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Research Paper

Next-Gen Services Innovation: Leveraging Metaverse for Unparalleled Customer Satisfaction in Tourism Industry

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Abstract

The objective of this study is to examine the next-gen services innovation: leveraging the metaverse for unparalleled customer satisfaction in tourism industry of Pakistan. Traditional techniques to the customer satisfaction are not extended enough in the quickly changing technological context. Our research focuses into use of a metaverse technology to get superior customer satisfaction in realm of the next-generation services innovation, in order to tackle of this difficulty. This study estimated the associations between the customer experience, technological revolution, service innovation, metaverse, and customer satisfaction. We used a convenience sampling strategy to gather data. It was selected to examine gathered data using the advanced partial least squares structural equation modelling (PLS-SEM), demonstrates the intense effects of metaverse adoption on the customer experience, service innovation, and satisfaction. Throughout investigating the relationship between the metaverse technology and customer satisfaction, this research advances knowledge of innovative service approaches, allow businesses to fully utilize the metaverse technology and permit customer experiences.

Introduction

The revolution of the metaverse, a virtual shared place cause by the joining of physical and virtual reality, has bring about a vast difficulty of the digital world in the latest years (Dluhopolskyi et al., 2021). This game-changing technology has the capacity to entirely alter how tourism companies offer the services and attract to their customers. Businesses must innovate and modify rapidly in this age of the fast changing digital ecosystems if they are willing to stay upward of the curve. This research digs into the field of a next-gen services innovation and analyzes the precise possibilities provided by the leveraging of metaverse to enhance customer satisfaction (Lee, Lee, & Kim, 2022). The revolution of metaverse is demonstrate of a basic change in the way of people talk and capture with the digital material. The metaverse, which derive in the science fiction and is already becoming a reality, composed of a virtual and augmented reality settings along with the immersive experiences that uncertain the constraint between the actual and virtual worlds (Kiryakova, 2020).

A vigorous platform with various possibilities, the metaverse offers everything from socializing to business, entertainment to education (Gräf et al., 2023). To nurture a competitive limit and achieve sustainable growth, companies must hold the consequences of metaverse and fully utilize its capabilities as they cross this new digital landscape (Xu et al., 2022). Businesses must overcome the matter of separating out from the competition and providing clients with extraordinary experiences in an increasingly competitive market. The modern, tech-savvy consumer may have higher expectations than traditional methods of charming with customers and providing services (Kurtz & Clow, 1992). Figure 1 highlights metaverse as a valuable service platform, through digitalization, excellence, interoperability and model flexibility.

Figure 1: Metaverse as Service Platform.
Source: appinventiv.com

Moreover, in order to be competitive and relevant, the quick speed of technology advancement demands constant innovation and adaptability. So, how companies might use the metaverse to review customer interactions and raise service standards to never-before-seen heights is the practical issue our research attempts to solve. Although the notion of metaverse has been the subject of much discussion recently, there is still substantial vacuum in the literature concerning its real-world implementations in services innovation space (Abe et al., 2007). The majority of the earlier research has concentrated on

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the theoretical frameworks and theoretical analyzes, ignoring the practical strategy and the real-world applications that companies might exploit to effectively use of the metaverse. This study propose to close this gap and provide effective ideas and the empirical insights to the emerging area of metaverse-enabled services innovation (Lee et al., 2021).

This study's main aim is to find out how the metaverse could encourage the development of the next-generation services and how that could affect customer satisfaction in tourism industry of Pakistan. The research aims are to refine the primary motivators and success factors for leveraging the metaverse in the service delivery by an extensive examination of the case studies, best practices, and industry trends. Moreover, the study is to attempts pinpoint obstacles and problems obstructive the uptake of the metaverse technology and provide the solutions (Wang, Su, & Yan, 2023). The ultimate objective is to offer practical insights that allow the companies to entirely use of the metaverse and offer unparalleled customer experiences (Pappas et al., 2023). This study has important implications for the companies in a variety of industries trying to stand out from the competition and the progress in digital era. The research provides the organizations with the necessary information and the strategies to stay competitive by clarifying of the metaverse's revolutionary potential in the reassignment consumer relationships and service delivery (Hemmati, 2022). In addition, the study underlines how crucial customer satisfaction is to long-term performance and brand loyalty, which highlights how essential it is for businesses to the embrace innovation and the metaverse as a pole of their service strategy (Alam, 2006).

Literature Review

Relationship Between Metaverse and Technological Revolution

By adopting the metaverse as they guide this disorder geography, businesses may unlock hitherto undeveloped possibilities for innovation and customer involvement. Modern technology and innovative experiences work hand in hand to create a strong match between the technological revolution and the metaverse (Kraus et al., 2023). By using virtual reality technology, businesses may attract customers in dynamic digital worlds where innovation is countless. Thanks to the metaverse, marketers can connect with consumers on a highly personal level and control geographical barriers through interactive product demos and virtual showrooms (Shao, Derudder, & Witlox, 2022). Businesses and their customers can create long-term relationships that not only flourish customer satisfaction but also encourage a sense of community and emotional link by fusing creativity and technology (Sharma & Baoku, 2013). Figure 2 is the study framework showing the mechanism to satisfy customers through metaverse.

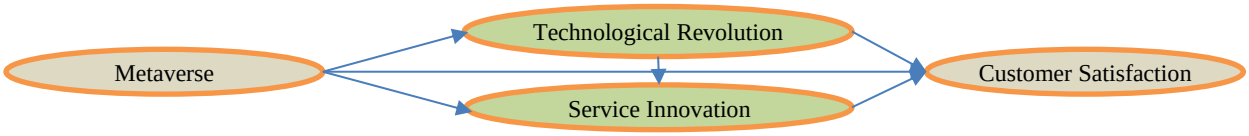

Figure 2: Framework of the Study Showing the Mechanism to Satisfy Customers Through Metaverse.

Furthermore, the metaverse helps modify innovation by empowering individuals and businesses to create and engage in previously inconsiderable ways (Snider, 1994). Through user-generated content and virtual economies, the metaverse fosters an innovative and enterprising society where ideas grow and barriers to entrance are eliminated (Halperin & Bar-Tal, 2011). Additionally to accelerate the rate of technological development, this democratization of innovation makes sure that everyone can earn profit from it, which promotes comprehensive growth and advances society. Moreover, the metaverse works as a medium through which digital and real-world experiences connect, making it increasingly difficult to differentiate between interactions that arise online and offline (Minagawa, Xu, & Morimoto, 2018). Businesses may establish experience connections based on trust, creativity, and shared values by harnessing the metaverse's transformational capacity to create immersive experiences that deeply connect with customers (Burton, 2018). Let's take this risk to create a future where customer satisfaction has no bounds and the metaverse acts as a pathway to inconsiderable possibilities as we set off on our virtual adventure (Zhai, 1998).

Hypothesis (H1): *Metaverse has a positive effect on technological revolution.*

Relationship Between Metaverse and Service Innovation

The integration of metaverse shows an incomparable potential in quickly changing field of service innovation (Salunke, Weerawardena, & McColl-Kennedy, 2019). Customer satisfaction may be transform in ways never before considered by using the metaverse as technology keeps link the gap between the physical and digital worlds. Basically, the metaverse is a limitless virtual environment in which users are free to create, engage, and analyze through the incorporation of digital land with service innovation (Urzedo, Westerlaken, & Gabrys, 2023), Businesses can create an environment where customer experiences exceed the restrictions of tangible world (Rowland & Schweigert, 2000). A massive outcome of incorporating the metaverse into service innovation is the capacity to provide an immersive encounter. Imagine a situation where customer may enter a personalized virtual atmosphere and interact with products or services in a way that looks meaningful and distinct (Behera et al., 2023). Businesses may now more accurately serve to individual needs and desires just because of metaverse. Examples of this include allowing

customers to virtually visit a vacation zone, test-drive a car through immersive simulations, and try on clothing in a virtual changing room (Papagiannidis, See-To, & Bourlakis, 2014).

Moreover to increase customer satisfaction, this degree of personalization motivates a stronger bond and commitment (Lee & Cranage, 2011). Moreover, companies and their customers can work together and co-create through the metaverse. Companies can ask for feedback in real-time and purify products or services based on direct suggestions by actively including their customers in creation and development process using virtual platforms and interactive experiences (Friston et al., 2021). The metaverse creates a feeling of community and ownership by removing barriers between producers and customers, making them feel proud as compulsory contributors to the creative process. This cooperative method enhance the relationship between businesses and their Customers while also producing more appropriate and powerful solutions (Binks & Ennew, 1997).

Additionally, the metaverse opens doors to the new markets and viewers worldwide by controlling geographical barriers (Hudson-Smith & Batty, 2022). Businesses may get access to the customers in the far-off places or underprivileged areas by adopting a virtual atmosphere and giving them access to products and services that were before unreasonable. Moreover, to exceeding market reach, this democratization of access promotes addition and diversity among the customers, improving the general quality of service for all parties (Amusan & Oyewole, 2012). Whatever is considered, the union of metaverse and service innovation has the power to completely change the way companies talk with their customers. By using the virtual words, businesses can craft experiences that are not only promotes the tastes of each individual consumer, but also promote addition, cooperation, and global outreach (Sharma et al., 2013). By doing this, they open the door to a brand-new era of customer satisfaction in which limitations disappear and creativity is uncontrolled (Wang et al., 2021).

Hypothesis (H2): *Metaverse has a positive effect on service innovation.*

Relationship Between Metaverse and Customer Satisfaction

The incorporation of the Metaverse offers a unique chance to alter customer satisfaction in the field of Next-Gen services innovation (Sabbani, 2022). Businesses can create significant relationships with their customers by using the immersive characteristics of the Metaverse to provide individualized, interactive experiences that surpassed geographical limitations (Dionisio, Iii, & Gilbert, 2013). The commitment to understand and meeting the different demands of customers in a virtual environment is at the core of this cooperation. Above all, companies can accurately modify their services to individual preferences due to Metaverse's unparalleled customization abilities (Bhavana & Vijayalakshmi, 2022). Customers are given authority and a view of agency by interrelating with products and services in previously unimaginable ways just because of virtual avatars and environment. The Metaverse allows clients to confidently make educated selections by qualifying them to virtually test-drive cars or try on virtual dresses before making a purchase (Donà & Ciuffo, 2022).

Moreover, by crossing secular and geographical divides, the Metaverse enables straight forward interaction and communication between companies and their clients (Poncet & Ripert, 2007). Businesses can provide service at all times and establish remarkable links with customers worldwide by using virtual reality (VR) seminars (Gandhi & Patel, 2018), interactive sessions, and instantaneous communication channels. Long-lasting relationships based on mutual respect and understanding are enhanced by accessibility, which not only improves convenience but also enhance a sense of relativity and loyalty among customers (Zins, 2001). Moreover, the Metaverse enhance innovation by motivating companies to regularly alter and adapt in the order to meet the ever-changing demands of their customers. Enterprises can construct immersive experiences that engage and satisfying consumers by adopting emerging technologies like augmented reality (AR), mixed reality (MR), and virtual commerce (v-commerce) (Al-Ansi et al., 2023). This can lead to new standards for customer satisfaction. The metaverse provides unlimited opportunities for the co-creation of items in virtual workshops, gamification of buying experiences, and arrange virtual events (Mitra, 2023).

The Metaverse provides organizations actual advantages including reduced costs, increased productivity, and increased brand awareness in addition to raising customer satisfaction (Hwang & Lee, 2022). Businesses may acquire new income streams and a competitive edge in digital marketplace by optimizing workflows, cutting expenses, and connecting with new audiences (Aldrich, 1999). Establishing a good reputation in Metaverse also helps companies draw in top personnel, create strategic alliances, and establish themselves as leaders in their field in the eyes of stakeholders and customers. Eventually, there's a great chance that incorporating the metaverse will raise customer satisfaction to previously unheard-of levels. Businesses may develop interactive and personalized experiences that deeply connect with the customers by using the immersive qualities of this virtual world (Middleton & Mather, 2008). Businesses may differentiate themselves and develop enduring relationships with their customers using a variety of means available in the metaverse, from customization and interaction to innovation and make creation (Lee et al., 2011). Undoubtedly, as we set out on this revolutionary expedition, the Metaverse represents not only forthcoming state of customer satisfaction but also its current state (Bowen, 2001).

Hypothesis (H3): *Metaverse has a positive effect on customer satisfaction.*

Relationship Between Technological Revolution and Customer Satisfaction

The technology revolution, which works as a motivation for

redefine of the customer experience in the metaverse, is at the center of this pattern shift (Panda, 2023). Technological improvements in the augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) provide immersive, customized, and the extremely realistic interactions inside the metaverse (Gandedkar, Wong, & Darendeliler, 2021). Moreover, technological developments in the augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) provide immersive, customized, and the incredibly realistic interactions within the metaverse (Luck & Aylett, 2000). Consumers are now active co-creators of their experiences rather than of submissive audience just because of these technological advancements, which improve the customer satisfaction and commitment (Mahajan, 2021). With its unlimited capabilities, the metaverse exceeds the limitations of traditional service mediums, providing a dynamic and attractive environment where the customers can negotiate, experiment, and discover products and services in the ways that were before unbelievable.

Moreover, the metaverse crosses national borders, producing new opportunities for the international cooperation and the community development (Gaurav, 2023). In virtual environments, customers from the different cultures and backgrounds may interact, share experiences, and jointly generate value, promoting inclusion and a sense of belonging that exceed the geographical boundaries. In the final investigation, a new era of the customer satisfaction is being declared by the metaverse of the technological revolution (Aguwa, Monplaisir, & Turgut, 2012). Here, the global association, personalized interactions, and immersive experiences come together to provide unparalleled value for the both enterprises and the customers. In progressively digital environment, organizations may drive innovation, create the new development possibilities, and the strengthen consumer connections by exploit the metaverse's transformational potential (Buhalis, Leung, & Lin, 2023).

Hypothesis (H4): *Technological revolution has positive effect on customer satisfaction.*

Relationship Between Service Innovation and Customer Satisfaction

In ever-changing context of Next-Gen services innovation, the Metaverse presents itself as a revolutionary space with countless chances to reinvent customer satisfaction (Christodoulou et al., 2022). The pivotal role in this change by serving as a link between innovative service offerings and unparalleled customer satisfaction (Khan & Fasih, 2014). Businesses may create an environment where customer satisfaction is not just a goal but a seamless and integral element of service experience by skillfully utilizing the Metaverse. In Next-Gen services innovation, conduct symmetry of technology innovations, user-centered design, and customized interactions (Welz & Rosenberg, 2018). Service providers may give clients with an experience that surpass the physical world by utilizing the immersive qualities of the Metaverse. Visualize a situation where consumers may connect with goods, services, and brands in a virtual environment that replicates the real world and provides many opportunities for personalization and interaction (Drettakis et al., 2007).

In this situation, crucial in selecting these experiences and making sure they fits the distinct tastes and needs of each customer. The smooth integration of cutting-edge technologies like artificial intelligence (AI), virtual reality (VR) (Luck & Aylett, 2000), and augmented reality (AR) is essential to success. With the use of these technologies, service providers can build immersive and dynamic environments that let users occupy, explore, and experience products in ways that weren't possible before (Yapo et al., 2010). In retail industry, for example, clients may virtually try on clothing, see furniture in their homes, or even take a test drive—all from the console of their own home. By adding true value to customer journey and preventing them from becoming mere gimmicks, the mediate or function guarantees increased customer satisfaction and loyalty (McWilliams & Gerstner, 2006). In addition, the Metaverse offers a rich environment for customer and corporate co-creation and cooperation. Customers can actively participate in the innovation process by participating in interactive service simulations or essential product design workshops (Hsiao & Chou, 2004). This communication is facilitated, which encourages a sense of involvement and ownership in the services provided. Customers feel heard, respected, and appreciated as a consequence, which increases customer satisfaction and advocacy (Yeh, 2013).

Furthermore, the obligation of the digital space and includes the smooth fusion of online and physical channels (Zhu et al., 2021). Businesses can guarantee that consumers may seamlessly move between the Metaverse and the real world, preserving continuity and consistency in their interactions, by developing a flawless omnichannel experience (Bhalla, 2014). This consistency upholds dependability and trust, which increases customer satisfaction and loyalty even more (Iberahim et al., 2016). To put it simply, Next-Gen services innovation is like a catalyst for change, using the Metaverse to manage customer satisfaction to previously unheard-of levels. Businesses may create lasting relationships with their consumers by integrating technology, empathy, and co-creation in a way that creates loyalty that surpasses transactional interactions. Navigating the Metaverse as it develops, helping companies and customers alike realize the full potential of immersive encounters (Power & Teigland, 2013).

Hypothesis (H5): *Service innovation has positive effect on customer satisfaction.*

Relationship Between Technological Revolution and Service Innovation

The crucial in facilitating the positive interaction between developing technologies and service innovation in the dynamic field of technological innovation (Opazo-Basáez, Vendrell-Herrero, & Bustinza, 2022). Being experienced in both fields,

the liaison, encouraging cooperation and synergy to achieve progress. This dynamic middleman becomes even more important when we explore the metaverse and cross over into unexplored areas like virtual and the augmented reality (MacCallum & Parsons, 2019). Achieving unparalleled customer satisfaction is the constant goal at the core of this mutually beneficial partnership. The metaverse is an infinite canvas for reinventing customer experiences instead of just a place to escape (Golf-Papez et al., 2022). Immersion technologies allow businesses to provide customers with individualized, engaging, and memorable experiences that surpass physical boundaries. With virtual store transforming the shopping experience and immersive virtual events beyond physical bounds, the metaverse offers a surplus of chances to connect and delight customers in ways that were previously unthinkable (Lau & Lee, 2019). But there are multiple obstacles and complexity in the way of actual innovation. The excels in this situation, expertly handling the complexities of service delivery and technical integration (Hagebak, 1979). They enable the smooth integration of cutting-edge technology with client-focused services through strategic alliances, cross-industry collaborations, and creative experimentation. The enables companies to drive the envelope of possibility and discover new frontiers in customer satisfaction by cultivating an ecosystem of creativity and innovation (Mahmoud, Hinson, & Anim, 2018).

In addition, the works with a strong dedication to inclusive and moral innovation (Papaioannou, 2018). They understand how essential it is to preserve individuality, advance variety, and guarantee accessibility in the metaverse (Dionisio et al., 2013). They participate in the creation of a metaverse that is egalitarian and socially responsible in the addition to being technologically sophisticated by encouraging responsible behavior and inclusive design assumptions. They offer the groundwork for a time in the future when everyone can wholly capture in and get the benefits of the metaverse's revolutionary capabilities by doing this (Kimmerly, 2023). In overall, there is a symbiotic synergism and favorable impact between service innovation and the technological revolution. By using the metaverse's transformational capabilities, they offer experiences that exceeds the norm, satisfying customers and promoting commercial success (Karim & Chowdhury, 2014). Under their direction, companies can confidently cross the complications of digital territory, welcoming innovation as a driving force behind exceptional customer satisfaction.

Hypothesis (H6): *Technological revolution has a positive effect on service innovation.*

Methodology

The purpose of this study is to look at the outcomes of using the Metaverse to enhance customer satisfaction in next-generation services. This study's methodology consist a number of important elements, such as the research design, collection methods, sampling techniques, and data analysis practices. This study put in a predominantly descriptive research approach. Considering the Metaverse's latest advancements and its use in service innovation, a descriptive method is seen to be adopted for learning more about its possible impact on customer satisfaction. To provide a detailed grip of the recent state of Metaverse-based services and their outcomes for customer satisfaction, a descriptive element was also added. For this project, a number of data collection techniques were used in order to give detailed awareness. To learn about the views of industry specialist, service providers, and technology developers on using the Metaverse for service innovation and its impacts on customer satisfaction in Pakistan, questionnaire was used.

Data from a larger amount of the consumers was collected using quantitative approaches, such as surveys, in order to establish their tastes, attitudes, and views concerning Metaverse-based services. Specific and sampling approaches may be used in this inspection. To select members for surveys, purposive sampling was used to consider their history and level of involvement with Metaverse technology and service innovation. The study's survey components were used by the convenience sampling, which was assure a vast representation of customers across demographic categories, geographic locations, and usage practices. Finally, 427 responses were collected for data analysis from Pakistan tourism industry. In order to obtain massive awareness, the data analysis processes were used quantitative approaches.

Results and Findings

The recommendations were followed in this study in order to analyze the data that was gathered, which is a common technique for analyzing primary data (van Vlymen & De Lusignan, 2005). The two main components of its basis are (1) measurement model assessment and (2) structural model assessment. Measurement model assumptions must be achieved initial to performing structural model assessment (Klein et al., 2001). This includes examining the reliability of data; that is, whether the data gathered is reliable enough to carry out the investigation. It consists of composite reliability and Cronbach alpha. To determine how closely connected a set of objects is to one another, Cronbach's alpha is a measure of internal consistency (Brown, 2002). After data screening, data statistics are given in Table 1 and Figure 3.

Individual item reliability was considered through factor loadings (shown in Table 2) of each item (question). For the variables to approach the other assumptions of the measurement model, factor loadings (Dwyer, 1937) on all of the items must be more than 0.50, including average variance extracted (AVE) (dos Santos & Cirillo, 2023). AVE displays the external consistency that serves as the basis for convergent validity. Convergent validity, an instrument frequently employed in social science research, describes the extent to which two measurements of theoretically linked phenomena

are really connected (Carlson & Herdman, 2012). Measurement model is given in Figure 4.

One of the well-known methods for data analysis, Smart PLS-SEM, was used to acquire the results of the current study. The majority of earlier research suggested PLS-SEM (Hair et al., 2019) as one of the appropriate methods for data analysis. PLS-SEM relies on two main stages. First, the measurement model was investigated to confirm its validity and reliability. The structural model that was created based on the literature review and utilized to test the hypotheses is presented in the second section. The structural model assessment in Figure 5 serves as the basis for most study findings (John & Sali, 2003).

Table 1: Data Statistics.

	No.	Missing	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
Meta1	1	0	3.654	4	1	5	1.226	-0.718	-0.514
Meta2	2	0	3.776	4	1	5	1.178	-0.517	-0.648
Meta3	3	0	3.594	4	1	5	1.209	-0.769	-0.445
Meta4	4	0	3.63	4	1	5	1.202	-0.705	-0.459
TR1	5	0	3.654	4	1	5	1.196	-0.503	-0.582
TR2	6	0	3.823	4	1	5	1.162	-0.17	-0.785
TR3	7	0	3.614	4	1	5	1.243	-0.785	-0.511
SI1	8	0	3.512	4	1	5	1.257	-0.667	-0.547
SI2	9	0	3.571	4	1	5	1.204	-0.617	-0.515
SI3	10	0	3.843	4	1	5	1.136	-0.264	-0.773
SI4	11	0	3.78	4	1	5	1.118	-0.31	-0.626
CS1	12	0	3.713	4	1	5	1.167	-0.357	-0.649
CS2	13	0	3.713	4	1	5	1.133	-0.366	-0.626
CS3	14	0	3.618	4	1	5	1.187	-0.621	-0.518
CS4	15	0	3.744	4	1	5	1.116	-0.532	-0.524

Note: CS = Customer Satisfaction, Meta = Metaverse, SI = Service Innovation, TR = Technological Revolution.

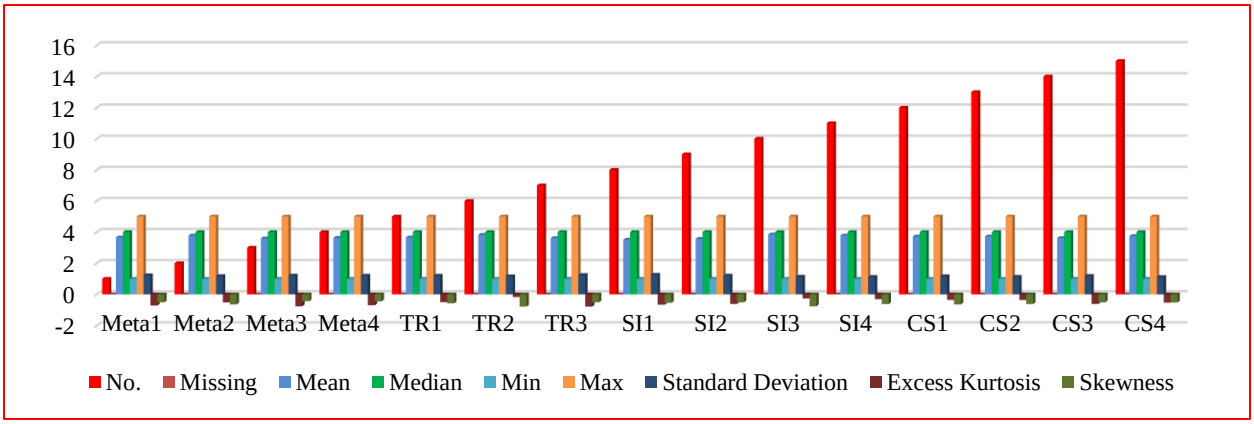

Figure 3: Data Statistics after Data Screening.

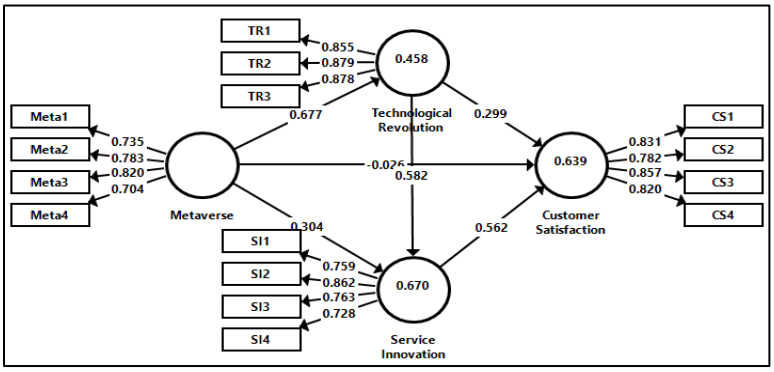

Figure 4: Measurement Model Assessment.

Note: CS = Customer Satisfaction, Meta = Metaverse, SI = Service Innovation, TR = Technological Revolution.

During the procedure, average variance extracted (AVE), factor loading, and reliability were assessed. Previous research suggests that items with factor loading less than 0.40 have to be excluded. As per the findings of Hair et al. (2010), convergent validity is attained when the item factor loadings exceed 0.5. Cronbach's-Alpha was computed in the current investigation to

determine the data's internal consistency. In addition, George and Mallery (2019) offered the following guidelines for calculating the value of alpha: α> 0.9 for excellent, α< 0.8 for good, and α< 0.7 for acceptable. Composite reliability (0.70), and average variance extracted (AVE) (0.50) are all deemed satisfactory for the current investigation. Table 2 shows the factor loadings and Table 3 shows the Cronbach alpha, composite reliability (Raykov, 1997), and average variance extracted (AVE).These values are all above and beyond adequate.

Table 2: Factor Loadings.

	Customer Satisfaction	Metaverse	Service Innovation	Technological Revolution
CS1	0.831			
CS2	0.782			
CS3	0.857			
CS4	0.82			
Meta1		0.735		
Meta2		0.783		
Meta3		0.82		
Meta4		0.704		
SI1			0.759	
SI2			0.862	
SI3			0.763	
SI4			0.728	
TR1				0.855
TR2				0.879
TR3				0.878

Note: CS = Customer Satisfaction, Meta = Metaverse, SI = Service Innovation, TR = Technological Revolution.

Table 3: Alpha, CR and AVE.

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Customer Satisfaction	0.841	0.842	0.893	0.677
Metaverse	0.758	0.766	0.846	0.58
Service Innovation	0.783	0.792	0.861	0.608
Technological Revolution	0.84	0.841	0.904	0.758

This measuring model reports two things: item loadings (shows in Table 2) and AVE (shows in Table 3). As per the rule of thumb, factor loading desire to be higher than 0.40, and here we can see that all loaded variables of customer satisfaction (CS), metaverse (Meta), service innovation (SI), and the technological revolution (TR) are acceptable (Silvestri, Piccarozzi, & Aquilani, 2019). Furthermore, the average variance extracted (AVE), which should be larger than 0.50, was created by the component loading. In our data, CS (0.677 > 0.50), Meta (0.58 > 0.50), SI (0.608 > 0.50), and TR (0.758 > 0.50), are acceptable, so the measurement model is viable. Table 4 also displays discriminant validity (Farrell & Rudd, 2009).

Table 4: Discriminant Validity.

	Customer Satisfaction	Metaverse	Service Innovation	Technological Revolution
Metaverse	0.707			
Service Innovation	0.861	0.896		
Technological Revolution	0.86	0.843	0.765	

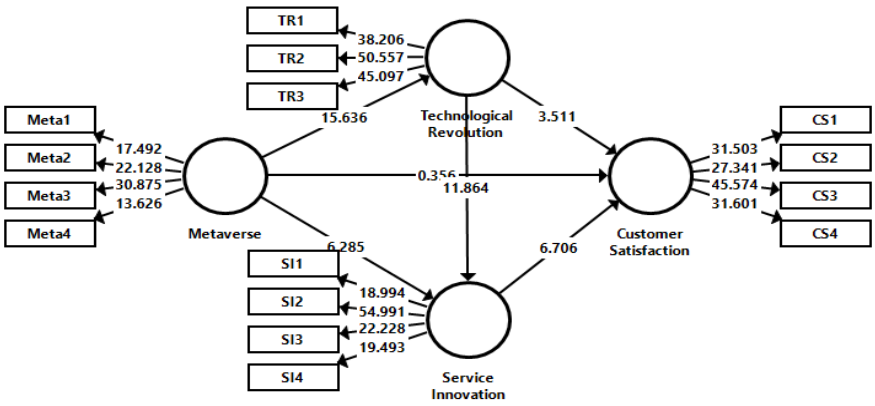

Figure 5: Structural Model Assessment.

Second, the associations between independent and dependent variables were examined using structural model assessment (Baumgartner & Homburg, 1996). The present study's hypotheses have an at-value of 1.96 or higher to support them. Every hypothesis that has a value of less than 1.96 was deemed unsupported. In the current study, it is found that all the variables have a statistically relationship, except the direct effect of metaverse on customer satisfaction (0.356 < 1.96) (Rane, Choudhary, & Rane, 2023). Thus, we reject the Hypothesis 1. Metaverse has a statistically relationship with service innovation (6.285 > 1.96). Thus, we fail to reject the Hypothesis 2. Metaverse has a statistically relationship with technological revolution (15.636 > 1.96). Thus, we fail to reject the Hypothesis 3. Service innovation has a statistically relationship with customer satisfaction (6.706 > 1.96). Thus, we fail to reject the Hypothesis 4. Furthermore, the original sample (O –value) shows that all the correlations are positive (Daniels, 1944).The relationships between the variables are appear in Figure 5, and the hypothesis' outcomes are shown in Table 5. These results are also reported in Figure 6.

Table 5: Results.

	β	Mean	SD	T Statistics	P Values
Metaverse -> Customer Satisfaction	-0.026	-0.027	0.074	0.356	0.722
Metaverse -> Service Innovation	0.304	0.305	0.048	6.285	0
Metaverse -> Technological Revolution	0.677	0.678	0.043	15.636	0
Service Innovation -> Customer Satisfaction	0.562	0.565	0.084	6.706	0
Technological Revolution -> Customer Satisfaction	0.299	0.297	0.085	3.511	0
Technological Revolution -> Service Innovation	0.582	0.58	0.049	11.864	0

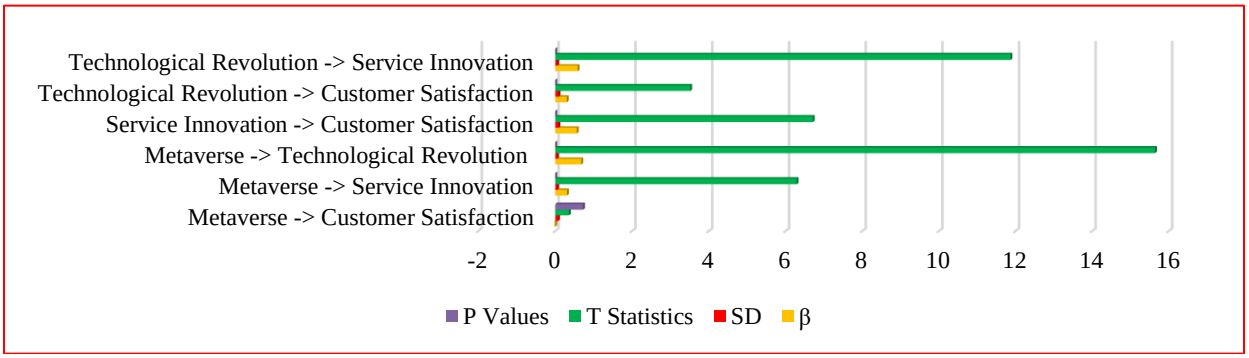

Figure 6: Hypotheses Results.

Discussion

The conclusion of this study provide essential contribution to our experience of how the metaverse impacts various facets of business and customer experience in Pakistani tourism industry. First, in line with other studies showing the transformational capability of virtual atmosphere on technology inspiration and development, our results point to beneficial effect of the metaverse on the technological revolution (Drucker, 1966). This suggested that the metaverse perform as a prompt for the development of technological innovation, with the ability to completely change various industries (Soete, 1987). Moreover, our results endorse previous research that highlight the importance of virtual platforms in reinventing the way services are assumed and provided, supporting the idea that the metaverse motivates innovation in the service delivery (Valencia, Enríquez, & Tigreros, 2018). This suggest how important it is to utilize metaverse technology to enhance service offerings and adopt to changing customer preferences (Aburbeian, Owda, & Owda, 2022).

Moreover, the outcomes of our research elaborate a favorable correlation between consumer satisfaction and the metaverse (Choi, Lee, & Kim, 2023), suggesting that virtual experiences that are highly immersive are components in raised customer satisfaction (Söderlund, Oikarinen, & Tan, 2022). This research focuses on the significance of the metaverse in encouraging meaningful and interesting conversations for the customers, creating on previous studies inspecting the links between virtual atmosphere and customer satisfaction (Lee et al., 2022). Moreover, in line with other studies that showed a relationship between enhanced customer experiences and technology developments (Srivastava, Kishore, & Dhingra, 2021). Our research show favorable effects of the technological developments on customer satisfaction (Bell & Pavitt, 1995). This shows the need of assign resources towards modern technology in order to precisely serve to altering demands and tendency of customers (Sepasgozar & Loosemore, 2017).

Our results also demonstrate the beneficial effect of service innovation (Song, Song, & Di Benedetto, 2009) on customer satisfaction, indicating that companies who place a high priority on innovation in their service delivery processes would maybe see an increase in customer satisfaction (Danaher & Mattsson, 1994). This result is consistent with other research that highlights the value of current innovation in preserving competitive advantage and cultivating favorable customer

views (Hana, 2013). In conclusion, our research verifies the affirmative correlation between technological revolution (Marcuse, 2010), and service innovation, suggesting that technological progress expedites the creation and execution of inventive service resolutions (Wang, Lee, & Trappey, 2017). This emphasizes how technology and service innovation are linked to impel corporate performance and improve customer experiences (Spiess et al., 2014). Generally, the study's findings offer insightful information about the metaverse's revolutionary potential for the advancing technology, improving customer satisfaction, and delivering services. This emphasizes how required it is to embrace the virtual environments in order to remain competitive in quickly switch the digital landscape of today (Nash et al., 2000).

Conclusion

In conclusion, our study interpret the complex relationship between metaverse and innovation in the technology, customer satisfaction, and service providing in tourism industry. The outcomes underline how virtual environments have the capacity to the technological revolution and stimulate the new service innovations. Moreover, our analysis emphasizes how important it is for the metaverse to provide immersive and the interesting experiences in order to enhance the customer satisfaction. Significantly, the findings underline the relationship between service innovation, technological revolution and the customer satisfaction, signifying that the companies who successfully exploit the metaverse stand to benefit in the fast-paced digital environment of today. Embracing the potential provided by the metaverse emerges as a vital strategy for the organizations to stay competitive and fulfil the changing requirements and tastes of the customers as they negotiate complications of growing virtual environment.

Implications of the Study

This study has an important implications for the practitioners of tourism industry and the researchers across a extent of the professions. The results emphasize importance of the acknowledging metaverse as a driving force behind the technological revolution and innovation. Although practitioners may use these findings to deliberate the invest in the metaverse technology to remain onward of the curve in their particular sectors, researchers can continue to review the processes through which the virtual environments drive technical progress. Secondly, the significance of reconsideration the service delivery in the virtual settings is shown by the positive correlation found between the metaverse and the service innovation. Companies may improve the customer experiences and procure a competitive margin in the market by using this information to create the innovative service solutions that are adapted to the unique features of the metaverse. While practitioners may exploit this information to create the complete project that entirely utilize the metaverse to improve the customer experiences and accomplish organizational goals, researchers can further examine the complex interactions between these elements. Overall, our study's implications emphasize the metaverse's transformational potential and the offer insightful counsel on how to best use it for the industry and academics alike.

Limitations and Future Directions

Although our study offered the insightful information, there are few important restrictions to take into the account. First off, the study desired on participant the self-reported data and was mostly concerned with how the metaverse was believed to affect the technological revolution, service innovation, and the customer satisfaction. In the future, a wider range of approaches, such as the experimental or longitudinal designs, may be used in the research to get a greater perceptions of the causal links between the variables. Furthermore, the research was conducted in a particular business or the setting, which could have restricted how widespread the results might be applied. Subsequent investigations may explore into the influence of metaverse in many industries and the cultural settings, with the aim of perceiving how its consequences could vary according to the distinct organizational and social elements. Furthermore, even though the focal point of our research was on the metaverse's benefits for the service innovation, customer satisfaction, and the technological revolution, it's crucial to perceive any of the possible obstacle or difficulties related to the virtual settings. To give a more thorough grab of its consequences, further study might look into the possible problems as well as privacy issues, digital inequity, or possibility of the addiction inside the metaverse.

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CRediT Authorship Contribution Statement

Aqeela Akbar, Bright Antwi Agyei: Conceptualization, Data curation, Formal analysis. Bright Antwi Agyei: Funding acquisition, Investigation, Methodology, Project administration, Resources, Software. Aqeela Akbar: Supervision, Validation, Visualization. Bright Antwi Agyei: Writing original draft. Aqeela Akbar, Bright Antwi Agyei: Writing review & editing.

Declaration of Competing Interest

The authors disclose no known conflicts of interest, financial or personal, related to this research.

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Ethical Statement

The authors confirm compliance with ethical standards, with no ethical approval necessary due to the exclusion of biological or tissue materials.

Data Availability Statement

The datasets created for this study are available for access by contacting the corresponding author under reasonable conditions.

Artificial Intelligence/ Language Module Statement

No AI or LLM technologies were involved in this research, and the authors collectively acknowledge responsibility for its creation and content.

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