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Research Paper

Does Metaverse Trialability, Metaverse Relative Advantage and Metaverse User Satisfaction Influence Metaverse based FinTech Innovation?

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Abstract

The objective of this study is to address the role of metaverse trialability and metaverse relative advantage in FinTech innovation adoption in Pakistan. Although several previous studies have addressed FinTech innovation in Pakistan through various dimensions, however, the FinTech innovation adoption was not addressed by considering the metaverse technology. The immersive nature of the Metaverse allows users to interact with FinTech innovations in a more intuitive as well as engaging manner, however, it is rarely addressed in Pakistan. This study developed the survey questionnaire to measure the relationship between metaverse trialability and metaverse relative advantage in FinTech innovation adoption. The questionnaire was distributed among the users of metaverse technology among the financial institutions. Data was analyzed by using statistical tools to achieve the study objective. It is found that metaverse trialability and metaverse relative advantage has positive effect on user satisfaction. Similarly, metaverse trialability and metaverse relative advantage has positive effect on FinTech innovation adoption.

Introduction

Fintech innovations refer to technological improvements and creative ideas applied in the financial sector to advance and automate the delivery as well as use of financial services (Al-Dmour et al., 2020; Ali et al., 2018; Gladden, 2020). When fintech first ascended in the twenty-first century, it denoted to the technology used in backend systems of well-known financial foundations, such as banks. There was a measure toward consumer-oriented services between roughly 2018 and 2022. These days, fintech incorporates a wide range of fields and businesses, comprising investment management, the retail banking, education and nonprofit fundraising, as well as fundraising (Hasan et al., 2020; Yang & Zhang, 2022). FinTech based financial transactions are increasing. The growth of FinTech can be seen through transactions shown in Figure 1.

Figure 1: Global Digital Payment Transaction Value in USD Billion.
Source: Mordor Intelligence.

The integration of the Metaverse technology with FinTech innovation signals a transformative era of technology in financial services among various regions of the globe, driven by improved user experiences and increased accessibility along with robust security measures (Ab Razak et al., 2020; Ali et al., 2018; Saba et al., 2019). By leveraging immersive virtual situations, FinTech companies can offer communicating and personalized financial services, making dense financial processes more intuitive and engaging for users. This synergy facilitates trialability, allowing consumers and the businesses to experiment with new financial products in a risk-free virtual space, thereby building the confidence and fostering adoption. Additionally, the Metaverse facilitates real-time data analytics and blockchain integration, developing transaction transparency and as well as security (Aburbeian et al., 2022; Bhavana & Vijayalakshmi, 2022; Heo et al., 2022; Kim & Kim, 2021; Kye et al., 2021). Collaborative virtual spaces further foster innovation through stakeholder engagement and iterative feedback, while virtual regulatory sandboxes safeguard compliance and expedite the implementation process. Accordingly, the Metaverse significantly quickens the adoption of FinTech innovations, driving a more inclusive, efficient, and user-centric financial ecosystem.

However, the implementation of Fintech technology among various institutions is very complicated (Aulia et al., 2020; Firmansyah & Ramdani, 2018; Shaikh et al., 2020). It is not easy to implement fintech innovations in the financial sector because this sector is one of the sensitive sectors globally due to the nature of financial matters as well as transactions (Al-Dmour et al.,

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2020; Alwi et al., 2019). Similarly in the Pakistan the fintech innovation adoption is very low and it is at basic stage therefore it is not easy for financial institutions in Pakistan to implement fintech innovations. Other studies carried out research on fintech in Pakistan in various aspects by considering various variables (Ali et al., 2018; Naeem & Akhtar, 2021). But the implementation of innovation with the help of new technology which is metaverse is rarely addressed by the previous studies. Therefore, this study introduced metaverse technology as one of the important constructs for implementing fintech innovations. According to the current study metaverse trialability and metaverse relative advantage has the ability to promote fintech innovations which is shown in Figure 1.

Finally, the objective of this study is to address the role of metaverse trialability and metaverse relative advantage in FinTech innovation adoption in Pakistan. Even though some preceding studies have spoken FinTech innovation through various dimensions (Al-Dmour et al., 2020; Azman et al., 2020; Gladden, 2020; Majid, 2021; Naeem et al., 2021; Shaikh et al., 2020), however, the FinTech innovation adoption was not addressed by considering the metaverse technology which is most important in the current technological environment. The immersive nature of the Metaverse permits users to cooperate with FinTech innovations in a more innate as well as participating manner, however, it is rarely addressed in Pakistan. Therefore, this study has vital important for literature and practitioners.

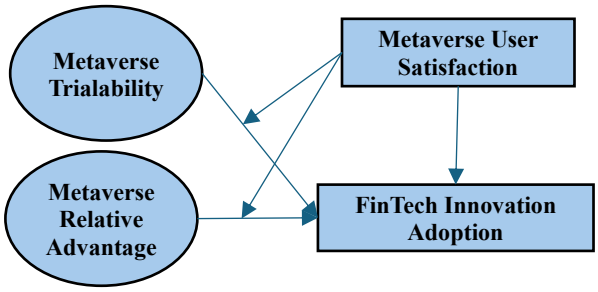

Figure 2: Framework of the Study showing the relationship between Metaverse Trialability, Metaverse Relative Advantage, Metaverse User Satisfaction and Metaverse based FinTech Innovation.

Literature Review

Metaverse Trialability, Metaverse User Satisfaction and FinTech Innovation Adoption

Fintech, an acronym for financial technology, is the need of current financial institutions. The hypothesis assumes that Fintech adoption is shaped by the potential users' as well as user organization's aptitude to try out the solution or experience it, or trialability (Fauzan et al., 2019; Islam et al., 2020). The term trialability is an extent of how easily promise users can try out the new technology or innovation to recognize it further before a close devotion to the service. One of the primary values of trialability is risk relief. FinTech innovations often imply the complex, high-stakes financial processes where errors can be costly. The Metaverse agrees FinTech companies and their customers to the experiment with new financial products and services in a dictated, virtual environment (Banerjee et al., 2012; Hayes et al., 2015; Hsbollah & Idris, 2009a; Oluyinka et al., 2021). By providing a sandbox for the trial and error, the Metaverse assists users to identify and address potential issues beforehand a full-scale rollout. This process builds faith among users and stakeholders, reducing the resistance to adoption and fostering a more receptive attitude towards innovation.

The immersive nature of the Metaverse grants users to interact with the FinTech innovations in a additional intuitive and engaging manner (Hwang & Chien, 2022; Lee et al., 2021). Users can pilot through virtual environments, contribute to interactive tutorials, and simulate real-world financial scenarios. This hands-on method facilitates the users to better understand the functionality and benefits of new FinTech products and services. In a similar way, Better Mortgage aims to further the house mortgage procedure by providing users with a tested pre-approval letter as soon as after submit an application using a digital-only platform. GreenSky objectives to connect banks and home repair debtors by assisting customers in preventing lenders and providing interest-free marketing periods.

Trialability facilitates permanent advancement through user feedback (Banerjee et al., 2012; Changchun et al., 2017) which increase user satisfaction. As users investigate with FinTech innovations in Metaverse, they provide effective insights into their experiences, inclinations, and pain points. FinTech companies can use this feedback to enhance their products and services, making needed adjustments to improve usability, performance, and customer satisfaction (Essel, 2022; Hsbollah et al., 2009a). This iterative aspect process of testing and improvement ensures that innovations are well-aligned with user needs and beliefs, increasing the likelihood of successful implementation. The ability to the trial new technologies lowers the obstacles to entry for both consumers as well as businesses. This accessibility encourages more prevalent experimentation and adoption of FinTech innovations. For customers, the opportunity to test FinTech innovations without requiring significant resources or taking on economic risks makes them additional open to exploring new solutions (Rabbani, 2022; Rabbani et al., 2020) which also has impact on user satisfaction. For businesses societies, trialability reduces the preliminary investment required to the deploy new technologies, as they can begin with pilot projects and scale up based on proven success.

Regulatory compliance is the serious aspect of FinTech innovation. Along with compliance, user satisfaction is an important construct (Bouckaert & Van de Walle, 2003; Halilovic & Cicic, 2015; Horan et al., 2006; Wilbanks et al., 2018). User satisfaction can affect the relation of trialability and FinTech innovation. Metaverse can supply as a testing ground for confirming that new financial products as well as services meet regulatory standards earlier to, they are launched in the genuine world. This positive approach minimizes regulatory risks and expedites approval process, facilitating smoother implementation. By simulating regulatory environments and agreement checks within the Metaverse, FinTech companies can recognize and

address prospective regulatory issues early in the advance process.

The trialability of the Metaverse has the deep positive effect on FinTech innovation application by mitigating risks, improving user understanding, driving unceasing improvement, lowering barriers to entry, facilitating regulatory compliance, and fostering collaborative innovation and training. By allowing the users and businesses to the experiment with new financial technologies in a virtual, controlled environment, Metaverse accelerates adoption and integration of FinTech innovations. This trialability not only confirms that innovations are well-tested and refined but also builds confidence and the trust among users, paving the way for successful and widespread implementation.

Hypothesis 1: *Metaverse trialability increases the FinTech innovation adoption.*

Metaverse Relative Advantage, Metaverse User Satisfaction and FinTech Innovation Implementation

The Metaverse fosters a cooperative environment where FinTech companies can work with other firms, technology providers, and even communicate with the customers to co-create innovative solutions. Virtual spaces can host collaborative workshops, the hackathons, and innovation labs, bringing together varied expertise to solve complex financial challenges (Avouris & Yiannoutsou, 2012; Witmer et al., 1996). This collaborative approach can accelerate the development and implementation of cutting-edge FinTech innovations.

There are many ways or types of adoption that may occur, such as the use of mobile payment platforms, online banking platforms, robo-advisors for investment purposes, or peer-to-peer lending platforms (Alwi et al., 2019; Kim & Yang, 2017; Widyasthana et al., 2017). Furthermore, there exist blockchain-based solutions that help complete several types of transactions: Relative Advantage can be expressed in the belief that the more advantages users or organizations see in using Fintech solutions, the more likely they would be to adopt these activities. Conclusively, this correlates well with the Innovation Diffusion Theory because innovations with more benefits are more likely to be adopted sooner and more frequently. In conclusion, there are many arguments that support the hypothesis that Relative Advantage positively affects Fintech adoption (Ezeh & Nwankwo, 2014; Ezeh et al., 2015; Hsbollah et al., 2009a; Hsbollah & Idris, 2009b). As demonstrated through perceived benefits, cost-effectiveness, user experience, competitive structure, regulatory framework and support, the educational component, and network objective, the considerations identified in this paper are necessary to promote further Fintech adoption and ensure the full benefits of financial technology to the modern economy.

In the Metaverse, FinTech companies can leverage real-time data and analytics to improve their services continuously. The virtual environment generates a wealth of data on user interactions, preferences, and behaviors. This data can be analyzed to gain insights into customer needs, market trends, and potential areas for innovation. By utilizing this information, FinTech firms can develop and implement innovative solutions more quickly and effectively. It is possible to identify the several main factors and mechanisms, as well as the conducts in which these features contribute to the P-effect of Relative Advantage on Fintech adoption: -Perceived benefits and value proposition: the main source of the Relative Advantage from Fintech solutions is the real or perceived benefits and value proposition that they offer to consumers. For instance, mobile apps offer the transactional speed as well as convenience, whereas robo-advisors offer an composed, data-driven approach to investing (Chen & Tsai, 2019; Hino et al., 2018; Min et al., 2021; Widyasthana et al., 2017). These benefits create the value proposition that is appealing to clients who seek more as compared what traditional services can offer.

Established financial institutions feel pressured by FinTech's as many incumbents took years to develop the products that startups can offer in months. Thus, many Big Finance players have to collaborate with or adopt FinTech's to be sustainable, and this perception enhances Relative Advantage. The fourth and potentially significant Factor contributing to Relative Advantage is the regulatory environment and the trust in Fintech's products. Indeed, while the regulatory environment can enhance the perceived benefits and legitimacy of Fintech products, it can also undermine the perception due to security, data protection, and compliance with the law requirements. Therefore, establishing Fintech users' trust will depend partially on the regulatory environment. The Metaverse provides highly interactive and drawing user experience, far outside established digital interfaces (Kim et al., 2021). This heightened level of the engagement can increase user satisfaction level and loyalty, as the customers find the services more appealing and easier to understand. FinTech platforms within the Metaverse can offer users immersive experiences, such as virtual banking branches, interactive financial planning sessions, and realistic simulations of financial scenarios (Zadorozhnyi et al., 2022). In deduction, if you've ever wondered why the certain area of the financial life was so unpleasant or felt like it wasn't completely the right match, fintech probably has a solution for you.

The Metaverse enables highly personalized financial services. Through data analytics and AI, FinTech companies can analyze user behavior within the virtual environment to offer tailored financial advice, customized investment opportunities, and personalized product recommendations. This level of personalization can significantly enhance the user experience and meet individual customer needs more effectively, fostering innovation in service delivery. The Metaverse, an immersive virtual environment combining augmented reality (AR), virtual reality (VR), and other advanced technologies, presents a relative advantage in the context of FinTech innovation implementation. This advantage stems from the Metaverse's unique capabilities, which can revolutionize financial technologies and services.

The relative advantage of the Metaverse in FinTech innovation implementation is multifaceted along with user

satisfaction, encompassing the enhanced user experiences leading to increase in satisfaction, improved accessibility, personalized services, the secure transactions, real-time analytics, collaborative innovation, educational opportunities, and regulatory compliance (Hwang & Lee, 2022; Lee, Lee, et al., 2022). By leveraging these unique capabilities, FinTech companies can develop as well as implement innovative FinTech that meet the evolving needs of the customers, ultimately driving the future of financial services in a digital-first world. From the above discussion, it is evident that user satisfaction can influence the relationship between metaverse relative advantage and Fintech innovation adoption.

Hypothesis 2: *Metaverse relative advantage increases the FinTech innovation adoption.*

Hypothesis 3: *Metaverse user satisfaction increases the FinTech innovation adoption.*

Hypothesis 4: *Metaverse user satisfaction moderates the relationship between metaverse trialability and FinTech innovation adoption.*

Hypothesis 5: *Metaverse user satisfaction moderates the relationship between metaverse relative advantage and FinTech innovation adoption.*

Methodology

The current study developed the questionnaire to measure metaverse trialability, metaverse relative advantage, metaverse user satisfaction and FinTech innovation adoption. FinTech innovation adoption is measured by using four scale items. Relative advantage is measured by using four scale items. Metaverse trialability is measured by using three scale items. Finally, metaverse user satisfaction is measured by using three scale items. All the scale items are reported in Table 1.

After development of questionnaire, the current study distributed 800 questionnaires among the users of metaverse technology among the financial institutions. Only those respondents were selected which were using the FinTech and metaverse technology. Those individuals having no or less intersection with the metaverse or FinTech were not allowed to fill the questionnaire. Questionnaires were distributed online as well as offline. 352 questionnaires were received, and 280 valid questionnaires were used for data analysis.

Table 1: Scale Items.

Construct	Items
FinTech Innovation Adoption	1. FinTech innovations are important for transactions. 2. FinTech helps to innovate products. 3. FinTech helps to innovate ideas for improvement. 4. FinTech innovation adoption is helpful for users.
Metaverse Trialability	1. Before deciding on whether to adopt Fintech, I would try. 2. Try innovation is important for the user. 3. Adoption of innovation without trial can lead to different results.
Metaverse Relative Advantage	1. Innovation must be different. 2. Ideas must have value. 3. Innovation should have valuable features. 4. Relative advantage compared to others gives me comfort.
Metaverse User Satisfaction	1. I like e-services. 2. I like transactions through online mode. 3. E-services are important for me.

Findings

The scale developed in this study was assessed to examine the reliability and validity. Two types of reliability are considered in this study: individual item reliability and construct reliability. Individual item reliability is considered by using factor loadings which are shown in Table 2. These factor loadings are also shown in Figure 3. According to literature, factor loading must be higher than 0.7 (Hair et al., 2017; Hair et al., 2012; Hair Jr et al., 2020; Shair et al., 2021). It can be observed from the results, factor loading of all the items is higher than 0.7, therefore, individual item reliability was achieved.

Table 2: Individual Item Reliability.

Variables	Items	Loading
FinTech Innovation Adoption	1. FinTech innovations are important for transactions.	0.725
	2. FinTech helps to innovate products.	0.802
	3. FinTech helps to innovate ideas for improvement.	0.756
	4. FinTech innovation adoption is helpful for users.	0.809
Metaverse Trialability	1. Before deciding on whether to adopt Fintech, I would try.	0.881
	2. Try innovation is important for the user.	0.789
	3. Adoption of innovation without trial can lead to different results.	0.777
Metaverse Relative Advantage	1. Innovation must be different.	0.701
	2. Ideas must have value.	0.865
	3. Innovation should have valuable features.	0.865
	4. Relative advantage compared to others gives me comfort.	0.791
Metaverse User Satisfaction	1. I like e-services.	0.826
	2. I like transactions through online mode.	0.855
	3. E-services are important for me.	0.725

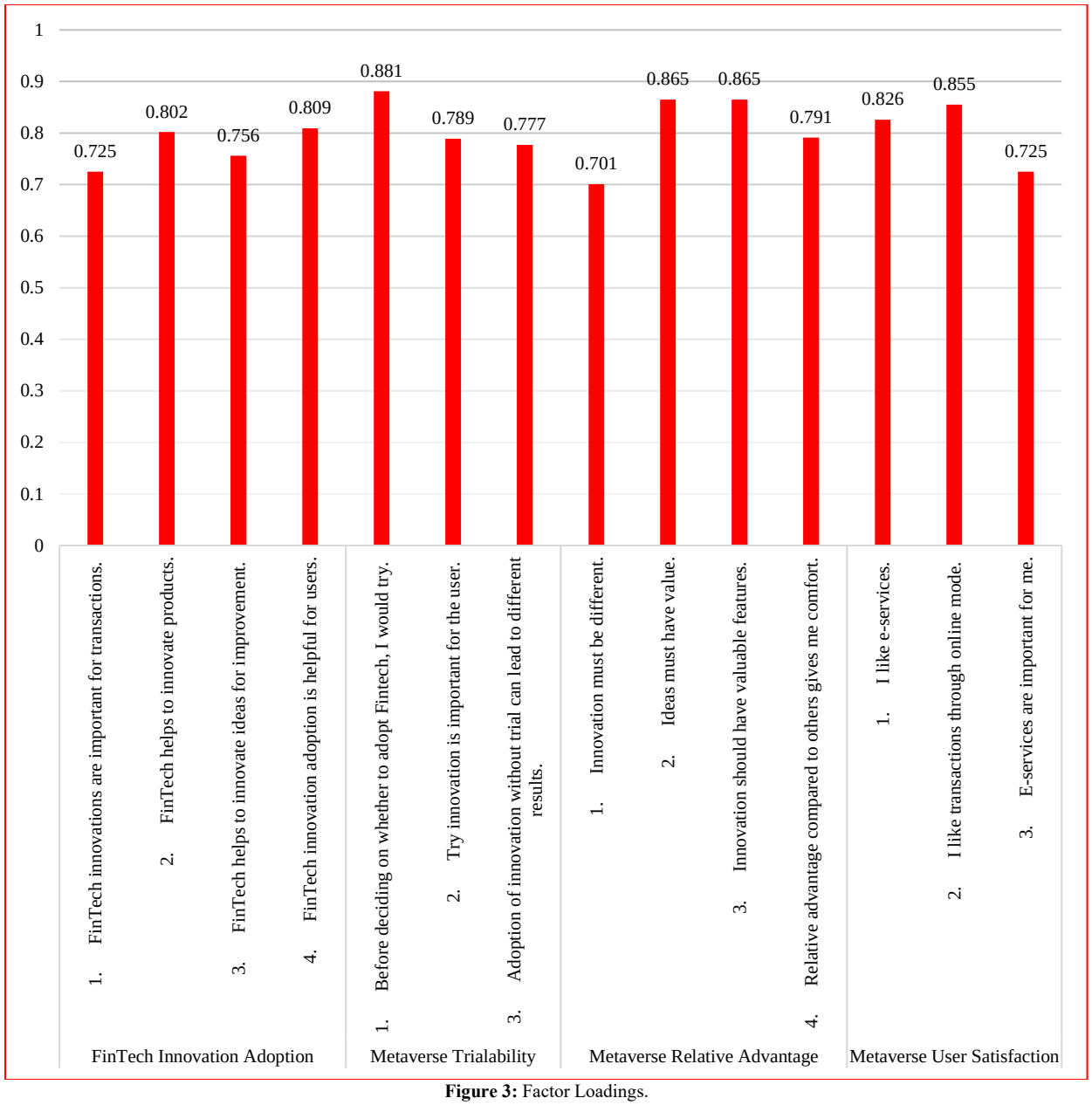

Figure 3: Factor Loadings.

Furthermore, construct reliability was considered through two measures. These measures include Alpha values and composite reliability (CR). According to the literature, Alpha values and composite reliability (CR) must be higher than 0.7 (Fattah & Setyadi, 2019; García-Fernández et al., 2018). It can be observed from Table 3 and Figure 4, all the constructs have Alpha values and composite reliability (CR) are higher than 0.7 which confirmed the construct reliability. Convergent validity was assessed through average variance extracted (AVE) which must be higher than 0.5. Additionally, discriminant validity is achieved through Heterotrait-monotrait ratio of correlations (HTMT) which is shown in Table 4 in which are the values are less than 0.9 (Ali & Kim, 2015; Fattah et al., 2019; Hafkesbrink, 2021; Hair et al., 2017; Kock, 2015; Streukens & Leroi-Werelds, 2016).

Table 3: Alpha, Composite Reliability and AVE.

Variables	Alpha	Composite Reliability	AVE
FinTech Innovation Adoption	0.855	0.889	0.602
Metaverse Trialability	0.781	0.821	0.555
Metaverse Relative Advantage	0.798	0.835	0.565
Metaverse User Satisfaction	0.865	0.898	0.615

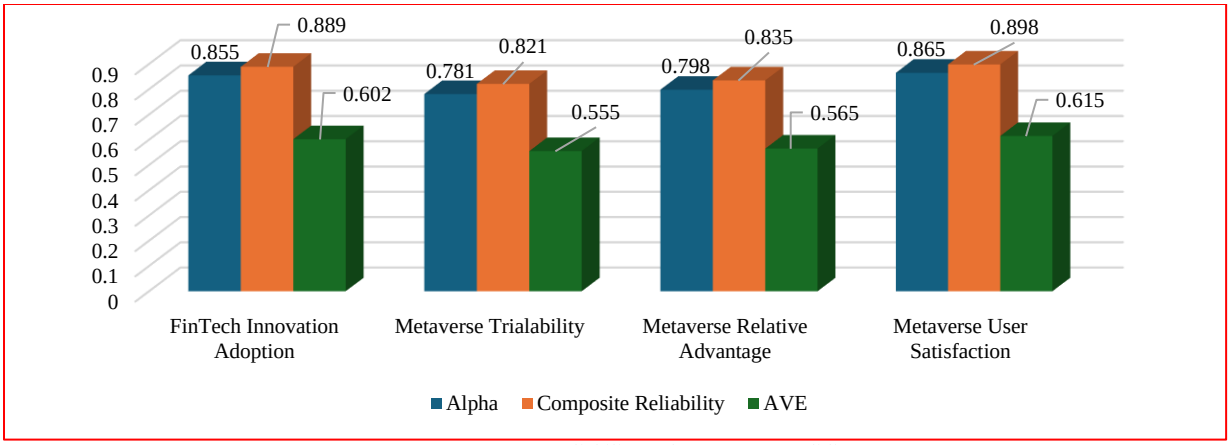

Figure 4: Construct Reliability and Convergent Validity.

Table 4: Heterotrait-monotrait ratio of correlations (HTMT).

	FinTech Innovation Adoption	Metaverse Relative Advantage	Metaverse Trialability	Metaverse User Satisfaction
FinTech Innovation Adoption				
Metaverse Relative Advantage	0.666			
Metaverse Trialability	0.452	0.617		
Metaverse User Satisfaction	0.652	0.523	0.511	

Hypotheses of the study are examined by using t-value and p-value along with the beta value. It can be observed from Table 5, the value of all the relationships is higher than 1.64 which confirmed that all hypotheses are significant. Additionally, the p-value is less than 0.05 which also confirms the significance of the relationship. These results are also reported in Figure 5.

Table 5: Results.

	Beta	T Statistics	P Values
Moderating Effect 1 -> FinTech Innovation Adoption	0.061	3.685	0
Metaverse Relative Advantage -> FinTech Innovation Adoption	0.136	1.732	0.042
Moderating Effect 1 -> FinTech Innovation Adoption	0.214	3.63	0
Metaverse Trialability -> FinTech Innovation Adoption	0.083	1.76	0.039
Metaverse User Satisfaction -> FinTech Innovation Adoption	0.425	7.254	0

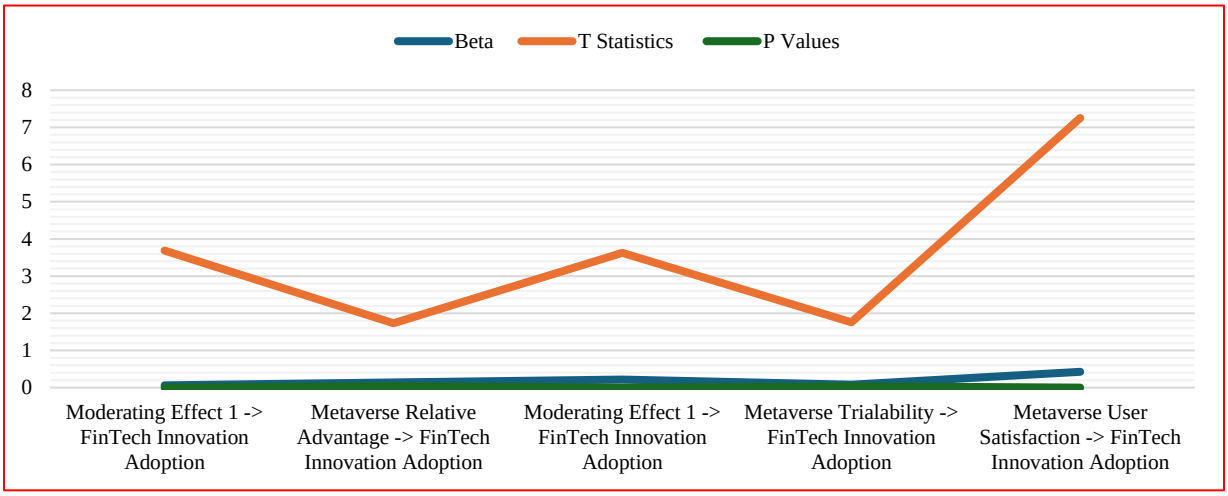

Figure 5: Results (Direct and Moderation Effect).

Both moderation effects reported in Table 5 and Figure 5 are significant. According to the results, Moderating effect of metaverse user satisfaction strengthen the relationship between metaverse trialability and Fintech innovation adoption which is

shown in Figure 6. Similarly, Figure 7 highlighted that moderating effect of metaverse user satisfaction strengthen the relationship between metaverse relative advantage and FinTech innovation adoption.

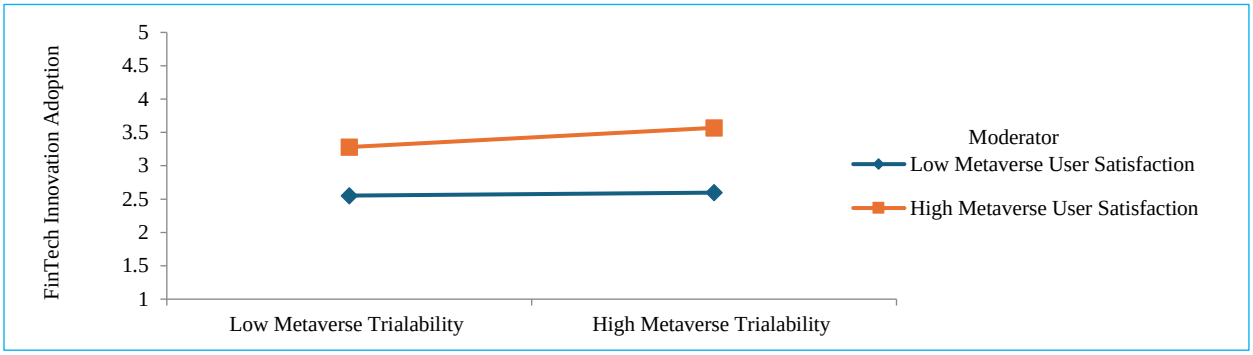

Figure 6: Moderating effect of Metaverse User Satisfaction Strengthen the Relationship between Metaverse Trialability and FinTech Innovation Adoption.

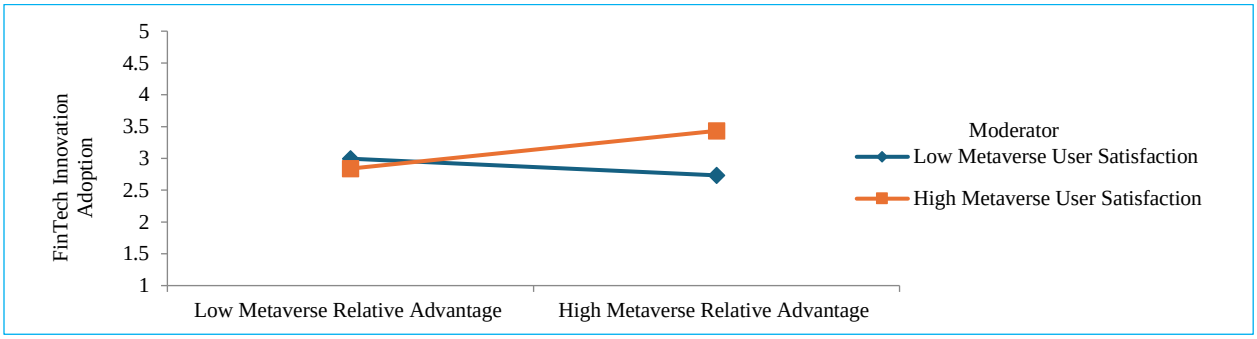

Figure 7: Moderating effect of Metaverse User Satisfaction Strengthen the Relationship between Metaverse Relative Advantage and FinTech Innovation Adoption.

Discussion and Conclusion

The objective of this study was to address the role of metaverse trialability and metaverse relative advantage in FinTech innovation adoption in Pakistan along with moderating role of metaverse user satisfaction. Even though several prior studies have addressed FinTech innovation, however, this relationship was not examined. Therefore, this study proposed five hypotheses, three direct effect hypotheses and two moderating effect hypotheses.

Trialability decreases perceived risks as well as uncertainties by allowing users to cooperate with and test new FinTech solutions without significant financial or operational commitments (Saygili & Ercan, 2021). This hands-on experience facilitates the users to understand the practical assistance and usability of innovations, adopting a sense of the confidence and reducing resistance to change. The Metaverse offers the exceptional benefits such as immersive user experiences, personalized financial services, and enhanced accessibility, which are not available in conventional financial systems (Lee & Gu, 2022). Highlighting the relative advantage of Metaverse technology is pivotal in driving its adoption in the FinTech sector. When users perceive the substantial benefits, such as adjusted convenience, efficiency, and engagement, they are more likely to adopt these types of innovations. These advantages make Metaverse-integrated FinTech solutions more fascinating to users.

Satisfaction arises from the positive user experiences (Bouckaert et al., 2003; Halilovic et al., 2015; Horan et al., 2006; Wilbanks et al., 2018), including the ease of use, engagement, and overall effectiveness of Metaverse-integrated financial services. When users find the Metaverse enjoyable and beneficial, their satisfaction translates into the higher likelihood of adopting as well as continuously using FinTech innovations. High user satisfaction not only promotes initial adoption but also encourages long-term loyalty and advocacy, leading to upheld growth and acceptance of FinTech innovations.

While trialability allows users to the experiment with and understand new technologies, the level of satisfaction descended from these experimental experiences significantly impacts the adoption decision (Dwivedi et al., 2021; Megahed et al., 2021; Naeem et al., 2021; Saygili et al., 2021). If users are highly satisfied with their trial experiences, their probability of adopting the innovations increases, expanding positive outcome of trialability. While the innate benefits of Metaverse provide a convincing case for adoption, the actual user experience plays a substantial role in this development (Akour et al., 2022; Shen et al., 2021). When users are satisfied with the functionality, usableness, and overall experience of the Metaverse-integrated FinTech solutions, the perceived relative advantage is reinforced, leading to the higher adoption rates.

Future Direction

This study proved that metaverse trialability, relative advantage, and user satisfaction are pivotal factors in the adoption of FinTech innovations which are an important contribution to the literature, however, this study has few limitations. The limitation of the study is important for future studies to investigate further the effect of metaverse trialability, relative advantage, and user satisfaction on FinTech innovation adoption. First, this study should not include other elements such as adaptability and simplicity. Therefore, future studies should include adaptability and simplicity of innovation. Second, since this study could not include interviews, future studies should examine the effect of metaverse trialability, relative advantage, and user satisfaction on FinTech innovation adoption by conducting interviews of respondents. Third, the threatening; metaverse adaption in Pakistan is threatening, therefore, factors should be identified.

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CRediT Authorship Contribution Statement

Muhammad Junaid Yousaf: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

I confirm there are no financial or personal interests influencing this research.

Fundings

The author reports that this study was not financed by any external funding sources.

Ethical Statement

The study adhered to ethical principles, and no approval was required since human tissue or biological materials were not utilized.

Data Availability Statement

Upon reasonable request, the datasets analyzed in this study are obtainable from the corresponding author.

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