NEGATIVE ATTRIBUTES OF THE METAVERSE BASED ON THEMATIC ANALYSIS OF MOVIE "BELLE" AND "READY PLAYER ONE"

Y.S. Seo[1] and Austin Kang[2]

[1]Department of Korean and Chinese Cultures, Hankuk University of Foreign Studies
Graduate School, Seoul, Korea
[2]Department of Medicine, Seoul National University, Seoul, Korea

ABSTRACT

This study aims to examine the potential negative attributes of the metaverse in which multiple users conduct social, cultural, and economic activities, interacting with each other through avatars. We analyzed movies about the metaverse, "Belle" and "Ready Player One," showing some negative attributes of the metaverse platform using thematic analysis. In "Belle," privacy-related threats and security-related threats were derived. On the other hand, in "Ready Player One," privacy-related threats, security-related threats, economy, and addiction issues were derived. Therefore, it is necessary to systematically classify the negative attributes related to the metaverse for its sustainable development. Furthermore, it is required to form a social discourse on these issues and to establish countermeasures.

KEYWORDS

metaverse, negative attributes, Belle, Ready Player One, thematic analysis

1. INTRODUCTION

Metaverse technology makes a virtual environment linked to the physical world [1]. The metaverse is a shared digital and online space where objects and virtual environments can interact with each other [2], which promises many bright opportunities for business, economics, and society [3]. Thus, the metaverse, a network of 3D virtual worlds focused on social connection, includes a hypothetical iteration of the Internet as a single, universal and immersive virtual world facilitated by the use of virtual reality (VR) and augmented reality (AR) headsets [4]. Furthermore, with the advancement of related technologies, the metaverse has attracted enormous attention all over the world [5]. In particular, the COVID-19 pandemic has markedly changed how we live and play games. This is because the disruption from the virus has forced many people to quarantine and self-isolate [6]. Against this background, movies based on the metaverse were also produced. "Belle" is a 2021 Japanese animated science fantasy film about the metaverse, written and directed by Mamoru Hosoda and produced by Studio Chizu [7]. As animation is a visual art form that uses the rapid display of sequential images to create an illusion of movement [8], it can provide an opportunity to glimpse the future metaverse society that has not yet been implemented. Also, science fiction (sci-fi) is a genre that uses speculative, fictional science-based depictions of phenomena that are not fully accepted by mainstream science, such as extraterrestrial lifeforms, extrasensory perception, alien worlds, and time travel, along with futuristic elements such as spacecraft, cyborgs, robots, interstellar travel or other technologies [9]. "Ready Player One" is a 2018 dystopian sci-fi film written by Ernest Cline and directed by Steven Spielberg, showing both positive and negative aspects of the metaverse in the future [10].

Regarding the metaverse's colossal potential, the industry has already come forward with preparation, accompanied by feverish investment. However, there are few discussions about the metaverse in academia to guide its development scientifically [11]. Previous studies on the metaverse are still in their infancy, including concepts [12], technical aspects [13], and application areas [14]. However, some studies anticipate problems that can appear once the metaverse is in full swing. As the metaverse has come up, there'll be privacy issues that the users may face [15]. Falchuck, Loeb, and Neff [16] evaluated the social metaverse, showing that users' digital footprint and digital breadcrumbs can be tracked and can reveal not just their identity but also their age, location, shopping preferences, friends, favorite movies, and much more. Jaber [17] showed that there could be many problems related to the security and privacy of the system users. However, most studies only carried out a conceptual approach to privacy and security, and case studies using thematic analysis were rarely conducted [16]. Thematic analysis is a method for identifying, analyzing, and reporting themes within data [18]. Thus, this study examined the negative aspects of the metaverse in the movies "Belle" and "Read Player One" using theme analysis. To this end, the following research question was presented: RQ1) What are the negative attributes related to the metaverse that appear in films based on the metaverse?; RQ2) what are the themes related to the negative attributes of the metaverse derived from the two cases? This study is structured as follows. Chapter 2 presents the theoretical background of the metaverse as well as animation, and Chapter 3 explains the research method. Chapter 4 presents the results of analyzing the negative attributes of the metaverse described in the films "Belle" and "Ready Player One" through thematic analysis. Chapter 5 summarizes the research and includes limitations and implications.

2. THEORETICAL BACKGROUND

2.1. Metaverse

The metaverse refers to a 3D virtual shared world where all activities can be carried out with the help of augmented and virtual reality services [19]. The term "metaverse" was first used in 1992 in Neal Stephenson's novel "Snow Crash," which depicts the metaverse as a virtual reality (VR) space that utilizes the internet and augmented reality (AR) via avatars and software agents [20]. The metaverse has been described as a new iteration of the internet that utilizes VR headsets, blockchain technology, and avatars within a new integration of the physical and virtual worlds [21]. The concept of assets and related ownership, including human rights, and legal or ethical issues in the metaverse, has not yet been fully explored, as they relate to the actions of avatars acting on behalf of people [22]. With profound effects on marketing, tourism, leisure, hospitality, citizen-government interaction, education, health, and social networks, there is enormous potential for organizations to adapt their business models and operational capabilities to function in the metaverse [12]. Significant areas of concern include ethics, data security, safety, regulation, and the potential detrimental psychological impact on vulnerable members of society [21]. Therefore, this study examines the negative attributes of the metaverse, focusing on the contents presented in the movie.

2.2. Animation

Animation is a technique for making stationary images appear to be moving. In traditional animation, images are manually painted or drawn on transparent celluloid sheets so they may be captured and shown on film. Today, computer-generated imagery (CGI) is used to create most animations [23]. Computer animation can be highly detailed 3D animation, whereas 2D computer animation might be employed for aesthetic purposes, low bandwidth, or faster real-time renderings [24]. Other typical animation techniques include a stop-motion approach on 2D and

3D items such as paper cutouts, puppets, or clay figures [25]. Cartoons are animated movies with exaggerated visuals, typically short ones. The style takes inspiration from comic strips, often featuring superheroes, anthropomorphic animals, or the adventures of human protagonists[26]. The animated characters often create an imaginary world to escape from reality. Regarding avatars in the metaverse, they are much more than 3D human-like models and can be customized in the way they move using animation [27].

2.3. Sci-Fi Films

Sci-fi films use speculative, fictional science-based depictions of phenomena that are not entirely accepted by mainstream science, such as robots, cyborgs, extraterrestrial lifeforms, spacecraft, time travel, interstellar travel, or other technologies. Sci-fi films have often focused on social or political issues and explored philosophical problems like the human condition [28]. Sci-fi films deal with speculation about nature and include the main foundations of science and technology. However, the "science" of Hollywood sci-fi films is often considered pseudoscience, relying primarily on mood and quasi-scientific artistic fantasies rather than facts and established scientific theories [29].This provides space for dealing with plausible fiction, so it can help shape discourse about futures that are not yet fully realized, such as the metaverse. Therefore, this study estimates the characteristics of the future metaverse society through what is depicted in the sci-fi film, "Ready Player One."

3. METHODOLOGY

We purchased the animated and sci-fi films described above through the YouTube platform and evaluated them through subject analysis. One of the most prevalent types of analysis in qualitative research is the thematic analysis which focuses on identifying, analyzing, and interpreting patterns of meaning within qualitative data [30]. Thematic analysis is a strategy for characterizing data, encompassing interpretation, code selection, and theme construction. A distinguishing feature of thematic analysis is its flexibility to be used within a wide range of epistemological or theoretical frameworks and applied to a broad spectrum of research questions, designs, and sample sizes [31]. Braun and Clarke [32] argue that thematic analysis can stand alone as an analytic method and be considered foundational for other qualitative research methods.

4. RESULTS

4.1. Thematic Analysis of Contents Related to "Belle"

Table 1 shows the result of the thematic analysis of the animated film "Belle." According to the thematic analysis, the main themes of "Belle" were summarized as privacy and security. Although the metaverse can bring many benefits, it is likely to multiply and compound privacy and security issues. The results show that Suzu's location, lifestyle, habits, and more can be revealed in "U." For example, the metaverse can enable the tracking of human bodies and even thoughts, particularly as Suzu develops deep relationships with a digital avatar, "Belle." Also, a digital avatar is linked to a user's real-life identity. As seen in the case of "Belle," when a digital avatar can be linked to the user's real-life identity, problems related to privacy as well as security may appear. When users interact through their avatars, there may be situations where some form of altercation occurs that would equate to breaking the law if it took place between people in the real world. Such incidents could be in breach of tort law (negligence or nuisance) or criminal law (assault, burglary, rape, or murder). For example, an avatar (e.g., Justin) assaulted another (e.g., Dragon). In particular, vigilantes were active in "Belle" to maintain public order in the metaverse.

his shows that security can be an essential issue in the metaverse and that the police system needs to be operated like in the real world to maintain public order.

Table 1. Thematic analysis of contents related to "Belle"

Contents	Subcategory	Category	Theme
Suzu hid her identity under the name Belle in order to work in "U".	Misuse of avatar	Identity-related threat	Privacy
While "U" could create an AS based on the face of a real user through body sharing technology, Suzu created an avatar different from herself.	Possibilities of identity theft	Identity-related threat	Privacy
Belle first appeared on "U", and many users criticized her after hearing the song.	Negative comments online	Threat to personal security	Security
Justices' vigilante activity	Internet vigilantism	Threat to social security	Security
Justin used the software to find out information that others (Belle and the Dragon) didn't want.	Identity-related threats.	Identity-related threat	Privacy
Bruises on Dragon's body in real time	Leakage of personal biometric information	Privacy threat	Privacy
Negative comments about Dragon continued not only in "U" but also in the real world.	Negative comments online and offline	Threat to personal security	Privacy
As some celebrities were suspected of being Dragon, they had to explain that they were not Dragon.	Forced disclosure of personal information of celebrities	Identity-related threat	Privacy
Belle covered her face in the metaverse to hide her identity.	Attacks and harassment of specific avatars by vigilantes	Identity-related threat	Privacy
Justin kidnapped Belle for his own purposes.	Damage to avatars' rights to autonomy and safety	Threat to personalsecurity	Security
Justin led vigilantes and burned Dragon's castle.	Damage to the property of others.	Threat to personal security	Security
Users surrounded Belle and made her unable to move.	Avatar's autonomy is compromised	Threat to personal security	Security
After being hit by Justin's beam, Belle revealed her real-world appearance in the metaverse.	Invasion of privacy	Privacy threat	Privacy
The ridicule of users who saw Belle in real life. They also posted negative comments online.	Ridicule in real life and negative comments online	Threat to personal security	Security
Suzu and friends find out Kei and Tomo's location through internet broadcasting	Invasion of privacy	Privacy threat	Privacy

4.2. Thematic Analysis of Contents related to "Ready Player One"

The metaverse was portrayed in the sci-fi film "Ready Player One." Table 2 shows the result of the thematic analysis of "Ready Player One." According to the thematic analysis, the main themes of "Ready Player One" were summarized as privacy, security, economy, and addiction.

Similar to the contents of "Belle," "Ready Player One" suggested that privacy and security could be negative factors in the metaverse. This study confirms that if the digital avatar's (e.g., Parzival) privacy is not maintained, it can cause threats to the user's safety in the real world (e.g., the destruction of Wade's house and the death of his aunt). In particular, data management in the metaverse is very important because facial expressions, eye and hand movement, speech, biometric features, and brain wave patterns can be profiled when creating a user's avatar. In other words, threats to privacy and security should be removed in the metaverse as in the real world since avatars in the metaverse can be linked to users in the real world. Therefore, it is judged that data management will become more important than anything else to maintain privacy and security in the metaverse.

On the other hand, in "Ready Player One," unlike "Belle," topics about economic and addiction issues were also drawn. In "Ready Player One," many users are portrayed as staying in the metaverse to escape the real world, suggesting that they are addicted. In addition, the thematic analysis shows that some economic issues can also appear as negative attributes (e.g., distortion of the economic order), suggesting that management of the metaverse platform is necessary.

Table 2. Thematic analysis of contents related to "Ready Player One"

Contents	Subcategory	Category	Theme
Wade spent most of time at OASIS, while people were wearing gear and playing games on the street.	Metaverse addiction	Threat to addiction	Addiction
In OASIS, avatar could freely change its appearance such as gender and race.	Anonymous identity in the metaverse	Identity-related threat	Privacy
Allowance of gambling within OASIS	Increase in gambling-related crime & addiction	Threat to social security/addiction	Security /addiction
OASIS founder James Halliday staked his legacy and ownership of the game on three missions	In-game actions affected the economy in the real world	Threat to economic security	Security
Violence during racing in the metaverse (killing avatars and destroying facilities)	Violence in the metaverse	Threat to personalsecurity	Security
A prize of 100,000 coins for Wade's successful mission in his first race. Also, items purchased in the game are distributed in real life.	OASIS game money is distributed in the real world	Economy-related threat	Economy
As Wade's avatar, Parzival, climbed onto the racing rankings board, Sorrento, the head of the IOI corporation, commissioned Irok to assassinate Parzival.	Instigating crimes within the metaverse	Threat to personal security	Securityy
The user also has the tactile and pain sensations conveyed through the avatar. That is, the avatar's pain is transmitted to the user. IOI staff attacked Artemis and Parzival while they are dancing	Users could feel the violence inflicted on the avatar	Threat to personal security	Security

Parzival escapes the crisis by purchasing paid items. Artemis's father, who had excessive debt while purchasing equipment in the game, was taken to the IOI in the real world and suffered from exploitation and died.	Excessive capitalistic harm in the metaverse	Economy-related threat	Economy
After Irok checked public records related to Parzival in the metaverse, he could find Wade's residence in the real world.	Poor management of personal information in the metaverse	Privacy threat	Privacy
When Wade refused Sorrento's offer, Sorrento bombed Wade's house. The IOI attacked the rebel hideout where Samantha, who saved Wade, was located.The IOI continued to pursue and locate Wade and friends via drone.	Information management in the metaverse can be linked to personal physical safety.	Threat to personal security	Security
Irok and Sorrento using the Orb of Osuvox to block other users from entering the third mission location	Blocking other users from using the metaverse	Data-related threat	Privacy

4.3. DISCUSSION

This study examined the content of the two films through thematic analysis, deriving privacy-related and security-related threats [33], as well as economic and addiction issues as negative attributes related to the metaverse. Thematic analysis is one of the most common forms of analysis within qualitative research, which emphasizes identifying, analyzing, and interpreting patterns of meaning within qualitative data [30]. The thematic analysis provides a flexible method of data analysis, allowing researchers with various methodological backgrounds to engage in this type of analysis. As there is no one correct or accurate interpretation of data, interpretations are inevitably subjective and reflect the positioning of the researcher. Two researchers conducted thematic analysis independently in this study and coordinated their opinions. Through this, the study could reach an agreed-upon coding, deriving themes of negative attributes in metaverse-related animation and sci-fi films.First, it's a discourse on privacy-related threats. Privacy leakage can happen almost everywhere in social networks as well as in the metaverse. Users' private or sensitive information can be leaked from public information from a secure social network platform. Social network sites ask users to create a profile that contains sensitive information [34]. A malicious party can collect sensitive information about social network users from their online profiles and public information. Also, the social network platform provider may trade the managed users' profile and activity information on the data market [35], thus increasing the unpredictable risk of privacy leakage. Analysts can collect users' information from public data or purchase it from the social network provider, which can be used to purposely mine for marketing as well as advertising [36]. Adversaries can utilize personal information to send phishing or scam messages that may increase the success rate of phishing or a scam, thus causing severe trouble to social network users [37]. Therefore, privacy protection policies related to avatars and users in the metaverse are required. Second, it's a discourse on security-related threats. Security is resilience against or protection from potential harm caused by others by restraining the freedom of others to act [38]. Advances in computer graphics could bring digital avatars physically similar to humans into the metaverse. Much debate surrounds the question of whether a user's real-life identity, a set of attributes that makes an individual or a group of individuals distinct from others, should be exposed when a crime or a misdemeanor is

committed. Classifying a digital avatar as a victim of permanent damage or destruction seems reasonable. However, classifying a digital avatar as a victim of crimes that inflict purely emotional damage seems less reasonable if it cannot feel like a human [39]. However, cybersecurity is not merely a set of guidelines and actions intended to prevent cybercrime that includes any criminal activity accomplished through using a network, the internet, and technological devices. That is, cybersecurity refers to security as it is applied to information technology and is ultimately about protecting various networks, seeking to make it difficult for hackers to find and exploit vulnerabilities [40]. If the above is considered, security in the metaverse should include both security for users, including avatars, and security for networks. Third, it's a discourse on economic issues. Grey economic activity refers to unregulated or under-regulated markets [41] where transactions take place to some extent outside officially sanctioned trade areas. The grey economy includes any economic activity that is legal but unrecorded and unregulated. These transactions are not recorded in the official economic activity statistics, so a country's reported economic activity tends to be underreported. There is no clear way to gain a perfect understanding of the amount of activity within the grey economy. However, it may be related to common criminal tax violations, including tax fraud and tax evasion [42]. That is, tax evasion is directly related to the level of grey economy in a country [43]. Cryptocurrency is one such grey economic activity. In particular, a crypto metaverse is a metaverse where blockchain technology is incorporated into its underlying technology and economy [44]. As economic crime and the grey economy are closely related, the grey economy can be one of the negative attributes in the metaverse [45]. Fourth, it's a discourse on addiction issues. It is often reported that the metaverse is highly addictive [46]. In particular, gambling addiction is identified as one of the most destructive addictions [39]. Internet addiction disorder, social media, and video game addiction can have mental and physical repercussions over a prolonged period, such as anxiety, depression, and various other harms related to having a sedentary lifestyle, such as an increased risk for cardiovascular disease and obesity [47]. As shown in "Ready Player One," the metaverse could be used as a place to escape from reality [48]. Based on the contents of the two films, this study derived the negative attributes related to the metaverse using thematic analysis. Furthermore, studies related to the perceptions of experts, surveys of users, and empirical analysis of related data are required.

5. CONCLUSIONS

This study aimed to examine the negative attributes related to the metaverse. Thus, we reviewed the content of the two films through thematic analysis, deriving privacy-related, security-related threats and economic and addiction issues as negative attributes related to the metaverse. Our findings provide insight into the potential negative attributes in the metaverse where multiple users conduct social, cultural, and economic activities and interact with each other through avatars. Although this study has limitations as a case study on two films using thematic analysis, it has significance in revealing that negative attributes related to the metaverse can cause various social problems in the future. Future studies will be necessary to determine negative attributes from the description of the metaverse in various movies using big data analysis.

REFERENCES

[1] Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., ... & Burgos, D. (2022) "Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis", *Smart Learning Environments*, Vol. 9, No. 1, pp1-31.

[2] Pyun, K. R., Rogers, J. A., & Ko, S. H. (2022) "Materials and devices for immersive virtual reality", *Nature Reviews Materials*, Vol. 7, pp841-843.

[3] Upadhyay, A. K., & Khandelwal, K. (2022) "Metaverse: the future of immersive training", *Strategic HR Review*, Vol. 21, No. 3, pp83-86.

[4] Allam, Z., Sharifi, A., Bibri, S. E., Jones, D. S., & Krogstie, J. (2022) "The metaverse as a virtual form of smart cities: opportunities and challenges for environmental, economic, and social sustainability in urban futures", *Smart Cities*, Vol. 5, No. 3, pp771-801.

[5] Kim, T., & Jung, S. (2021) "Research on Metaverse Security Model", *Journal of Korea Society of Digital Industry and Information Management*, Vol. 7, No.4, pp95-102.

[6] Alzueta, E., Perrin, P., Baker, F. C., Caffarra, S., Ramos-Usuga, D., Yuksel, D., & Arango-Lasprilla, J. C. (2021). "How the COVID-19 pandemic has changed our lives: A study of psychological correlates across 59 countries", *Journal of clinical psychology*, Vol. 77, No. 3, pp556-570.

[7] Cao, C. (2022). Mamoru Hosoda's metaverse dreams. *Kill Your Darlings*, pp72–78.

[8] Harrison, H. L. H., & Hummell, L. J. (2010) "Incorporating animation concepts and principles in STEM education", *Technology and Engineering Teacher*, Vol. 69, No. 8, p20.

[9] Kitzinger, J., Henderson, L., Smart, A., & Eldridge, J. (2002) "Media coverage of the ethical and social implications of human genetic research", *Sociology of Health and Illness*, Vol. 25, No. 1, pp24-49.

[10] Myers, J. Y., & Abd-El-Khalick, F. (2016). "A ton of faith in science! Nature and role of assumptions in, and ideas about, science and epistemology generated upon watching a sci-fi film." *Journal of Research in Science Teaching,* Vol. 53, No. 8, pp1143-1171.

[11] Jeon, J. H. (2021). "A study on education utilizing metaverse for effective communication in a convergence subject", *International Journal of Internet, Broadcasting and Communication*, Vol. 13, No. 4, pp129-134.

[12] Mystakidis, S. (2022). Metaverse. *Encyclopedia*, Vol. 2, No. 1, pp486-497.

[13] Zhou, Y., Xiao, X., Chen, G., Zhao, X., & Chen, J. (2022) "Self-powered sensing technologies for human Metaverse interfacing", *Joule*, Vol. 6, No. 7, pp1381-1389.

[14] Bibri, S. E., & Allam, Z. (2022) "The Metaverse as a virtual form of data-driven smart cities: the ethics of the hyper-connectivity, datafication, algorithmization, and platformization of urban society." *Computational Urban Science*, Vol. 2, No. 1, pp1-22.

[15] Cao, L. (2022) "Decentralized ai: Edge intelligence and smart blockchain, metaverse, web3, and desci", *IEEE Intelligent Systems*, Vol. 37, No. 3, pp6-19.

[16] Bibri, S. E., Allam, Z., & Krogstie, J. (2022) "The Metaverse as a virtual form of data-driven smart urbanism: platformization and its underlying processes, institutional dimensions, and disruptive impacts", *Computational Urban Science*, Vol. 2, No. 1, pp1-22.

[17] Jaber, T. A. (2022) "Security Risks of the Metaverse World", *International Journal of Interactive Mobile Technologies*, Vol. 16, No. 13, pp4–14.

[18] Smith, J., & Firth, J. (2011) "Qualitative data analysis: the framework approach", *Nurse researcher*, Vol. 18, No. 2, pp52-62.

[19] Damar, M. (2021) "Metaverse Shape of Your Life for Future: A bibliometric snapshot", *Journal of Metaverse*, Vol. 1, No. 1, pp1-8.

[20] Joshua, J. (2017) "Information Bodies: Computational Anxiety in Neal Stephenson's Snow Crash", *Interdisciplinary Literary Studies*, Vol. 19, No. 1, pp17-47.

[21] Usmani, S. S., Sharath, M., & Mehendale, M. (2022) "Future of mental health in the metaverse. General Psychiatry", Vol. 35, No. 4, e100825.

[22] Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., ... & Wamba, S. F. (2022) "Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy", *International Journal of Information Management,* Vol. 66, **e**102542.

[23] Martinez, A., Campera, M., & Nekaris, K. A. I. (2022). The Use of Live Action, Animation, and Computer-Generated Imagery in the Depiction of Non-Human Primates in Film. *Animals*, Vol. 12, No. 12, p1576.

[24] Lansdown, J., & Schofield, S. (1995) "Expressive rendering: A review of nonphotorealistic techniques", *IEEE Computer Graphics and Applications*, Vol. 15, No. 3, pp29-37.

[25] Maselli, V. (2018) "The evolution of stop-motion animation technique through 120 years of technological innovations", *International Journal of Literature and Arts*, Vol. 6, No. 3, pp54-62.

[26] Carter, C. (2019). "Exaggerated cartoon style motion in Hotel Transylvania." *International Journal of Computer Graphics and Animation (IJCGA)*, Vol. 9, No.4, pp29-43.

[27] Nendya, M. B., Yuniarno, E. M., & Gunanto, S. G. (2014). "Facial rigging for 3d character." *International Journal of Computer Graphics & Animation*, Vol. 4, No. 3, pp21-29.

[28] Ahn, S.B. (2017) "Resistance to a Posthuman and Retrograde Oughtopia: Exploring the Narrative of South Korea's Sci-Fi Animation, Wonder Kiddy", *Animation*, Vol. 12, No. 1, pp45-61.

[29] Telotte, J. P. (2019) "What Is This Thing? Framing and Unframing the Science-Fiction Film", *Film History: An International Journal*, Vol. 31, No. 1, pp56-80.

[30] Kiger, M. E., & Varpio, L. (2020) "Thematic analysis of qualitative data: AMEE Guide No. 131" *Medical teacher*, Vol. 42, No. 8, pp846-854.

[31] Shukla, S. K., & Sharma, M. K. (2019) "Managerial paradox toward flexibility: Emergent views using thematic analysis of literature", *Global Journal of Flexible Systems Management*, Vol. 20, No.4, pp349-370.

[32] Braun V, Clarke V. (2006) "Using thematic analysis in psychology", *Qual Res Psychol*. Vol. 3, No. 2, pp77–101.

[33] Far, S. B., & Rad, A. I. (2022) "Applying Digital Twins in Metaverse: User Interface, Security and Privacy Challenges", *Journal of Metaverse*, Vol. 2, No. 1, pp8-16.

[34] Xi Chen and Katina Michael. (2012) "Privacy issues and solutions in social network sites", *IEEE Technology and Society Magazine*, Vol. 31, No. 4, pp43–53.

[35] Kandias, M., Mitrou, L., Stavrou, V., & Gritzalis, D. (2017) "Profiling online social networks users: an omniopticon tool", *Int. J. Soc. Netw. Min.*, Vol. 2, No. 4, pp293-313.

[36] Xueting Liao, Danyang Zheng, and Xiaojun Cao. (2021) "Coronavirus pandemic analysis through tripartite graph clustering in online social networks", *Big Data Mining and Analytics*, Vol. 4, No. 4, pp242–251.

[37] Diksha Goel and Ankit Kumar Jain. (2018) "Mobile phishing attacks and defence mechanisms: State of art and open research challenges", *Computers Security*, Vol. 73, pp519–544.

[38] Corry, O. (2014) "From defense to resilience: Environmental security beyond neo-liberalism", *International political sociology*, Vol. 8, No. 30, pp256-274.

[39] Guichard, A. (2009) "Hate crime in cyberspace: the challenges of substantive criminal law", *Information & Communications Technology Law*, Vol. 18, No. 2, pp201-234.

[40] Von Solms, R., & Van Niekerk, J. (2013) "From information security to cyber security", *computers & security*, Vol. 38, pp97-102.

[41] Kirchler, E., Maciejovsky, B., & Schneider, F. (2003) "Everyday representations of tax avoidance, tax evasion, and tax flight: Do legal differences matter?", *Journal of Economic Psychology*, Vol. 24, No. 4, pp535-553.

[42] Mackenzie, S. (2022) "Criminology towards the metaverse: Cryptocurrency scams, grey economy and the technosocial", *The British Journal of Criminology*, Vol. 62, No. 6, pp1537–1552.

[43] Atanasijević, J., Jakovetić, D., Krejić, N., Krklec-Jerinkić, N., & Marković, D. (2019) "Using big data analytics to improve efficiency of tax collection in the tax administration of the Republic of Serbia", *Ekonomika preduzeća*, Vol. 67, No.1, pp115-130.

[44] Zheng, L., & Zheng, Y. (2021) "The non-consensus of the 'metaverse' economy", *Metaverse*, Vol. 2, No. 1, p13.

[45] Kankaanranta, T., & Muttilainen, V. (2010) "Economic crimes in the construction industry: case of Finland. Journal of financial crime" Vol. 17, No. 4, pp417–429.

[46] Bojic, L. (2022) "Metaverse through the prism of power and addiction: what will happen when the virtual world becomes more attractive than reality?", *European Journal of Futures Research*, Vol. 10, No. 1, pp1-24.

[47] Savci, M., & Aysan, F. (2017) "Technological addictions and social connectedness: predictor effect of internet addiction, social media addiction, digital game addiction and smartphone addiction on social connectedness", *Dusunen Adam: Journal of Psychiatry & Neurological Sciences*, Vol. 30, No. 3, pp202-216.

[48] Bibri, S. E. (2022) "The social shaping of the metaverse as an alternative to the imaginaries of data-driven smart Cities: A study in science, technology, and society", *Smart Cities*, Vol. 5, No. 3, pp832-874.

AUTHORS

Ms. Seo completed her master's degree at Hankuk University of Foreign Studies. She is currently researching web content and storytelling.

Austin Kang is a doctor who completed his bachelor's, master's and doctoral degrees from Seoul National University. He has accumulated research achievements not only in medicine, but also in the humanities and social sciences. He has written and published 10 books and has published numerous papers.