

CONCEPTUAL MODEL ON THE ADOPTION OF CHINESE MOBILE OPERATING SYSTEM WITH ROGERS' DIFFUSION OF INNOVATIONS THEORY AND ANIMOSITY

LAU, S. L. H.^{1*} – ABDULLAH, M.²

¹ *Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor, Malaysia.*

² *Faculty of Management, Universiti Teknologi Malaysia, Johor, Malaysia.*

**Corresponding author
e-mail: samuellau[at]graduate.utm.my*

(Received 05th July 2024; revised 28th August 2024; accepted 21st November 2024)

Abstract. The Mobile Operating System (MOS) market has been dominated by the Apple's iOS and Google's Android. From the origin perspective, the MOS market is clearly dominated by the US, which can be used as a political weapon in geopolitical conflicts. During the US-China trade war, Huawei was banned from using Android. In response to the ban, Huawei introduced its own MOS, HarmonyOS. However, as of 2024, HarmonyOS remains insignificant in the MOS market. This leads to the key focus of this paper, which is to determine the factors that affect the adoption of Chinese MOS. The researchers of this paper conducted literature reviews to gather relevant variables for this case study. The findings of this paper presented a conceptual model consisting of five innovations attributes by Rogers' Diffusion of Innovations (DOI) theory and the Animosity as a moderating variable. Five innovations attributes are hypothesised to have relationships with the intention to adopt Chinese MOS, and Animosity is hypothesised to moderate their relationships. This model can contribute to the academic theory of DOI and Animosity in the context of the MOS industry, and provide real-world implications for all Chinese MOS developers, which in return benefit the consumers themselves.

Keywords: *mobile, operating system, diffusion of innovations, animosity*

Introduction

Mobile Operating System (MOS) refers to an operating system that developed specifically for mobile devices like smartphones (Okediran et al., 2014). The MOS market has been dominated by Apple's iOS and Google's Android for decades, as both combined to monopolize close to 100% of the MOS market share. From the origin perspective, the MOS market is clearly being dominated by the US, as both Apple and Google are headquartered in the US. This has raised international concerns from the geopolitical point of view because its MOS dominancy can be used as a political weapon in geopolitical conflicts, especially during the current era of high tensions among international relationships. The international geopolitical conflicts in the world today have vastly increased. In 2016, the United Kingdom had voted to leave the European Union; in 2017, North Korea launched missiles that overflowed Japan and conducted nuclear tests; in 2018, trade blacklists were imposed between the United States (US) and China; in 2019, Turkey began a military offensive into Syria; in 2020, COVID-19 led to protectionism with restricted cross-border transactions; in 2021, Armenia and Azerbaijan clashed in a border conflict; in 2022, Russia invaded Ukraine which caused global sanctions and military involvements; in 2022, the US politician Nancy Pelosi visited Taiwan, which provoked China to conduct missile firings

surrounding Taiwan; in 2023, Israel and Hamas-led Palestinian had military conflicts along Gaza Strip.

Geopolitical conflicts have significant impacts on international trades, with great example of the conflicts between the US and China. Under various claims like unfair trade practices and intellectual property theft, then President of the US, Donald Trump, imposed trade tariffs and trade barriers targeting China. Both countries had responded against each other's political actions throughout 2018 and 2019, until a bilateral agreement was mutually reached in 2020. Media have been calling this series of economic tensions as a "Trade War". Technology industry was one of the inevitable victims under the US-China geopolitical conflicts. In 2019, the US government included Huawei, a technology conglomerate based in China, and its 114 affiliates into an economic blacklist, which legally prohibited US companies from purchasing Huawei-made telecommunications equipment. Moreover, the blacklist also suspended US companies to involve in any business supply to Huawei, which covered all hardware, software, products and services. From hardware perspective, it became illegal for TSMC to manufacture the smartphone chips for Huawei. From software perspective, Huawei was no longer approved to obtain the license of the world's most popular MOS, Android, from its American owner, Google. This ban towards Huawei remains valid until today.

Problem statement

Due to extremely tough external factors caused by geopolitical tensions, Huawei's full-year revenue for 2021 had dropped 29 per cent, which was also its first annual decline. Huawei, who used to be the number one smartphone maker in its home country China, was dropped out of the top five in its domestic market share. The scenario was even worse in the global smartphone market. Huawei only hold 4 per cent of the market share in the first quarter of 2021, a sharp decline from its glorious peak at 20 per cent of global smartphone market share before the US ban. In response to the US ban, Huawei had also turned its way to develop its own products and services without relying on US companies. For the default mobile applications, Huawei introduced Huawei Mobile Services (HMS) to replace Google Mobile Services (GMS). For the source for external applications, Huawei introduced AppGallery to replace Google's Play Store. Most importantly for MOS, Huawei introduced HongmengOS, also known as HarmonyOS, to replace Google's Android. Started with the ban due to geopolitical conflicts, it has been much more difficult for Chinese companies to source for Western supply into their business chain. Hence, it became crucial for Chinese companies to apply its own product innovations, just like how Huawei introduced its own HarmonyOS as the MOS replacement. However, the next challenge is whether the Chinese product innovations can be willingly adopted by the consumers, especially in the MOS market which has been dominated for more than decades by West-originated MOS, Apple's iOS and Google's Android. As of year 2024, Huawei still does not gain any significant market share in the smartphone industry, which implies that its HarmonyOS remains insignificant in the MOS market.

HarmonyOS is publicly acknowledged as an innovative MOS, thanks to its unique system architecture to seamlessly collaborate across terminals in contrast to iOS and Android (Li and Zhang, 2022). The next question is why HarmonyOS, a MOS that equipped with product innovations, does not able to be adopted by consumers and to grab a significant market share. This leads to the key focus of this paper, which is to

propose a conceptual model that incorporates the possible factors that can affect the adoption of product innovations, in this case, the Chinese MOS. Previous research has been conducted in the academic area about the adoption of product innovations. One of the most cited theories is “Diffusion of Innovations (DOI)” by Rogers et al. (2014). DOI theory consists of many factors that can affect the rate of adopting product innovations. Among the factors, there are five product innovations attributes, namely Relative Advantage, Compatibility, Complexity, Trialability, and Observability. Rogers proposed that these innovations attributes have positive impact on the rate of adoption, except Complexity to have negative impact. Therefore, the researchers of this paper propose to use the five attributes from the DOI theory as the basis of the proposed conceptual model. The initial development and public release of HarmonyOS by Huawei cannot be realized without considering the factors of increasing geopolitical conflicts and the worsening relationship between the US and China. In academic research, international relations do play a significant role in consumer behaviours. One of the key concepts is called Animosity, which refers to the consumers' hatred towards certain countries (Klein et al., 1998). Therefore, the researchers of this paper propose to use Animosity as another basis for the proposed conceptual model, specifically as a moderating variable between DOI and the adoption of Chinese MOS.

Proposed research questions

Based on the background of this research and the problem statements, the researchers of this paper aim to address the following research questions: (1) RQ1: Does each attribute of innovations from DOI (Relative Advantage, Compatibility, Complexity, Trialability, and Observability) have significant relationship with adoption of Chinese MOS? (2) RQ2: Does animosity have a moderating effect on the relationship between attributes of innovations and adoption of Chinese MOS?

Proposed research objectives

Based on the research questions, the researchers of this paper aim to achieve the following research objectives: (1) RO1: To examine the direct relationship between each attribute of innovations from DOI (Relative Advantage, Compatibility, Complexity, Trialability, and Observability) and adoption of Chinese MOS. (2) RO2: To examine the moderating effect of animosity on the relationship between attributes of innovations and adoption of Chinese MOS.

Materials and Methods

The researchers have conducted literature review from 2019 to 2022, including literature on various databases, such as Emerald, ScienceDirect, Scopus, SpringerLink, etc. It consists of searching keywords like “Mobile Operating System”, “Chinese Mobile Operating System”, “Diffusion of Innovations”, “Innovations Adoption”, “Animosity”, and any relevant terms related to the research areas.

Innovations attributes on adoption of product innovations

Table 1 provides an overview of the literature review, which consists of recent researchers who have examined the relationship between the five innovations attributes and the adoption of product innovations. Past research had been conducted in the

context of many industries, for example, cryptocurrency (Bharadwaj and Deka, 2021), solar panel (Menon and Sujatha, 2021), fintech (Okoli and Tewari, 2021), and banking (Okour et al., 2021). Only two literatures found that the five innovations attributes do have significant relationships as Rogers et al. (2014) proposed, the rest had mixed findings which means some attributes have significant relationships while some do not have. Therefore, the conceptual model of this paper can help to examine the relationships in the MOS industry.

Table 1. Innovations attributes on adoption of product innovations.

Author	Context/industry	Findings: Significant relationship with DOI
Bharadwaj and Deka (2021)	Cryptocurrency	Mixed
Menon and Sujatha (2021)	Solar Panel	Mixed
Okoli and Tewari (2021)	Fintech	Mixed
Okour et al. (2021)	Banking	Mixed
Tiwari and Thakur (2021)	Hotel	Mixed
Achuthan et al. (2020)	Education	Yes
Kyriakou et al. (2020)	Cloud Storage	Yes
Raman et al. (2020)	Education	Mixed
Yoon et al. (2020)	Agriculture	Mixed
Choshaly (2019)	Eco-label Product	Mixed
Muflih et al. (2019)	Healthcare	Mixed
Wolff and Madlener (2019)	Electric Vehicle	Mixed

Innovations attributes on adoption of smartphone or mobile application

Table 2 provides an overview of the review of the literature on the examination of the relationship between the five innovations attributes and the adoption of product innovations. However, Table 2 targets innovations in the smartphone or mobile application product, because these two categories are more relevant to the context of this study, the MOS. However, Table 1 and Table 2 reach a similar conclusion that only some of the findings supported the significant relationships as proposed by Rogers et al. (2014), and there were some findings that did not support the hypotheses. Therefore, the conceptual model of this study can help to examine the relationships in the MOS industry.

Table 2. Innovations attributes on adoption of smartphone or mobile application.

Author	Context/industry	Findings: Significant relationship with DOI
Nezamdoust et al. (2022)	Mobile Health App	Mixed
Srivastava and Fernandes (2022)	Mobile Banking App	Yes
Wang (2022)	Mobile Payment App	Mixed
Yoo et al. (2021)	Smartphone	Mixed
Jamalova and Constantinovits (2020)	Smartphone	Yes
Kaur et al. (2020)	Mobile Payment App	Mixed
Mombeuil (2020)	Mobile Wallet App	Yes
Salim Abdulrahman (2019)	Mobile Banking App	Mixed

Innovations attributes on adoption of mobile operating system

Similarly to Table 1 and Table 2, the researcher of this study attempts to provide an overview of the review of the literature on the examination of the relationship between DOI and the adoption of product innovations, narrowing down to the MOS industry in Table 3. Based on the latest search on various databases available to the researcher, there is only one publicly published research paper in the context of MOS by Mehra et al. (2022). However, they only studied two out of the total of five DOI innovations attributes, namely Compatibility and Observability. In addition to that, they focused on the different versions of Android, instead of comparing different MOS. Therefore, the

conceptual model of this study is one of its first to study all five characteristics of DOI innovations in the context of adopting a different MOS.

Table 3. Innovations attributes on adoption of mobile operating system.

Author	Context/industry	Findings: Significant relationship with DOI
Mehra et al. (2022)	Mobile Operating System	Yes

Animosity on consumer behaviours

Table 4 lists recent literature on the impact of animosity on consumer behaviour, published from 2019 to 2022, and on various databases, such as Emerald, ScienceDirect, Scopus, SpringerLink, and so on. Past researchers had generalised that animosity has a negative relationship with their dependent variables, such as purchase intention, willingness to buy, product avoidance, boycott, or other similar concepts. However, it had shown inconsistent results based on the literature review. For example, the findings from Fong et al. (2022) supported that animosity by the Chinese toward the US has direct effects on their purchase intention; but the findings from Lee et al. (2021), who also conducted the study in the China-US context, had the opposite result. Therefore, the conceptual model of this study aims to fill the research gap to further examine the significance of animosity on consumer behaviours. In addition to that, none of the literature has examined the animosity in the MOS industry.

Table 4. Animosity on consumer behaviours.

Author	Target countries	Findings: Significant relationship with DOI
Fong et al. (2022)	China-US	Yes
Mishra et al. (2023)	India-China	Yes
Ahmad (2023)	Pakistan-US	Mixed
Salma and Aji (2023)	Indonesia-France	Yes
Antonetti and Manika (2022)	China-US	No
Güngördü Belbağ (2023)	Turkey-German,France	Mixed
Fong et al. (2021)	China-Japan	Yes
Lee et al. (2021)	China-US	Mixed
Mainolfi (2021)	Russia-Italy/China-US	Yes
Verma (2022)	India-China	Yes
Yang et al. (2022)	China-Foreign	No
Lee et al. (2022)	Taiwan-China,Indonesia,Japan	Yes

Animosity has been studied as an independent variable, a mediating variable (Mishra et al., 2023), or a moderating variable (Lee et al., 2022). In the proposed model of this paper, animosity will be introduced as a moderator for several reasons: Firstly, it is an ideal situation to introduce a moderating variable when inconsistent relationships have been shown (Memon et al., 2019). In this case, the relationships between DOI and the adoption of product innovations are showing inconsistent results, as discussed in previous section; Secondly, adding a moderator can provide a more nuanced understanding of relationships; Thirdly, adding a moderator can further improve the predictions of the outcomes from our conceptual model; Fourthly, adding animosity as a moderator can also fill the research gap because based on the literature review, no previous studies have been conducted in this manner.

Results and Discussion

Based on the literature review on Rogers' DOI, it can be concluded that DOI's five innovations attributes, namely Relative Advantage, Compatibility, Complexity,

Trialability, and Observability, are deemed to have relationships with the adoption of product innovations. However, recent literatures presented mixed results during the examination. Besides that, Animosity has been studied as a variable on consumer behaviours, especially regarding intention to buy or boycott products from certain countries. However, mixed results have also been presented during the examination in recent literatures. Therefore, the researcher of this paper has combined DOI's five innovations attributes with Animosity into proposed hypotheses and conceptual model, for further examination in the MOS market.

Proposed hypotheses

Applying the concepts of Rogers' DOI in the context of this study, it can be hypothesised that a smartphone user will have a greater intention to adopt Chinese MOS when the Chinese MOS has relative advantage over other MOS, is compatible with the user's lifestyle, is trailable by the user before purchase, and is equipped with innovations that are easily observed by the user. However, if the Chinese MOS is too complex to be used, a smartphone user will have less intention to adopt the Chinese MOS. Therefore, *Table 5* summarised the hypotheses 1a, 1b, 1c, 1d, and 1e of the proposed model. These hypotheses will be able to answer above-mentioned Research Questions 1 (RQ1) and Research Objective 1 (RO1). Applying the concept of animosity to the context of this study, it can be hypothesised that the relationship between the five attributes of DOI's innovations and the intention to adopt Chinese MOS will be negatively impacted by animosity. This is because the smartphone user might have a lower intention to adopt Chinese MOS due to her animosity toward China, regardless of how innovative the Chinese MOS is. Therefore, the following statements have been developed as the hypotheses of this study. By examining the moderating effect of animosity on the relationship between the innovations attributes and the adoption of Chinese MOS, this study will use these hypotheses to answer Research Questions 2 (RQ2) and Research Objective 2 (RO2), as summarised in *Table 6*.

Table 5. Hypotheses 1a, 1b, 1c, 1d and 1e.

Category	Description
Research Questions	RQ1: Does Does each attribute of innovations from DOI (Relative Advantage, Compatibility, Complexity, Trialability, and Observability) have significant relationship with adoption of Chinese MOS?
Research Objectives	RO1: To examine the direct relationship between each attribute of innovations from DOI (Relative Advantage, Compatibility, Complexity, Trialability, and Observability) and adoption of Chinese MOS.
Hypotheses	1a: There is a positive relationship between Relative Advantage and the Intention to Adopt Chinese MOS.

Table 6. Hypotheses 2a, 2b, 2c, 2d and 2e.

Category	Description
Research Questions	RQ2: Does animosity have a moderating effect on the relationship between attributes of innovations and adoption of Chinese MOS?
Research Objectives	RO2: To examine the moderating effect of animosity on the relationship between attributes of innovations and adoption of Chinese MOS.
Hypotheses	2a: When the Animosity against China is stronger, the relationship between Relative Advantage and the Intention to Adopt Chinese MOS is weaker. 2b: When the Animosity against China is stronger, the relationship between Compatibility and the Intention to Adopt Chinese MOS is weaker. 2c: When the Animosity against China is stronger, the relationship between Complexity and the Intention to Adopt Chinese MOS is weaker. 2d: When the Animosity against China is stronger, the relationship between Trialability and the Intention to Adopt Chinese MOS is weaker. 2e: When the Animosity against China is stronger, the relationship between Observability and the Intention to Adopt Chinese MOS is weaker.

Proposed conceptual model

Figure 1 illustrates the conceptual model proposed by the researcher of this study. The model incorporates five independent variables, which are the five attributes of innovations from Rogers et al. (2014) DOI, namely Relative Advantage, Compatibility, Complexity, Trialability, and Observability. They are linked to one dependent variable which is named as Intention to Adopt. The model also incorporates one moderating variable, Animosity, which is hypothesized to moderate the relationship between independent variables and dependent variable.

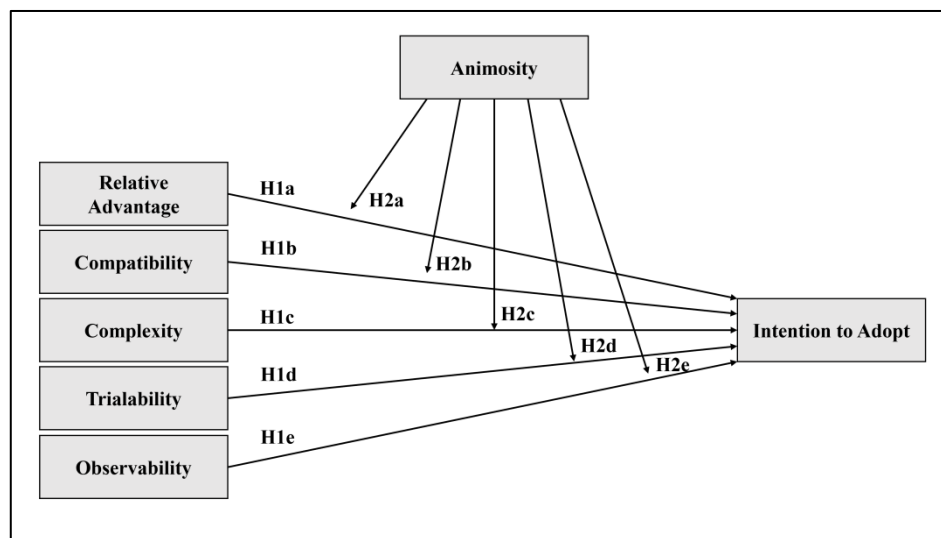


Figure 1. Proposed conceptual model.

In short, the proposed model of this study seeks to address all above-mentioned research gaps by studying the relationships between DOI's innovations attributes and the adoption of Chinese MOS, as well as the moderating impact of Animosity. The proposed model will contribute to the academic theory as follow: (1) Based on the literature review, inconsistent results had been shown when past researchers examined the relationship between these DOI's five innovations attributes and the adoption of innovations. The proposed model can further examine the DOI theory and provide theoretical implications to relevant research areas. (2) There are also several studies on DOI that have been conducted in many different industries. However, the findings could not be generalized for the Mobile Operating System (MOS) industry. The proposed model will provide industrial research contribution by examining the DOI theory in the MOS market. (3) Rogers' DOI theory was first proposed in 1962, which had been more than 60 years. Although Rogers published several latest editions of his book, the DOI theory was not modified compared to its original edition in 1962. The proposed model will contribute to the research by examining the DOI theory in the latest market today. (4) According to the literature review, the proposed model will be one of its first to study Animosity as a moderator on adopting product innovations. Past studies on other contexts also had shown inconsistent results. Hence, the proposed model will provide new and interesting insights to the relevant academic research areas. On the other hand, the proposed model will provide real-world implications for the market players in the MOS market, especially those who are originated from China. Currently, Huawei's HarmonyOS suffered the lack of adoption by the consumers. Hence, the proposed model could provide inspirations and references for Huawei to understand the reasons behind and to further improve their products. However, it does not only contribute to

Huawei but also other Chinese companies, because others could be the next geopolitical target in the future. Hence, all smartphone makers or MOS developers can learn from the findings of the proposed model and adjust their business strategies to mitigate the possible geopolitical risk.

Conclusion

Lastly, the proposed model is expected to be beneficial for the society, especially general consumers or smartphone users. By having more insights on the consumers' adoption of product innovations, and more understanding on the impacts of DOI and animosity, MOS developers can develop MOS that best suit the consumers' needs, which in return will benefit the consumers themselves. Besides that, the proposed model will increase the awareness of animosity in the consumers' decision process. It will be an unfortunate case if the consumers reject a high-quality MOS purely due to the irrational factor of animosity. Hence, the findings of the proposed model will provide the assistance and guidance for consumers to adopt the MOS that best meet their realistic needs. Future researchers are encouraged to test the model in different countries, especially countries that was once welcoming Huawei Android-based smartphones but now rejecting Huawei new HarmonyOS-based smartphones. This will highly in line with the overall concepts of the proposed model. On the other hand, the proposed model only incorporates DOI theory, hence future researchers can combine the proposed model with variables from other adoption theories, for examples, TPB, TAM or UTAUT.

Acknowledgement

This research is self-funded.

Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

REFERENCES

- [1] Achuthan, K., Nedungadi, P., Kolil, V., Diwakar, S., Raman, R. (2020): Innovation adoption and diffusion of virtual laboratories. – *International Journal of Online and Biomedical Engineering* 16(9): 22p.
- [2] Ahmad, M.S. (2023): Buying US products and services: religiosity, animosity, and ethnocentrism of young consumers. – *Journal of Islamic Marketing* 14(5): 1188-1210.
- [3] Antonetti, P., Manika, D. (2022): Modeling multiple forms of consumer animosity through fuzzy-set qualitative comparative analysis. – *European Journal of Marketing* 56(1): 113-132.
- [4] Bharadwaj, S., Deka, S. (2021): Behavioural intention towards investment in cryptocurrency: an integration of Rogers' diffusion of innovation theory and the technology acceptance model. – *In Forum Scientiae Oeconomia* 9(4): 137-159.
- [5] Choshaly, S.H. (2019): Applying innovation attributes to predict purchase intention for the eco-labeled products. – *International Journal of Innovation Science* 11(4): 583-599.

- [6] Fong, C.M., Chang, H.H.S., Han, Y.L. (2022): Animosity, preference conflict and consumption context in an international crisis: a normative influence perspective. – *International Marketing Review* 39(6): 1285-1308.
- [7] Fong, C.M., Chang, H.H.S., Hsieh, P.C., Wang, H.W. (2021): The impact of service category and brand positioning on consumer animosity in the service sector—a social identity signaling perspective. – *Journal of Product & Brand Management* 30(8): 1229-1246.
- [8] Güngördü Belbağ, A. (2023): Diversity and consumer dispositions towards foreign countries in an emerging market. – *International Journal of Emerging Markets* 18(9): 2218-2238.
- [9] Jamalova, M., Constantinovits, M.G. (2020): Attitudes Toward Smartphone Characteristics: What Do Users Pay For? – *International Journal of Interactive Mobile Technologies* 14(9): 19p.
- [10] Kaur, P., Dhir, A., Bodhi, R., Singh, T., Almotairi, M. (2020): Why do people use and recommend m-wallets? – *Journal of Retailing and Consumer Services* 56: 11p.
- [11] Klein, J.G., Ettenson, R., Morris, M.D. (1998): The animosity model of foreign product purchase: An empirical test in the People's Republic of China. – *Journal of Marketing* 62(1): 89-100.
- [12] Kyriakou, N., Euripides, L., Paraskevi, D. (2020): Factors affecting cloud storage adoption by Greek municipalities. – In *Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance* 9p.
- [13] Lee, H.M., Chen, T., Chen, Y.S., Lo, W.Y., Hsu, Y.H. (2021): The effects of consumer ethnocentrism and consumer animosity on perceived betrayal and negative word-of-mouth. – *Asia Pacific Journal of Marketing and Logistics* 33(3): 712-730.
- [14] Lee, Y.H., Wei, C.F., Lee, B.C., Cheng, Y.Y., Chen, Y. (2022): Consumer brand engagement in the US–China trade war. – *Asia Pacific Journal of Marketing and Logistics* 34(1): 75-90.
- [15] Li, H., Zhang, G. (2022): Smart Micro-Lecture Online Application System for Mental Health Guiding Course based on HarmonyOS Considering Video Information Transmission Algorithms. – In *2022 6th International Conference on Trends in Electronics and Informatics (ICOEI)*, IEEE 4p.
- [16] Mainolfi, G. (2021): Luxury during trade tensions. The influence of economic animosity, cosmopolitanism and patriotism on intention to buy foreign luxury products. – *International Marketing Review* 39(1): 32-54.
- [17] Mehra, A., Rajput, S., Paul, J. (2022): Determinants of adoption of latest version smartphones: Theory and evidence. – *Technological Forecasting and Social Change* 175: 17p.
- [18] Memon, M.A., Cheah, J.H., Ramayah, T., Ting, H., Chuah, F., Cham, T.H. (2019): Moderation analysis: issues and guidelines. – *Journal of Applied Structural Equation Modeling* 3(1): 1-11.
- [19] Menon, N.M., Sujatha, I. (2021): Influence of Rogers' theory of innovation of diffusion on customer's purchase intention—a case study of solar photovoltaic panels. – In *IOP Conference Series: Materials Science and Engineering*, IOP Publishing 1114(1): 8p.
- [20] Mishra, S., Saxena, G., Chatterjee, R. (2023): Battle between psychological ownership and consumer animosity to influence consumers' buying behavior: a moderated mediation model. – *Asia Pacific Journal of Marketing and Logistics* 35(4): 944-961.
- [21] Mombeuil, C. (2020) An exploratory investigation of factors affecting and best predicting the renewed adoption of mobile wallets. – *Journal of Retailing and Consumer Services* 55: 9p.
- [22] Muflih, S., Bleidt, B.A., Lafferty, L., Shawaqfeh, M.S., Alvarez, G. (2019): Measuring knowledge and attitudes towards the utilization of pharmacogenetic testing among physicians. – *Journal of Pharmaceutical Health Services Research* 10(2): 227-234.

- [23] Nezamdoust, S., Abdekhoda, M., Rahmani, A. (2022): Determinant factors in adopting mobile health application in healthcare by nurses. – *BMC Medical Informatics and Decision Making* 22(1): 10p.
- [24] Okediran, O.O., Arulogun, O.T., Ganiyu, R.A., Oyeleye, C.A. (2014): Mobile operating systems and application development platforms: A survey. – *International Journal of Advanced Networking and Applications* 6(1): 2195-2201.
- [25] Okoli, T.T., Tewari, D.D. (2021): DOES THE ADOPTION PROCESS OF FINANCIAL TECHNOLOGY IN AFRICA FOLLOW AN INVERTED U-SHAPED HYPOTHESIS? AN EVALUATION OF ROGERS DIFFUSION OF INNOVATION THEORY. – *Asian Academy of Management Journal of Accounting & Finance* 17(1): 281-305.
- [26] Okour, M.K., Chong, C.W., Abdel Fattah, F.A.M. (2021): Knowledge management systems usage: application of diffusion of innovation theory. – *Global Knowledge, Memory and Communication* 70(8/9): 756-776.
- [27] Raman, R., Nedungadi, P., Amrita, R.P., Banerji, S., Mohan, R., Ramesh, M.V. (2020): Investigating the factors affecting the adoption of experiential learning programs: MBA students experience with live-in-labs. – In *2020 IEEE Bangalore Humanitarian Technology Conference (B-HTC)*, IEEE 6p.
- [28] Rogers, E.M., Singhal, A., Quinlan, M.M. (2014): Diffusion of innovations. – In *An Integrated Approach to Communication Theory and Research*, Routledge 16p.
- [29] Salma, S.Y., Aji, H.M. (2023): What drives Muslims to boycott French brands? The moderating role of brand judgement and counterargument. – *Journal of Islamic Marketing* 14(5): 1346-1368.
- [30] Salim Abdulrahman, M. (2019) Factors influencing the adoption of mobile banking service among Cihan Bank customers in the Kurdistan Region of Iraq. – *International Journal of Advanced Science and Technology* 27(1): 289-301.
- [31] Srivastava, M., Fernandes, S. (2022): An empirical study to measure consumer adoption of mobile banking services. – *International Journal of Public Sector Performance Management* 9(1-2): 165-189.
- [32] Tiwari, V., Thakur, S. (2021): Environment sustainability through sustainability innovations. – *Environment, Development and Sustainability* 23(5): 6941-6965.
- [33] Verma, P. (2022): Animosity leads to boycott and subsequent reluctance to buy: evidence from Sino Indian disputes. – *Review of International Business and Strategy* 32(3): 368-386.
- [34] Wang, E.S.T. (2022): Influences of innovation attributes on value perceptions and usage intentions of mobile payment. – *Journal of Electronic Commerce Research* 23(1): 45-58.
- [35] Wolff, S., Madlener, R. (2019): Driven by change: Commercial drivers' acceptance and efficiency perceptions of light-duty electric vehicle usage in Germany. – *Transportation Research Part C: Emerging Technologies* 105: 262-282.
- [36] Yang, R., Ramsaran, R., Wibowo, S. (2022): Do consumer ethnocentrism and animosity affect the importance of country-of-origin in dairy products evaluation? The moderating effect of purchase frequency. – *British Food Journal* 124(1): 159-178.
- [37] Yoo, J., Choi, S., Hwang, Y., Mun, Y.Y. (2021): The role of user resistance and social influences on the adoption of smartphone: Moderating effect of age. – *Journal of Organizational and End User Computing (JOEUC)* 33(2): 36-58.
- [38] Yoon, C., Lim, D., Park, C. (2020): Factors affecting adoption of smart farms: The case of Korea. – *Computers in Human Behavior* 108: 10p.