



Digital Information and Brand Loyalty in China: An Emerging Perspective of Metaverse Users in Online Businesses

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Abstract

In the current era of industrialization, metaverse technology is increasing significantly. Particularly, online businesses are heavily investing in metaverse technology which can provide extraordinary benefits to the customers. However, this area is unexplored and most of the previous studies on metaverse ignored online business activities. Therefore, this study is an attempt to highlight metaverse users brand loyalty in China. The relationships between information communication technology (ICT), effective payment method, e-logistic, distribution charges, transit time, customer satisfaction and brand loyalty were considered. Data was collected by using a survey questionnaire. Structural Equation Modeling (SEM) was employed to analyze the collected data. It is observed that metaverse users brand loyalty is grounded on ICT, effective payment method, e-logistic, distribution charges, transit time and customer satisfaction. These factors have the potential to encourage or discourage the level of brand loyalty among metaverse users. Results of the study have vital importance for online businesses to promote performance by introducing metaverse technology.

Introduction

In modern times, due to globalism, the markets are mature and people are more conscious about the products and services (Brin, 2022). In reality, awareness in society related to metaverse technology is one of the fundamental reasons that has led the organizations to perform the new and different operations in the target market to develop a competitive advantage. However, as the scenario of the customers is changing, at the same time, this all is leading the organizations to go with a more effective strategy to get better and advanced results in the target market (Nightingale & Sethna, 2020). At the same time, it is also critical to understand that with the help of these online business opportunities the youth of different countries in getting the opportunity and utilizing it in an effective way for the financial benefits (Mohsin, Bashir, & Bin Tariq, 2018).

However, online business practices have changed the dynamic contrast of conventional businesses and now from recruitment to the raw material and from raw material to the final production, every activity is conducted online due to metaverse technology. In this way, the obligation of management is to guarantee that the clients are provided with a user-friendly interface and a very actual payment technique for the transaction of money with the online business organizations to purchase the product or services (Mejia-Escobar, González-

Ruiz, & Duque-Grisales, 2020). Besides, if the more opportunities are provided with the help of stakeholders and the development of technology would take the online business to an advanced level, there would always need for continuous monitoring of the online businesses to determine to what extent the relationship between different factors that are supporting the online business is helping for the customer satisfaction (Hida & Dewi, 2021). In the mature market, the concept of brand loyalty is critical because the people are brand conscious and they are always willing to purchase products and services that are tagged with any brand (Winkler et al., 2022). In the traditional business sector, brand management is an important responsibility to communicate the values of the brand to the people for developing competitive advantage and brand loyalty. However, in the modern and online business trade, the whole brand management system is changed and there is no physical communication between customers and the businesses (Junejo et al., 2023). In this regard, for the development of loyalty, the process of online purchase is considered the effective way to work by the business management to develop the satisfaction in the customer's mind and provide him the opportunity to accelerate this satisfaction to the brand loyalty and developed long term relationship with the brand (Ahmad et al., 2022). Indeed, more productivity in brand management will lead the online businesses to an advanced level and increase the market share of the online business.

In any business activity, the obligation of the management is to satisfy the clients. However, if the satisfaction is not provided to the customers, in results it leads the customers to switch the brand and go with any other approach for the purchasing of products and services (Salamat, Farahani, & Salamat, 2013). In the brand management, particularly in the online business organizations, the critical role of an effective payment method is important to consider because until and unless there would not be any kind of effective payment method then it would be useless for the business organizations to provide the right opportunities to the brand management for providing unique payment services to the customer (Winkler et al., 2022). Indeed, the accountability of the brand management in online business through metaverse technology is not limited to providing effective payment methods to the customer, but it is to provide on-time delivery and a rapid transportation system that would help the brand management satisfy the customer (Rane, 2023). In the mature market, the customers are well aware of the comparison of different business organizations and they go with a different type of comparison when they are purchasing products or services (Yallop & Aliasghar, 2020). In this regard, these customers focus on different kinds of factors such as the web design, e-payment, and e-traceability to determine to what extent the business organization is providing the opportunity to the customer to develop a higher level of satisfaction for the customers (Sullivan & Fosso Wamba, 2022).

This study is significant both theoretically and practically because it addresses the theoretical gap in literature and the practical gap in practice of online businesses. In this regard, this study is critical for the scholars and the management of the online brands because it highlights the facts for both the stakeholders. On the one hand, this study is a greater contribution to the literature because the correlation between the inducements and dependents variables of this study was not checked in an earlier study in the context of Chinese online brands. To deal with this gap in the literature, this study was significantly considered, and the data collected from the Chinese respondents contributed to the worth of the study. Therefore, this study is significant as it contributes to knowledge.

Literature Review

Information Communication Technology (ICT)

ICT is a process in which people and businesses are sharing information and transforming data to communicate with each other for a collective purpose (Ximei & Khan, 2022). It is based on internet tools and applications that help to share information from one to another to ensure purpose and integrity. Furthermore, information communication technology has helped different businesses to grow globally, and in the case of multinational companies, it assisted to communicate with the people from head office. The era of information communication technology is expanding and almost every business is now linked with the tools of information communication technology (Chou et al., 2022).

Effective Payment Method

Payment method refers to the method that is used for making a transaction from one to another. However, an effective payment method is a process in which people transfer payments effectively without any kind of barriers (Pramanik & Rakib, 2020). There are difficulties when people make transactions with business firms, but with the help of effective payment methods, people get the opportunity to work effectively and make transactions without any barriers or delays. In this regard, the businesses with effective payment methods are more successful, because people want easiness in the process of purchasing and payment. Particularly, in online businesses, the role of effective payment is critical to understand and people must be provided with a reliable and secure payment method (Arraya, Pellissier, & Preto, 2015).

E-Logistic

Electronic logistics or e-logistic is the process of information provided to the customers when they are purchasing from any business organization online (Yaqub et al., 2022). It is to share the information of parcel with the clients to ensure that he is satisfied with the services. In past, it was difficult to share all the related information with the clients, but over time, with the help of the information technology sector, it has become easier for the business organizations to grow productively by utilizing the feature of the e-logistic system (Hameed et al., 2018).

Low Distribution Charges

Low distribution charges refer to the payment on the delivery of a parcel or product to the customers. Indeed, logistics is the expensive part of purchasing, but at the same time, it is also a necessary part of purchasing (Sullivan & Fosso Wamba, 2022). In this regard, the organizations that are providing the services or products at the low distribution charges, these organizations are creating a competitive advantage in the target market. The clients of any organization are always looking for free or less expensive delivery of the products (Purwanto & Sudargini, 2021). In this way, low distribution charges are critical for the people to make a transaction with any business entity.

Low Transit Time

In the business organization product delivery, there is a vital role in low transit time because, in the world of hurry, people always want products and services to be delivered as early as possible (Berggren & Nacher, 2001). Also, the business firms are working to expand the delivery system to ensure that people must be provided with products and services in very little time, which would be helpful for them to develop long-time relationships with the business organization. In this way, for low transit time in product or service delivery, the large business firms of the online platform are managing the warehouses in different localities to provide efficient and effective services.

Customer Satisfaction

The satisfaction of a customer is when the customer is provided with the advantage of products or services which he purchases to satisfy his need. It is important to understand that every customer has a different set of values, and the level of satisfaction for each customer is different. Business organizations are working for customer's satisfaction, but in the era of globalism, due to high competition, it has become difficult for business organizations to satisfy the customers (Hida & Dewi, 2021). Indeed, customer satisfaction is a critical success factor for business firms, to develop in the market with competitive advantage.

Brand Loyalty

Brand loyalty refers to the set of values the customers in the target market are providing to the brands (Winkler et al., 2022). In this regard, it is a mutual set of shared values and concerns, because, on the one hand, brands are working to supply quality products or services to the groups. On the other hand, people are attached to the services and values of brands, and they are not going for any kind of leapfrogging or brand switching. Brand loyalty helps the brands to have loyal customers and expand their market share to the appropriate level by having permanent customers. It helps the brands to effectively increase their revenue (Thompson, 2014). Finally, the research framework for this study is constructed on the literature review that is summarized in the below Figure 1.

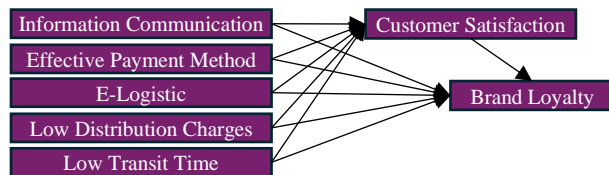


Figure 1: Conceptual Framework of the Study.

Hypotheses Development

ICT, Customer Satisfaction, and Brand Loyalty

ICT in the era of metaverse technology has become a critical factor in the modern age because it has provided a modern and digital way for the people and community for sharing information (Ximei & Khan, 2022). In the past, when there was no concept of information communication technology, it was difficult for the people to communicate with each other, and their facing different kinds of problems (Chou et al., 2022). At the same time, the business sector was facing the problem of sharing information with the customers and this problem led the businesses in a different direction where the crises were not ending (Dahles & Susilowati, 2015). In this regard, due to the lack of sharing information, it was difficult for the business market and the organization to grow in the different geography to communicate their values and provide products and services to the customers to develop a strong relationship with the customer. Furthermore, the innovation of

new products or services that facilitated the people with information communication technology was the step when the era of digitalization started, and people started to communicate with each other rapidly.

However, not only the community but at the same time, the business sector also facilitated with sharing of information and digitalization to grow up in the market and the other geography. It is also noted that with the advantage of ICT, the global village concept has been developed where businesses and communities are connected for better facilitation (Hameed et al., 2018). ICT is the best tool of communication for the business sector particularly the small and the large brands in the market because these brands are providing all the information to the customers at their and with the help of information communication technology (Ullah et al., 2023). The small brands are using different tools of ICT to share the information about their product and service to the target market and the target customers to provide the value and the foundation of their business through metaverse technology. As result, the customers are getting advantage of this information communication technology because they are not physically visiting the markets, but they are getting all the information on their screen (Salamat et al., 2013). On the other hand, information communication technology also facilitated the large brands because these large brands are utilizing information communication technology to have a sustainable and long-term relationships with the customers including after purchase services. The large brands are taking advantage of it because these brands are facilitated by ICT to have links with the target customers. In the case of Amazon and Alibaba, it is understood that there is an important role of information communication technology behind the success of these market successful businesses (Thompson, 2014).

At the same time, the information people get on that screen before purchasing is critical in modern times because now the markets are mature, and the people are well aware of their purchasing decision. Further, to provide all the information to the customers at their end, different brands are using digital tools of communication to share the information with the target market and get the things in the best way for the success of the business. Importantly, the organizations that are working on the traditional pattern and are not utilizing the tools of digitalization for the market growth and services to the customer, these business firms are badly failed in the target market for getting competitive advantage, because the alternative and opponents' competitors are using the tool of information communication technology (Andrei et al., 2021; Zahran, 2024). In the broad term, information communication technology is facilitating the businesses for getting advantage because the more efficient and effective technology a business would have in result, the more productivity and performance of the organization would be guaranteed.

Hypothesis (H1): ICT has a relationship with customer satisfaction.

Hypothesis (H2): ICT has a relationship with brand loyalty.

Hypothesis (H3): Customer satisfaction has a relationship

with brand loyalty.

Effective Payment Method, Customer Satisfaction, and Brand Loyalty

The payment method of Amazon and Alibaba is effective and reliable because thousands of people are making a transaction on a routine basis with these business organizations and they are facilitated by effective and secure payment methods (Ali, Hussin, & Abed, 2019). If the business organizations are successful to provide an effective payment method for the customers, it would ultimately lead the customer to loyalty because it is also reported that most of the customers are loyal to the brand due to the effective payment method as a service (Dahles & Susilowati, 2015). In backward countries, business organizations, particularly online businesses are facing the problem of effective payment methods of the information technology sector is to provide an appropriate solution to the online business firms for providing effective and reliable payment methods that would help customer satisfaction (Fayyaz et al., 2022). Not only, a reliable and effective payment method is necessary, but it must be user-friendly because most of the customers, the online businesses, are not used to using the online payment methods. Therefore, they must be provided with an appropriate payment method that would help them to become satisfied and get brand loyalty.

Hypothesis (H4): *Effective payment methods have a relationship with customer satisfaction.*

Hypothesis (H5): *Effective payment method has relationship with brand loyalty.*

E-Logistic, Customer Satisfaction, and Brand Loyalty

An electronic logistic system is important for the business organization because when it was developed it provided the appropriate facilities to the business organization for the operationality of the business organization (Yaqub et al., 2022). In the past, the traditional logistic system was used manually, and it was not effective as the electronic logistic system. For one thing, the innovation of information technology, it has become easier for business organizations to use the electronic logistic system for providing the best services to the target market to develop customer satisfaction (Khoi et al., 2018). In the case of Amazon and eBay, it is necessary to understand that the success of the business organizations is based on the logistic system because by providing the right information at the exact time for making the true decision, it is important to have the information accurately (Taghikhah et al., 2021). In the like manner, opposite to the traditional logistic system, metaverse technology aid the electronic system has changed the way of the game for the businesses because with help of globalism the business organization is expanding to the multinational companies, and it would be difficult for the organization to have the traditional logical system. In this way, it is the finest contribution of the IT sector to provide the appropriate electronic logistic system to develop the business in the selected market (Ximei & Khan,

2022). The electronic payment system, unlike the traditional system, is better and provides the best facilities for locating, tracking, insurance, and returning the product and services between the transaction of business and the customer.

The role of electronic logistics is to facilitate the people and the business at the same time for developing long-term relationships with the business organizations (Thoumrungroje & Racela, 2022). As far as the department and emergence of online brands are concerned, the brands must adopt the electronic logistic system because it is efficient and effective for the customers and the business administration as well. Also, with the help of this electronic logistics system, different organizations are getting a competitive advantage over the competitors because this way of communication and providing services and products to the target market is matchless and effective (Mohsin et al., 2018). Indeed, the responsibility of the business organizations is to understand this critical success factor and ensure the application of electronic logistic systems opposite to traditional logistic systems for the business organization to grow in the target market. Alibaba is providing all the information to the customers related to the transportation of the product including the insurance and tracking to facilitate the customer in the development and advanced way that is helping to build the competitive advantage (Putri & Honggare, 2022). Also, when the customers of online business organizations are provided information on the electronic logistic system, they develop positive behavior toward the business organizations for the long-term business loyalty. In the mature market, the customers are well educated and well informed in this regard, the organizations need to use digital system to provide all the information to the customer on their screen to provide them the role of a user-friendly system (Yuslem, Nawawi, & Dahrul, 2022). The facilities of the electronic logistic systems are perceived by the customer as the best facility that ultimately helps them to develop positive behavior and loyal to the business. Oppositely, the business establishments that are not delivering the services of the electronic closest system in the modern time, these organizations are not able to compete without digestion that is providing the services related to the electronic logistic system (Andrei et al., 2021; Ochieng, 2019). In this way, the responsibility of the administration of the emerging business on the online platform is to utilize the features of the information technology sector and provide the electronic system to the people to develop customer behavior.

Hypothesis (H6): *E-logistic has a relationship with customer satisfaction.*

Hypothesis (H7): *E-logistic has a relationship with brand loyalty.*

Low Distribution Charges, Customer Satisfaction, and Brand Loyalty

Importantly, the business organization in the modern time should understand that the customers are mature and well aware and they are always concerned with low distribution costs (Junejo et al., 2023). Therefore, the business groups that are

offering the services facilities with low distribution cost, the role of these organizations is increased in the target market as a competitive advantage. The ICT sector relation to metaverse technology, the logistic provider's sector, and the business organizations must have an agreement to safeguard that the clients are provided the facilities of low distribution charges for getting a competitive advantage in the selected market (Ximei & Khan, 2022). However, to provide service with less distribution cost, the organization needs to work on effective and efficient planning to provide facilities in a way that would be useful for the target market for developing competitive advantage and customer satisfaction as well. Also, when the customers are satisfied with the low distribution cost then they would develop an understanding of the brand, and loyalty to the brand would be developed.

Hypothesis (H8): *Low distribution charges have a relationship with customer satisfaction.*

Hypothesis (H9): *Low distribution charges have a relationship with brand loyalty.*

Low Transit Time, Customer Satisfaction, and Brand Loyalty

In the business companies' performance, transit time is important to consider in the mature and competitive market. Indeed, it is a fact that every business organization's traditional or online platform is working to deliver products or services to the target market on a rapid basis. However, due to a different kind of critical factors that are affecting the delivery time of the products and services to the customers (Salamat et al., 2013). Based on this factor of delivery time, different organizations have developed a competitive advantage in the target market over the competitors. In the competition between eBay and Amazon, the organizations are working to develop and established more warehouses in different localities to target the clients as early as possible with the products geographically (Savarimuthu, George, & Mohanchandran, 2023). Also, the warehouses of Amazon are established and working in different regions of the United States, Australia and Canada are the best examples to minimize and reduce the delivery time of the products to the customers (Reyes-Mercado, 2023). Oppositely, the badly failed to reduce the time of delivery to the customers are facing challenges and competition from the organization that is rapidly delivering the products to the customers. Similarly, the organizations must consider that the role of product delivery in the low time is critical to developing the satisfaction of the customer along with the term (Tiep Le & Nguyen, 2022). Also, the organizations should consider the role of delivery time by research and development to work on more productive strategies and well policies for delivering the products to the customer in minimum time.

In the Chinese online platform business market, the delivery time of products is 3 to 5 working days (Thoumrungroje & Racela, 2022). In this regard, the responsibility of the organizations is to understand the role of minimum delivery time as a significant success factor to explain brand loyalty in the

target market. In the era of productivity and rapid action, people want to be delivered the products or services at the minimum time to get an advantage at the right time (Van Ark, 2022). In this way, this demand of people is important to consider by the business organizations because the loyalty of the customers to the brand is directly responsible for this factor. However, the organizations should consider the important role of low delivery time for customers business loyalty (Andrei et al., 2021). The responsibility of the business organizations is to satisfy the customer by any means and develop sustainable relationship with the customers to get more profit and increase the market share (Yuslem et al., 2022). Importantly, the organizations in the first world countries are working effectively to reduce the delivery time of the product to the customer to satisfy the customer and develop a competitive advantage on this base.

Hypothesis (H10): *Low transit time has a relationship with customer satisfaction.*

Hypothesis (H11): *Low transit time has a relationship with brand loyalty.*

Hypothesis (H12): *Customer satisfaction mediates the relationship between ICT and brand loyalty.*

Hypothesis (H13): *Effective payment method mediates the relationship between ICT and brand loyalty.*

Hypothesis (H14): *Customer satisfaction mediates the relationship between e-logistic and brand loyalty.*

Hypothesis (H15): *Customer satisfaction mediates the relationship between low distribution charges and brand loyalty.*

Hypothesis (H16): *Customer satisfaction mediates the relationship between low transit time and brand loyalty.*

Methodology

Research Philosophy

In this study, the positive paradigm research philosophy was adopted for the study. It is because this philosophy highlights that the research related to social sciences must be studied independently (Bayanova et al., 2019). Furthermore, this philosophy works on the deductive approach that is quite useful for social sciences studies, because the relationship between the variables must be checked according to the cause-and-effect relationship. In this regard, the deductive approach of research helps to conclude in a general way (Damamisau et al., 2020). In a nutshell, positivist researchers believe in value-free science and emphasize testing the relationship between the variables based on numbers as replicating research.

In this study, the purpose was to test the hypotheses based on the structural model. In this regard, the model is based on the assumption that there is a significant relationship between ICT, effective payment method, e-logistic, low distribution charges, low transit time, customer satisfaction, and brand loyalty. Further, sixteen hypotheses were developed on the basis of literature review and tested for this study. Also, the purpose of this study was not to develop a new theory, rather, it focused on theory testing and verification with the help of a deductive research approach that is quite according to the

requirements of this study.

Research Design

In this study, the cross-sectional research design was adopted to test the relationship between the hypotheses. Importantly, the quantitative method of data collection was adopted and, in this regard, Smart PLS 3 software was used for accessing the relationship between the latent variables. In this way, the purpose of cross-sectional data analysis was to limitation of time and money for this study. It is understood that the research in the business field is categorized and conducted with the help of surveys (Fayyaz et al., 2022).

However, the most effective and useful method for business research is survey-based research because helps to collect the data from a large population in a very short period (Gaur et al., 2020). Also, the purpose of the survey research is to get the information within a short time to test the hypotheses of the study to test the relationship between the variables. Furthermore, surveys are also useful for describing the population of the study and in the development of the scale items of the study that are important to collect the data from the target respondents. On the other hand, it is a useful method for the study because it helps to save time, otherwise, the interview method is time taking method of research. For this study, the data were collected from the people of China who are purchasing from online businesses in the Chinese market. In this way, the customers of the big market giant online brands were a target for the study, because these people who are online purchasing from the businesses are the right ones to be studied to test the relationship between the hypotheses of this study.

Population and Sampling

The customers from the five cities of China are targeted for this study. The cities include Islamabad, Lahore, Karachi, Faisalabad, and Multan. In this way, several 100 units were selected from every five cities to get the response from the respondents (see Table 1). Finally, 500 questionnaires were distributed among the metaverse users and 281 were returned. The scale items are attached in the appendix.

Table 1: Sample Size.

Sr. No	City Name	Population in Target City
1	Islamabad	100
2	Lahore	100
3	Karachi	100
4	Faisalabad	100
5	Multan	100

Data Analysis

Data analysis of the study was carried out by using PLS-SEM which is grounded on measurement model to check the reliability and validity. Furthermore, structural models were employed to test the relationship among variables. Results of reliability and validity are reported in Table 2 and Table 3. Individual item's reliability was addressed through factor loadings (Hair Jr, Howard, & Nitzl, 2020; Kock, 2015; Streukens & Leroi-Werelds, 2016). All the items have factor loading above threshold level which is 0.5. Construct reliability as assessed through composite reliability which is higher than 0.7. AVE is higher than 0.5 which confirmed convergent validity. Additionally, Heterotrait-Monotrait ratio of correlations (HTMT) was used to examine discriminant validity, as shown on Table 3 and Figure 2.

Table 2: Factor Loadings, Alpha, CR and AVE.

Variables	Scale Items	Factor Loadings	Alpha	CR	AVE
Brand Loyalty	BL1	0.857	0.914	0.947	0.856
	BL2	0.974			
	BL3	0.941			
Customer Satisfaction	CS1	0.882	0.889	0.931	0.817
	CS2	0.899			
	CS3	0.930			
E-Logistic	EL1	0.840	0.931	0.948	0.787
	EL2	0.898			
	EL3	0.958			
	EL4	0.956			
	EL5	0.771			
Effective Payment Method	EPM1	0.620	0.868	0.917	0.742
	EPM2	0.953			
	EPM3	0.985			
	EPM4	0.906			
ICT	ICT1	0.851	0.734	0.838	0.576
	ICT2	0.932			
	ICT3	0.618			
	ICT4	0.663			
Low Distribution Charges	LDC1	0.859	0.874	0.922	0.798
	LDC2	0.887			
	LDC3	0.933			
Low Transit Time	LTT1	0.746	0.798	0.884	0.719
	LTT2	0.841			
	LTT3	0.944			

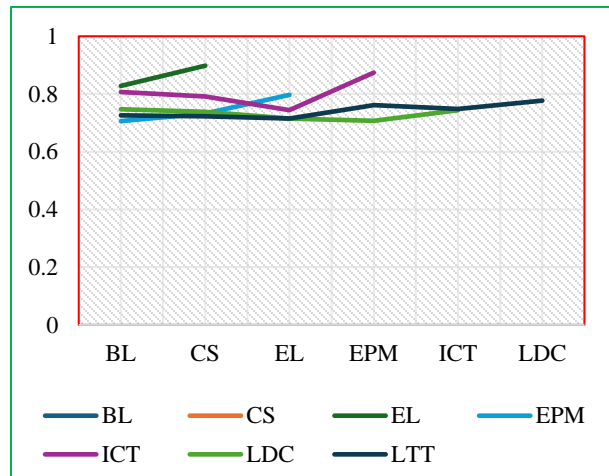
Note: ICT= Information Communication Technology; CS= Customer Satisfaction; BL= Brand Loyalty; EPM= Effective Payment Method; EL= E-Logistic; LDC= Low Distribution Charges; LTT= Low Transit Time.

Table 3: Discriminant Validity (HTMT).

	BL	CS	EL	EPM	ICT	LDC	LTT
BL							
CS	0.827						
EL	0.828	0.898					
EPM	0.706	0.733	0.797				
ICT	0.807	0.791	0.744	0.874			
LDC	0.747	0.738	0.715	0.707	0.744		
LTT	0.726	0.723	0.715	0.761	0.748	0.777	

Note: ICT= Information Communication Technology; CS= Customer Satisfaction; BL= Brand Loyalty; EPM= Effective Payment Method; EL= E-Logistic; LDC= Low Distribution Charges; LTT= Low Transit Time.

Structural model was employed to examine the relationship between variables. The relationship between ICT, payment method, e-logistic, distribution charges, transit time, customer satisfaction and brand loyalty were considered, and 11 direct hypotheses are evaluated. The outcomes of direct effect hypotheses are reported in Table 4 and Figure 3. The threshold level of t-value was 1.96 to accept hypothesis. The effect of ICT was found insignificant in relation to customer satisfaction because the t-value was below 1.96. However, all other direct effects (hypothesis 1-11) are supported.

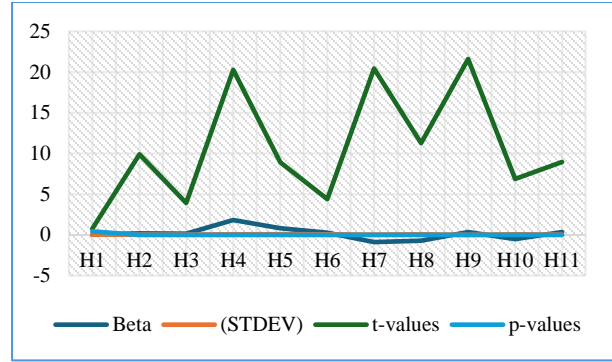
**Figure 2:** HTMT.

Note: ICT= Information Communication Technology; CS= Customer Satisfaction; BL= Brand Loyalty; EPM= Effective Payment Method; EL= E-Logistic; LDC= Low Distribution Charges; LTT= Low Transit Time.

Table 4: Direct Relationship.

Hypotheses	Beta	(STDEV)	t-values	p-values	Decisions
H1. ICT -> CS	0.021	0.027	0.779	0.436	Insignificant
H2. ICT -> BL	0.192	0.019	9.917	0.000	Significant
H3. CS -> BL	0.160	0.041	3.929	0.000	Significant
H4. EPM -> CS	1.829	0.090	20.253	0.000	Significant
H5. EPM -> BL	0.825	0.092	8.918	0.000	Significant
H6. EL -> CS	0.268	0.061	4.395	0.000	Significant
H7. EL -> BL	-0.874	0.043	20.418	0.000	Significant
H8. LDC -> CS	-0.722	0.064	11.282	0.000	Significant
H9. LDC -> BL	0.370	0.017	21.598	0.000	Significant
H10. LTT -> CS	-0.502	0.073	6.865	0.000	Significant
H11. LTT -> BL	0.334	0.037	8.955	0.000	Significant

Note: ICT= Information Communication Technology; CS= Customer Satisfaction; BL= Brand Loyalty; EPM= Effective Payment Method; EL= E-Logistic; LDC= Low Distribution Charges; LTT= Low Transit Time.

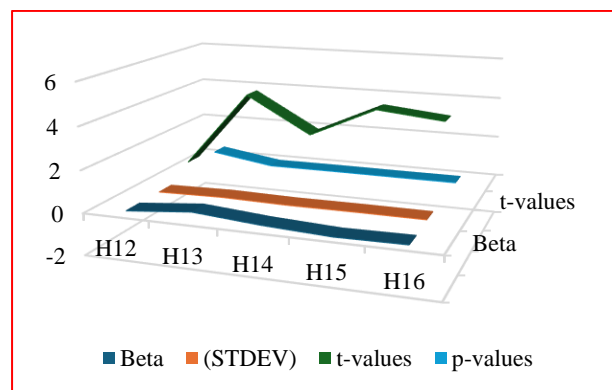
**Figure 3:** Direct Effect (Path Coefficient).

This section of the study presents the results of the mediation analysis of the variables presented in the theoretical framework of the study. In this regard, the data was analyzed, and the values were identified by PLS Bootstrapping. To begin with, according to the results of H12, CS doesn't mediate the relationship between ICT and BL ($\beta = 0.03$, $t = 0.711$, $p = 0.477$), therefore, H12 is rejected. Secondly, according to the results of H13, CS mediates the relationship between EMP and BL ($\beta = 0.293$, $t = 4.391$, $p = 0.000$), therefore, H13 is accepted. Thirdly, according to the results of H14, CS mediates the relationship between EL and BL ($\beta = 0.043$, $t = 2.646$, $p = 0.008$), therefore, H14 is accepted. Fourthly, according to the results of H15, CS mediates the relationship between LDC and BL ($\beta = -0.116$, $t = 0.028$, $p = 0.000$), therefore, H15 is accepted. Lastly, according to the results of H16, CS mediates the relationship between LTT and BL ($\beta = -0.080$, $t = 3.790$, $p = 0.000$), therefore, H16 is accepted (see Table 5 and Figure 4).

Table 5: Mediation Results.

Mediation	Beta	(STDEV)	t-values	p-values	Decisions
H12. ICT -> CS -> BL	0.003	0.005	0.711	0.477	Insignificant
H13. EPM -> CS -> BL	0.293	0.067	4.391	0.000	Significant
H14. EL -> CS -> BL	0.043	0.016	2.646	0.008	Significant
H15. LDC -> CS -> BL	-0.116	0.028	4.114	0.000	Significant
H16. LTT -> CS -> BL	-0.080	0.021	3.790	0.000	Significant

Note: ICT= Information Communication Technology; CS= Customer Satisfaction; BL= Brand Loyalty; EPM= Effective Payment Method; EL= E-Logistic; LDC= Low Distribution Charges; LTT= Low Transit Time.

**Figure 4:** Mediation effect Results.

Discussion and Conclusion

To begin with, H1 identifies an insignificant relationship between ICT and customer satisfaction while using metaverse technology. Secondly, H2 reveals a significant relationship between information communication technology and brand loyalty. Thirdly, there is a noteworthy correlation between brand loyalty and consumer satisfaction, as indicated by the results of H3. Fourthly, a strong correlation has been found between consumer happiness and efficient payment options, as indicated by the results of H4. Fifthly, H5 uncovers a significant relationship between effective payment methods and brand loyalty. Sixthly, H6 unfolds a significant relationship between e-logistic and customer satisfaction. Seventhly, H7 demonstrates a negative significant relationship between e-logistic and brand loyalty. Eighthly, H8 highlights a significant relationship between low distribution charges and customer satisfaction. In the ninth place, H9 highlights a noteworthy correlation between low distribution costs and brand loyalty. Moreover, H10 reveals a strong correlation between consumer happiness and a short transit time. In a similar vein, H11 finds a strong correlation between brand loyalty and a short journey time. Also, H12 unfolds an insignificant mediating role of customer satisfaction in the relationship between information communication technology and brand loyalty. Meanwhile, H13 demonstrates a significant mediating role of effective payment methods in the relationship between information communication technology and brand loyalty. Additionally, H14 emphasizes how important it is for customer happiness to function as a mediator in the interaction between brand loyalty and e logistic. Furthermore, H15 reveals that low distribution costs and brand loyalty are positively correlated, with customer satisfaction playing a negative and significant mediating function. Lastly, H16 highlights a negative significant mediating role of customer satisfaction in the relationship between low transit time and brand loyalty.

It is important to understand that ICT in relation to metaverse technology doesn't play a critical role in client satisfaction and brand loyalty because by ICT customers get services related to the business. Indeed, the business groups that are effectively working for the target market, these organization must consider the important role of ICT to develop the satisfaction of the consumers of the developed countries like America and China (Ximei & Khan, 2022). In this way, more satisfaction would be provided to the consumers related to the ICT, as a result, the more active participation of the customers would be to purchase from the same business or brand (Chou et al., 2022). Significantly, to advance the loyalty of the brand to the progressive level, the role of ICT is important to consider, because it provides a way to develop customer satisfaction to a greater level for getting maximum benefit for the customers and the business as well (Thoumrungroje & Racela, 2022). Therefore, the brand must consider the important role of information communication technology to provide customer satisfaction to providing appropriate services to the customers, but in the context of China, ICT is not affecting the customer satisfaction as most of the people are not concerned with it.

It is also a fact that customers are always concerned about the e-logistics system because they believe that the logistics system is critical to understand in the online businesses to make the transaction with any business entity (Yaqub et al., 2022). In this regard, the brand administration must consider the significant role of the services of electronic logistic systems to ensure that the customers get information on time to make the right decision related to their product and services that they have but just from the business entity (Porcu et al., 2020). Oppositely, the businesses in metaverse technology that are working in the online market and failed to provide the appropriate services of electronic logistic systems, these businesses are failing to a greater level and the competitors are getting it as a critical success factor. Therefore, the online business organizations must consider the role of the electronic logistic system to satisfy the needs of the customer and provide them away to the customer to develop more understanding and commitment to the brand to develop brand loyalty.

Future Directions

Although this study considered metaverse users which was rarely addressed by the previous studies, this study has few limitations. The limitations of this study are valuable for future studies to address the current idea in a new direction. First this study employed questionnaire survey to check the opinion of the metaverse users, however, the interviews from metaverse users could be more valuable to collect opinion and views of the people. Second, instead of customer satisfaction, other variables such as customer engagement with metaverse technology and customer retention could be more beneficial. Third, this study considered metaverse users, however, a specific variable related to the metaverse technology should be added to the current framework.

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CRedit Authorship Contribution Statement

Yali Tiana, Zahra Batool, Mehtab Abbasi: 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

The authors declare that no financial or personal interests are relevant to this study.

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Ethical Statement

The authors adhered to ethical standards, and approval was not necessary because the research excluded human tissue and biological materials.

Data Availability Statement

Data used in this research are available from the corresponding author upon request and reasonable justification.

Artificial Intelligence/ Language Module Statement

This research did not utilize any artificial intelligence or LLM tools, and the authors accept full accountability for its integrity and content.

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Appendix

Scale Items for this Study

Variables	Items
E-Logistic	(Please respond to all questions by considering the experience of metaverse technology use)
	I am satisfied with the e-logistic quality.
	I am satisfied with the price of e-logistic products.
	I am satisfied with the services of e-logistic.
	I am satisfied with the reputation of e-logistic.
Information Communication Technology	I am satisfied with the after-sale services of e-logistic.
	(Please respond to all questions by considering the experience of metaverse technology use)
	Information system is sufficiently secure to conduct business transactions.
	Information system can integrate operations with supplier.
	The logistics companies have relatively mature ICT equipment to deal with some emergency.
Effective Payment Method	The logistics companies use ICT equipment to give customers feedback timely.
	(Please respond to all questions by considering the experience of metaverse technology use)
	I perceive e-payment as a secure online transaction.
	I do not fear hacker invasions into e-payment system.
	The information I provided in the previous e-payment is helpful for secure e-payment transactions.
Low Distribution Charges	I perceive the information relating to user and e-payment transactions as secure.
	(Please respond to all questions by considering the experience of metaverse technology use)
	The company has a clear distribution fee list.
	The price rules are adequate and price relatively stable.
	The distribution charges are satisfactory.
Low Transit Time	I am satisfied with the time from ordering to receiving parcel.
	The delay time in holidays is normal.
	The time from mailing the return goods to receiving the new goods is reasonable.
	(Please respond to all questions by considering the experience of metaverse technology use)
	I trust the online store to deliver the product on time.
Customer Satisfaction	I am very dissatisfied with my online shopping experiences.
	I was satisfied with the e-payment options at the store I shopped.
	I tell others positive things about the brand I use.
Brand Loyalty	I pay more to the brand of my personal care products than the other brands.
	I feel better when I use the brand of my personal care products.