Metaverse in Operations Management: Predicting Managers' Intention to Use Metaverse through Perceived Usefulness, Training Value and Ease of Use (A CASE STUDY IN UAE)

Parveen Kaur[1], Ibrahim Mohammed[1], Mansura Mazharul[1]

[1]United Arab Emirates

A R T I C L E   I N F O

A B S T R A C T

The usage of metaverse technology is expanding across a variety of industries, particularly in the digital age we live in today. The intention of users to utilize Metaverse in Business Management is predicted by a number of criteria. This study examines the aspects that may have an impact on operations management's intention to use the metaverse. Six important managers from Abu Dhabi, in the United Arab Emirates, U.A.E., participated in the study using the TAM model. 250 surveys were utilized to gather data, and the results showed that adoption of Metaverse technology in operations management is highly influenced by perceptions of its utility, training value, and ease of use.

1. INTRODUCTION

"Technology has made it abundantly evident that one aspect predominates over all others in determining how well a business uses robotics and artificial intelligence. Even though it's pricey, the value it offers eventually surpasses the high price. It is impossible to overestimate the advantages of using technology in the workplace. Modern businesses rely largely on it, and this has changed how companies innovate, grow, and run [1]. The importance of business technology can be summed up best by these important factors: Efficiency: Technology enables the automation of repetitive tasks, a reduction in human error, and an increase in overall operational efficiency [2]–[5]. "Technology can encourage innovation by allowing businesses to develop new products and services, enter unexplored markets, and try out innovative business plans.". According to [6]–[9], technology gives businesses a competitive advantage by improving their operations, producing better products and services, and enabling them to respond to market changes more quickly. Businesses can benefit greatly from the use of technology and operations management (SCM) implementation approaches"[10]. Manufacturers and retailers may anticipate benefits such as cost optimization, greater revenues, and a shorter time to value. With the use of technology, assessing information, gaining comprehension, and making decisions that affect operations both now and later on are made simpler [11]–[14]. Additionally, operations technology elements promote decision-making that is speedier and more efficient. Additionally, it enables businesses to collect information and run real-time simulations based on a range of scenarios, enabling them to assess their options. Knowing the trade-offs associated with each kind of situation response will help you make better decisions.

According to [15]–[18], the Metaverse is a virtual environment that has the potential to revolutionize the procurement, operations management,

logistics, and marketing channels of the industry. Due to its ability to watch company activity, it has experienced exponential growth in the business industry [19]–[21].

Real-time and multisource data will replace historical data in operations management with the use of metaverse. Planning, problem-solving, visibility, and new collaborative opportunities will all benefit from the use of real-time and multisource data [22]–[25].

"The best course of action will be to use artificial intelligence to produce synthetic data that will aid in forecasting and manager training." Artificial intelligence will play a major role in transforming operations management. AI is going to be the most effective tool for tracking operations management motions [26].

"Metaverse will increase awareness of environmental issues and aid in reducing carbon emissions generated by operations management". Operations management is important because it may help achieve a number of business objectives. It is widely acknowledged that operations management is essential to the success of most firms and that it is fundamental to customer satisfaction.

"To increase their chances of success, top management should prioritize managing the operations, regardless of the size of the company". The ability of consumers to buy necessities at reduced prices thanks to modern supply chains enhances living standards. This is due to the fact that efficient operations lead to a more effective process for delivering items to market and, ultimately, consumers. Strategy formulation, sourcing for raw materials, manufacturing, distribution, and returns are the five most crucial aspects of operations management.

Therefore, the "Metaverse" is a global, interactive virtual environment where users can engage with one another. Managing the flow of virtual goods and services from producers to consumers is referred to as operations management in the metaverse. Because it enables companies and individuals to produce and market virtual goods and services, operations management is crucial in the metaverse. Among other things, these goods and services might be digital apparel, online real estate investing, and visual arts.

"Despite being around since the 1990s, there aren't many empirical studies on the acceptance of metaverse in operations management, according to current research. It wasn't until after COVID-19 that people started to learn more about it."

As far as the writers are aware, there isn't much proof that the met averse will alter operations management, and fewer research has explicitly looked at the connections between these concepts in this area [27]. Thus, the primary goal of this research is to influence the marketing sector and highlight the role that technology plays in operations for the purpose of training. Businesses can also use it to manipulate data and do real-time simulations based on a range of scenarios.

The Metaverse has the potential to yield numerous advantages for operations management. Specifically, it can enhance operations visibility through real-time monitoring of stock levels, dispatches, and other crucial performance data. Thus, it might provide a platform for real-time cooperation across operational stakeholders, irrespective of their location. Not to mention, the Metaverse can be used to simulate testing of products and packaging, doing away with the need for actual testing and saving money and time. Products might therefore develop and reach the market more swiftly.

2. LITERATURE REVIEW
2.1 SCOPE OF METAVERSE:

"Users can communicate with digital items and with each other in the metaverse, a shared virtual environment. It has the potential to fundamentally change how we work, play, and live, even if it is still in the early stages of development [26].

"The metaverse has the ability to completely transform the business sector by providing new opportunities for client involvement, sales, and marketing [28]. Businesses may create immersive experiences that let customers to interact with their products and services in fresh and interesting ways by leveraging the met aversion. Teams can cooperate and operate remotely from any area by utilizing the met averse [2]–[4].

Many companies are currently delving into the possibilities of the metaverse and making investments in the development of virtual experiences. We can expect to witness an increase in the number of companies using the metaverse to interact with customers and promote growth as technology develops and becomes more accessible. Numerous business applications of the metaverse

include immersive product demos, virtual meetings and events, and interactive customer engagements. It can also be utilized to facilitate distant work and teamwork, allowing groups to meet and collaborate in a shared virtual setting. Furthermore, the met averse can offer new chances for marketing and advertising since companies can create engaging and interactive virtual experiences to promote their products and services.

2.2. Operations Management Training (Metaverse)
According to the Accenture 2022 Tech Vision study, nearly two thirds of operations management professionals think the metaverse will help their business. The meta universe, in their words, blends what customers want with what companies already have [28]. This makes demand entirely "comprehensible" by helping firms better understand what customers want. It could be possible to balance supply and demand by comprehending both viewpoints. As an example, we can take the met averse "collaboration room" that exists between a shop and its managers. [13]–[16] Workers may gather to discuss anticipated sales statistics, production schedules, and supplier restrictions that may have an impact on the process's final product. In addition, users could virtually visit crowded ports to scan for possible traffic-related delays in cargo and to model ways to maintain product flow to the appropriate shelves and shops, giving them precise visibility into inventory placement. The managers of operations management can receive almost indirect instruction from all of these [2]–[5].
Technology has revolutionized the field of operations management. Businesses use these technologies, like artificial intelligence (AI) and cryptocurrencies, to improve productivity and streamline processes [29]. For example, companies like Walmart and Nestle have implemented block chain technology to track their products from point of origin to retail location, increasing transparency and dependability [17]–[20]. In a similar vein, statistical analysis driven by AI is helping firms maximize profits through stock optimization and demand forecasting while reducing waste. By utilizing cutting-edge technology, businesses can maximize their operations and obtain a competitive advantage [21]–[23].
"[5]–[8] states that although metaverse has been present for a while, it wasn't commonly accepted

until more recently. The metaverse is being quickly embraced in the current wave of [9], [11], [12] the metaverse to life." Reportedly, companies operating in the parallel world raised more than $10 billion by 2021—more than twice as much as they had the year before [24], [25]. The creators of Fortnite, Epic Games, have successfully raised $3 billion in the last year to support their broad goals for the metaverse. They have also partnered with LEGO to build a metaverse, with the potential for kids to profit from it by starting trillion-dollar companies around the world."

2.3. Prediction and Theoretical Model (TAM Model)
Fred Davis has made a substantial contribution to the study of how people choose whether to accept and use new technology by developing the groundbreaking "Technology Acceptance Model (TAM)." The two guiding concepts of the strategy are perceived usefulness and ease of use, which are often regarded as crucial psychological elements that encourage the adoption of the technology. Depending on how successfully the study conducted, we will investigate effects [26]. (Davis, 1985), the former having a closer relationship than the latter. The following Do you mean hypotheses are plausible in light of this data:H1: Perceived utility (PU) predicts the deployment of Metaverse technology in operations (META).
H2: Perceived training value (PV) is a predictor of the operational adoption of Metaverse technology (META).
H3: Perceived Ease of Use (PEOU) predicts the operational adoption of Metaverse technology (META).
"Perceived Usefulness" is a term that describes The term "perceived usefulness" describes how someone feels about the advantages they see in using a certain piece of technology. The term "perceived training value" describes how managers are taught to help clients understand the costs and benefits of services. Perceived training value is frequently used by users to determine maximal utility, presuming that benefits outweigh costs. Perceived training value is calculated using utility theory, which projects future usage. It is thought that the amount of training value on the metaverse would enhance the appearance of user-generated content and devotes. Future tech adoption plans are severely hampered. The term "Perceived Ease of Use" refers to a number benefits

of common usage, including accessibility, promptness, mobility, flexibility, and consistency. Finally, the feature of pervasiveness influences how people evaluate results, how much effort they are willing to put in, and how often they choose to adopt technological solutions.

Figure 1: Framework

Figure 1. Conceptual Outline:
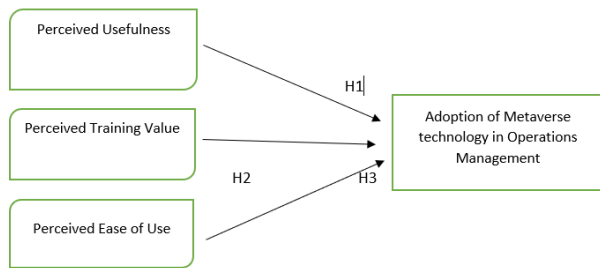
3. METHODOLOGY

Six key managers participated in this assessment research, which was conducted at operations management companies in Abu Dhabi. The research used an internet-based self-administered survey to collect information from managers of Organic food, raw materials, beverages, toys, and even meat in the United Arab Emirates (UAE), particularly within Abu Dhabi. It began on March 16 and ended on April 16, 2023, for a duration of one month. Furthermore, in order to present research within the context of an operations management research investigation, a number of researchers selected the group of participants as an entity for analysis. These individuals claimed to have sufficient knowledge of various organizational techniques in relation to operations management, as well as information on the perceived value and utility of what their specific companies had to offer in order to accept the use of metaverse in operations management."

4. DATA COLLECTION

Out of the 300 surveys that were assigned at random for this research, among them 50 were refused because the information provided on the questionnaires were uncommitted by the subscribers, the 250 surveys that were successfully completed *and useable were what made up the 83% response rate.* These 250 questioners. Because the sample size of 250 seems to be significantly larger

compared to what is needed in the following case, modeling of Multiple response may be used. To prove the hypotheses, the model is employed, it is important to keep in mind that all of the hypotheses are based on ideas already in existence, yet they are frequently set up in accordance with the operations management structure to facilitate supplier's acceptance of the metaverse (Khadija, 2021). An evaluation instrument was developed to evaluate the idea. and it was included in the research, 20 items make up the survey, which measures the four components listed on the form. The questions from the earlier studies were changed and altered before being included to the survey in order to maximize the research's usefulness. Table 1 presents the demography of the respondents. Table 2 presents the reliability statistics. Table 3 reflects the Extraction Method related to Principal Component Analysis [6]–[9].

Table 1. Demography statistics

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	106	45.7	50.7	50.7
	Female	103	44.4	49.3	100.0
	Total	209	90.1	100.0	
Missing	System	23	9.9		
Total		232	100.0		

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	63	27.2	30.1	30.1
	31-40	62	26.7	29.7	59.8
	41-50	61	26.3	29.2	89.0
	51-60	23	9.9	11.0	100.0
	Total	209	90.1	100.0	
Missing	System	23	9.9		
Total		232	100.0		

Marital Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	83	35.8	39.7	39.7
	Married	84	36.2	40.2	79.9
	Widowed	42	18.1	20.1	100.0
	Total	209	90.1	100.0	
Missing	System	23	9.9		
Total		232	100.0		

Education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under Grad	37	15.9	17.7	17.7
	Post Grad	87	37.5	41.6	59.3
	3.00	19	8.2	9.1	68.4
	4.00	48	20.7	23.0	91.4
	5.00	18	7.8	8.6	100.0
	Total	209	90.1	100.0	
Missing	System	23	9.9		
Total		232	100.0		

Table 2. Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.801	5

Reliability Statistics	
Cronbach's Alpha	N of Items
.776	5

Reliability Statistics	
Cronbach's Alpha[a]	N of Items
.641	5

Communalities	
	Extraction
Using Metaverse in my Job	.649
Using Metavarese improves my Performance	.671
Using Metavarese increases my productivity	.549
Using Metaverese Makes my job easier	.890
Metaveresels useful to my job	.799
How does the Metaverese compare to supplier service channels eg(email, phone support) in the terms of speed responds	.567
How easy was it to use the Metaverese	.868

Extraction Method: Principal Component Analysis.

5. FINDINGS AND DISCUSSION

It is found that perceived value, usefulness, and ease of use have a significant influence on the metaverse system's acceptance model. Because the utility, perceived training value, and perceived usability of technology have all been investigated in the context of the metaverse system, this research is unique. Using innovativeness as a supplier, among other interactions, increases the potential for a deeper understanding of the unique characteristics of the metaverse system."

The findings show that usability, training value, and simplicity of use are significantly impacted by the new features of the metaverse system, which may significantly improve operations management. According to [11]–[13] research, managers' perceptions of the virtual environment were positively influenced by these three criteria, which is consistent with the current findings. Users can employ artificially manufactured settings to build a world that is similar to the real world in virtual environments since they are easily accessible fundamental components. The results show that there is a significant relationship between the three variable features and the adoption and acceptance of metaverse technologies in operations management. Researchers' curiosity about novel possibilities connected to managers could influence people's acceptance of metaverse technology. The cost-benefit and compromise analyses in the current research have confirmed the influence of perceived training value on the analysis, suggesting that the adoption of metaverse in operations may be critical in certain contexts where it has a substantial impact on business performance [14]–[16]. Perceived training value is thought to favor the relationship between supplier adoption and acceptance, which is consistent with operations management research, and the current findings are in line with this research states that cost benefits and maximal utility have a substantial impact on perceived training value, which in turn influences the adoption of technology. Despite the fact that all of the previous theories have been validated and proven, the idea of seeming ubiquity was rejected. Since it would be more convenient in terms of both time and space, the current conclusion contradicts previous research that claimed the absence of time and space limits may enhance the adoption of technology. Research indicates that customer

views and trust in technology increase the factor of ubiquity. Furthermore, ubiquity offers advantages beyond temporal and spatial constraints, which have a substantial impact on earlier economic studies. According to study, managers' and general marketers' perceptions of performance, expectations for their efforts, and propensity to use technology are all impacted by their access to new services.

6. IMPLICATIONS OF THE RESEARCH
6.1 Theory-Based and Practical Considerations
The results indicate that the suggested contracts in the conceptual model make it easier to employ the metaverse in operations management. Among all of these structures, it has been discovered that the innovativeness factor greatly affects whether the recommended technology is accepted. The outcomes of this could be related to a number of factors. Did any of them influence corporate organizations in a way that would encourage them to adopt this innovation by creating norms? Managers may be more concerned with positive marketing outcomes and rewards when using the metaverse system since it can provide a range of tools not found in traditional company, preventing a dull and less intuitive business environment. Therefore, managers' supply techniques may be more influenced by the normative effect. The utilization of the metaverse system by customers could lead to quicker and more pleasurable marketing activities.

6.2 Implications for Management
"The current study's results have significant practical implications because they provide business administrators with essential guidance on how to support marketers' adoption and utilization of the metaverse platform". perceptions of both complexity and enjoyment. The desire of managers to employ cutting-edge technology and receive additional training in its application is influenced by two important criteria. According to the latest study, there is potential to use the new system in the future due to its indisputable usability and nice atmosphere. In a similar vein, experts can help marketers change their minds about the application of metaverse systems by highlighting the innovative aspects of this technology. Utility, which has a strong connection to business, is one of the essential characteristics, according to.

Providers can achieve their objectives in this area by assisting with an efficient supply plan.
"Business authorities should host seminars to inform managers about the benefits of implementing the metaverse system," suggests [17]–[19]. These seminars' main objective is to encourage a positive outlook on creating operations management systems and evaluating company activity evaluation criteria by offering rewards to participants who begin using them. It could be advised to gather information from customers who, after implementing metaverse in training values, have had success in their marketing endeavors in order to serve as an example for other suppliers.

7. LIMITATIONS AND RECOMMENDATIONS FOR ARTICLES IN THE FUTURE
The study is constrained to a theoretical framework and a set of variables that could be expanded upon in further investigations [20]–[22]. The data collection includes a set of managers chosen from the United Arab Emirates. Consequently, data from a literature review may be used to build a comparison study. Because the study only looked at one e-commerce system, its conclusions cannot be applied to other marketing platforms. Using the current model, future research will assess the efficacy of different systems. Future studies may therefore take into account other important managers' criteria based on the technology under investigation. Among the various moderating factors that are accessible, innovativeness can be used as a significant moderating factor in subsequent research as a moderating element in the model.

8. CONCLUSION
Artificial intelligence and robots have made technology the only element influencing an organization's performance. It is expensive, but in the end, the value it provides outweighs the high price. The use of technology in business has several benefits. In the shared virtual environment known as the met averse, users can communicate with virtual objects and with one other. Numerous business applications exist for it, such as virtual meetings and events, engaging client interactions, and realistic product demonstrations.
"The metaverse offers new avenues for customer interaction, sales, and marketing. Businesses in the

parallel universe are expected to have raised over $10 billion by 2021—more than twice as much as they did the year before. Over the course of the last 12 months, Epic Games, the business behind Fortnite, successfully raised $3 billion to fund their expansive metaverse goal. Six significant UAE managers participated in this evaluation study, which was conducted at operations management companies in Abu Dhabi. Due to the unreliability of the respondents' responses, 50 out of the 300 surveys that were randomly assigned for this study were discarded. The findings demonstrated that perceptions of training value have a major influence on operations managers' intentions to use metaverse technology. The most recent results contradict previous research that predicted the removal of time and space constraints would lead to a greater use of technology. This study advances the application of the training idea in operations management by utilizing the TAM model and metaverse technology. The Perceived training value is added to the model by the study. For managers in the UAE, this study is being done. The same research may provide different findings if it is conducted in various nations. In summary, it is evident that the adoption of Metaverse technology in operations management in the United Arab Emirates is significantly influenced by perceptions of its usefulness, training value, and ease of use.

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