Navigating the Metaverse: Assessing the Influence of Web3, Blockchain, and Cryptocurrency Knowledge on User Adoption

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This paper assesses the level of understanding and knowledge of Web3, Blockchain, and Cryptocurrency among the participants and examines how this knowledge affects their willingness to engage with the Metaverse. Prior to that, the participants were asked to estimate their level of knowledge on the above-mentioned topics. The findings revealed a positive and significant association between actual knowledge of Web3 & Cryptocurrencies and entering the Metaverse. In contrast, knowledge of Blockchain technology does not have a significant influence. Furthermore, ownership of cryptocurrency was found to be a significant factor, as individuals who possessed cryptocurrency demonstrated a greater willingness to enter the Metaverse compared to non-owners. Moreover, participants in general tended to overestimate their actual knowledge, resulting in lower actual knowledge levels than self-reported knowledge.

1. **Introduction**

Technological advancements have altered people's lives and given the digital ecosphere new life. Face-to-face contact is no longer the exclusive means of forming social relationships between people. Artificial intelligence, Blockchain, immersive technology, and other topics are at the forefront of a new computing revolution. The use of these technologies has helped to fuse the actual and virtual worlds and increase the digitalization of the physical world. People now pay close attention to interactivity, multiple perceptions, immersion, and autonomy (Fawns et al., 2020). That's when the Metaverse comes in – an entirely new environment within the universe. The concept was first introduced in the 1990s (Stephenson, 1990), but it has just recently become popular, especially after Facebook's transformation to Meta in October 2021. Several other significant tech titans also made significant investments and ambitious announcements, which raised global awareness of the Metaverse within the last year (Büchel & Klös, 2022).

The term "Metaverse" refers to a shared virtual reality environment, where avatars which are controlled by humans can communicate with one another simultaneously, take part in pleasure activities, make transactions, or interact together on projects. It generates varying degrees of immersive, multimodal experiences by merging virtual, augmented, and physical reality (Lee et al., 2021). It has the potential to bring about the next round of digital novelty, resulting in complete alteration of the economic and social structure (PwC, 2022).

Although many studies have previously been done on the overall effects of VR and AR technology, the attitudes and readiness of people to employ such technologies are yet unknown. Thus, there are still significant gaps in the field of knowledge on the Metaverse because it is yet a futuristic idea (Damar, 2021).

Therefor the goal of this study is to examine peoples' current desire to enter the Metaverse and to identify peoples' attitudes toward entering the virtual environment in relation to their current knowledge level on Blockchain, Web 3 & Cryptocurrency.

1. **Theoretical background**
    1.1.   Metaverse

There have been many attempts to define the term metaverse, but no agreed definition has yet been found (Lee et al., 2021; Wang et al., 2023; Mystakidis, 2022). The metaverse could be defined "[…] as a virtual environment blending physical and digital, facilitated by the convergence between the Internet and Web technologies, and Extended Reality (XR)" (Lee et al., 2021).

1.2. Blockchain Technology

Blockchain Technology was first introduced in a whitepaper by Satoshi Nakamoto in 2008 (Nakamoto, 2008). Blockchain functions as a distributed ledger with global participants contributing to its operation. Cryptographic hash functions validate the blocks, and this specific hash function is employed exclusively by Bitcoin (Nofer et al., 2017; Nakamoto, 2008).

1.3. Web3

Web3 aims to create a more decentralized and user-centric online environment by leveraging blockchain technology. Blockchain technology enables several other technological advancements, including Non-Fungible Tokens (NFTs), Decentralized Autonomous Organizations (DAOs), and Decentralized Finance (DeFi) (Kiong, 2022). These developments can coexist harmoniously on a Blockchain and mutually reinforce each other. Cryptocurrencies, which operate on blockchain networks, serve as native digital assets facilitating peer-to-peer transactions and incentivizing network participants. These digital currencies play a pivotal role in Web3 ecosystems, empowering users with ownership of their data, enabling decentralized finance (DeFi) applications, and fostering a new paradigm of trustless interactions and decentralized applications (dApps) within the evolving digital landscape. Non-Fungible-Token (NFT) represent genuine ownership of digital assets, primarily utilized in the art market on platforms such as OpenSea, which has experienced significant growth in recent years. (Darcy & Potts, 2023)

2. Methodology

The aim of this research is primarily to gain an understanding of people's willingness to engage in the Metaverse at the present state and in relation, to examine their knowledge level on the topics – Web3, Blockchain & cryptocurrency. In order to answer the research questions of this paper, a quantitative research approach is best suited and will therefore be used to achieve the objective of this study. This will be achieved by an online survey, asking participants several questions to gain an insight into the topics mentioned above. Furthermore, the participants are asked 10 questions on each of the subjects Web3, Blockchain & cryptocurrency, resulting in 30 questions in total to gain an understanding about their current knowledge level on each topic. A three-phase approach was used in order to develop and validify the scales used. (Boateng et al., 2018)

In a further step, it will be analyzed if there is a connection between the knowledge level and the willingness to enter the Metaverse. Moreover, before proposing the questions, the respondents will be asked to rate their knowledge level on each level beforehand, which will result into a further analysis, examining the differences between their self-rated knowledge and their actual knowledge.

3. Results

Before the actual data analysis, we will briefly discuss how the data cleaning was carried out. In total, data of 408 participants was collected. Firstly, 83 cases were excluded because they did not complete the questionnaire. Furthermore, another 159 cases were excluded because they answered with "no" to the filter question "Have you ever heard of the Metaverse before?". Thus, the final sample has a remaining sample size of n=166. Table 1 offers a breakdown of the sample characteristics.

Sample characteristics (n=166)				
Percentage Male	49.4%	**Education level**	Less than Highschool	10.8%
Age	Ø 25.41±5.942		Graduated highschool or equivalent	29.5%
			Bachelor's degree	39.2%
			Master's degree	20.5%
„Ever entered the Metaverse?"	27.1%		PHD	0.0%
		Annual income	0-30.000$	56.6%
			31.000-60.000$	34.9%
			61.000-90.000$	7.2%
			>91.000$	1.2%

Table 1: Sample characteristics (n=166)

Several studies in many areas of research have pointed out the relationship between knowledge and willingness to use a specific technology (Luik & Tamalu, 2021; Bracci et al., 2022; Huang et al., 2022) However, as Dunning and Kruger (1999) pointed out, individuals with lower ability at a task overestimating their competence. Hence the actual knowledge based on our knowledge scales were compared with the self-rated knowledge.

H1: There is a difference between the actual knowledge regarding web3 and the self-rated knowledge regarding web3.

H2: There is a difference between the actual knowledge regarding Blockchain Technology and the self-rated knowledge regarding Blockchain Technology.

H3: There is a difference between the actual knowledge regarding cryptocurrency and the self-rated knowledge regarding cryptocurrency.

		Mean/std. dev.	Min-Max	Kolmogorov-Smirnov sig.	t-test paired sample
H1	self-rated knowledge – actual knowledge (Web3)	43.46/25.152 43.73/21.80	0-100	.200* <.001	T(166)=-.111
H2	self-rated knowledge – actual knowledge (Blockchain)	43.67/25.122 44.09/21.27	0-100 10-90	.200* <.001	T(166)=-.174
H3	self-rated knowledge – actual knowledge (Cryptocurrency)	47.10/26.428 37.41/19.35	0-100 0-90	.066 <.001	T(166)=4.187*

p<.05* p<.01**
Table 2: t-test statistics

In the case of the hypotheses of difference between the self-evaluated and actual bodies of knowledge, it can first be stated that the values for the scales are not normally distributed, which is evident from the significant results of the Kolmogorov-Smirnov test. However, due to the large sample size of >100, this requirement is not taken into account because the t-test method is robust (Rasch & Guiard, 2004). Significant differences exist only in the self-evaluated and actual knowledge about the crypto currency, whereby the self-evaluated amount of knowledge is estimated to be significantly higher. Thus, only H3 can be assumed.

Cryptocurrencies play a crucial role in the metaverse due to their ability to facilitate secure, decentralized transactions within virtual environments. (Akkus et al., 2022)

H4: Individuals who own cryptocurrency tend to have a significantly higher self-rated likeliness of entering the Metaverse than individuals who do not own any cryptocurrency.

Individuals who own cryptocurrency (n=58, M=68.55) are significantly more likely to enter the Metaverse than those who do not (n=108, M=45.68) (t(166)=5.378, p<.001). The effect size is Cohen's d=26.129, which corresponds to a strong effect. Thus, H4 can be assumed.

In the following hypotheses, the variable "ever entered the MV?" serves as the dependent variable. It is assumed that actual experience with the MV is a more useful variable to

better explore consumer characteristics. This variable possesses the two categories of "yes, already entered" and "no, not entered yet", thus logistic regression is performed. For the following calculations, some variables were dummy-coded.

H5: The higher the actual knowledge of Web3 is, the more likely a person has already entered the Metaverse.

H6: The higher the actual knowledge of Blockchain Technology is, the more likely a person has already entered the Metaverse.

H7: The higher the actual knowledge of cryptocurrency is, the more likely a person has already entered the Metaverse.

While no specific studies were found that outline Metaverse usage is linked to sociodemographic data, results from previous studies in other technology related-fields have shown that age (Morris & Venkatesh, 2006), gender (Li et al., 2008; He & Freeman, 2009), education (Welch, 1970; Krueger, 1993; Lleras-Muney and Lichtenberg, 2002) as well as income (Foster & Rosenzweig, 2010) to play a role in technology adoption.

H8: Men have entered the Metaverse more likely than women.

Several studies have shown that men are more prone to new technology than women.

H9: People who have already used the Metaverse differ in age from people who have not yet used the Metaverse.

H10: People who have already used the Metaverse have a different level of education than people who have not yet used the Metaverse.

H11: People who have already used the Metaverse have a different level of income than people who have not yet used the Metaverse.

Table 3 below shows the logistic regression models for hypotheses 5 - 11.

	Model 1 (H5)	Model 2 (H6)	Model 3 (H7)	Model 4 (H8)	Model 5 (H9)	Model 6 (H10)	Model 7 (H11)
Actual knowledge Web3	1.019*						
Actual knowledge Blockchain		1.008					
Actual knowledge Cryptocurrency			1.035**				
Gender (1=female)				.688			
Age					1.054		

Education						1.240	
Annual income							2.127**
Constant	.158**	.255**	.095**	.638	.096**	.207**	.111**
Omnibus Test	χ²(1)=5.456*	χ²(1)=1.058	χ²(1)=13.090**	χ²(1)=1.121	χ²(1)=3.298	χ²(1)=1.244	χ²(1)=9.191**
$R^2_{Nagelkerkes}$	.047	.009	.110	.010	.029	.011	.078

Table 3: logistic regression results

It becomes clear that only models 1,3 & 7 can show a significant omnibus test, which means that only these models predict significantly different values by means of the predictors than if only the modal value of the AV was used as the predicted value. Models 1, 3 & 7 also have the highest values for Nagelkerke's R^2, which indicates the best fit. Furthermore, the regression coefficient of Model 1 is positive and significant (Wald(1)=5.340, p=.021, eB=1.019), which means that when the actual knowledge of Web3 increases by one scale value, the probability that a person has already entered the MV increases by 1.9%. Thus, H5 can be accepted.

Moreover, the regression coefficient of Model 3 is also positive and significant (Wald(1)=11.912, p<.001, eB=1.035), which means that when the actual knowledge of Blockchain Technology increases by one scale value, the probability that they have already entered the MV increases by 3.5%. Additionally, the regression coefficient of model 7 is positive and significant. (Wald(1)=8.850, p=.003, eB=2.127), which means, that with higher annual income the probability to have entered the Metaverse increases by 212.7%.

The other models are not significant as a whole and also have a weaker variance explanation. In addition, there are no further significant regression coefficients, which means that the other hypotheses 6, 8, 9 & 10 must be rejected.

4. Discussion

The findings suggest an interesting relationship between individuals' willingness to enter the metaverse and their knowledge about web3 and cryptocurrencies. It's notable that higher knowledge about web3 and cryptocurrencies is associated with an increased willingness to enter the metaverse, while the same relationship is not significant with blockchain knowledge.

Web3 and cryptocurrencies, are often directly relevant to the infrastructure and economy of the metaverse. Participants with a high understanding of these concepts may see the metaverse as a natural extension or application of the principles they are familiar with. While blockchain is a foundational technology for many aspects of the metaverse, its technical nature might not directly influence the user experience or participation in the metaverse. Participants might not see a direct connection between their knowledge of blockchain technology and their ability to engage meaningfully in the metaverse. Furthermore, the metaverse is a dynamic and evolving concept. It's possible that individuals perceive knowledge of web3 and cryptocurrencies as more aligned with cutting-edge developments and trends, whereas blockchain might be seen as a more established but less directly impactful technology for the metaverse, even though it is implemented in the general concepts of web3 (Momtaz, 2022) as well as cryptocurrencies (Akkus et al., 2022)

Cryptocurrency possession often indicates a familiarity and comfort with digital assets and decentralized systems, aligning closely with the ethos of the metaverse that often operates on blockchain technology. Individuals owning cryptocurrencies might have a predisposition toward exploring innovative digital spaces, like the metaverse, due to their existing engagement with DeFi or digital ecosystems. Additionally, annual income serves as a proxy for financial capability, granting individuals greater access to requisite technology, such as high-performance devices and VR equipment, crucial for an immersive metaverse experience. Moreover, higher-income individuals may perceive the metaverse as an avenue for leisure, investment, or networking, leveraging their financial resources to engage more actively within this evolving digital landscape.

5. Conclusion

In conclusion, the findings of this study reveal a significant relationship between individuals' knowledge about web3 and cryptocurrencies and their willingness to enter the metaverse. Specifically, a higher level of understanding in these areas is positively associated with a greater inclination to engage with the metaverse. However, the relationship between blockchain knowledge and willingness to enter the metaverse was found to be non-significant. This suggests a nuanced interplay between specific technological knowledge domains and their influence on metaverse participation. These

findings shed light on the importance of technological literacy, particularly in web3 and cryptocurrency domains, in shaping individuals' readiness to embrace the metaverse. The implications extend beyond mere interest, impacting potential adoption rates and the evolution of virtual environments.

However, this study has potential limitations. Firstly, the study relied on a relatively small sample size of 166 participants, which may limit the generalizability of the findings to a broader population as the respondents are primarily assumed to be Austrian residents, the conclusions drawn from the quantitative analysis may not be generalizable. For instance, the Asian market is not covered in this paper, despite the fact that China, Japan, and South Korea are among the top Metaverse nations and would make for an intriguing field of study. Future studies might make an effort to establish a more uniform distribution of the sample's sociodemographic traits. Additionally, the sample primarily consisted of individuals with above-average education levels, which may introduce biases and restrict the representativeness of the results. In addition, the study employed a cross-sectional design, capturing data at a specific point in time. This limits the ability to establish causal relationships or capture changes in knowledge and attitudes over time. Longitudinal studies would provide more robust insights into the dynamics of knowledge and interest in the Metaverse. The study focused in general on the relationship between knowledge, individual characteristics, and the likelihood of entering the Metaverse. However, other factors that could influence this likelihood, such as social norms, cultural factors, or personal motivations, were not fully explored.

Further research should delve deeper into the nuanced relationships between different facets of technological knowledge (such as blockchain-specific understanding), socio-economic factors, and the psychological motivations driving metaverse engagement. Exploring how diverse demographics, cultural backgrounds, or educational levels interact with technological literacy in influencing metaverse adoption could provide valuable insights. Longitudinal studies tracking the evolution of attitudes toward the metaverse and the impact of technological advancements would offer a comprehensive understanding of this dynamic landscape.

Understanding the multifaceted influences on individuals' willingness to enter the metaverse is essential for anticipating trends, designing inclusive virtual experiences, and fostering broader societal acceptance and integration of this emerging digital frontier.

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