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Metaverse: A new challenge for cost accounting

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Abstract: The connection between cost accounting and the Metaverse has not empirical tested yet. Consequently, the current empirical study predicts the challenges facing adopting cost accounting information under the Metaverse world. To reach this goal out, an online-questionnaire is developed to gather the data. The researcher has received more than sixty online responses, 63. A structural equation modelling (using Smart PLS 4.0) is implemented to interpret the results. The study, however, had unveiled that data security, quality of cost accounting information, and the trust in the cost accounting information cannot be considered real challenges for user of the Metaverse world. The study also has asserted that the job relevance is a main challenge for the adopters of the Metaverse. Indeed, there is no sufficient empirical evidence to deem the Metaverse a new challenge for cost accounting, especially in Iraq.

العالم الافتراضي: تحدي جديد لمحاسبة التكاليف

سالم خليل خالد

كلية الإدارة والاقتصاد/جامعة الموصل

المستخلص

ان العلاقة بين العالم الافتراضي ومحاسبة التكاليف لم تختبر عمليا لحد الان. وبناءً على ذلك فان الدراسة الحالية تحاول استكشاف التحديات التي تواجه محاسبة التكاليف في ظل العالم الافتراضي (Metaverse). ولتحقيق هذا الهدف، تم تطوير استبيان عبر الإنترنت لجمع البيانات. وقد تلقى الباحث أكثر من 60 اجابة عبر الإنترنت. وقد تم استخدام برامج احصائية حديثة (Smart PLS 4.0) لتفسير النتائج. وقد بينت النتائج التي توصلت اليها الدراسة أن أمن البيانات وجودة معلومات محاسبة التكاليف والثقة في معلومات محاسبة التكاليف لا يمكن اعتبارها تحديات حقيقية لمستخدمي العالم الافتراضي (Metaverse).

الكلمات المفتاحية: العالم الافتراضي، محاسبة التكاليف، أمن البيانات، الثقة، الصلة بالوظيفة.

1. Introduction

The Metaverse imitates face-to-face business activities (Qasim, El Refae, & Eletter, 2023). While the metaverse is a new development (Zhao et al., 2023), it has quickly changed the environment which creates opportunities and challenges for all stakeholders (AL-Hawamleh, Altarawneh, Hikal, & Elfedawy, 2024). And the world is still attempting to adapt with the products produced by the third industrial revolution (AL-GNBRI, 2022). Particularly, by 2030, the global revenue from virtual activities in the metaverses will surge from \$0.39 trillion to \$6.79 trillion (Zadorozhnyi, Muravskyi, Humenna-Derij, & Zarudna, 2022).

During the last 50 years, the accountants are concerned about using the new technologies which will create challenges for their works (Kruskopf et al., 2020). So far, the literature has not clearly stated the perception of the accounting community toward adopting the Metaverse (Burlea-Schiopoiu, Popovici, & Panait, 2023). Some academics, for instance, believe that the Metaverse considers a challenge for today's accountants (Burlea-Schiopoiu et al., 2023). "Accounting for virtual assets in the metaverse is a difficult and time-consuming operation (AL-Hawamleh et al., 2024: 189). The future of accounting, including cost accounting, under the metaverse is still unclear and questionable (AL-GNBRI, 2022). More clearly, "accounting in the

metaverse becomes increasingly complicated because, in some cases, it is difficult to determine income distribution in transactions where the parties involved are not clearly stated or when the transaction involves intermediaries. In the metaverse, it is not easy to account for income, even if there are standards for some activities" (Burlea-Schiopoiu et al., 2023: 5).

This paper is set as follows. Section 2 discusses the Metaverse and its challenges for cost accounting. The next section dedicates for the development of research hypotheses. The fourth section presents the research methodology. Section 5 presents the main findings. The final section is dedicated for the conclusion.

- 2. The Metaverse and its challenges for cost accounting:** The metaverse is not a brand-new business world which is called the digital economy (AL-Hawamleh et al., 2024). It is a virtual information environment which includes all objects such as manufacturers, suppliers, buyers, etc. (Zadorozhnyi et al., 2022). The metaverse is the beyond reality which combines physical reality and digital virtuality (Massaro, Spanò, & Kuruppu, 2023). The metaverse is originated from the Greek prefix "meta" which refers to (beyond), and the word "universe" (Massaro et al., 2023). Metaverse is considered one of the most important facets which are likely to transform organizations into virtual businesses (Taha, Eldalash, & Mohamed, 2023). Several businesses now have digital assets in the metaverse world (Handoko, Thomas, & Indriati, 2023). Some famous accounting firms started making their own offices inside the Metaverse (Hatane, Sondak, Tarigan, Kwistianus, & Sany, 2023). However, this makes new challenges for accounting (Handoko et al., 2023). Such transformation has an effect on cost, revenue, future performance evaluation and decision-making (Taha et al., 2023). More clearly, accounting practices have been implicated by the Metaverse (Kadhim & Al Ani, 2023). For the accountants, the metaverse implies emerging new paradigms concerning the instruments of conventional accounting (Burlea-Schiopoiu et al., 2023). The Metaverse generates new digital assets or virtual assets (AL-GNBRÍ, 2022). "A digital or virtual asset is anything that is stored digitally and is uniquely identifiable that organisations can use to realize value" (Jackson & Luu, 2023, p. 303).

Some examples of these digital assets are shown in Figure 1. Digital assets are seen in tangible form and intangible form but they are quite different (Ruan, 2019). For instance, an organization's reputation is an intangible assets but not a digital one, while an organization's online reviews are deemed digital ones (Ruan, 2019). However, values of these assets are largely fluctuated in a short time (Ruan, 2019).

The lack of rules imposes it to some fears, like price volatility, fraud, and hacking (AL-Hawamleh et al., 2024). Then, accountants should adopt creative means to handle their valuation as in the metaverse (AL-Hawamleh et al., 2024). To successfully address the problems related with virtual assets in the Metaverse, new regulations and laws are necessary (AL-Hawamleh et al., 2024). In the Metaverse world, people are able to purchase and sell different types of the virtual assets such cryptocurrencies (AL-Hawamleh et al., 2024). Under the Metaverse world, it is challenge to trace transactions, ownership and value under the because the accounting, including cost accounting, has not defined the virtual or digits assets (AL-Hawamleh et al., 2024).

A diversity of firms that have concerns about the integrity and transparency of the organizations' activities in the metaverse which should be considered (Zadorozhnyi et al., 2022). That is, verifying the financial statements' reliability is extremely tough to reach out in the metaverse (Zadorozhnyi et al., 2022). Costs of sales of tangible and intangible goods are totally different from those virtual products (Zadorozhnyi et al., 2022). Now cost accounting needs to appropriate record, report, and analyse of financial information pertaining to metaverse digital assets (AL-Hawamleh et al., 2024). Indeed, the challenges facing using cost accounting in the Metaverse world are many but some like trust, job relevance, data security, and quality of information may be applied (Afifa, Van, & Van, 2022). For example, job relevance refers “the degree to which an individual that the target system is applicable to his or her job” (Venkatesh & Davis, 2000: 91). The interesting question here is does the cost accounting suit for the Metaverse environment?

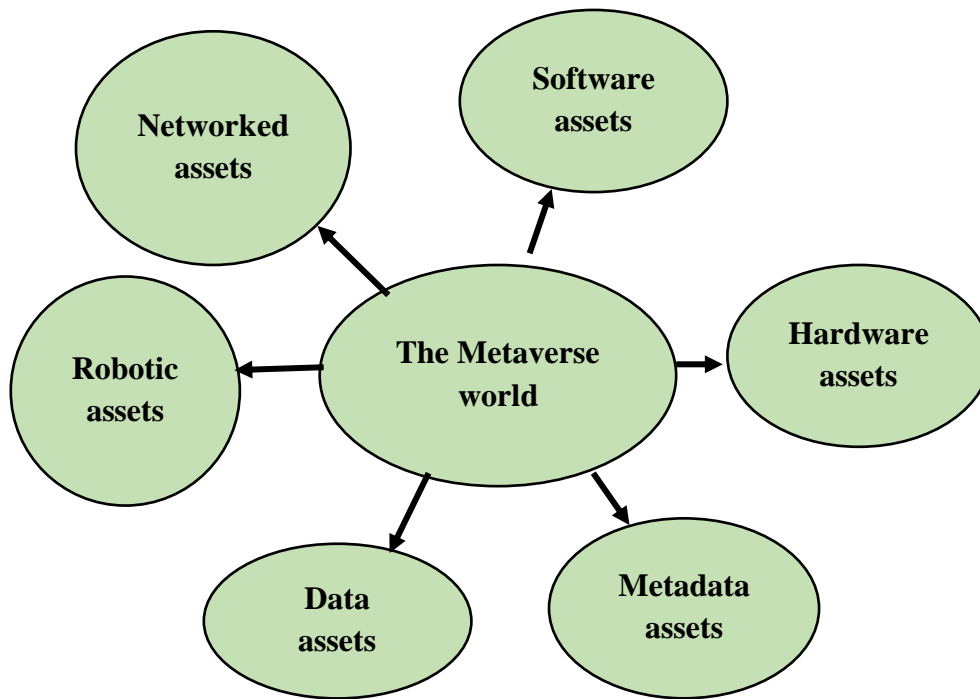


Figure (1): These assets based on the Metaverse, is developed based on (Ruan, 2019).

3. Hypotheses development: Based on the literature review, to determine the most important challenges facing using cost accounting by the users of the Metaverse, there are four hypotheses in this study:

Hypothesis 1: The data offered by cost accounting is not safe for the users of the Metaverse.

Hypothesis 2: Cost accounting has not been updated yet to be relevant for the Metaverse world.

Hypothesis 3: The quality of information offered by cost accounting is not satisfied the users of the Metaverse.

Hypothesis 4: Cost accounting provides untrusted information for the users of the Metaverse.

4. Research method: The data was collected by an online questionnaire. The questionnaire has two parts. The first one dedicated to collect the participants' demographic information. The second part designed to discover the challenges facing the application of cost accounting in the Metaverse. All constructs measured of the survey are included in Table 1. While the questionnaire developed in Arabic, the responses translated into English. We have received more than sixty online responses, 63. Then, a five-point Likert scale was deemed useful for the current the study.

Many scholars prefer using CB-SEM in quantitative research but PLS-SEM is much better than CB-SEM in some cases, particularly for the topics have not been investigated before (Henseler et al., 2016). The link between the Metaverse and cost accounting is a new topic. This makes PLS-SEM is appropriate for this research.

Table (1): Measurements of constructs

Construct	Items	Study(s)
Job relevance	JR1: The cost accounting cannot be massively adopted in the Metaverse world.	Afifa et al., 2022)
	JR2: The cost accounting usage is not relevant in the Metaverse world.	
	JR3: Cost accounting is not suitable for future accounting service	
	JR4: The future of the Metaverse is with cost accounting activities.	
Trust	T1: Under the Metaverse, cost accounting is not fully trustworthy	Afifa et al., 2022)
	T2: Cost accounting is not honest under the Metaverse world.	
	T3: For users of the Metaverse, cost accounting information is not transparent and visible	
	T4: For users of the Metaverse, cost accounting is unable to prevent opportunists from gaining profits	
Quality of information	QI1: For the Metaverse users, the cost accounting information is not timely updated.	Afifa et al., 2022)
	QI2: For the Metaverse users, the cost accounting information is not accurate.	
	QI3: For users of the Metaverse, the cost accounting information is not verifiable.	

Construct	Items	Study(s)
	QI4: For users of the Metaverse, the cost accounting information is not reliable.	
Data security	DS1: Cost accounting cannot maintain the confidentiality of its information under the Metaverse world.	Al Shbail et al., 2022
	DS2: Some unauthorized individuals that might access our data is our concern.	
	DS3: We have a concern about storing our data in the Metaverse world.	

Source: This table is set by the author.

5. Results

5-1. Demographic information: The researcher has got 63 responses. 85.8% of the participants, as stated in table 2, are males whereas only 14.2% are females. Also, people who are involved in this study between 21 and 30 years old are only 3.3% while 46% of them are from 31 and 40. The rest of them are either from 41 to 50 years or over than 50. Finally, the participants' experiences are outlined in table 2. The table illustrates that the majority of the participants, 41%, have over than 10 years.

Table (2): Demographic information

Category	Demographic measures	Percentage
Gender	Male	85.8%
	Female	14.2%
Age	From 21 to 30 years	3.3%
	From 31 to 40 years	46%
	From 41 to 50 years	44.4%
	Above 50 years	6.3%
Experience	Less than 10 years	41%
	From 11 to 15 years	22%
	Above 20 years	37%

Source: This table is set by the author

5-2. Measurement model: To check the validity of the model, some advanced statistical tools such factor loadings, Cronbach's alpha, composite

reliability, and average variance extracted are applied (Hair Jr, Hair Jr, Hult, Ringle, & Sarstedt, 2021). The outer loading is used to ensure the quality of the items (Hair Jr et al., 2021). According to (Bagozzi, Yi, & Phillips, 1991), items with lower than 0.4 outer loading should not be considered. Tables 3, 4, and 5 are included the results of the measurement model. The outer loadings results were adopted to confirm the quality of items used in this study. In addition, Cronbach's alpha and composite reliability used to define reliability of constructs. While Cronbach's alpha can underestimate the reliability (Peterson & Kim, 2013), composite reliability can overestimate the reliability (Hair Jr et al., 2021). Minimum scores of Cronbach's alpha and composite reliability, and average variance extracted are > 0.6 , > 0.7 , and more than 0.5 respectively (DeVellis, 2016; Teo, Tan, Ooi, Hew, & Yew, 2015). Indeed, the research model of this study has reached out the validity and reliability levels (Hair Jr et al., 2021).

Table (3): Convergent validity

Construct	Items	Factor loadings	Cronbach's alpha	Composite reliability	Average variance extracted
Cost accounting in the Metaverse World	CA1	0.890	0.846	0.858	0.907
	CA2	0.840			
	CA3	0.891			
Data security	DS1	0.815	0.854	0.864	0.901
	DS2	0.786			
	DS3	0.865			
	DS4	0.868			
Job relevance	JR1	0.803	0.823	0.831	0.882
	JR2	0.810			
	JR3	0.782			
	JR4	0.832			
Quality of information	QI1	0.793	0.805	0.925	0.876
	QI2	0.882			
	QI3	0.836			
Trust	T1	0.863	0.848	0.899	0.905
	T2	0.857			
	T3	0.897			

Source: This table is set by the author.

Table (4): Discriminant validity (based on Fornell-Larcker criterion)

	Cost accounting in the Metaverse World	Data security	Job relevance	Quality of information	Trust
Cost accounting in the Metaverse World	0.874				
Data security	0.546	0.834			
Job relevance	0.701	0.459	0.807		
Quality of information	0.588	0.506	0.602	0.838	
Trust	0.478	0.228	0.659	0.596	0.873

Source: This table is set by the author

Table (5): Discriminant validity (based on Heterotrait–monotrait ratio)

Construct	Cost accounting in the Metaverse World	Data security	Job relevance	Quality of information	Trust
Cost accounting in the Metaverse World					
Data security	0.627				
Job relevance	0.823	0.546			
Quality of information	0.636	0.621	0.728		
Trust	0.533	0.260	0.768	0.720	

Source: This table is set by the author

5.3 Structural model: Figure (2): and table 6 outlined the findings of structural model.

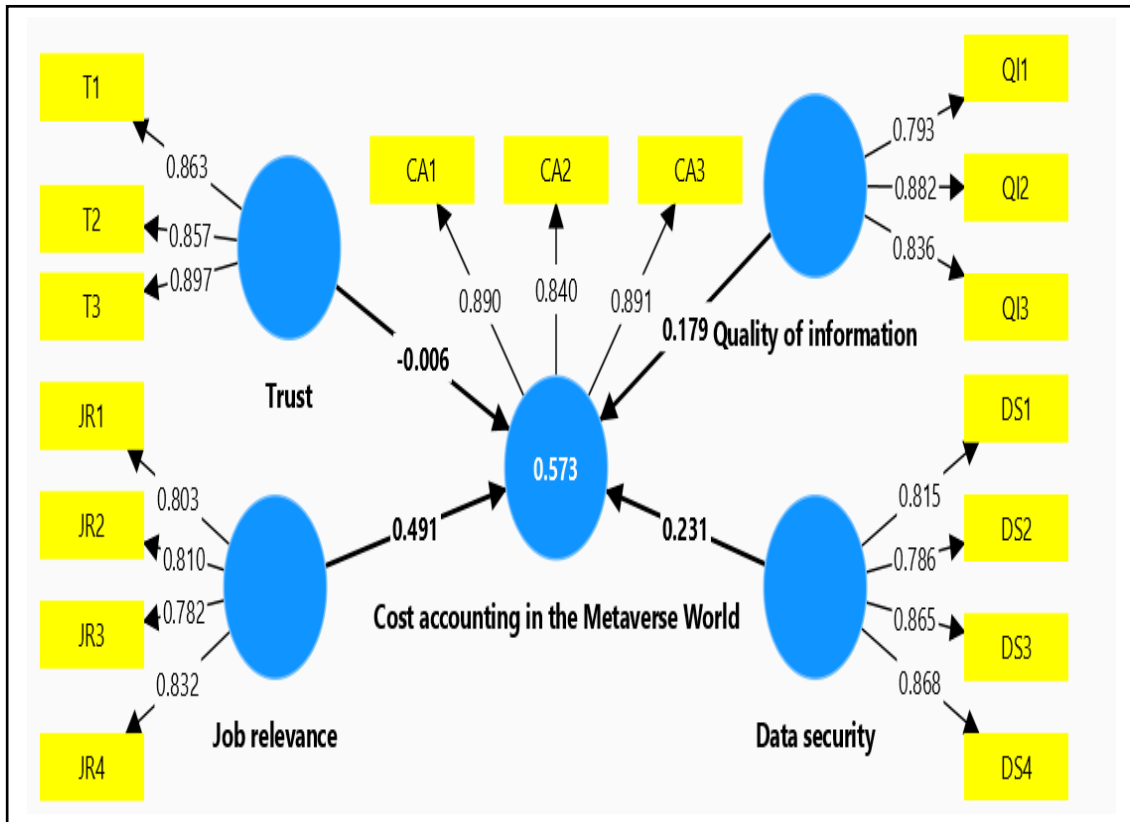


Figure (2): Structural model

Source: This Figure is set by the author

Table (6): Hypothesis testing

Structural path	Path coefficient	t-values	p-values	Conclusion
Data security -> Cost accounting in the Metaverse World	0.231	1.349	0.180	Not supported
Job relevance-> Cost accounting in the Metaverse World	0.491	3.839	0.000	Supported
Quality of information -> Cost accounting in the Metaverse World	0.179	1.168	0.243	Not supported
Trust -> Cost accounting in the Metaverse World	-0.006	0.034	0.973	Not supported

Source: This table is set by the author

6. Conclusion: To deal with the Metaverse world, it has been recommended the accountants to prepare for dealing with these accounting challenges (Handoko et al., 2023). To make some contributions in this regard, the current study has explored the challenges which might face cost accounting. The study, however, had unveiled that data security, quality of cost accounting information, and the trust in the cost accounting information cannot be considered real challenges for users of the Metaverse world. The study also has asserted that the job relevance is a main challenge for the adopters of the Metaverse. Indeed, there is no sufficient empirical evidence to deem the Metaverse a new challenge for cost accounting, especially in Iraq. However, the study calls for some future studies. For instance, a qualitative study is necessary at this stage to deeply understand how the cost accounting can be or not being affected by the Metaverse. Also, the sample of the research was small. Then, expanding the sample is another future study.

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