaç halinde doğru zamanda ve doğru hedefler için ortaya konmalıdır.

Bilgi yönetimi tanımlamaları doğrultusunda konusunda yapılan yorumlar ve görüşleri genel olarak değerlendirildiğinde, tüm bu tanımlamaların ortak paydası yaşadığımız ve çalıştığımız ortamda kapalı veya düzensiz halde bulunan bilginin bir fark yaratacak şekilde toplanması, paylaşılması ve güncellenmesi gerektiğinin bilinmesidir.

1.4.2. Bilgi Yönetiminin Amacı

Bilgi yönetiminin esas amacı, kurumun entelektüel sermayesini, kuruma rekabet gücünü kazandıracak şekilde kullanmak, pazar payını artırmada sürekli ve kalıcı üstünlüğe dönüştürme bağlamında ihtiyaç duyulan aktivitelerin organize edilmesidir. Barutçugil (2002), bilgi yönetiminin amacını; "üretim birimlerinde yeni teknolojilerin üretime uyarlanarak, verimliliğin artırılması, maliyetlerin düşürülmesi, iş bölümünün sağlanması, rekabet gücünün artırılması, yatırımlar ve isabetli kararlar ile işletmenin istikrarlı büyümesinin sağlanması" olarak ifade etmektedir.

1.4.3. Bilgi Yönetimini Etkileyen Unsurlar

Bilgi yönetimini etkileyen pek çok unsur vardır. Bunlar bilgi yöneticisi, kurum kültürü ve yapısı, çalışanların sosyal yapıları, teknoloji, bilginin evrimi, bilgi kirliliği, bilgi yönetiminde teknoloji ve insanın rolü olarak sıralamak mümkündür.

Bilgi Yöneticisi: Başlıca illeri örgütsel amaçlara uygun olarak yapan, uygulayan, amaç ve hedefler doğrultusunda kararlar vermekle sorumlu olan kişilerdir. Karar süreçlerinde tüm koşulları irdeleyip göze almak zorundadırlar. Ayrıca bu kararların uygulanması doğrultusunda da sorumlu olan kişi bilgi yöneticisidir (Barutçugil, 2002).

Kurum Kültürü ve Yapısı: Kurumsal kültür, çalışanların kurumla ilgili duygu ve düşüncelerini yansıtan ve çalışanlar tarafından kurumun nasıl tanındığını açıklayan bir olgudur (Zaim, 2005). Çalışanlar iki şekilde bunu tercih ederler; ya yeni bilgi edinme yoluyla bunları paylaşma ve kullanmaya açık olurlar ya da paylaşımcılığa ilgisiz kalarak bilgiyi kendilerine saklamayı tercih ederler. Kurum kültürü başka bir ifadeyle destekleyici ya da engelleyici bir unsur da olabilir (Barutçugil, 2002).

Kurumlarda yerleşmiş bir kültür vardır ve bu kurum kültürü kolayca değiştirilemez. Kültür zamanla davranış ve alışkanlıklarda vazgeçilemez hale gelir. Çalışanlar zaman içinde edindikleri bilgileri, tecrübeleri ve deneyimleri kendilerine saklarlar. Bu bilgilerden güç alarak işe bağladıklarını düşünürler. Bu bilgileri kimseyle paylaşmak istemezler (Awad ve Ghaziri, 2004). Bilgi yönetimi uzmanının görevi ise bu gizli ama önemli olan değerli bilgiyi, bir şekilde elde edilmiş kültürel yapının paylaşılmasını sağlayarak teşviklerle ortaya koyması yönünde çalışmalıdır.

Çalışanların Sosyal Yapıları: bir iş yerinde sosyal yapı orada çalışanların oluşturduğu ilişkiler yumağından oluşur ve bu ilişkiler kurumu oluşturan bir yapıya dönüşür (Barutçugil, 2002). Sosyal ilişkiler gereği yardımlaşma, çalışanlar arasında dayanışma kültürünün gelişmesi ve karşılıklı güven ortamının oluşturulması gereklidir. Bilgi yöneticisinin görevi ise bu ilişkileri geliştirmek ve örgüt yararına uygun halde kullanmak ve yönetmektir. Ayrıca sosyalleşme süreci örgütsel hiyerarşiye de uygun olmalıdır. Hiyerarşi bozulduğunda ast üst ilişkilerinde emir komuta sistemi işlerliğini kaybeder (Budak, 1998)

Bilginin Evrimi: Bilgi örgütsel yapı içinde sürekli bir evrim halindedir yani durağan değildir. Bu nedenle kaliteyi yükseltici ve maliyetleri düşürücü bilgilerin evrimi sürekli kontrol edilmeyi gerektirir (Davenport & Prusak , 1998). Bilgi yöneticileri bu aşamada bilgiyi sürekli tespit etmek, denemek,

sonuçlarından emin olabilmek için analiz etmek zorundadırlar. Bilgi, bilgi yöneticisinin süzgecinden geçtikten sonra kullanılabilir ve uygulanabilir işlerlik kazanmaktadır. Bu süreçten sonra bilgi yönetimsel olarak kullanılabilecek bir bilgi kimliği kazanır (Barutçugil, 2002).

Bilgi Kirliliği: Gereksiz ve fazla bilginin varlığı sistemler ve örgütsel yapılar için bilgi kirliliği oluşturur. Bu fazla ve gereksiz bilgi, bilginin yönetilmesini olumsuz etkileterek zorlaştırır, bireylerin yanlış yorumlamalarına sebep olabilir (Davenport & Prusak , 1998). Fazla bilgi, asıl gerekli olan bilgiyi ayırt etmeyi zorlaştırır ve karar süreçlerini uzatır. Dolayısıyla bilgi yöneticisinin gerekli olan bilgiyi en sade haliyle, ihtiyaç olunan kadar ve doğru bilginin elde edilmesi ile sağlaması gereklidir. Bilginin yorumlanması da bilgi kirliliğinden etkilendiğinden bunun ortadan kaldırılması hem işlerlik açısından hem de zaman bakımından kolaylıklar sunmaktadır. Kara (1990), bilgi kirliliği yüzünden günümüzde doğru bilgiye ulaşmanın zorlaştığını söylemiştir. Bu nedenle, bilgi yönetici bilgileri kullanırken önsezilerine kulak vermeden ve güvenilirliği ispatlanmamış kaynakları kullanmamalıdır. Bilgi yöneticisi görevi gereği yüzeysel ve kulaktan duyma bilgiye itimat etmez ve derindeki bilgilere ulaşmayı hedefler. Bu bağlamda kullanılacak her bilgi, önceden test edilmeli veya doğruluğunun ispat edilmesi zorunludur. Aksi takdirde örgüt içinde kullanılacak yanlış bir bilginin geri dönüşü olmayan sonuçlara yol açabileceği açıktır (Zaim, 2005).

Teknoloji: Her işletmenin veya örgütsel yapının bilgi yönetimini oluşturacak teknik bir alt yapı ve donanıma ihtiyacı vardır (Barutçugil, 2002). Bilgi yönetimindeki başarı elde edilen bilginin etkinliği ile doğru orantılıdır. Bilgi yöneticisi elinde mevcut teknik imkanları ile bilgiye kolayca erişebilmeli, bu bilgileri derleyip işlerlik kazandırmalı ve kullanılır halde sunmalıdır. Teknolojik bir eksiklik bilgi yönetiminde aksamalara ve bilginin işlerlik kazanmasında verimsizliklere yol açabileceğinden bu açıdan gerekli lan alt yapı ve teknolojilerin sağlanması gereklidir.

Bilgi Yönetiminde Teknoloji ve İnsanın Rolü: Bilgi yönetiminin başarılı olması için temel amacına uygun olarak bilgi yönetiminde yetkinliğin sağlanmasıdır. Bilgi yönetiminde önemli bilginin saptanması, kaydedilmesi, düzenlenmesi ve bütünleşik olarak sistemin bir parçası haline getirilmesi ve kurulumuyla sistemi destekleyici bir alt yapıya dayanır. Teknolojinin ve insanın bilgi yönetimindeki rolündeki payı tartışma konusu olsa da birinin varlığı ötekine ikame edilemeyecek derecede birbiriyle iç içedir. Teknoloji günümüz işletmelerinin işlerini kolaylaştıran, zamandan, mekandan ve maliyetlerden tasarruf sağlayan, çözüm süreçlerinde hız ve verimlilik kazandıran gerekli bir unsurdur. İnsan faktörü ise hem teknolojinin kullanıcısı hem de bilginin sahip ve uygulayıcısı olarak teknoloji ile bir bütün olarak düşünülmektedir. Teknolojisiz bir bilgi yönetimi düşünülmeyeceği gibi insansız bir teknoloji ve bilgi yönetim süreci de var olamaz (Davenport & Prusak , 1998). Bu nedenle bilgi sadece insana özgü bir kavram olarak kabul edilse de teknoloji yardımıyla kolayca işlenip işlerlik kazandırabilir ve örgütsel bilgi olarak kullanıma sunulabilmektedir. Ne teknoloji tek başına bilgiyi yönetmede yeteridir ne de insan tek başına bilgiyi işlemede teknolojiden bağımsızdır. Bu doğrultuda aradaki dengenin sağlayıcısı bilgi yöneticisi ve kullandığı bilgi yönetim süreçleridir.

2. Örgütlerde Bilgi Yönetimi

1990'lardan bu yana bilgi yöneyimi kavramı işletmelerde açısından bir süreç olarak ele alınmaya başlamıştır. Bilgi bu nedenle bir rekabet unsuru olarak görülmektedir. Rekabette başarıya giden yol bilginin elde edilmesi, işlenmesi, saklanması ve verimli hale dönüştürülerek işletmeler için değerli bir bilgi olarak sunulması demektir. Bilgi, bir değer olarak düşünüldüğünde işletmeler açısından örgütsel bağlamda stratejik bir öneme sahiptir. Yönetim kararlarından bütün örgütsel faaliyetlere kadar işletmeler her süreçte bilgiye ve bilginin yönetilmesine ihtiyaç duymaktadırlar. Örgütsel uyumun sağlanmasında, yeniliklerin örgüte adapte edilmesinde, değişim politikalarında, karar süreçlerinde her zaman bilgi aktif olarak rol oynamaktadır. Durağan bir yapıda olmayan bu bilgi ise örgütsel yapı içinde tıpkı yönetim kademelerinde olduğu gibi bir işlerlikle yönetilmeye, örgütle uyumlaştırılmaya, bütün yönleriyle örgütün performansına katkıda bulunması için değerlendirilmesine ihtiyaç vardır. Bilgi teknolojileri işletmelerin bilgi üretme kapasitelerinin sinerjik bir kombinasyonu ile örgütsel süreçleri oluşturmaktadır. Bilgi yönetiminin temelinde bu anlamda örgütsel performansın arttırılmasına yönelik bilginin eyleme dönüştürülmesi sürecinde bir stratejik amaç yatmaktadır.

Bilgi dayalı endüstriler örgütsel süreçlerine bilgiyi en iyi şeklide kanalize ettiklerinden dolayı başarıları kaçınılmaz olmaktadır. Bu da sürekli değişen bilginin doğası gereği örgütsel hedeflerin sürekli yeniden tanımlanması, güncellenmesi ve amaçlar doğrultusunda yeni yol haritalarının belirlenmesi anlamına gelmektedir. Dolayısıyla bilgiyi sadece elde etmenin örgütsel anlamda yeterli olmadığı açıkça ortadadır. Bu nedenle bilginin yönetimi süreci çok önemlidir. Örgütsel açıdan değerli bilgiler sürekli güncel tutulmalı ve işlerliği analiz edilmelidir. Bilgi bir defa elde edilip saklanarak problemlerin çözümünde yeterli olmadığından bilginin işlenmesi, değerlendirilmesi, analiz edilmesi, süreçlere uyumlanması ve saklanması örgütsel bilgi yönetiminin bir sorumluluğudur. Burada asıl görev bilgi yöneticisinin olsa da bilgiye sahip olan çalışan veya yöneticiler de bu sürecin bir parçasıdır. Çünkü bilgi yönetimi de örgütsel bir süreçtir.

Başarılı işletmelerin başarısının altında sürekli olarak bilgi üretmeleri, bilgiyi örgüte kazandırmaları ve yaymaları, bu hızla bilgiyi yeni teknolojilerle uyumlaştırarak ürünlerinde somut halde kullanmalarıdır (Nonaka, 1991). İşletmeler iş modelleri anlamında rekabet ederken ürün ve hizmetler bağlamında bilgi entellketiüel bir sermaye olarak farklılaşmalarına yol açmaktadır. Bu nedenle bilginin işlenmesi ve kullanılması teknoloji ile insan faktörünü de birleştirdiğinde rekabet başarısı ortaya çıkmaktadır. Ayrıca örgütsel kaynakların kullanımı da bilgi yönetimi sürecinin bir parçası ve rekabette avantaj sağlayabileceği bir unsurdur.

2.1. Örgütsel Bilginin Dijitalleştirilmesi

Dijitalleşme, teknolojiyi merkeze alıp, bilgiye ulaşımı kolaylaştırarak sahip olunan verinin tamamını ve elde edilen çıktıları yorumlamada ve paylaşmada örgütlere, yöneticilere büyük avantajlar sağlar. Dijital dönüşüm, dijital teknolojileri kullanarak örgütlerin faaliyetleriyle ilgili fırsatları yakalamaları, oluşabilecek rekabet avantajlarını fark etmeleri ve bu avantajları örgüt faaliyetlerinde kullanabilme becerileri olarak da ifade edilebilir (Çalışkan, 2022).

Verimlilik artışı, süreçlerin etkin ve hızlı hale getirilmesi oluşabilecek risklerin yönetilmesi için elzemdir. Dijital dönüşüm süreci örgütlerde yapılacak işleri ve takip edilecek süreçleri dijital teknolojileri kullanarak gerçekleştirmektir.

Dijital dönüşüm bir seferde ortaya çıkan bir durum olmayıp bugün "olgun" olarak kabul edilen teknolojilerin tanıtılması ve benimsenmesi bu dönüşümün ilk devresidir. İnternetin ve buna karşılık gelen platformların (arama motorları, pazar yerleri) yayılması, işletmelerin tüketiciler ve işletmeler arasında ağ kurmasını sağlayan etkenler ve işlevlerle ikinci devre yaşanmış, sayısallaştırma, büyük teknoloji gibi bir dizi ileri teknolojinin benimsenmesiyle üçüncü devreye erişilmiştir. Dijital dönüşümle örgütler; hedeflenen ticari büyümeyi sağlayarak operasyonel verimliliği artıracaktır (Katz, 2017).

2.2. Örgütsel Bilginin Fayda-Maliyet Analizi

Maliyet-fayda analizi kavramı, çeşitli yatırımların, iktisadi bakımdan kârlı olup olmadığını tespit edebilmek için, gerektirdiği masrafların ve sağladığı kazançların büyüklük derecelerinin sistematik bir şekilde karşılaştırılmasını ifade eder. Bütün yatırım şekilleri, daha büyük bir hasılat veya gelir şeklinde gelecekte fayda veya kazanç sağlamak amacıyla bugünkü tüketimden vazgeçilmesini içerir. Maliyet-fayda analizi bugün katlanılması gereken masraflar karşılığında ileride elde edilmesi söz konusu olan kazancın hesaplanmasında kullanılan araçtır. Kaynakların en iyi ya da en rasyonel şekilde dağılımını sağlamak için yatırımdan beklenen kazancı ölçmek esas amaçtır. Fiziki sermaye yatırımı yapmayı düşünen herhangi bir örgütsel bilginin fayda- maliyet analizindeki yatırımın işletmeye sağlayacağı muhtemel kazancı tespit için bir maliyet-fayda hesabı yapmak zorundadır (American Library Association, 2022).

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FMA bir ürün ya da hizmetin olası masrafları ve faydaları ya da hem masraf hem de faydaların bir incelemesini gerektirir. Doğrudan maliyetlerin tanımlanması göreceli olarak kolaydır. Ancak, dolaylı masrafları tanımlamak çok önemlidir. Zaman gibi unsurlar, kâğıt, mürekkep kartuşu gibi dolaylı önemi olan maliyetler, malzeme ve eğitim masrafları gibi unsurlar ya da bir ürün ya da hizmeti sağlamak için yapılan ek masraflar dolaylı maliyet olarak kabul edilir. Dolaylı masrafları kesin bir rakam olarak hesaplamak zordur. Hem doğrudan hem de dolaylı masrafların doğru tahminleri, bir ürün ya da hizmetin toplam maliyetini daha sağlıklı şekilde hesaplamak için gereklidir.

2.3. Örgütsel Bilginin Dijitalleşme Sürecinde Sürdürülebilirlik

Örgütsel bilginin dijitalleşmesi sürecinde fayda-maliyet analizinin sürdürülebilirliğinin sağlanması için maliyetlerin hesaplanması kullanım esaslarına göre belirlenmesi önemli bir kriterdir. Yani maliyeti yüksek örgütsel bilginin dijitalleştirilerek örgütsel bilginin maliyetlerinin düşürülmesi ve buna bağlı olarak sürdürülebilir kılınması bu dönüşüm sürecinin bir parçasıdır.

3. Bilgi Yönetiminin Fonksiyonları

Bilgi yönetiminin örgütler için ok önemli fonksiyonları vardır. Bilgi yönetiminin amaçları doğrultusunda bilginin öğrenilmesini hızlandırmak, doğru yerde doğru bilginin kullanılmasını sağlamak, doğru insanlara bilgiyi ulaştırmak ve örgütsel amaçlar ile uyumlu halde örgütün yararına kullanmak için bilginin fonksiyonlarının bilinmesi gereklidir. Bu fonksiyonlar (İnce & Oktay, 2006)

- Örgütsel yaratıcılığı yönetmek,
- Örgütsel yeniliği teşvik etmek,
- Motivasyonu sağlamak,
- İletişimi güçlendirmek,
- Örgüt iklimini iyileştirmek.
- Örgütsel iktisadilik sağlamak.

Sonuç

İşletmelerin rekabette üstünlük elde etmelerinin bir yolu da bilgi yönetimidir. Bilgiyi elde etmenin tek başına yeterli olmadığı kıyasıya rekabet ortamında bilginin yönetilmesi önemli bir yönetim fonksiyonudur. Rekabette etkin olabilmek için işletmelerin bilgiye sahip a ve onu etkin bir şekilde kullanmaları gerekir. Bilgi ekonomisi kavramı ise bilgi yönetiminin getirdiği bir sürecin sonucudur. Örgütsel bilginin entelektüel bir sermaye olması ve sürecin önemli bir parçası olmasından dolayı bilgi yönetiminde başarılı olan işletmeler rekabet avantajı elde ederek öne geçmektedirler. İşletmelerin faaliyetlerini bilgi temeli üzerine kurmaları ve bilgiyi işleyerek yaratıcı bir şekilde kullanılır hale getirmeleri ile sahip oldukları değer işletmenin başarısında temel bir ölçüttür. Bilgi yoğun işletmeler yoğun olarak bilgiyi üreten, işleyen, yayan, benimseyen, tüm üretim süreçlerine uyumlu hale getiren ve dahi sahip olunan bilgi ile önder rolünde olan işletmelerdir. Bilginin transferi ve süreçlere uyumlaştırılması başarılı bir bilgi yönetiminin sonucudur. Çevreye bilgi sunabilen ve çevresinden de bilgiyi alıp kullanabilen, ancak bu bilgiyi gerekli süzgeçten geçirerek verimli ve etkin hale getiren işletmeler bilgiden yeterince faydalanabiliyor demektir. Örgütler kendi iç sistemlerinde bilgi yönetimi bağlamında özerk olduğu kadar çevresiyle de bilgi alış-verişinde gerektiğinde açık olmalıdır. İşletmelerin başarısı için bilgi odaklı bir politika izlemeleri kaçınılmazdır. Bu nedenle bilgi yöneyim süreçleri iyi bilinmelidir. Tepe yönetimden en alta kadar gerekli olan bilgiler kademelerine göre yönetilmelidir. Örgütleri birbirinden ayıran ve değerli kılan ise sahip oldukları bilgi ve teknolojileri kullanma şeklidir. Bilgi yönetiminin başarısı örgütün başarısı anlamına gelmektedir.

Maliyeti yüksek örgütsel bilgi yerine alternatif bilgi kaynaklarının belirlenmesi ile birlikte bilgiye harcanan bütçeden tasarruf sağlanmış olacaktır. Örgütsel bilgi yönetiminde dijitalleşme sürecinde birim maliyetler basılı kaynaklara göre elektronik kaynak kullanımı ile azaltılarak hem maliyetten tasarruf hem de sürdürülebilir kılınması amaçlanmaktadır.

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CASE STUDY OF INVERTER AIR CONDITIONING LOGIC DURING UNDERCHARGE REFRIGERANT

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Abstract

Preventive maintenance or regularly known as routine or scheduled maintenance of equipment and assets to keep them running and prevent any costly unplanned downtime from unexpected equipment failure. In preventive maintenance of residential air conditioning, the evaporator, condenser, air filter cleanness, running current, and refrigerant charge must be checked and recorded to ensure the design cooling capacity can be delivered. Failure to conduct preventive maintenance will lead to component clogging, high energy consumption, and component malfunction. Lack of refrigerant charge in the air conditioning systems will decrease the cooling capacity and energy efficiency. The main objective of this case study is to study the logic of three parameters which is compressor discharge temperature, expansion valve opening, and operation current for the R32 inverter air conditioner system while running in undercharge state. In achieving the objectives, some methods that need to be done. First, to find the suitable capacity of air conditioning by using the rule of thumb method. Next, the installation of wall-mounted inverter air conditioning is to be done, and observation of three parameters which is compressor discharge temperature, expansion valve opening, and operation current of inverter system that affected if the unit running in undercharge refrigerant capacity. From the result, it seems all three parameters all direct relationships with each other. From the result, undercharging 10% of refrigerant will increase the 6-7oC compressor discharge temperature, increase 0.1 amperes of operation current (A), and 10-40pls the expansion valve opening. In a conclusion, new sets of data and information for inverter split unit air conditioning can be used for teaching and learning reference and can assist the troubleshooting work at the site as well.

Keywords: Undercharge refrigerant, inverter air conditioning, maintenance

Jel Classification: C8, Y8, O31

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1. Introduction

An air conditioning is mainly used for treating air in an internal environment to establish and maintain required standard of temperature, humidity, air cleanliness and air motion. Direct expansion system or known as DX system is mainly use for residential as it has a lower price, light weight, quiet operation, ease of installation and maintenance and low energy consumption. (M. A. S. S.A. Nada, Appl. Therm. Eng, 2017) state split type is commonly used as their design simple and flexible. As for today, major electricity consumption among residential, commercial and industries is air conditioner (Mohsen Farzad, 1989). Variety of air conditioner brands and types including inverter and non-inverter unit are available in Malaysia market today, it's made easier for consumer to make a choice. Previously, non-inverter unit are often used by Malaysia consumer, as the price is much lesser compared to inverter unit. However, the energy consumption is much higher almost 40% due to compressor motor speed cannot be regulate according to room temperature. Meanwhile, Inverter air conditioner has ability to run in partial load and control compressor frequency to maintain a desired room set temperature. As a result, the energy consumption can be reduced between 11% to 38%. Purchasing inverter unit will add more cost compared to non-inverter as this unit comes with multi speed compressor motor and condenser fan motor, add of intelligent sensor and printed circuit board (PCB) at outdoor unit to ensure the maximum thermal comfort can be delivered and maximum efficiency can be achieved. Nevertheless, the extra cost will be absorbed back by electric saving made by inverter unit. The electricity savings of inverter unit can be achieved by ensure the correct design load calculation, correct installation procedure made by installer or contractor, conducting schedule maintenance, usage time and usage method as well. Nowadays, as a quick and easiest way to conduct the refrigerant charging procedure, Malaysian air conditioning technician or contractor will conduct it by using the manifold gauge and ampere meter to measure the capacity of refrigerant in air conditioning system. By using this method, the accurate amount can't be measured as the pressure inside the refrigerant system will fluctuate according to ambient temperature and even worse, if no vacuuming procedure conducted after installation or repairing of air conditioner completed. Lack of knowledge and awareness to conduct the refrigerant charging will lead to air conditioner components failure and the system unable to deliver their design cooling capacity. According to (Howard Cheung, James E. Braun, 2010) in their research, improper charge of refrigerant can be defined as contradictory mass of refrigerant with manufacturer standard, and it tends to decrease the capacity and energy efficiency of the system. Besides wrong procedure of refrigerant charging, the leakage of air conditioning components or piping route also can cause the undercharge situation occurred. The 30% reduction of refrigerant in air conditioning system can consume more energy from 17% to 23% (Domanski et al., 2015). (Proctor, 2000) in his study for California, found 4000 unit of residential air conditioner is operating without proper refrigerant charge where 34% of unit is undercharge, 28% overcharge and the balance is operated with sufficient refrigerant charge. According to catalogue and operation manual for some Malaysia air conditioner suppliers, the new split unit air conditioner will have certain amount of pre-charge refrigerant store on condenser unit where its sufficient for certain length of pipe which is from 6 to 10 metre. If the refrigerant piping exceeding the pre-charged length, the additional amount of refrigerant must be added to avoid from decreasing of capacity and efficiency of the system. Therefore, this research will study effect of refrigerant charge for residential inverter air conditioning unit from 60% - 100% refrigerant capacity. The result of compressor discharge temperature, expansion valve opening, and operation current will be presented.

The objective for the study is as follows: -

a. To study the logic for compressor discharge temperature, expansion valve opening and operation current for R32 inverter air conditioner system while running in undercharge state.

b. To prepare new sets of data and information on inverter air conditioner (split unit) for site troubleshooting and teaching & learning references.

2. Methodology

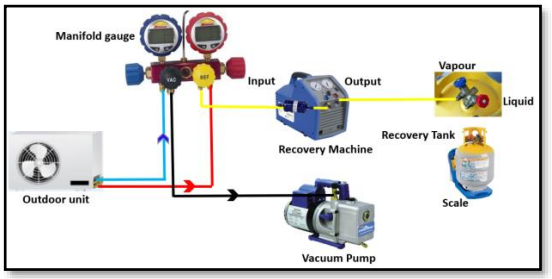

Figure 1. Recovery refrigerant setup

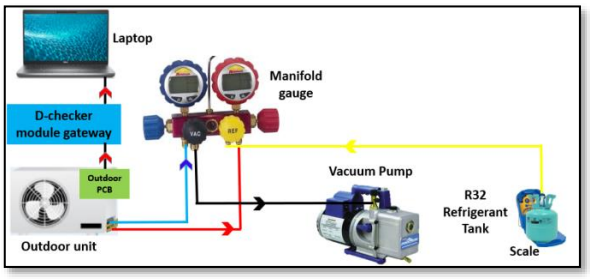

Figure 2. Refrigerant charging setup

The study setup was designed and implemented by using inverter air conditioner unit (split type) with a relevant equipment and accessories. The variable for this experiment work is refrigerant charge and each charge is observed for 15 minutes. The experiment is repeated for all level refrigerant charge from 60% to 100% charge. The findings of this experiment unable to compare with any manufacturer standard and any previous research as it conducted without applied the testing procedure as stated in Air-Conditioning & Refrigeration Institute (ARI) Standard 210/240 due to limitation of equipment and psychrometric room to maintain the fluctuation of outdoor air temperature. The first procedure prior to starting the study is to calculate the cooling load require for Lecturer room inside a Metallurgy Lab at Polytechnic Kuching Sarawak by using rule of thumb method as below:

Rule of thumb = Width (W) x Length (L) x Coefficient for laboratories

= 10ft x 12ft x 75btu/hr/ft^2

= 9000Btu/hr

After the cooling load was determine, selection and installation of air conditioner unit was made. In this study, the air conditioner unit used is 9,100Btu/hr (2.67kW) inverter wall mounted. The unit used R32 refrigerant as the working refrigerant. D-Checker module is connected to inverter air conditioner PCB to collect the data and the software is used to observe the inverter parameter. The refrigerant charge inside an air conditioner unit will be taken out first to designated R32 recovery cylinder with assistant of recovery machine and continue with vacuuming process to pull down the pressure below the

atmospheric value 760mmHg to ensure no remaining refrigerant and moisture trap inside as shown if Figure 1. The new R32 refrigerant cylinder was place on top of weighing scale and connect to manifold gauge and then connected to outdoor unit service valve of inverter air conditioner as shown in Figure 2. In this study, 5 different charges of refrigerant, parameter to be observed and air conditioner mode is shown in Table 1 below:

Table 1. Experiment setup parameter

Refrigerant charge (%)	60, 70, 80, 90, 100
Observe parameter	1. Compressor discharge temperature (^{o}C) 2. Expansion valve opening (pls) 3. Operation current (A)
Temperature setting (^{o}C)	18
Fan mode	High

3. Result and Discussion

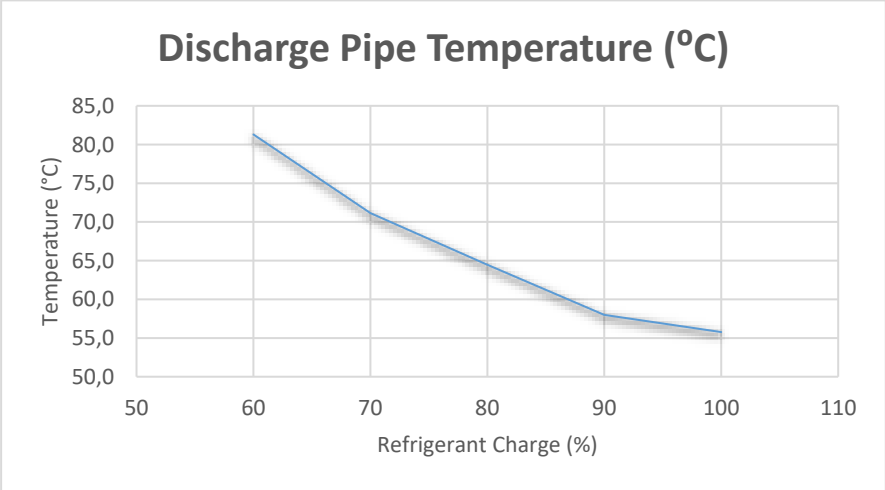

Figure 3. Compressor discharge temperature (^{o}C) data

Discharge pipe temperature (Td) data was recorded 15 minutes for every refrigerant charge percentage. As shown in Fig.3, the highest temperature for compressor discharge recorded was 81.3^{o}C which is during 60% charge. The temperature of compressor discharge decreases almost 5-10^{o}C upon 10% of refrigerant was added to the system, and it's going to decrease until 55.8^{o}C once reach the optimum charge. During undercharge condition, the amount of refrigerant flow to compressor is lesser and it will cause increasing of superheat value, thus the compressor crankcase will be hotter and will affected the

discharge temperature reading. This situation is almost similar with undersize of air conditioner unit, where capacity of air conditioner unable to cater the bigger room size. Hence, the refrigerant will fully be vaporized at the inlet of the evaporator while air conditioner continuously absorbs heat from entire room, and it will cause high temperature evaporator outlet to the compressor. According to John Houcek [3] in previous study, state that the undercharged condition will cause decreasing of system capacity and create abnormal high superheat where it will increase the temperature of compressor windings and result to damage if continuous operation. Besides undercharge condition, surrounding fluctuation of outdoor air temperature, cleanliness of condenser fin coil, condenser fan speed and outdoor unit installation clearance will also cause change of discharge pipe temperature. The value of subcooling will rise slightly with increase of outdoor temperature, (Mohsen Farzad, 1989a).

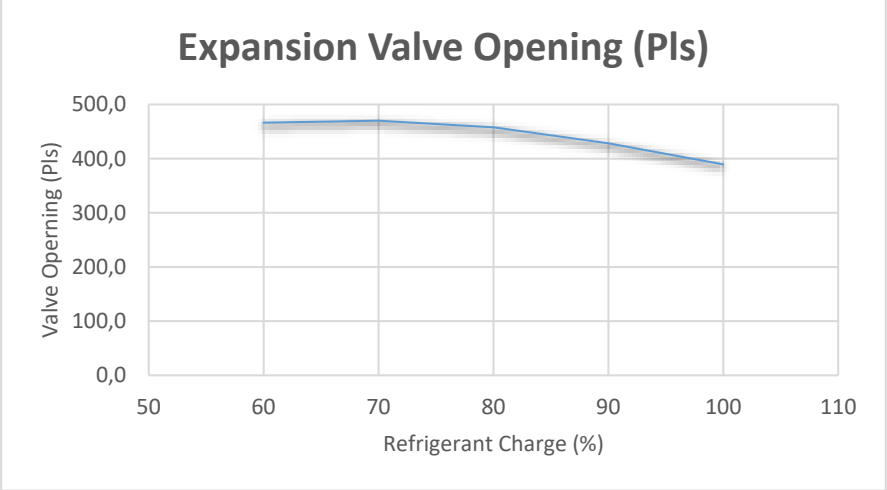

Figure 4. Expansion valve opening (Pls) data

Expansion valve opening (Pls) data was recorded 15 minutes for every refrigerant charge percentage. As shown in Fig. 4, the expansion valve tends to close steadily throughout the increase of refrigerant charge. Increasing of 10% refrigerant charge tends to narrow 33% (10 to 40pls) of expansion valve opening. This trend explained when more refrigerant was added into the system, it will cause more cold refrigerant flow into evaporator and compressor. Thus, once the temperature of evaporator and compressor superheat value is getting lower, the expansion valve opening value will going to decrease. This statement was supported by (Mohsen Farzad, 1989b) in his research mention that the superheat will decrease once the refrigerant amount was added into the system. During the observation, the temperature of compressor discharge data is directly related to the change of expansion valve opening. At the 60% refrigerant charge, the expansion valve opens wider to 466.4 pls to lower the temperature of discharge pipe which is 81.3^{o}C and its reach the minimum opening 389.3 pls at 100% charge where compressor discharge temperature recorded was 55.8^{o}C. (Kim et al., 2010) state on their research, undercharge of 70% refrigerant will fully open the expansion valve. The situation indicates that wider the opening of valve is to allow more refrigerant flow to evaporator and to reduce the compressor discharge temperature.

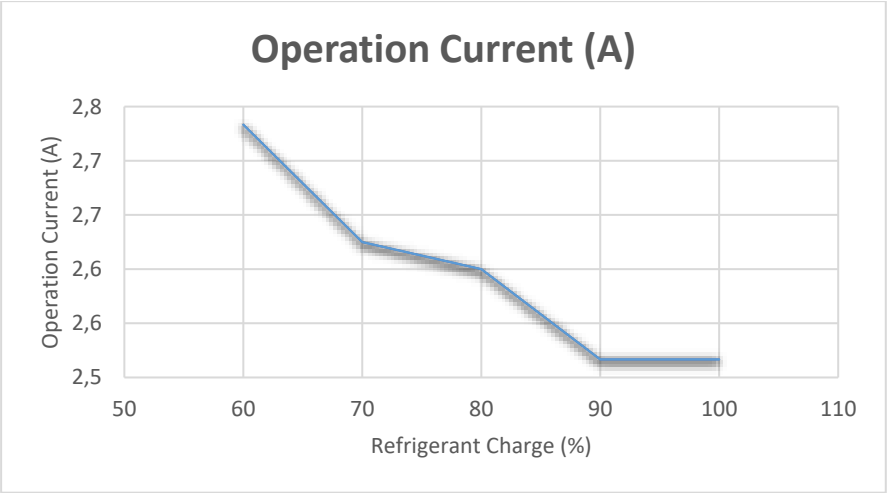

Figure 5. Operation current (A) data

Operation current (Amp) data was recorded 15 minutes for every refrigerant charge percentage. As shown in figure 5, it was found that the operation current (A) increase 0.1A during undercharge condition. The operation current was at maximum at 60% refrigerant charge where data recorded was 2.7A. During the observation, found that this trend happens due to increasing of compressor frequency where it tries to pull the evaporator temperature to achieve the desired operation setting temperature. The operation current (A) reduce steadily with increasing of refrigerant charge as the amount of refrigerant flow is sufficient to minimize the valve opening and reduce the discharge pipe temperature. Thus, the compressor tends to slow down its rotation and indirectly it will reduce the operation current. Although the value of current fluctuation is small if compared to others parameter recorded, but the compressor discharge temperature is high. Continuous operation of undercharge operation will shorten the lifespan of the compressor.

4. Conclusion

The present research emphasis on determining the value of 3 parameter of split unit inverter system. Since the experiment not conducted accordance with ARI 210/240 standard, thus the result could not compare directly to the others previous research and manufacturer standard. However, the data can provide some information to air conditioner technician on how air conditioner operated during undercharge refrigerant and could be used as a guidance for troubleshooting work on the inverter system. As a conclusion, all 3 data have relationship among each other's. Increasing and decreasing of refrigerant charge will give impact on the reading for each component. Besides, the summary for this case study is tabulated in Table 2 below:

Table 2. Case study summary

Refrigerant Charge (%)	**Compressor discharge temperature (ºC)**	**Expansion Valve Opening (pls)**	**Operation Current (A)**
100	55	380	2.5
90	62	400	2.5
80	69	420	2.6
70	76	440	2.7
60	82	470	2.8

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SPACE COLONIZATION AND EXPLORATION; AN ECONOMIC EXERCISE

Satyam Tiwari [1]

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Abstract

This article reviews how the status of the term "Economy" has changed among various states, leading them to make a sustainable society on Earth and Outer Space. Though with the current budget and innovations, the idea of space settlement still seems far-fledged. However, with international collaboration, some results predicted humans would flag Mars in the near future. With the increased funding on science and technology and international collaboration, some states are on the verge of constructing new pathways to another world. Such investment will help humans be an interplanetary species and develop new values and methods to their knowledge. This article also discusses some of the settlement models that might be possible in the near future, provided the investment feasibility.

Keywords: Space settlement, economics, interplanetary habitat, science exploration, human settlement

Jel Codes: O23, O32, B15, L93

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Introduction

The Economy has played a significant role in stabilizing the era of Mankind, so let it be their expanding the sustainable colonization by examining the social-environment development (Polasky et al., 2019), or dodging a model for equal privileges. Today, new breakthroughs are being co-operated by private space agencies which were once thought to be speculative so let it be development of reusable rockets or the visions of space travel (Yazıcı & Tiwari, 2021). Now it is these private corporations like SpaceX are partnering with the state agencies with an ambition of delivering humans to Mars. With its business model, humanity is looking for its long-term goal of sustaining them over other celestial bodies with a good return on investment. Several of the budget sheets have been created by several space organizations that could ensure human efforts to colonize space. For instance, with the Artemis mission, NASA hopes to pave a path for Mars by building a lunar gateway (NASA's Lunar Exploration Program Overview, 2020). Human settlement programs would help to void the questions against humankind's survival and detect the Big Bang's fingerprints by establishing the telescopes on celestial bodies (Siegel, 2018). i.e., Far Side of the Moon. This article will follow a brief investigation on the human settlement on space and Earth, with the first dedicated to the historical preview for economical configuration that has been developed within the society. The second section concludes the investment approach for settlement and scientific exploration. The last section of the article follows the type of settlement models along with a brief introduction about the Artemis program that would be approached by humans in the immediate-future through an international collaboration.

1. Humans on Earth

Human civilizations have existed for more than 6,000 years on Earth. However, most breakthrough developments have been started in the last three centuries, making humans a dominant species over others. From theories to applications, humans started to work on every core aspect which could enable their sustainability not on Earth but also over other celestial bodies.

1.1. Historical Trends of Economy in Human History

Economics is defined as the science which regulates the production & consumption of goods and services by society. The foundation of the Economics and financial concept was laid down long before, in the bronze age, approximately 4,000-5,000 BCE. It was not until mid of the 18th century when Adam Smith laid down the foundation of modern economics, whose work introduced the concept of Capitalist production, free markets, and values in Economics.

As soon as the definition of economics was concise, nations started to implement its universal characteristics during global industrialization. A study performed on the U.K. historical background suggests that most of the hike in average income per capita occurred only within the last two centuries, with the development of machines and industrializations (Roser, 2013).

Though a few dips in the nation's Economy have been observed due to some unprecedented events like the 2008 economic crisis and the global pandemic of 2019, an overall growth entropy of the global economy is still constructive.

1.2. Expenditure in Settlement on Earth

An estimation reports that about 150 million people worldwide could be considered homeless, with 1.6 billion having "inadequate shelter." Several states like India, Australia, and others have launched their scheme to provide or subsidize permanent shelter to the most vulnerable segment of people, including children, disabled, and mentally -ill people of different age groups (Scheme of Shelters for Urban Homeless, 2013) (G Housing and Homelessness, 2020). With these schemes, the different governments have prepared different budget schemes to make sure settlement of every part of the population on Earth, for example, $3.3Mn by the Australian government (Affordable Housing, 2021), $567 million by the Canadian, and $1.13Mn by the regional government in Germany (Homeelessness in Germany, 2017) to tackle homelessness.

1.3. Approaches to Settlement in Space

As the governments' primary problems regarding settlement are getting sorted, new organizations are now being co-operated to wing human visions of colonizing other extra-terrestrial planets. Several organizations, including government and private, have their plans and timelines to approach settlement in space. Settling in space or over other planets might allow humans to extend their values (Haqq-Misra, 2016) and preserve the human race from any intermediate threat (Globus et al., 2017). Giants like SpaceX have unveiled their plan of colonizing Mars, detailing the number of people required to make a colonial settlement along with the rocket-ship specifications (Chandler Unified School District, 2018). Currently, various ideas are being tested and measured, which could open the gate for humans to settle on space under a minimum budget as possible.

2. Scientific Exploration

A background scientific investigation is always required before approximating the room for human habitability in other corners of the solar system. To undertake such an examination, there is always a need for investment in several scientific instruments like Telescopes, Probes, and other ground-based channels. This section will analyze the budget configuration and models that space-based research institutions plan to launch to serve scientific exploration and human curiosity.

2.1. Investment in Scientific Exploration

NASA has published its' recent budget directory for the Fiscal Year 2022, emphasizing most of its' budget for Science and Research development, approximately $7.91Bn, followed by Deep Exploration System (D.E.S.) with a budget of around $6.88Bn. However, this trend is to grow year by year with $8.6Bn in science and $7.77Bn in D.E.S. by 2026 (NASA, 2021), defining the efforts NASA is dispersing to create a room for human exploration and settlement.

Not just NASA, other state institutions like the Japanese Aerospace Exploration Agency (JAXA), Indian Space Research Organization (I.S.R.O.), and European Space Agency (E.S.A.) are also taking their record for their budget investment in Scientific Exploration and development of space transportation systems.

E.S.A. has prioritized its' budget domain for Space Transportation and Scientific programs as second and third highest with the funding of $1.32Bn and $630Mn correspondingly (E.S.A. Budget 2021, 2021).

2.2. Investment Outcomes

With the current investment plans, this subsection will provide the list of the significant scientific projects declared under their listing.

- James Webb Space Telescope: Acronymed as JWST, the primary task of JWST will be to use optimized Infrared rays to peek over the composition of the extrasolar rocky worlds with improved sensitivity (Scientific Discovery with the James Webb Space Telescope, 2018), and peer back to 13.5 billion years to observe the first light of the universe.

- D.S.E. project: This project involves the missions like Artemis, which would allow the first woman to land over the lunar south pole and the development of the lunar gateway module, to support the successive landings on to the Moon (An Overview of the Volatiles Investigating Polar Exploration Rover (VIPER) Mission, 2019).

- Plankton, Aerosol, Cloud, ocean Ecosystem (PACE): Due by launch in 2023, this mission will have the sole purpose of identifying the duration of Phytoplankton Bloom and understanding the dynamics of Earth's air quality.

- VIPER: Volatile Investigating Polar Exploration Rover or VIPER will be proving its significance by searching for volatile minerals, i.e., water ice (H2O), in lateral and vertical settings at the southern pole of the lunar surface by 2023. VIPER will be the first-ever resource mapping mission to pave a path for sustainable human settlement on another celestial body.

- Jupiter Icy Moon Explorer (JUICE): Due by launch in 2023, this E.S.A. mission will provide humans a better understanding of the formation of Jovian and habitability conditions of its neighboring Moons(Grasset et al., 2013). The JUICE mission will elucidate the possible habitability of the subsurface ocean of Europa, Ganymede, and Callisto.

3. Investment Plan for Space Colonization

The above section describes how the states are disbursing their space exploration budget. However, this section will briefly entail the investment program that is more centric towards human settlement over other celestial bodies.

3.1. Historical Models for Space Colonies

Edward Everett Hale, in 1869, was among the first few visionaries to portray the picture of space colonization. In his work, he described the construction and launch of a brick-made 200 feet wide diameter satellite, inhabited by humans, into the Earths' orbit (Hale, 2017). His fictional description can be co-related with modern-day International Space Station (I.S.S.). Soon after Edward Hale, other visionaries and scientists also shared their fictional models. One of them was Konstantin Tsiolkovsky, a pioneering Russian rocket scientist. In his book, Beyond Planet Earth, published in the early 20th century, Tsiolkovsky depicted space colonizers growing crops for their survival and generating greenhouse gasses. He also forefronted the idea that space colonization would preserve the human species as a whole by minimizing the risk of extinction (A.S.C.L., 1961).

Gerard K. O'Neill published another interesting idea to colonize space in his book in 1977, The High Frontier: Human Colonies in Space, envisioning the human establishment in the stable Lagrangian point of the Earth-Moon system. He also mentioned harnessing the resources of lunar and Near-Earth Asteroids to develop spacecraft in these Lagrangian points, enabled with artificial gravity (O'Neill et al., 2019). Further Ideas continue to be developed proposing low-cost human habitats in space or over the surface of other celestial bodies for more extended sustainable periods.

3.2. Orbital Settlements

Equatorial Low Earth Orbit (E.L.E.O.): An orbital settlement may be built under the 500 Km orbit of the Earth. These accommodations would be the most economical settlement by providing the tourists, materials, and energy exchange service daily compared to the interplanetary settlements. Such structures would also have lower transportation cost. It would allow humans to return to Earth in a matter of hours in case of any tragedy (Globus et al., 2017).

In terms of radiation risk, these settlements would also possess the negligible radiation effect, with relatively lower energy particles, that could easily be coped with the minimal shielding (Globus, 2017) using Earth-based materials. These settlements may use solar power as their primary source of energy to fulfill the standard requirements of travelers. With all the advantages of an Orbital settlement, there is a good reason to believe that early settlements might be carried out in Earths' orbit, followed by successive colonizations over the region of other celestial bodies (National Space Society, 2021).

3.3. Lunar Settlements Model- The Artemis Model

The lunar touch-down in the 21st century with the Artemis program was not an instantaneous act but long planning with the collaborative research institutions. This section will brief the Artemis model and its objective of ensuring the long-term presence of humans on the Moon, unlike the Apollo Mission.

With the tentative combined budget of $93 Bn (Wall, 2021) estimated to be spent for the Artemis program, the program is planned to be conducted into three phases, Artemis -I, Artemis-II, and Artemis-III, with their respective components including S.L.S. (Space Launch System), Orion Spacecraft, Lunar Gateway, Moon landing module. The mission is set to be the first mission with large-scale collaboration with commercial companies like SpaceX, Blue Origin, and Boeing and international partners like E.S.A., Australian Space Agency, and JAXA followed by future space missions which could be the subject of commercial activities for private and state enterprise (Yazıcı & Darıcı, 2019).

- S.L.S.: This super heavy-lift expendable launch system has been under development since 2011 under NASA, intending to carry 180,000Kg under the Artemis Program. An approximation of $800 Mn per launch (Artemis Program: What You Need to Know about NASA's Moon Mission, 2021) for this launcher has been estimated.

- Orion Spacecraft: Equipped with the Life support system, Orion is a command module designed to carry the Artemis astronauts to the Moon. Orion uses some similar configuration as Apollo Command and Service Module (C.S.M.) but with increased complexity and thermal protection system.

- Lunar Gateway: Similar to that of the International Space Station (I.S.S.), the Lunar Gateway will be a small space station revolving around the Moon, designed to serve as a hub for the astronauts in exploring (Artemis Program: What You Need to Know about NASA's Moon Mission, 2021) and constructing settlements on the lunar surface. The first pieces of Lunar Gateway are tentative to be launched by 2022.

- Moon landing Module: The landing module would serve in back and forth landing of Artemis crew, cargo, and robotics down to the lunar surface from the Lunar Gateway. For the Human Landing System (H.L.S.) design, NASA made a contract with SpaceX, Blue Origin, and Dynetics worth $967 Mn.

The first three Artemis missions will compile sending and testing of the Orion capsule into the orbit of Moon, sending the crew of four Astronauts into the orbit of the Moon, and boarding over the south pole of the lunar surface using the Lunar Gateway, respectively. The Artemis would try to establish the human base for its long-term presence using Technology, Resources, and Partnership. If successful, Artemis would become the foundational mission in its first steps for making humans an interplanetary mission utilizing the Lunar Gateway for possible missions to Mars.

3.4. Martian Settlement Model

The only planet in the solar system that could sustain humans with the progression of current technological models in the near future is Mars. Unlike the Moon, being at a distance of 361 million Km from Earth, it might take approximately six months for the first crew to be transported onto Mars when it is closest to Earth. Elon Musk, the C.E.O. of SpaceX, has a vision of starting human self- settlement

on Mars as early as 2050. Musk has estimated a budget of approximately $100 Bn to $10 Tn to establish the first city on Mars (Brown, 2019).

Sustaining a city on Mars would be more challenging than maintaining it on Earth. Unlike Earth, the Martian atmosphere consists of 95.32% of carbon dioxide, 2.7% of nitrogen, 1.6% of argon, and trace levels of carbon monoxide. Humans would need advanced tools to perform In-Situ Resource Utilization (I.S.R.U.) to extract Oxygen (O2), H2O (water), and other necessary elements out of the Martian surface to accommodate a certain martian population (Tiwari, 2021). However, to cop-out the harsh Martian environment, some designs of the future Martian inhabitants have been suggested, including Mars Pyramid and Mars Acropolis (Williams, 2021). Such settlement programs would help humans explore the new spectrum of values and evolutionary destiny (Colonizing Mars Could Speed up Human Evolution, 2021). The ambition of human settlement over the other celestial bodies can only be bridged with feasible funding and progression in technology. However, an in-depth investigation is required of the critical funding needs, which is not under the scope of this article.

Discussion

This article has briefed how humans have evolved the concepts of economics to run the individual states. With humans more accessible with their budgets, now they are endeavoring for the settlement program in space. The new budget focuses not only on the settlement programs but also on the deployment of scientific instruments, which would eventually aid the knowledge of humans about our universe and the values that first settlers might perceive during their inhibition over other celestial bodies Taking the historical model and regulated budget sheets as an example, humans are now attempting to establish their colony with the Moon as a primitive point that would eventually open the doors for inhabiting other celestial objects. For space settlement, it is suggested that orbital settlements would be far more economical and easily accessible than a planetary settlement, i.e. Mars, due to a number of factors like Resource availability, proximity from Earth, and the radiation effects.

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