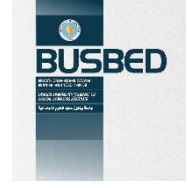


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## METAVERSE: BIBLIOMETRIC ANALYSIS, A CONCEPTUAL MODEL PROPOSAL, AND A MARKETING-ORIENTED APPROACH

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### ABSTRACT

Revolutionary technological developments such as television, internet, and social media etc., in which have affected all areas of life, have also prominently affected marketing activities as well. It is expected that the Metaverse, one of today's newest technological developments, will also be revolutionary. The main purpose of this study is to visually present the bibliometric analyzes of empirical studies on the Metaverse between 2021-2022 and to propose a theoretical model based on effects of the variables in the studies. For this purpose, a bibliometric analysis for 11 studies was performed using VOSviewer. According to the results obtained from the study, most studies related to the Metaverse were made in South Korea. Looking at the theoretical infrastructure of the studies, the studies were mostly based on the expanded technology acceptance model. In the studies, the most used variable was "intention". In most of the studies, the effect of other variables on intention was investigated. Another aim of the study is to present predictions in terms of marketing. Based on the prediction that the Metaverse will be used more widely and more functionally in the future due to its unique properties, marketing foresight have been put forward in the conclusion and recommendations section of the study.

**Keywords:** Metaverse, Marketing, Bibliometric Analysis

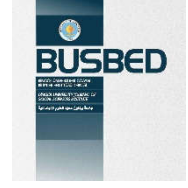
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## METAVERSE: BİBLİYOMETRİK ANALİZ, KAVRAMSAL BİR MODEL ÖNERİSİ VE PAZARLAMA YÖNLÜ BİR YAKLAŞIM


Zübeyir ÇELİK<sup>1</sup>, Bulut DÜLEK<sup>2</sup>, İbrahim AYDIN<sup>3</sup>, Reha SAYDAN<sup>4</sup>


### ÖZ


Televizyon, internet, sosyal medya gibi devrim niteliğindeki teknolojik gelişmeler hayatın her alanını etkilediği gibi pazarlama faaliyetlerini de önemli ölçüde etkilemiştir. Günümüzün en yeni teknolojik gelişmelerinden biri olan Metaverse'ün de devrim niteliğinde olacağı beklenmektedir. Bu çalışmanın başlıca amacı 2021-2022 yılları arasında Metaverse ile ilgili yapılan ampirik çalışmalara yönelik bibliyometrik analizleri görsel olarak sunmak ve çalışmalardaki değişkenlerin birbirleri üzerindeki etkilerine bağlı olarak teorik bir model önermektir. Bu amaç için ulaşılan 11 çalışmanın VOSviewer yazılımı kullanılarak bibliyometrik analiz gerçekleştirilmiştir. Çalışmadan elde edilen sonuçlara göre Metaverse ile ilgili en fazla çalışma Güney Kore'de yapılmıştır. Çalışmaların teorik alt yapılarına bakıldığında ise çalışmalar en çok genişletilmiş teknoloji kabul modeline dayandırılmıştır. Çalışmalarda en fazla niyet değişkeni kullanılmıştır. Çalışmaların çoğunluğunda diğer değişkenlerin niyet üzerinde etkisi araştırılmıştır. Çalışmanın bir diğer amacı da pazarlama açısından ön görüler sunmaktır. Metaverse'ün kendine has özelliklerine bağlı olarak ileride daha yaygın ve daha fonksiyonel olarak kullanılacağı tahminine bağlı olarak, çalışmanın sonuç ve tavsiyeler kısmında pazarlama ön görüleri ileri sürülmüştür.

**Anahtar Kelimeler:** Metaverse, Pazarlama, Bibliyometrik Analiz

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## 1. INTRODUCTION

The concept of the Metaverse has recently been one of the most talked-about subjects in the field of technology. The Metaverse is a digital version of how we work in the real world. Users interact with each other and with the environment, which also mirrors the physical world, in this 3D digital area by forming avatars that look like them and imitate their movements (Hollensen et al., 2022).

Instead of using 2D flat devices like a smartphone or laptop to navigate through web pages, the metaverse allows users to engage with 3D virtual worlds using their avatars, where they can work, learn, or simply have fun in virtual reality (Dhelim et al., 2015). In the metaverse world, virtual reality and augmented reality applications are used for users to have an immersive and exciting experience (Çelikkol, 2022).

In recent years, Metaverse technology has attracted a lot of interest and demand from brands (Hollensen et al., 2022). The metaverse is described as a universe that produces a lucrative virtual economy by providing new and equal opportunities to current users and businesses. The recent announcement by Facebook to change its name to Meta signals a possible growth in technical innovation that could dramatically change the world (Almarzouqi et al., 2022). By 2025, the global metaverse market is expected to be worth around \$280 billion. It is expected to lead to the development of new markets and cultural industries as its utility grows among companies targeting younger customers (Hwang and Lee, 2022).

Bibliometrics is a method of analyzing books and other communication instruments using mathematical and statistical techniques (Pritchard, 1969). Citation analysis and content analysis are widely used bibliometric methods. Although bibliometric techniques are most commonly used in the field of library and information science, they have a variety of applications. The author, title, subject, and citations of scientific publications in a certain discipline are the primary focus of bibliometric studies. This type of analysis provides useful indicators of scientific productivity, trends, emphasis on research in various directions, and publication preferences of researchers (Jacobs and Pichappan, 2001).

Researchers started to become more interested in the concept of metaverse after 2020, and they began to do their first studies on the subject (Çelikkol, 2022; Damar, 2021; Kraus et al., 2022; Park et al., 2022). Unlike previous studies, a bibliometric study is carried out in this study and a conceptual model is proposed for metaverse technology. A literature review was conducted in this area, focusing on empirical studies that included the concept of a metaverse in the study title as well as the hypothesis. It is expected that the findings of the study will provide a more comprehensive perspective to new research in terms of identifying research trends and highlighting the distinctive features of the metaverse.

## 2. METAVERSE

The term metaverse is derived from the words meta (beyond) and the universe. It combines multiple different sandboxes (mix of virtual and augmented reality) to express real life using avatars (Sparkers, 2021). The Metaverse is a post-reality universe that combines physical reality and digital virtuality in a continuous and persistent multi-user environment (Mystakidis, 2022). The Metaverse system is a digital area accessible through a virtual world that allows users to communicate and engage in interactive activities (Collins, 2008).

In his 1992 sci-fi novel *Snow Crash*, Neal Stephenson developed the term "metaverse" to describe a persistent, immersive 3D virtual world in which any user, anywhere in the world, can access anything from commerce to entertainment (Collins, 2008). In Stephenson's understanding of the Metaverse, humans as avatars interact with intelligent agents and each other in an immersive world that appears to be a neon-lit night metropolis (Dionisio and Gilbert, 2013).

Individual users have their own avatars in the metadatabase, which are similar to their actual identities, to experience a virtual life that is a metaphor for their actual world (Lee et al., 2021). Users can enjoy an enhanced immersive virtual experience thanks to digital visualization technologies such as virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR) (Dhelim et al., 2015).

The utilization of avatars, interoperability, asset continuity, and synchronization are all common elements of a metaverse (Kim, 2021). Remarkably, the metaverse allows for interoperability between platforms that represent various virtual worlds, allowing users to develop and distribute content between virtual worlds (Lee et al., 2021).

Metaverse technology, which was originally used for games, is now actively used for different purposes in many areas such as meetings, incentives, conferences, exhibitions, schools, institutions, sports, entertainment, fashion, and retail, especially due to need (Hwang and Lee, 2022).

### 3. METHOD

The aim of this study is to perform bibliometric analysis and propose a conceptual model for metaverse technology. It is known that especially in the last few years, Metaverse technology has received a lot of attention and demand by brands in practice (Hollensen et al., 2022). In the years after 2020, it is seen that researchers started to be more interested in the concept of metaverse and they made the first study attempts for the metaverse issue (Çelikkol, 2022; Damar, 2021; Kraus et al., 2022; Park et al., 2022). Therefore, for this study, the studies conducted in the next years of 2020, namely 2021 and 2022 (today) were selected. However to determine the limitations of the study and to ensure its originality, a literature review was conducted for empirical studies which included concept of metaverse in the study titles and also included a hypothesis/research model. Considering the "metaverse" key concept, which is the subject of the study, studies were tried to be reached through Google Scholar (Snyder, 2019). Few studies were found in 2021 or 2022 due to the new interest in the metaverse for empirical studies by researchers. Considering that a limited number of studies have been carried out on the Metaverse, it is seen that Metaverse is a new subject and empirical studies have not developed due to the inadequacy of theoretical studies on the subject. Accordingly, the study is expected to both support the theory and guide empirical studies.

The majority of the studies (eight studies) among the eleven empirical studies were carried out in the current year 2022. There were only three empirical studies that were reached in 2021. As a result, bibliometric data sources were obtained by making content analyzes of the eleven studies reached. VOSviewer was run for bibliometric data sources. VOSviewer is performed for analysis of bibliometric data sources as it provides visual mapping (Paul and Bhukya, 2021). Finally, a conceptual model was proposed according to the results of the accessed studies.

### 4. BIBLIOMETRIC ANALYSIS

#### 4.1. Selected Studies

The studies selected for this study are those published between 2021 and 2022, those with the concept of "metaverse" in the title of the study, and those with a research model/hypotheses. Visual mapping of eleven selected studies is presented in Figure 1. Contrary to 2021, it is seen that the studies conducted in 2022 are co-occurrences. Because, as a result of the literature review, it was seen that eight studies were published in 2022 and three studies in 2021.

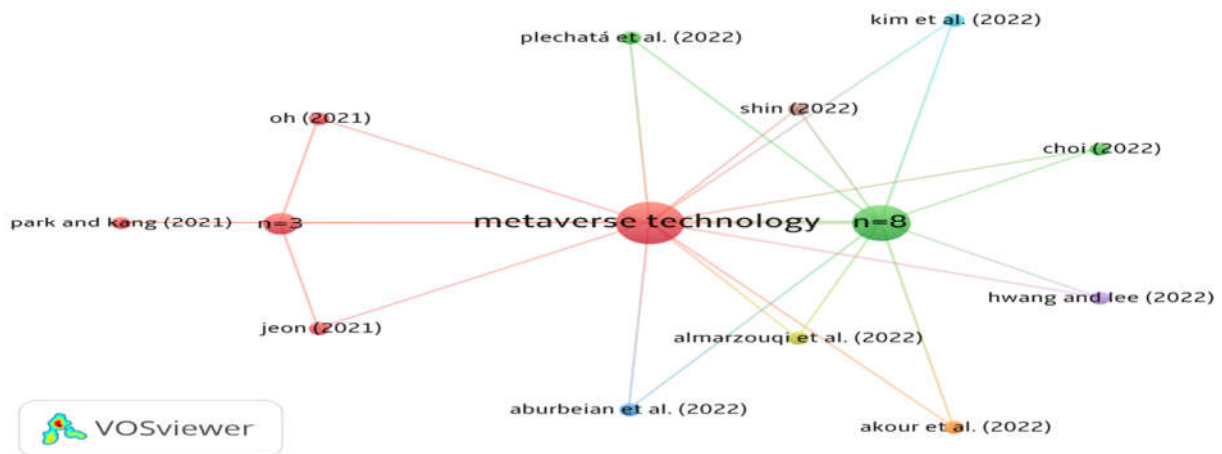


Figure 1. Co-Occurrences for studies selected

#### 4.2. Countries of Studies

Figure 2 presents the visual mapping for the countries where the studies were conducted. It is seen that the studies are carried out in South Korea, the United States of America (USA), the Kingdom of Saudi Arabia (KSA), the United Arab Emirates (UAE), Palestine, and Oman. However, it is unclear in which countries some studies were conducted. On the other hand, it seems that most studies were conducted in South Korea. Simultaneously, there are international studies conducted in the Kingdom of Saudi Arabia (KSA), United Arab Emirates (UAE), and Oman.

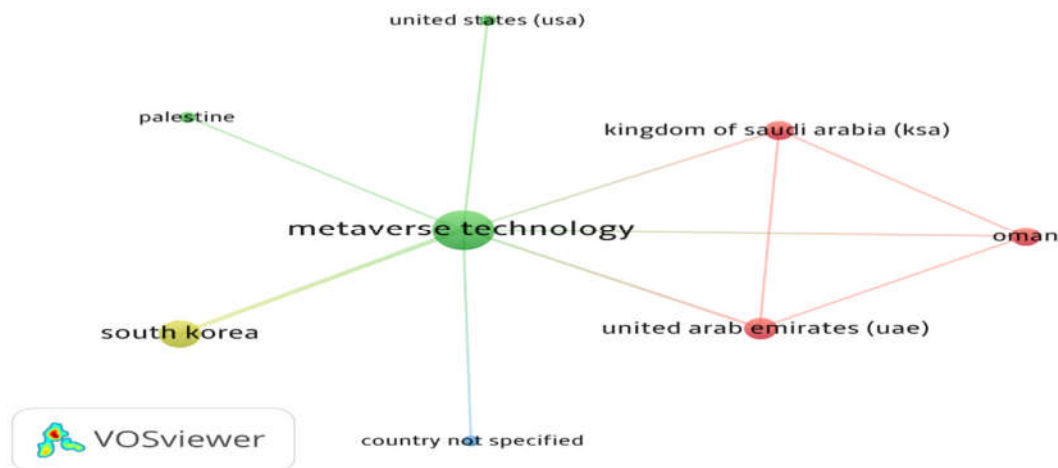


Figure 2. Co-Occurrences for countries

#### 4.3. Theoretical Backgrounds of Studies

The visual mapping of the theories/models forming the theoretical background of the studies is presented in Figure 3. Extended Technology Acceptance Model (ETAM), Metaverse Spice Model, Affordance Process Model, Cognitive Affective Model of Immersive Learning (CAMIL), User Experience-Based Design Innovativeness (UXBDI), and Telework Theory are the theories/models that form the theoretical background of the studies. However, the theoretical background of most studies is based on the Extended Technology Acceptance Model (ETAM).

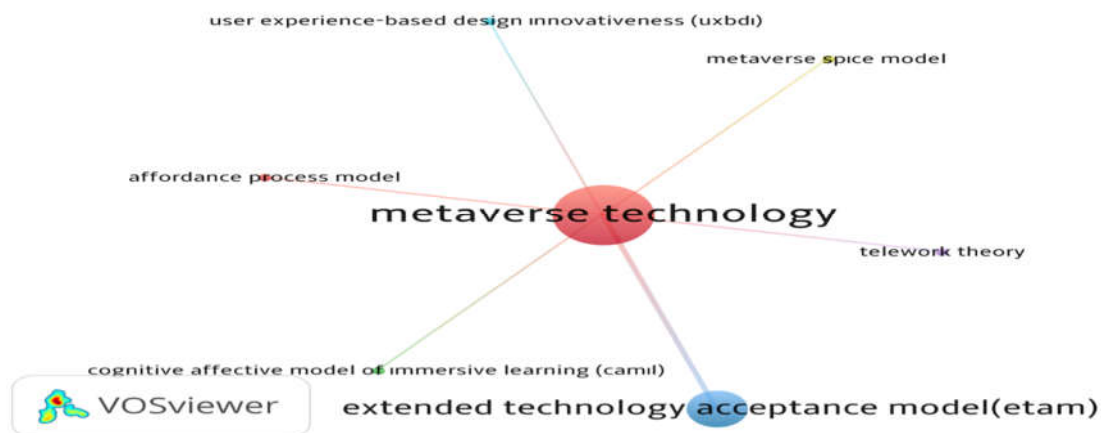


Figure 3. Co-Occurrences for theoretical backgrounds

#### 4.4. Methodology of Studies

Figure 4 presents the visual mapping for the methodological backgrounds of the selected studies. In some studies, only students are the sample units of the studies, while in some studies there are people other than students and the sample units are mixed. Some studies use only survey or experiment and survey techniques together to collect data. The sample size of the studies is less or more than 384. However, there are more studies with mixed sample units, using only survey or experiment and survey technique simultaneously, and a sample size of less than 384. In addition, SPSS, AMOS, and SmartPLS packages were used in the analysis of the data. Hypothesis/model tests were performed by performing regression analysis, correlation analysis, difference tests (t-test or one-way ANOVA), and structural equation modeling (SEM) through these package programs. In addition, some studies use machine learning (ML) algorithms, importance-performance map analysis (IPMA), artificial neural network (ANN), and ethnographic methods for data analysis. However, hypothesis/model tests are mostly performed by running structural equation modeling (SEM) via the AMOS package program. Finally, as shown in red for example, mixed sample unit, simultaneous use of experiment and survey technique, sample size less than 384, use

of SPSS as a package program, and simultaneous use of regression analysis and Pearson correlation analysis are common constructs for some studies.

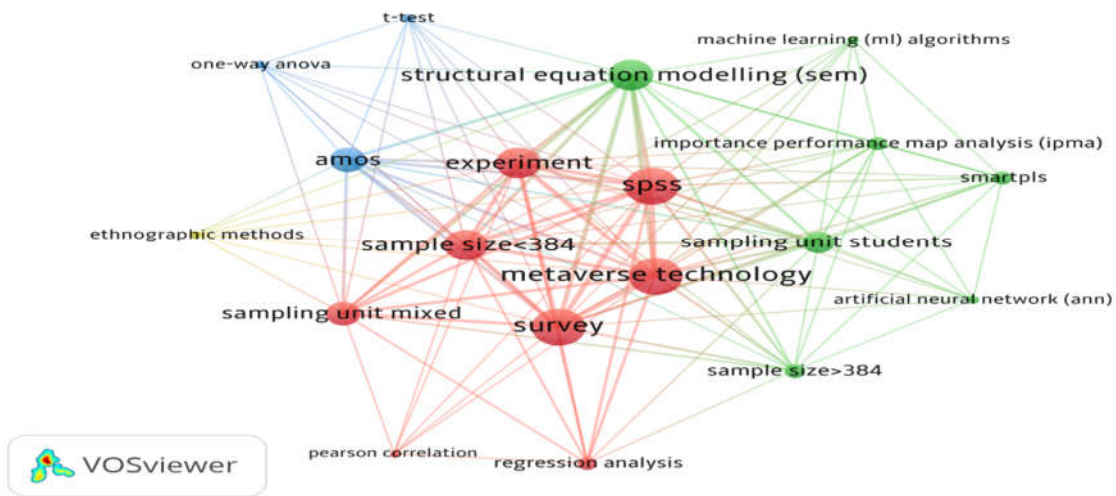


Figure 4. Co-Occurrences for methodology

#### 4.5. Variables of Studies

Visual mapping for the variables evaluated in the studies is presented in Figure 5. The variables evaluated in alphabetical order are as follows: attitude, attractiveness, commitment, concurrence, continuity, dietary footprint, economic flow, embodiment, emotions, empathy, identification, identity, immersion, intention, interaction, interoperability, novelty, perceived compatibility, perceived complexity, perceived curiosity, perceived ease of use, perceived enjoyment, perceived observability, perceived spatial property, perceived trialability, perceived usefulness, personal innovativeness, playability, price, psychological distance, response-efficacy, risk perception, satisfaction, self-efficacy, social norm, spatial presence, system quality, task-technology fit, and telework. A total of thirty-nine variables were evaluated. Among the total variables, intention (Documents=9), perceived ease of use (Documents=7), perceived usefulness (Documents=7), self-efficacy (Documents=5), and social norm (Documents=4) were the most evaluated variables. However, each of the variables of personal innovativeness, perceived enjoyment, satisfaction, and spatial presence were evaluated in an equal number of studies (Documents=3). In addition, each of the variables of attitude, perceived compatibility, perceived observability, perceived trialability, interaction, and system quality were evaluated in an equal number of studies (Documents=2). Except for these variables, each of the variables was evaluated in only one study (Documents=1). As a result, it should be considered that the variables evaluated in most studies may have been evaluated simultaneously.

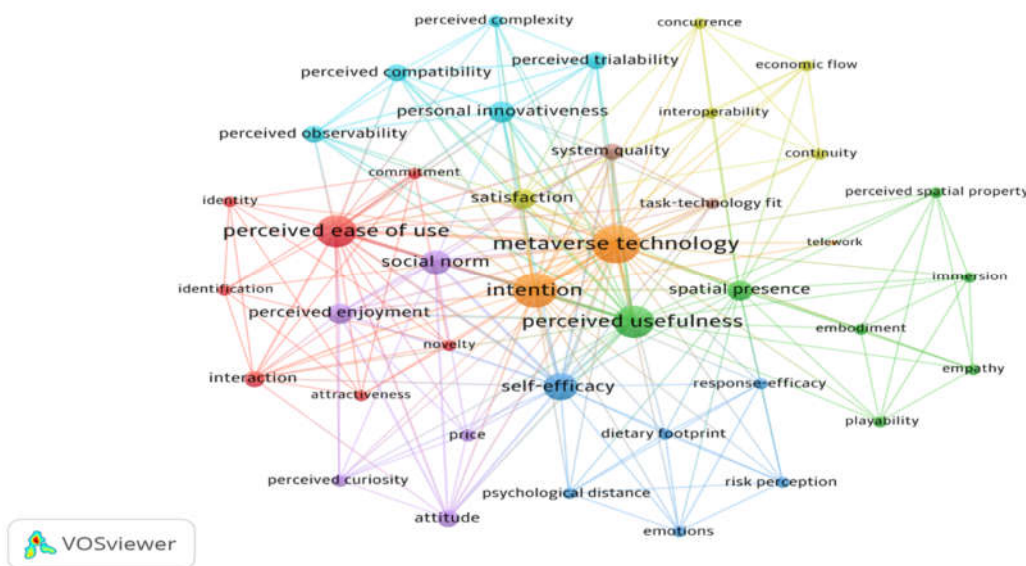


Figure 5. Co-Occurrences for Variables

5. CONCEPTUAL MODEL PROPOSAL

System quality (Kim et al., 2022; Oh, 2021), social norms (Park and Kang, 2021), self-efficiency (Aburbeian et al., 2022; Kim et al., 2022; Oh, 2021; Park and Kang, 2021), interaction (Park and Kang, 2021), perceived curiosity (Aburbeian et al., 2022), perceived enjoyment (Aburbeian et al., 2022; Oh, 2021; Park and Kang, 2021), and personal innovativeness (Akour et al., 2022; Almarzouqi et al., 2022) affect perceived ease of use. In this context, the conceptual model of the factors affecting perceived ease of use is shown in Figure 6.

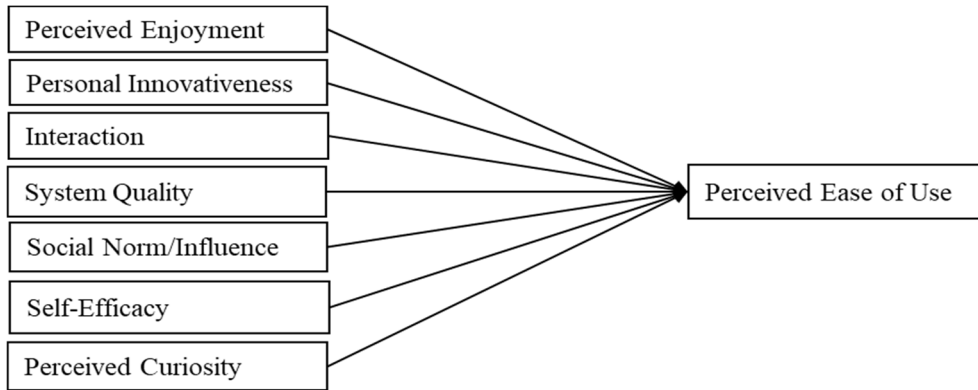


Figure 6. Conceptual model of factors affecting perceived ease of use

System quality (Kim et al., 2022; Oh, 2021), social norms (Aburbeian et al., 2022; Oh, 2021; Park and Kang, 2021), interaction (Park and Kang, 2021), perceived enjoyment (Aburbeian et al., 2022; Oh, 2021), perceived ease of use (Aburbeian et al., 2022; Kim et al., 2022; Oh, 2021), task-technology fit (Kim et al., 2022), personal innovativeness (Akour et al., 2022; Almarzouqi et al., 2022), immersion (Shin, 2022), and spatial presence (Shin, 2022) affect perceived usefulness. Besides, perceived spatial properties affect immersion and spatial presence (Shin, 2022). In contrast, perceived usefulness affects empathy and embodiment (Shin, 2022). Also, empathy and embodiment affect playability (Shin, 2022). Accordingly, the conceptual model of the factors affecting perceived usefulness is shown in Figure 7.

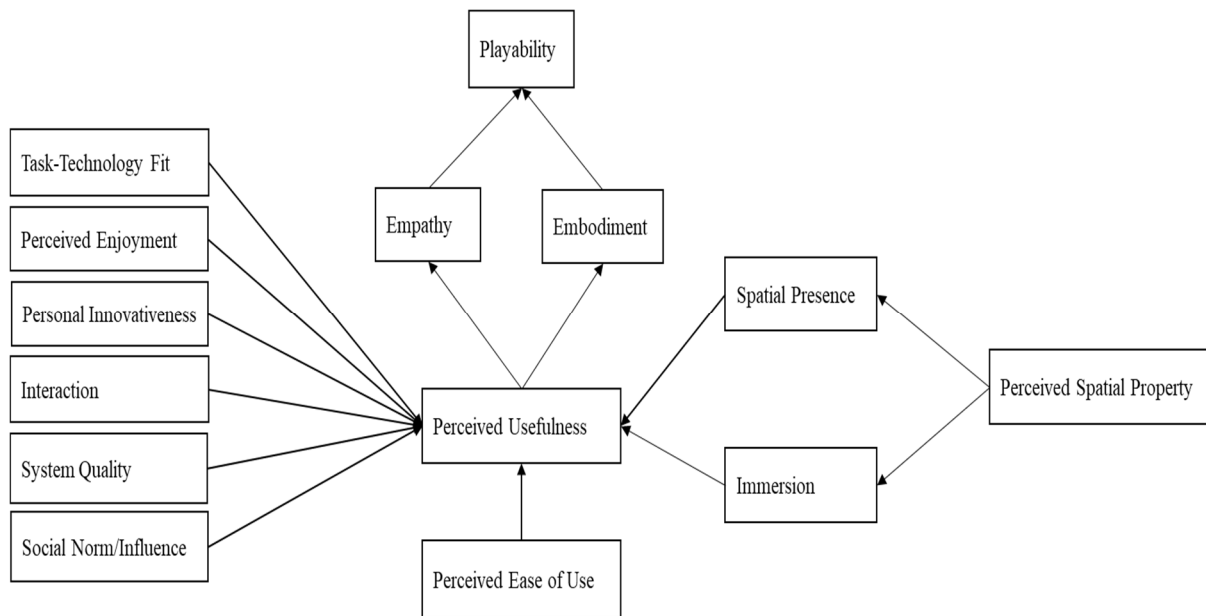


Figure 7. Conceptual model of factors affecting perceived usefulness

Perceived trialability (Akour et al., 2022; Almarzouqi et al., 2022), perceived observability (Akour et al., 2022; Almarzouqi et al., 2022), perceived compatibility (Akour et al., 2022; Almarzouqi et al., 2022), perceived complexity (Akour et al., 2022), continuity (Hwang and Lee, 2022), spatial presence (Hwang and Lee, 2022), interoperability (Hwang and Lee, 2022), concurrence (Hwang and Lee, 2022) affect satisfaction. Therefore, the conceptual model of the factors affecting satisfaction is shown in Figure 8.

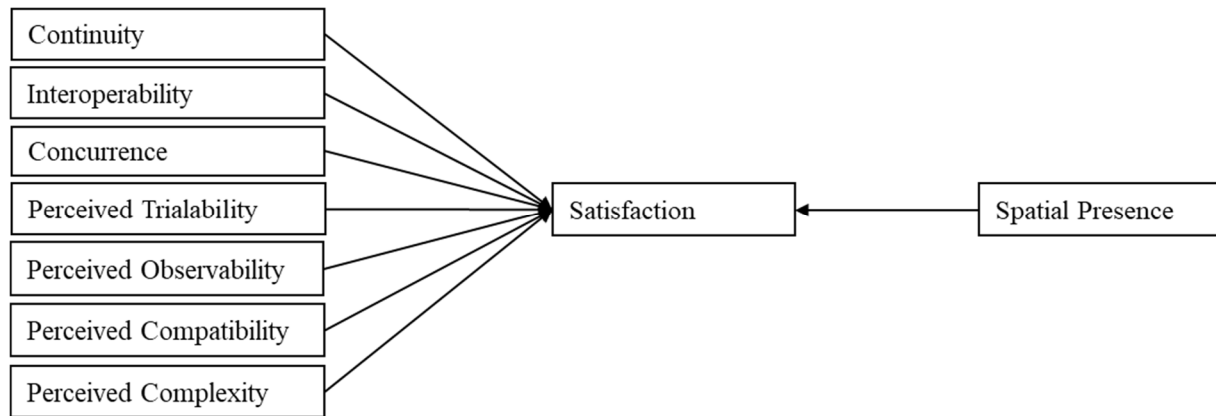


Figure 8. Conceptual model of factors affecting satisfaction

According to Jeon (2021), attractiveness and interaction affect both identification and commitment, and identity also affects identification. Thus, the conceptual model of the factors affecting identification and commitment is shown in Figure 9.

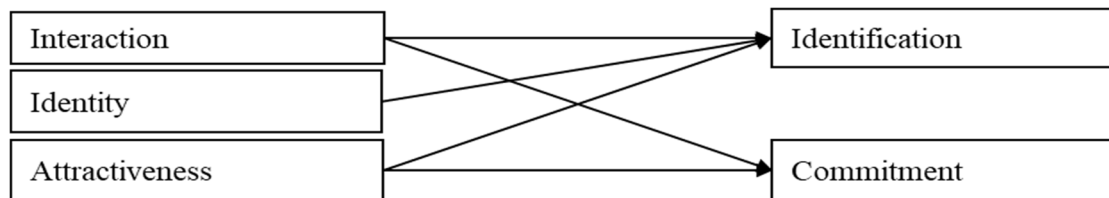


Figure 9. Conceptual model of factors affecting identification and commitment

Perceived ease of use and perceived usefulness affect attitude (Aburbeian et al., 2022; Park and Kang, 2021). Based on this, the conceptual model of the factors affecting attitude is shown in Figure 10.

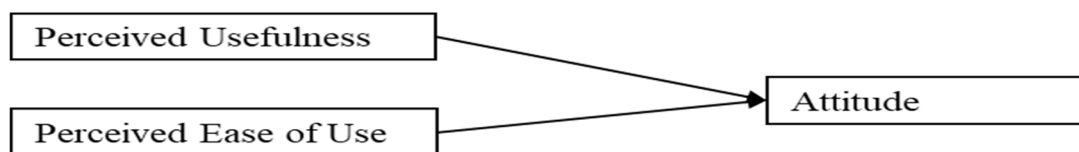


Figure 10. Conceptual model of factors affecting attitude

According to Plechatá et al. (2022), spatial presence affects psychological distance and emotions, psychological distance affects risk perception, as well as emotions and risk perception affect intention. In addition, system quality (Oh, 2021), self-efficiency (Oh, 2021; Plechatá et al., 2022), social norms (Oh, 2021), perceived ease of use (Akour et al., 2022; Almarzouqi et al., 2022; Kim et al., 2022; Oh, 2021), perceived usefulness (Akour et al., 2022; Almarzouqi et al., 2022; Kim et al., 2022; Oh, 2021), perceived enjoyment (Oh, 2021), telework (Choi, 2022), price (Aburbeian et al., 2022), continuity (Hwang and Lee, 2022), spatial presence (Hwang and Lee, 2022; Plechatá et al., 2022), interoperability (Hwang and Lee, 2022), concurrency (Hwang and Lee, 2022), satisfaction (Akour et al., 2022; Almarzouqi et al., 2022; Hwang and Lee, 2022), and attitude (Aburbeian et al., 2022; Park and Kang, 2021) affect intention. In contrast, intention affects dietary footprint (Plechatá et al., 2022). According to these findings, the conceptual model of the factors affecting intention is shown in Figure 11.



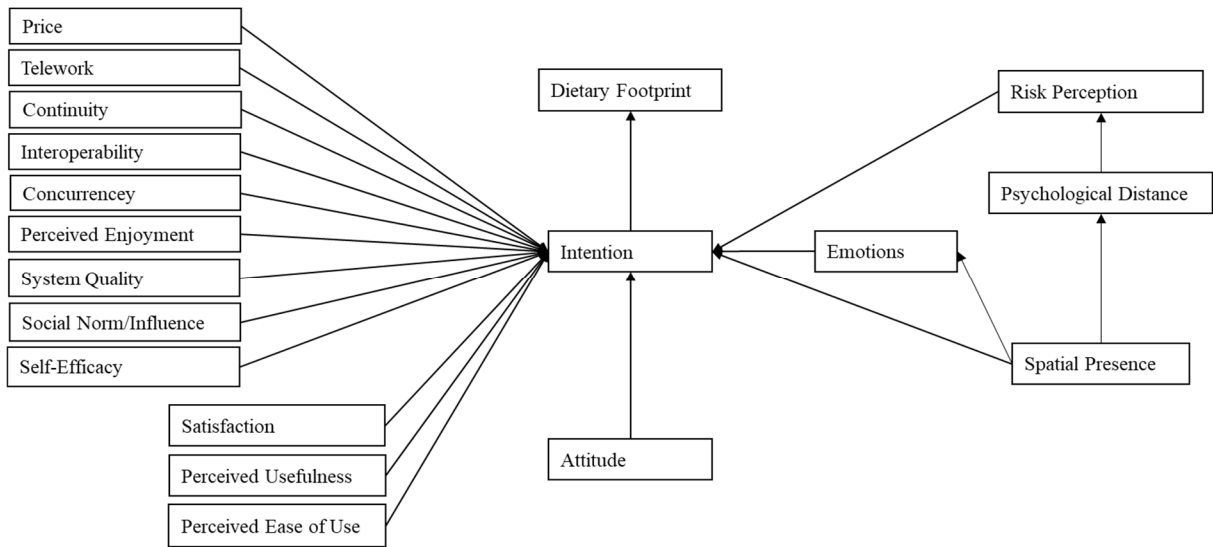


Figure 11. Conceptual model of factors affecting intention

In conclusion, the proposed conceptual model based on the integrated framework of the presented models is shown in Figure 12.

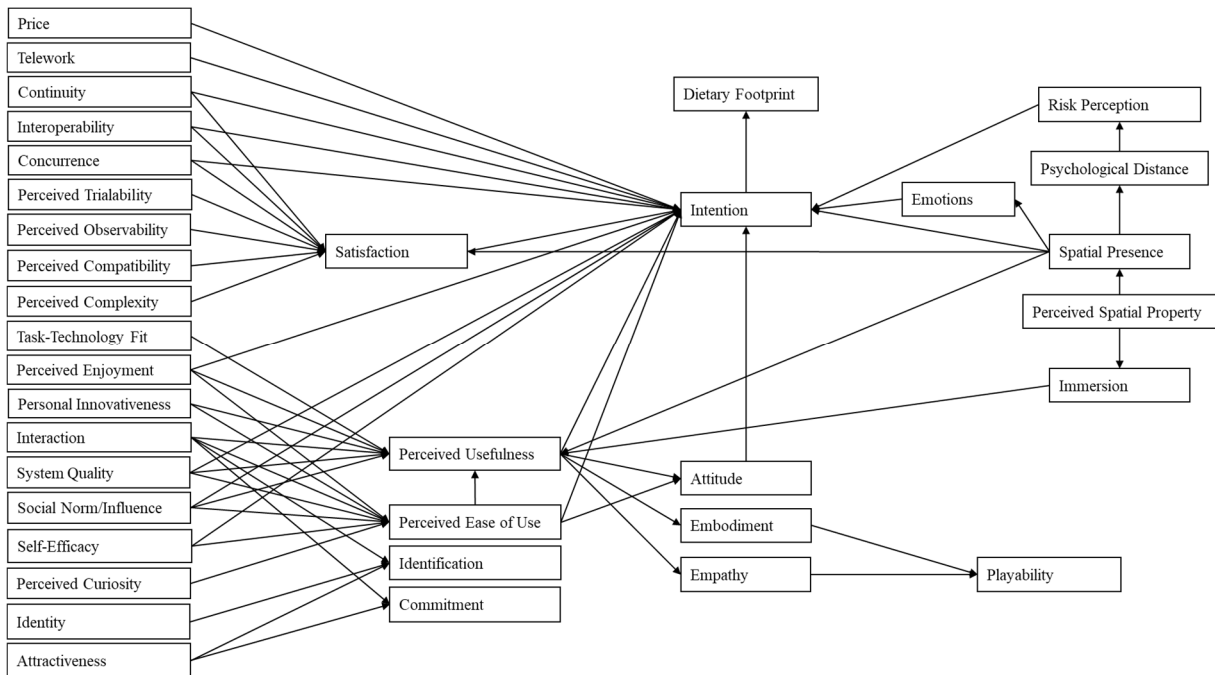


Figure 12. Proposed conceptual model

### 5. CONCLUSION AND RECOMMENDATIONS

Metaverse is one of the latest developments brought about by technological developments. In this study, 11 studies on the Metaverse conducted in 2021 and 2022 were examined using the visual mapping technique. It is revealed which theory/models were the back ground fort he studies, at which countries the studies occured, how the data were collected for the studies, and which analysis methods were used for the data and which variables were used in the studies. Considering the effects of the variables used in the studies on each other, a theoretical model was proposed. It was concluded that most studies were conducted in South Korea. This was an expected result. Because, one of the countries where the most articles about new technological developments are published is South Korea (Choi et al., 2021; Guo et al., 2021; Alagumalai, 2021).

Looking at the collection and analysis of data, mixed sample unit, simultaneous use of experiment and survey technique, sample size less than 384, use of SPSS as a package program, and simultaneous use of regression analysis and Pearson correlation analysis are common constructs for some studies. Looking at the theoretical

background of the studies, it was seen that most of the studies were based on the extended technology acceptance model. In studies, the acceptability of this technology has been questioned for a new and developing phenomenon such as the Metaverse, which is a great expectation technologically. It was determined that the most used variable in the studies was the intention. After the intention variable, perceived ease of use and perceived usefulness were the second most used variables. When the studies were examined, it was seen that the effect of almost all variables on intention was investigated. Considering the effects of the variables on each other, a theoretical model has been proposed in the studies examined. Only 3 empirical studies on Metaverse were reached in 2021, and 8 studies were reached in the first 5 months of 2022. It is conjectured that more empirical studies will enter the literature in the remaining months of 2022. It is expected that this proposed model for the Metaverse, which is expected to be studied more in the future, will provide significant benefits for researchers and offer foresight to researchers.

Metaverse is actively used in fields such as sports, entertainment, education, and fashion today. It is estimated that the Metaverse will develop in the future and will provide convenience and advantages to consumers, businesses, government institutions, and almost every area of life, as it will emerge as a much more functional technology. Businesses will be able to have strong interactions with employees, other businesses, partners, consumers, and all stakeholders without distance limit. Advertisements can be given in organizations attended by many people in the Metaverse world. With the spread and development of the Metaverse in the future, brands may agree with Facebook for avatar dresses with their logos. Today, brand ambassadors in social media can engage in much more remarkable and effective activities in the Metaverse. With Metaverse, more data about consumers can be obtained and thus more personalized promotion activities can be carried out. Salespeople can meet with representatives of other companies via Metaverse. If appropriate, a presentation may be made to representatives of multiple companies rather than a representative of a single company. In addition, the fact that body language can be used in the Metaverse, unlike phone calls, will provide the opportunity to conduct sales negotiations much more effectively. On a single platform for the training of salespeople in various parts of the country, trainers will be able to train by using their body language more effectively than on platforms such as Zoom that offer the opportunity to meet collectively, and they will be able to easily perform practice in cases that require practicals. In addition, with the Metaverse, market research will be easier and more comprehensive.

According to the results obtained from the study, the most intention variable was used in the studies. It will be useful to use the intention variable in the studies to be carried out to understand consumer behaviors towards the Metaverse. Because, using the intention variable to understand how consumer behavior will be towards Metaverse, which is one of the newest technological developments, will make significant contributions to the business world and the literature. Another result is that most of the studies are based on the extended technology acceptance model. Marketing science is one of the disciplines most affected by technology. The use of the extended technology acceptance model in Metaverse-related marketing studies will provide valuable contributions.

There are also some limitations of the study. Due to the scarcity of studies on the concept of the Metaverse, only 11 empirical studies could be examined in the current study. It is expected that many empirical studies on the Metaverse will be conducted in the near future. A similar study can be done with more studies after studies increase. The studies reviewed were from different fields. With the proliferation of studies, studies related to specific fields can be made.

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#### **CONTRIBUTION OF RESEARCHERS**

The contribution rate of the 1st author to the research is 25%, the contribution rate of the 2nd author to the research is 25%, the contribution rate of the 3rd author to the research is 25% and the contribution rate of the 4th author to the research is 25%.

Author 1: His duties and responsibilities in the research.

Author 2: His duties and responsibilities in the research.

Author 3: His duties and responsibilities in the research.

Author 3: His duties and responsibilities in the research.

#### **DECLARATION OF CONFLICT**

The study has no financial or personal connection to any of the participants or institutions. There is no conflict of interest in the research.