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Article

Social Cognitive Theory to Assess the Intention to Participate in the Facebook Metaverse by Citizens in Peru during the COVID-19 Pandemic

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Abstract: The current study aims to validate and apply an instrument to assess the relationship between institutional support, technological literacy, and self-efficacy on the intention to participate in the Facebook Metaverse using social cognitive theory. We performed a cross-sectional, analytical study of 410 citizens in Peru to assess the influence of institutional support, technological literacy, and self-efficacy on the intention to participate in the Facebook Metaverse during the COVID-19 pandemic. The research model was validated using partial least square structural equation modeling (PLS-SEM) to establish the influence of variables on the model. Institutional support and technological literacy were found to influence the self-efficacy of participating in the metaverse positively by correlations of 0.573 and 0.257, respectively. Self-efficacy of participating positively influenced the intention to participate in the Facebook Metaverse by 0.808. The model explained 65.4% of the intention to participate in the Facebook Metaverse. Bootstrapping demonstrated that the path coefficients of the research model were statistically significant. The research outcomes may help firms to develop planning and investment in the metaverse, as well as understanding the factors that influence a higher intention to participate in the Facebook Metaverse.

Keywords: metaverse; Facebook; institutional support; technology; self-efficacy; intention to participate; Peru; COVID-19

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1. Introduction

The use of technology increasingly leads to an intense relationship between people and online media. This increased involvement could be achieved if the proposal recently raised by Facebook materializes: living in the metaverse. The term metaverse was first used by Neal Stephenson in his science fiction novel *Snow Crash* published in 1992; in the said novel, the metaverse is described as a virtual environment that has its origin in a computer and is based on various concepts [1]. Previous studies in the literature have not assessed the willingness and factors to participate in the metaverse.

Due to the COVID-19 pandemic and the associated lockdown to prevent contagion, various aspects of common life were affected, such as health [2–14] and the direct impact on the Sustainable Development Goals (SDGs) [15], which has generated an increase in care through telemedicine [16]. On the other hand, education was impacted [17–19], causing a rapid increase in the use of synchronous and asynchronous technological tools. These changes in the world generated greater interconnectivity, which created the right conditions for the overcrowding of the metaverse.

Currently, the metaverse can be recognized as a level of user experience with video games [20], which can be played through laptops, cell phones or different consoles. It is also possible to see the experience of purchasing products and services online using different connected devices and forms of online payment [21]. Another relevant component is their experience during normal browsing and the reception of different types of advertising, whether in pop-up formats such as spam or subscription links [22]. Online stores are constantly perfecting immersive and personalized purchase offers [23] through more sophisticated tools adaptable to the end-users' needs and characteristics [24]. On the other hand, this computational experience has increased the development of more specific and sophisticated tools such as spatial computing with geospatial mapping [25]. At the same time, the user experience is moving towards a deeper stimulation of the user's senses based on virtual reality (VR), augmented reality (AR), and extended reality (XR) [25]. The security provided by blockchain positively impacted the user experience in monetary transactions online [26], with closer integration of wearable devices and the online environment [27], using neural networks more efficiently [28]. Furthermore, the widespread availability of Wi-Fi and network connections allow for constant connectivity, whether you are at the university cafeteria, the veterinary clinic, or the bus station [29], linked with microelectromechanical sensors (MEMS) that allow the control of transport systems to ensure efficiency and safety of the constant connection [30].

Recording people's daily activities, the metaverse is the primary information source [31,32]. Thus, it is possible to generate a detailed profile of people or human groups that constantly post opinions about different topics on different social networks. For instance, the trends generated on Twitter have been used for the generation of television programs, movies, and even online games [33]. Similarly, Instagram [34] and Tik Tok [35], Google Maps, and Waze have been used to feed content into immersive platforms such as SecondLife [36]. In the metaverse, a crucial component is an avatar that each user has, reflecting what we do in the real world. Historically, avatars were idealized and allowed to project desired profiles with desired characteristics that can play a protagonist role in the virtual world [37,38]. The metaverse more recently proposed devices that can capture expressions from the physical world and transmit them directly to the virtual avatar [39], which implies a virtual copy of the real world, with the highest possible fidelity in features and functions [39].

The current study aims to measure relevant variables related to social cognitive theory that can have an effect on the intention to participate in the metaverse, such as institutional support, technological literacy, and participation self-efficacy. In social cognitive theory, individuals possess a self-system that allows them to measure control of their thoughts, feelings, motivation, and actions. This self-system provides referential mechanisms and a set of sub-functions to perceive, regulate, and evaluate behaviors, resulting in the interplay between the system and the sources of environmental effect. Thus, it serves as a self-regulatory function to convert individuals with the capacity to have an effect on their cognitive processes to alter their environment.

Institutional support is defined as the support supplied by universities and firms by access and training in technology for their users [40]. Technological literacy is the knowledge and skills a person must develop to carry out daily activities using technological devices [41]. This variable refers to a person's ability to conduct their daily use of computers successfully. Technological literacy can be modified by external effects, such as training schools for students and jobs for workers. In the current study, technological literacy was measured by the respondents' reports of their expertise in using Microsoft Office, the Microsoft Windows environment, social networks, efficient e-mail management, and video games. Self-efficacy is the behavioral intention to perform an action based on their intention and knowledge, as established in the Theory of Planned Action [42]. As Meta-Facebook has proposed, this advance of the metaverse could accelerate in the coming years, so it is necessary to know people's willingness to immerse themselves in the metaverse for their daily activities.

Several companies are increasingly interested in investing in the metaverse, so it is helpful to know the current effect of these factors, and, finally, it is key to know the intention to participate in the Facebook Metaverse. It is also necessary to know the effect the support received by users in their schools or companies may have on their self-efficacy to participate in the metaverse. Likewise, as mentioned earlier, it is essential to know the effect of technological literacy, that is, the basic knowledge of using digital tools on self-efficacy. For this reason, the objective of this study is to measure and verify the proposed explanatory model that institutional support, technological literacy, and self-efficacy are factors that explain the intention of participation in the Facebook Metaverse by citizens in Peru. By testing the model, it would be possible to verify whether increasing technological literacy and institutional support positively affect self-efficacy and ultimately increase the intention to participate in the metaverse.

The literature review is presented in Section 2. Section 3 provides the approach, and the methodology is presented in Section 4. The results are described in Section 5. The Discussion is described in Section 6. Conclusions are provided in Section 7.

2. Literature Review

There are reports describing system builds that help scalability into the metaverse, such as writing response times for massive activity such as the Massively Multiplayer Online Game (MMOG) [43,44], development of 3D models from the real world for integration into the metaverse [45,46], analysis programmed against cybercrime [47,48], multiplayers in the metaverse [20,49]. Moreover, it evaluated the interoperability of heterogeneous virtual environments in the metaverse [50,51]. Another investigated component is the results of simultaneously applying user interaction techniques to virtual and physical environments [52]. Other research has focused on evaluating the performance of users' avatars, which increasingly become a critical element in the development of commercial offers by involving analysis of the user's projected behavior, i.e., the person's consumption preferences will not necessarily coincide with those of their avatar [53]. An important experience in the literature is the virtual services that have been rising due to the present pandemic such as virtual museum visits [54] and virtual tourism [55]. Moreover, it was reported that religious activities impact the metaverse [56]. Education is one of the global activities with more changes in the development of applicability of metaverse-based platforms, incorporating a vast range of devices, utilities, and systems to generate a better and more significant student experience [57,58]. Other relevant research on the metaverse was its contribution to the creation of smart cities [59] based on logging [60,61], augmented reality [62,63], and extended reality [64,65].

2.1. Scientific Theory

Theory of Social Cognitive

Social Learning Theory was proposed in the 1960s [66], and, in 1986, it evolved into Social Cognitive Theory (SCT) [67]. SCT states that learning in people occurs in a social context as a reciprocal and dynamic interaction of the person, behavior, and environment [67]. Furthermore, it considers a person's past experiences contributing to behavioral action. The theory aims to explain how people regulate their behavior through control and reinforcement to achieve a specific behavior that is intended to achieve a goal and can be maintained over time [67]. Self-efficacy is transcendental in the present research. Self-efficacy refers to a person's confidence level in their ability to successfully perform a specific behavior [67]. Self-efficacy is unique to social cognitive theory and has been added to other theories in later years. In one model, self-efficacy is influenced by a person's specific abilities, other individual factors, and environmental factors [68,69]. We utilized the social cognitive theory, which proposes that the behaviors within the individual's control can augment self-efficacy, and self-efficacy is a predictor of the intention of a specific behavior.

3. Approach

3.1. Hypotheses

3.1.1. Intention of Participation in the Facebook Metaverse

This variable allows us to know what people want in the virtual world, where they feel there is virtual potential, the interest to have greater participation in the Internet, and the willingness to integrate the physical world with the virtual world. Even though everything promised by the Facebook Metaverse is in a preliminary phase, the primary offer is the integration of people using devices to have a unified real-virtual life. Previous studies show technological literacy as a predictor of intention to participate in social media [70], self-efficacy as a predictor of intention to participate in the use of computers [71], social media [72], and Facebook [73] based in social cognitive theory. The contribution of this study is to integrate this evidence to generate a model that links the institutional support that a person has for the place where they work or study, the literacy they have regarding technology, the ability they feel to be able to have efficient online participation, and finally the intention to participate in the Facebook Metaverse. The aim is, therefore, to determine whether the variables presented below have a positive and significant effect on self-efficacy and whether they also have a positive and significant effect on the intention to participate in the Facebook Metaverse.

3.1.2. Institutional Support

Institutional support is the support that the universities and firms supply in terms of access and training in technology for their users [40,74]. Schools and jobs play a fundamental role in people's lives as they spend many hours of the day there. Thus, people depend on what they are programmed to be taught in terms of technology; while students may have some computer courses within the curriculum, they may have no other learning inputs [75]. Likewise, workers may have minimal exposure to technology, or it may only be based on sending and receiving emails, leaving aside the maximization of the use of digital tools.

Hypothesis 1. *Institutional support has a positive and significant effect on the self-efficacy of participating in the metaverse.*

3.1.3. Technological Literacy

This variable includes the capability of a person to carry out their daily use of computers in a successful way [76]. Technological literacy can be modified by an external effect such as school training in students and workers' jobs.

Hypothesis 2. *Technological literacy has a positive and significant effect on self-efficacy in participating in the metaverse.*

3.1.4. Self-Efficacy of Participating in the Metaverse

Self-efficacy is the belief that a person has about their ability to do any activity successfully and incorporate concrete behaviors into their usual routine [77]. Self-efficacy can also be defined in the previous step as the intention of adopting a specific behavior [77].

Hypothesis 3. *Self-efficacy in participating has a positive and significant effect on the intention to participate in the Facebook Metaverse.*

Self-efficacy is expected to mediate between institutional support, technological literacy, and intention to participate in the Facebook Metaverse.

Hypothesis 4. *Self-efficacy has a significant mediating role between institutional support and intention to participate in the Facebook Metaverse.*

Hypothesis 5. *Self-efficacy has a significant mediating role between technological literacy and intention to participate in the Facebook Metaverse.*

3.2. Research Model

The research model considers institutional support, technological literacy, self-efficacy in participating in the metaverse, and intention to participate in the Facebook Metaverse. The research model details the relationship between the variables (Figure 1).

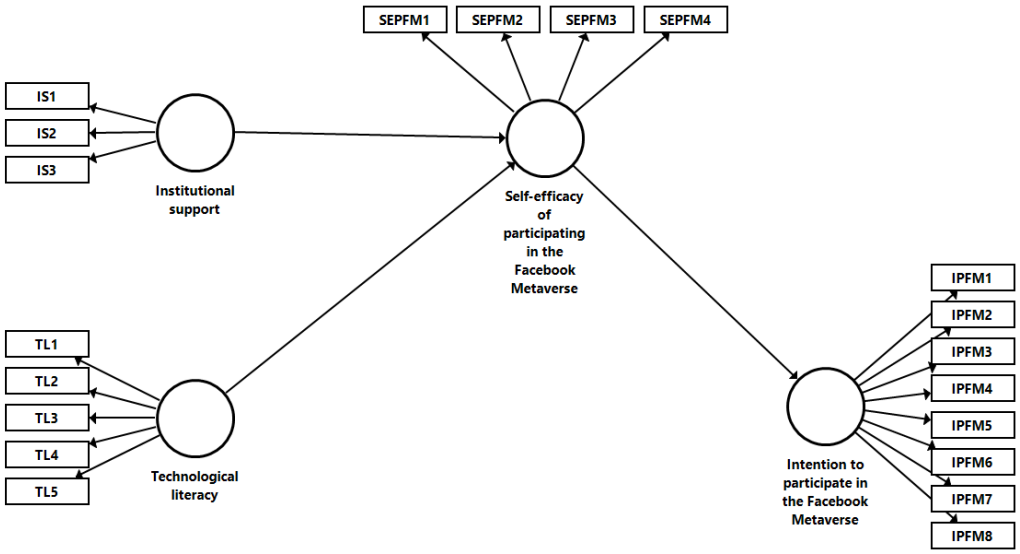

Figure 1. Research model.

4. Methodology

4.1. Research Design and Sample

This study aims to describe the effect and significance of factors explaining the intention to participate in the Facebook Metaverse. The methodology includes an observational study with both a descriptive and inferential design. Data on citizens from Peru were collected through non-probabilistic sampling (snowball sampling).

4.2. Instrument

The questionnaire validated by experts included questions to evaluate the effect of institutional support and technological literacy mediated by self-efficacy of participating on the intention to participate in the Facebook Metaverse. The three items of institutional support items were adapted from Alvarez-Risco et al. [78]; technological literacy included five items adapted from Cruz-Torres et al. [79]. The four items for self-efficacy of participating in the metaverse were adopted from previous studies [78]. Finally, the authors developed eight items for intention to participate in the Facebook Metaverse. All the items are assessed through a five-point Likert-type scale.

4.3. Sample

The data were collected from 410 participants, 254 women (61.95%) and 156 men (38.05%) over 18 years of age between 15 November to 15 December 2021, through an online survey shared by emails and WhatsApp. The questionnaires from citizens who agreed to participate in the study were considered valid.

4.4. Data Analysis

The data obtained were analyzed by the statistical program SmartPLS version 3.3.3. The reason for using PLS-SEM is that the model and theory associated are still under development, and exploratory analysis is needed. Moreover, PLS-SEM shows the significance

of relationships between constructs to demonstrate how well the model performs. Thus, PLS-SEM can handle independent variables simultaneously. Goodness-of-fit helps analyze the discrepancy between the observed values and those expected from the model in a customarily distributed case. In PLS-SEM, the reliability of the variables was evaluated by examining the loadings of each item considering reliable values higher than 0.50. The internal consistency was calculated using Cronbach's alpha and compositive reliability [80]. The average extracted variance allowed for evaluating the fit of the model. A good fit corresponds to values higher than 50%, and discriminant validity was analyzed using the Fornell–Larcker criterion [80,81].

5. Results

5.1. Reliability of Scales

The reliability of scales was calculated by analysis of internal consistency. As shown in Table 1, the variables' scales showed reliability coefficients (Cronbach's Alpha) higher than 0.7. According to the values reached in the sub-scales, it is possible to confirm the composite reliability of the questionnaire. All loading of items exceeds 0.5, which is considered the minimum required for exploratory analysis.

Table 1. Construct validity using PLS-SEM.

Scale Item	Factorial Weight	Composite Reliability	Average Extracted Variance
Institutional support			
My university/work offers training to improve Internet navigation	0.885	0.911	0.774
My university/work program activities are based on educational/labor apps	0.884		
My university/work has been promoting virtual training since before the pandemic	0.870		
Technological literacy (I consider myself an intermediate-advanced user . . .)			
. . . of Microsoft Office (at least Word and Excel *)	0.848	0.945	0.776
. . . of the Microsoft Windows environment (a PC regardless of brand, not a Mac *)	0.893		
. . . of social networks (at least Facebook and Instagram *)	0.884		
. . . in email management (at least sending and reading email *)	0.900		
. . . of video games (online or multiplayer games regardless of genre and console *)	0.878		
Self-efficacy of participating in the Facebook Metaverse			
Participating in the metaverse advertised by Facebook is a task I can perform	0.860	0.918	0.738
I have the necessary technological skills to participate in the metaverse advertised by Facebook	0.863		
I have sufficient technological skills to participate in the metaverse advertised by Facebook	0.841		
I will be able to combine my daily activities with my participation in the Facebook Metaverse	0.872		
Intention to participate in the Facebook Metaverse			
I plan to participate actively in the metaverse announced by Facebook	0.799	0.948	0.697
I will actively shop in the metaverse advertised by Facebook	0.812		
I am interested in participating in job interviews in the metaverse advertised by Facebook	0.829		
I am interested in taking training courses in the metaverse advertised by Facebook	0.785		
I am interested in getting a new romantic partner in the metaverse advertised by Facebook	0.849		
I will recommend my friends to participate actively in the metaverse advertised by Facebook	0.853		
I will recommend my partner to participate actively in the metaverse advertised by Facebook	0.876		
I will recommend my relatives to participate actively in the metaverse advertised by Facebook	0.870		

* These items are presented for scientific communication purposes for the journal. This version was not presented to the participants of the study.

5.1.1. Convergent Validity and Discriminant Validity Using SEM-PLS

Convergent validity was evaluated through the average variance extracted (AVE), which was higher than 0.5, the minimum recommended, showing that the construct explains more than 50% of the variance of each item. Finally, discriminant validity was analyzed through the Fornell–Larcker criterion [80]. It corroborated that the variance extracted square root was more significant than the correlations presented by one subscale compared to the rest. Moreover, the shared variance of all model constructs was not more significant than their respective AVEs, demonstrating discriminant validity. Table 2 shows compliance with this criterion in all subscales (diagonals between parentheses), demonstrating the discriminant validity of the instrument analyzed.

Table 2. Discriminant validity.

Scale	IS	IPFM	SEPFM	TL
IS	(0.924)			
IPFM	0.670	(0.835)		
SEPFM	0.749	0.808	(0.859)	
TL	0.880	0.621	0.582	(0.881)

IS: Institutional support; TL: Technological literacy. SEPFM: Self-efficacy of participating in the Facebook Metaverse; IPFM: Intention to participate in Facebook Metaverse.

Table 3 shows the R Square and R Square Adjusted to judge the model's goodness-of-fit.

Table 3. R Square and R Square Adjusted.

Scale	R Square	R Square Adjusted
Intention to participate in the Facebook Metaverse	0.654	0.653
Self-efficacy of participating in the Facebook Metaverse	0.561	0.559

5.1.2. Structural Model Assessment

According to Streukens and Leroi-Werelds [81], the bootstrapping technique is a non-parametric procedure to verify if the path coefficients are significant. For the statistical significance of relations, it applied the bootstrapping method at 5000 resamples since all p-values < 0.05; hypotheses from 1 to 3 are supported. Moreover, the effect size (f 2) was added to understand the direct impact of a variable (Table 4). The variance inflation factor (VIF) by item was between 1.969 and 4.086, focusing on formative assessment and confirming the absence of multicollinearity.

Table 4. Convergent validity and discriminant validity.

H	Hypothesis	Beta	SD	T-Value	p-Value	Supported
H1	IS → SEPFM	0.573	0.052	11.090	0.000	Yes
H2	TL → SEPFM	0.257	0.057	36.415	0.000	Yes
H3	SEPFM → IPFM	0.808	0.022	4.541	0.000	Yes

IS: Institutional support; TL: Technological literacy; SEPFM: Self-efficacy of participating in the metaverse; IPFM: Intention to participate in Facebook Metaverse; SD: Standard deviation.

Table 5 shows the specific indirect effects evidenced in the overall model. Self-efficacy in participating in the metaverse is a mediator between Technology literacy and Intention to participate in the Facebook Metaverse. Moreover, Self-efficacy of participating in the metaverse function was a mediator between Institutional support and Intention to participate in the Facebook Metaverse, demonstrating that increased Self-efficacy of participating in the metaverse due to high institutional support and Technological literacy increases Intention to participate in Facebook Metaverse

Table 5. Specific indirect effects.

Scale	Original Sample	Sample Mean	SD	*T*-Value	*p*-Value
H4: TL → SEPMF → IPFM	0.208	0.207	0.045	4.610	0.000
H5: IS → SEPMF → IPFM	0.463	0.464	0.050	9.228	0.000

IS: Institutional support; TL: Technological literacy; SEPMF: Self-efficacy of participating in the metaverse; IPMF: Intention to participate in Facebook Metaverse; SD: Standard deviation.

The results confirmed that institutional support, technological literacy through self-efficacy of participating in the metaverse predicted intention to participate in the Facebook Metaverse (Figure 2).

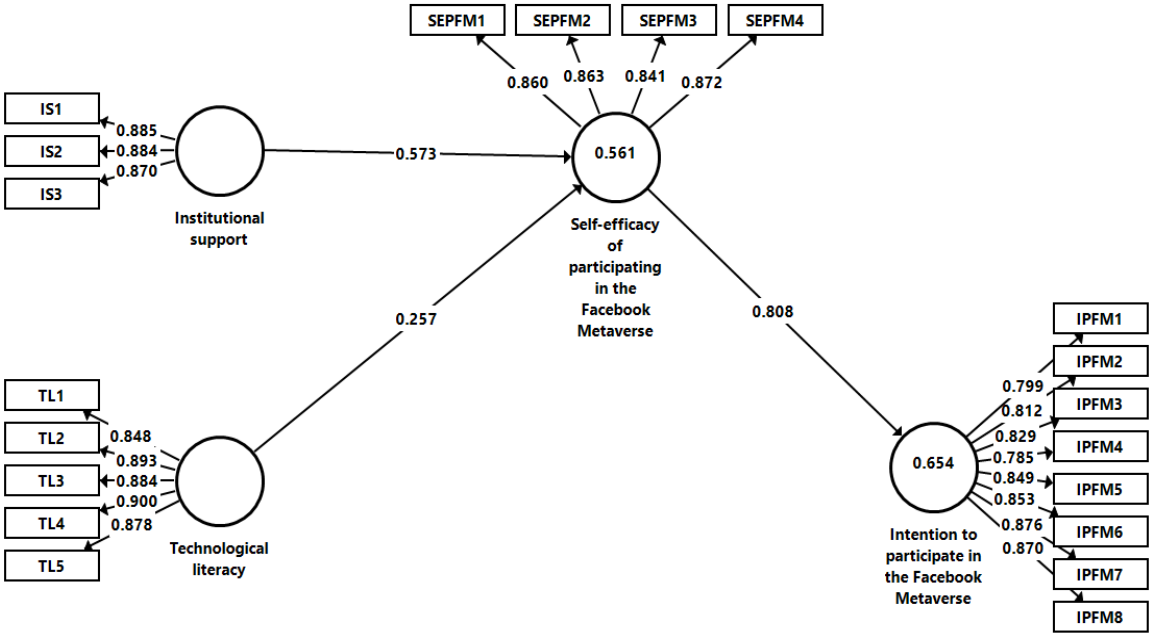

Figure 2. Research model evaluated.

5.1.3. Test of Hypothesis

According to the analysis, institutional support has a significant and positive effect of 0.573 on self-efficacy of participating in the metaverse. Hypothesis 1 was confirmed. Technological literacy has a significant and positive effect of 0.257 on self-efficacy of participating in the metaverse. Hypothesis 2 was confirmed.

Self-efficacy in participating in the metaverse has a significant and positive effect of 0.808 on intention to participate in the Facebook Metaverse. Hypothesis 3 was confirmed. In an analysis of specific indirect effects, self-efficacy showed a significant mediating role between institutional support and intention to participate in the Facebook Metaverse (*p*-value: 0.000). Hypothesis 4 was confirmed. Self-efficacy showed a significant mediating role between technological literacy and intention to participate in the Facebook Metaverse (*p*-value: 0.000). Hypothesis 5 was confirmed. The institutional support and technological literacy explained 56.1% of the self-efficacy of participating in the metaverse. The variables in the model explained 65.4% of the intention to participate in the Facebook Metaverse.

6. Discussion

The current study evaluated the model and the relationship between institutional support, technological literacy, self-efficacy in participating in the metaverse, and intention to participate in the Facebook Metaverse in citizens in Peru. The results showed that the questionnaire was valid, reliable, and statistically relevant in applying to the sample and that the model explained the variables that describe the intention to participate in the Facebook Metaverse.

Our study shows that institutional support has a significant and positive effect on self-efficacy. Previous research reports that institutional support has an effect on self-efficacy in the entrepreneurial environment [82–84], computer and information industry [85,86], creativity and social areas [87,88], education and academic research [89,90]. Several universities reported to have institutional support for technological knowledge and skills as reported in Malaysia [91], Jordan [92], Australia [93], India [94], and Russia [95].

It is relevant to mention that STEM (Science, Technology, Engineering, and Mathematics) careers are the only ones that should have strong computational support since the contents of the careers are associated with digital interaction. However, students in non-STEM careers have been reported that could be deprived of institutional support for their best technological performance [96]. These gaps in training from universities and companies generate disparity in training and, therefore, disparate results in academic and work teams' performance. Specifically, some examples of technology training centers at universities include Stanford University with its Technology Training [97], where technology training is offered on encryption, data storage, backups, Oracle Business Intelligence Enterprise Edition, OpenText, SALLIE, VPN, Confluence, Drupal, JIRA, Qualtrics, Cloud gateway, and other tools. Other examples include the University of Alberta [98] and the University of Edinburgh [99]. It is important to note that regardless of what an educational institution might offer as part of its curricula, a student can access additional training at a different institution or self-train in technological competencies at their own pace if necessary.

We observed in our study that self-efficacy increases as technological literacy increases. It was reported in different fields that literacy is vital to have an effect on decision-making because it impacts self-efficacy, behavioral intention, and behavior. For instance, Triana et al. [100] showed that technological literacy is a barrier to telehealth, which would become an essential service in the metaverse. The effect of technological literacy on self-efficacy for usage objectives of social networks was identified to be crucial for fluent communication between teachers and students [101], especially considering that students are increasingly connected to digital devices and have an overwhelming preference to communicate by these means leaving aside more traditional means such as email or phone calls [101]. Similarly, the benefits of improving technological literacy were reported in students [102] and firms [103].

Finally, following social cognitive theory, it was possible to demonstrate the effect of self-efficacy on the intention to participate in the Facebook Metaverse. Self-efficacy is a strong predictor of technological and behavioral intention in South Korea [104], Australia [105], Malaysia [106], the United States [107], China [108], Taiwan [109], and the United Arab Emirates [110]. The research outcomes may help firms to develop planning and investment in the metaverse, as well as understand the factors that have an effect on a higher intention to participate in the Facebook Metaverse.

The main contribution of the current study was to report some factors that explain the intention to participate in the Facebook Metaverse. This study is among the first worldwide to evaluate the metaverse with a multivariate technique (PLS-SEM) to measure the effect of the factors that explain people's intention to participate in the Facebook Metaverse. Knowing the effects of variables makes it easier for companies and educational centers to plan how to incorporate students and workers into this new ecosystem. The replication of this study in other countries and continents give a clearer picture of what the world's population is expecting from this disruptive technological offer from Facebook. Currently,

several companies are already making business agreements and strategic alliances to make this integration of the real and virtual world a reality in the short term, with all the economic benefits involved and with the change in the social dynamics of people that the metaverse implies.

Limitations

Our data were collected in Peru, a country with limited access to the internet, and it remains unclear whether the access to the Facebook Metaverse is widely implemented or available compared to other countries that might have more access to social media or the internet. However, knowing the intention to use this virtual universe can help companies to work on improving connectivity and download speed in that country, which results in more customers, more downloads, and longer connection times.

We surveyed Peru citizens older than 18 years, but the intention to use the metaverse might be higher in teenagers who are more willing to use emerging technologies. It remains to be determined what the Facebook Metaverse offers on its first version and how ready to use the various functionalities and user devices to understand the user experience, either positive or negative. In the future, it is recommended to re-assess the intention to use once the Facebook Metaverse is fully launched. Further research is warranted in different countries, age groups, and the specific preferences on the Facebook Metaverse functionalities.

7. Conclusions

The COVID-19 pandemic accelerated the acceptance of virtuality in all age groups, and Facebook's proposal of the Facebook Metaverse comes as a timely offer. We observed that institutional support, technological literacy, and participation self-efficacy have a positive and significant effect on the intention to participate in the metaverse. Special attention needs to be provided by schools and firms to develop planning and investment in the metaverse, as well as understanding the factors that have an effect on a higher intention to participate in the Facebook Metaverse.

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Conflicts of Interest: The authors declare no conflict of interest.

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