What Drives Rural Women Entrepreneurs Towards Adoption of Mobile Applications in Business?

C. P. Mary Treasa* and P. Santhi

Department of Commerce, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641043, Tamil Nadu, India

Abstract

The escalation of mobile technology has transformed the entrepreneurial landscape, particularly in rural and underserved communities. Greater access to business applications on mobile devices has enhanced their operational efficiency, improved customer engagement, and strengthened their competitive edge. This research paper delves into the experiences of adoption intention of mobile applications among women rural entrepreneurs registered with Jan Shikshan Sansthan, Palakkad district, in 2022-2023 by applying purposive sampling. The study draws on qualitative insights from in-depth interviews and analyzes the data using the UTAUT Model with Smart PLS. The study confirmed that the effect of performance and effort expectancy on rural women entrepreneurs' willingness to adopt mobile apps for business operations was significant. On the contrary, social influence and facilitating conditions have a negative impact, indicating the focus on reducing technophobia among rural entrepreneurs with digital infrastructure and a continuous support system. The study proffers valuable insights to policymakers and app developers to promote adoption. Furthermore, this study aligns with the Digital India Initiative and Sustainable Development Goal 8, as it drives forward the digital transformation of small and medium enterprises.

Keywords: Behaviour Intention, Digital Divide, Mobile Application, Rural Women Entrepreneurship, UTAUT

1. Introduction

In the rapidly evolving digital landscape, the ubiquitous presence of mobile technology has become a catalyst in seamless communication and trade, transcending geographical boundaries and transforming the entrepreneurial landscape (Abed, 2021). It has contributed to economic development worldwide. Despite the widespread availability of mobile technology, the entrepreneurial opportunities and financial benefits enabled by these devices are uneven across countries and populations creating a digital divide (Rotondi *et al.*, 2020; OECD Going Digital Toolkit, 2023; Dahlman *et al.*, 2016). It is increasing between rural and urban areas, particularly among rural women entrepreneurs (Cirera *et al.*, 2022;

Chatterjee *et al.*, 2020). Although India is the world's second-largest smartphone market (IDC, 2024), out of 954.40 million broadband subscribers (with a minimum 2 Mbps downlink speed), only 398.35 million are in rural areas and 556 million in urban areas (TRAI, 2024). Moreover, the internet usage gap for businesses among men (36%) and women entrepreneurs (20%) in India accounts for 16% (GSMA, 2024). This digital gap disproportionately impacted rural women entrepreneurs' adoption of mobile technologies; for rural women entrepreneurs, mobile technologies are the most accessible and convenient means to search market information due to affordability and ease of use. Its potential will reshape societal dynamics and challenge traditional gender norms of society (Summers *et al.*, 2020). Nevertheless, the studies have found that

*Email: maryphd92@gmail.com

rural women entrepreneurs are primarily motivated to use their devices for personal communication and social networking rather than for accessing market information. (Summers *et al.*, 2020; Kapinga *et al.*, 2019).

The present research focuses on adopting business-related mobile applications by rural women entrepreneurs, as they are the game changers in fashioning mobile technology to the next level. It facilitates seamless coordination among women entrepreneurs to stay connected with suppliers, customers, traders, and intermediaries. It improves the speed of managing business with greater ease and efficiency with low costs and builds a competitive edge. However, rural women entrepreneurs' access to market information through mobile applications remains debated in the Indian context. Empowering women entrepreneurs through these applications can stimulate the economic well-being of families and communities. Moreover, digital connectivity through mobile phones is a necessity rather than a luxury.

Therefore, a crucial understanding of the factors that affect the adoption of mobile applications among rural women entrepreneurs is needed to bridge the digital divide and enable their effective participation in the digital economy. Hence, the study aimed to address the research problem by answering the research question:

What factors influence the willingness of women rural entrepreneurs to use mobile applications?

The Unified Theory of Acceptance and Usage of Technology Model (UTAUT) (Venkatesh *et al.*, 2003) is applied to find the key determinants of mobile application adoption in business operations among rural women entrepreneurs. Secondly, it examines the facilitators and barriers that can narrow the digital gap and strengthen rural women entrepreneurs. The findings of the study are useful for NGOs, app developers and policymakers to initiate digital inclusion in rural areas. Additionally, our research aligns with the Digital India program and Sustainable Development Goals, particularly SDG 5 and SDG 8, by advocating Information and communications technology to support women empowerment and the digital transformation of small and medium enterprises" (Zhang *et al.*, 2024; Pradhan *et al.*, 2017; United Nations, 2015).

2. Theoretical Background and Literature Review

2.1 Unified Theory of Acceptance and Usage of Technology (UTAUT)

UTAUT (Venkatesh *et al.*, 2003) is broadly applied in technology acceptance research across various end users, including healthcare (Edo *et al.*, 2023), Virtual education, and educational technologies (Ustun *et al.*, 2023), Electric vehicles (Le *et al.*, 2023), e-governance (Al Sayegh *et al.*, 2023), 5g acceptance (Iqbal *et al.*, 2023). The acceptance of new technology requires the researchers to select constructs from a myriad of competing models; addressing this issue, Venkatesh *et al.*, 2003 integrated individual user acceptance models into a unified UTAUT. This integration enables UTAUT to leverage the strengths of these models to offer an extensive framework for understanding technology acceptance (Nnaji *et al.*, 2023). In the UTAUT model, "Venkatesh *et al.* (2003) assert that Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) are direct determinants of technology adoption. These constructs have been refined from existing models. Users are inclined to accept a system if they believe it enhances their job performance, denoting PE. The ease of using the system reflects EE. The perception that their peers endorse the system's utilization is influential and indicates SI. The belief in the support and resources for system usage presage FC. Further, Gender, age, voluntariness, and experience are the key moderators (Venkatesh *et al.*, 2003).

UTAUT is recognized for its robustness and reliability in various technology acceptance research because of its simplicity. The limited constructs and moderating variables enhance its applicability. (Momani, 2020). The longitudinal approach of the UTAUT in mandatory and voluntary settings expands its pertinence. Additional constructs are added to test technology acceptance, incorporating hedonic motivation, price value, and

habit in the consumer context (Venkatesh *et al.*,2012). Additional constructs included in UTAUT involve digital literacy (Ullah *et al.*, 2022), perceived trust (Islam *et al.*, 2021), perceived risk (Arfi *et al.*, 2021), anxiety (Gunasinghe *et al.*, 2021), perceived credibility (Manrai *et al.*, 2021). In the Indian context, many studies have used the UTAUT model to investigate behaviour intention toward the adoption of mobile technology and applications among entrepreneurs in e-commerce (Goswami & Dutta, 2016), e-payment (Sobti, 2019), Mobile banking applications (Abed, 2021), Social Media adoption (Puriwat *et al.*, 2021).

2.2 Adoption of Mobile Applications for Business Operation among Rural Women Entrepreneurs

Mobile applications are considered the "game changers" for rural women entrepreneurs (Srinivasan, 2015). The convenience, real-time connectivity, personalization, and timeliness make mobile apps versatile tools for business operations. Leveraging mobile applications for business, including social media, mobile accounting, and mobile payment functionalities, gain market access, develop products, monitor consumer behaviour, and establish a competitive advantage - ultimately strengthening customer loyalty (Asamoah *et al.*, 2024; Mourtzis *et al.*, 2017). The research has been undertaken to explore the barriers and determinants to the adoption of mobile applications among entrepreneurs in India as well as abroad (Gupta *et al.*, 2024; Neumeyer *et al.*, 2020; Malik *et al.*, 2017). Further, the adoption of mobile applications can lead to increased innovation and entrepreneurial orientation among rural women, which can ultimately aid in the development of micro-entrepreneurship (Sur *et al.*, 2020; Nambisan, 2017).

Empirical studies pinpointed that limited availability and accessibility of required digital infrastructure, insufficient reliable internet connectivity, and affordability of smartphones in rural areas significantly impede the benefits of mobile applications. Furthermore, extant research indicates that the lack of digital literacy and technical skills represents the most substantial barrier, followed by prevailing social norms as a secondary impediment towards the adoption intention of mobile applications among women rural entrepreneurs (GSMA, 2023).

2.3 Research Gap

The past literature on evaluating rural women entrepreneurs' adoption of mobile applications using the UTAUT model is scarce in the Indian context. Therefore, considering the research gap to strengthen the existing literature, the present study aimed to explore the most significant determinants influencing the adoption of mobile applications among rural women entrepreneurs.

3. Research Framework and Formulation of Hypotheses

The present study integrates the UTAUT model (Venkatesh *et al.*, 2003). According to UTAUT, Users' intentions and behaviour regarding technology adoption are driven by their key beliefs. The use of
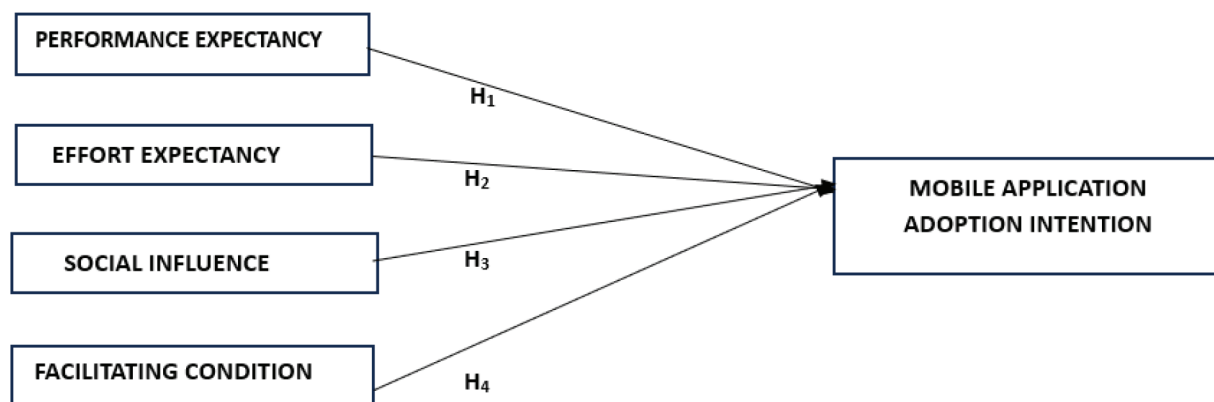

Figure 1. Proposed framework.

technology is determined by behavioural intention, which is influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. The research framework explores the intent of rural women entrepreneurs to adopt mobile applications. Figure 1 depicts the proposed research model.

The study tests hypotheses regarding the relationships among key constructs by proposing a hypothetical model.

3.1 Performance Expectancy on Behaviour Intention

The expectation of performance improvements is a critical determinant of technology adoption, as individuals are more inclined to utilize IT innovations if they believe these tools will enhance their productivity and provide tangible benefits (Venkatesh & Zhang, 2010). Entrepreneurs tend to prioritize the benefits that new opportunities can provide to improve their enterprise's performance (Holzmann & Gregori, 2023). Hence several studies claim the predominant influence of performance expectancy towards the technology adoption intention of entrepreneurs (Olasina *et al.*, 2015; Al Saedi *et al.*, 2020). In contrast, (Camilleri *et al.*, 2024; Moghavvemi *et al.*, 2017) found an inverse relationship between performance expectancy and behaviour intention. The relationship is tested through the formulating hypotheses.

H_1: Performance expectancy positively influences behavioural intention to adopt mobile applications in business.

3.2 Effort Expectancy on Behaviour Intention

The ease of using an information system is a key concern for users. A system that is overly complex or has a difficult-to-navigate interface can deter users from adopting it (Byun & Finnie, 2011). Perceived ease of use can enhance user performance, as the convenience and confidence gained from handling the system can positively influence their intention to use. Hence effort expectancy is regarded as the second important predictor of technology adoption (Tannady *et al.*, 2024; Chong, 2013). In contradiction, a negative

relationship between Effort expectancy and Behaviour intention was found in studies (Ali *et al.*, 2024; Kabra *et al.*, 2017) This relationship is tested through the formulation of hypotheses.

H_2: Effort expectancy positively influences behavioural intention to adopt mobile applications in business.

3.3 Social Influence on Behaviour Intention

Individuals' behaviours, feelings, and beliefs are often influenced by their peers, superiors, and the opinions of other important people they value (Kelman, 1958; Venkatesh *et al.*, 2003). Social influence has been a key factor incorporated in major technology adoption models, with varied conceptualizations such as subjective norms, social capital, group norms, and social identity, which shape technology adoption behaviours (Lorenz & Buhtz, 2017). Consequently, social influence has been regarded as a predictor of behavioural intention to adopt new technologies (Chopdar *et al.*, 2018; Chao, 2019). Conversely (Trivedi *et al.*, 2022; Nassar *et al.*, 2019) claim a negative relationship between Social Influence and behavioural intention to adopt the technology. This relationship is tested through the formulation of hypotheses.

H_3: Social influence positively influences behavioural intention to adopt mobile applications in business.

3.4 Facilitating Condition on Behaviour Intention

Ensuring the availability of adequate resources is crucial for unlocking the full potential of information technology and driving its widespread adoption (Onaolapo & Oyewole, 2018). It encompasses the availability of financial resources, software, and hardware and most importantly upskilling to get updated to technology (Venkatesh *et al.*, 2003). The empirical evidence from prior studies (Shahadat *et al.*, 2023; Purwanto *et al.*, 2020) indicated that facilitating conditions have a positive influence on behavioural intention. In comparison, the study (Utomo *et al.*, 2021; Abubakar & Ahmad, 2013) diminishes the influence of facilitating conditions on behaviour intention to adopt the technology. This relationship is tested through the formulation of hypotheses.

H$_4$: Facilitating Conditions positively influence behavioural intention to adopt mobile applications in business.

4. Research Methodology

The research design is a blend of both exploratory and descriptive. The target population for this investigation comprised women rural entrepreneurs registered with the Jan Shikshan Sansthan (JSS), under the Ministry of Skill Development and Entrepreneurship, in the Palakkad district of Kerala during the 2022-2023 period. JSS economically empowers the rural population by providing essential skills training, thereby facilitating the growth of local enterprises and creating new opportunities for the residents of the region.

Palakkad is the second most prominent industrial hub in the state of Kerala, after Kochi, and has been identified as a strategically significant location for India's forthcoming industrial development under the aegis of the National Industrial Corridor Development Programme initiated in 2022 which has clearance in August 2024 (The Union Cabinet Committee on Economic Affairs).

4.1 Data Collection and Sampling

A structured questionnaire was proposed with the two sections. The obligatory demographic data are included in the first section. The second section solicits queries regarding Mobile application adoption intention among rural women entrepreneurs using a 5-point Likert scale (with 1 indicating strongly disagree and 5 indicating strongly agree).

A total of 232 women entrepreneurs were registered under JSS in the Palakkad District in the year 2022-2023. Out of this total, 96 women are from rural areas, while the remaining 136 are from urban and semi-urban areas. For the current study, 96 rural women entrepreneurs were purposively selected using purposive sampling.

5. Data Analyses and Results

Rural women entrepreneurs' socio-economic profile depicts that all the rural entrepreneurs have primary education; the majority qualifies higher secondary level (53%), and few (25%) have technical and diploma degrees, indicating low education poses low acceptance of technology (Jain & Rekha, 2017). The majority (56%) of rural women entrepreneurs are involved in tertiary (service sector) activities to earn their livelihood, which mainly includes retailing (33%), financial services, e-service centres, transportation services, and pavement food stalls. The manufacturing sector (30%) includes activities like weavers, artisan works, snack making, and cake baking; only 57 per cent involved in agriculture and its allied activities. A significant portion of young entrepreneurs are engaged in the service sector presaging the demand for the tertiary sector in rural areas, and it is in line with the study by (Gnanasaranya, 2017), which claims that the tertiary sector provides more entrepreneurial opportunities in rural regions.

The majority of entrepreneurs are aware of social media, but very few are using (WhatsApp Business and Instagram) for business processes. Awareness and usage of popular mobile payment applications like Bhim UPI, Google Pay, PhonePe, and Paytm are high and have increased during the pandemic (Koomson *et al.*, 2023). Awareness of mobile accounting applications is necessary to report financial performance (Kamau *et al.*, 2024). and E-commerce applications, especially Flipkart and Amazon, are high. However, they need to be using it for business processes.

The analysis leveraged the power of partial least squares structural equation modelling, utilizing the Smart-PLS 4 software, to rigorously examine the causal relationships within the data (Sarstedt & Cheah, 2019). One of the key advantages of PLS-SEM is its robustness compared to other structural equation modelling techniques. The handling of a wide range of data conditions, including non-normal distributions, small sample sizes, and highly complex models, can be challenging for covariance-based SEM approaches. (Hair *et al.*, 2024; Chin, 1998). This robustness makes PLS-SEM a powerful and versatile analytical tool for examining complex theoretical models with reflective and formative constructs, across disciplines including marketing (Sarstedt *et*

al., 2022), international management (Richter *et al.*, 2022), strategic management (Hair *et al.*, 2012), supply chain management (Kaufmann & Gaeckler, 2015), operations management (Bayonne *et al.*, 2020), human resource management (Ringle *et al.*, 2020). For decades, Partial Least Squares Structural Equation Modeling has been a leading estimator in SEM models in the field of information systems (Sarstedt *et al.*, 2014).

5.1 Measurement Model

The measurement model in PLS-SEM shows how concepts and indicators are related to assessing the reliability, convergence, and distinctiveness of the constructs (Vaithilingam *et al.*, 2024).

5.1.1 Reliability and Convergent Validity

Accordingly, the findings reveal that Cronbach's alpha of all latent factors is above 0.70 as recommended by (Hair *et al.*, 2019). The factor loadings are recommended to eliminate items with values below 0.71and the current study shows that all the items are above 0.71. Further, the average variance extracted

is greater than 0.50 for all constructs. Therefore, the study met each prerequisite for internal and convergent validity shown in Table 1.

The Fornell-Larcker criterion and Heterotrait-monotrait ratio conclusively established the strong discriminant validity of all constructs, with values well within the acceptable 0.85 cutoffs confirming discriminant validity (Fornell & Larcker, 1981) as shown in Tables 2 and 3

The Variance Inflation Factor values for each of the variables are below the recommended cutoff of 3.3 suggested by Diamantopoulos *et al.* (2008). This eliminates concerns regarding the presence of multicollinearity as shown in Table 1.

5.2 Structural Model

The value of R-square which is 0.801 indicates that 80.1% of the total variation in Mobile adoption Intention is explained by the influence of Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Condition.
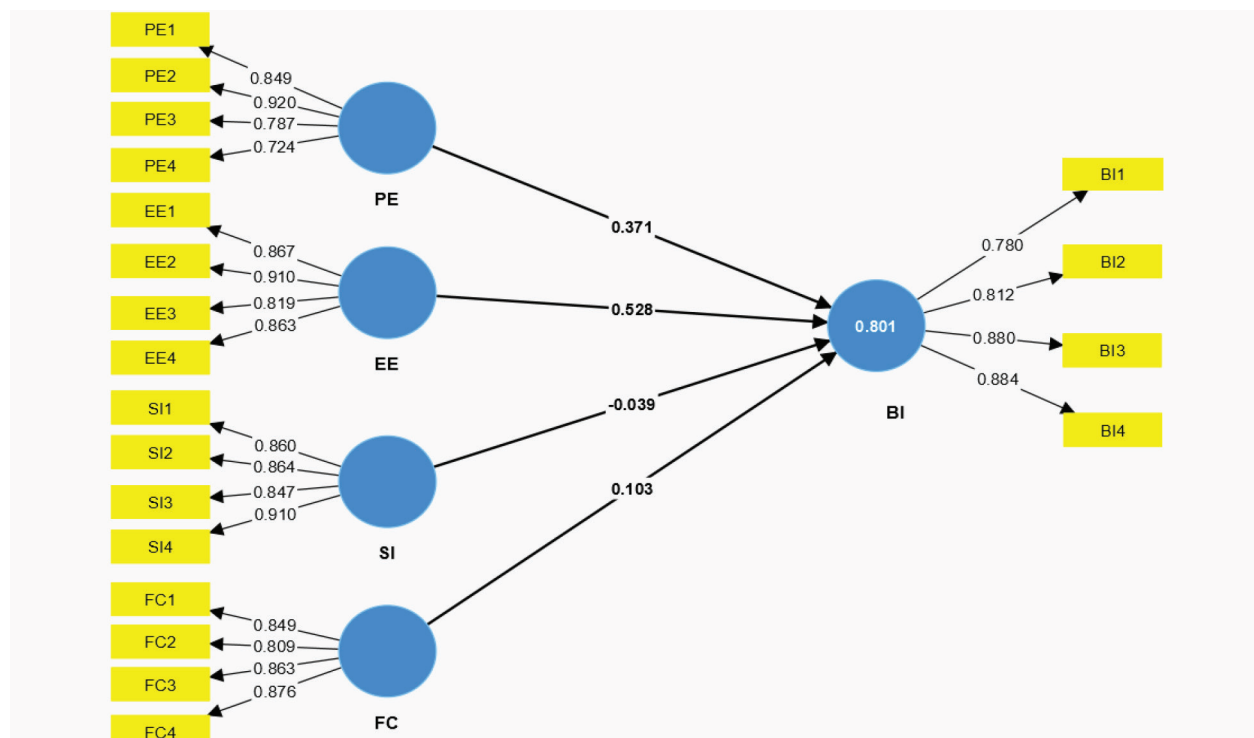

Figure 2. Path estimates of Structural model.

Source: Authors analysis

Table 1. Evaluation of reliability and convergent validity

Vari ables	Factor Loadings	VIF	Cronbach's Alpha	CR (rho_a)	CR (rho_c)	Average Variance Extracted
BI	0.780	1.951	0.860	0.862	0.906	0.706
	0.812	1.982				
	0.880	2.727				
	0.884	2.840				
EE	0.867	2.514	0.888	0.902	0.922	0.749
	0.910	2.959				
	0.819	2.111				
	0.863	2.191				
FC	0.849	2.322	0.872	0.88	0.912	0.722
	0.809	1.789				
	0.863	2.315				
	0.876	2.253				
PE	0.849	2.181	0.838	0.847	0.893	0.678
	0.920	2.918				
	0.787	2.388				
	0.724	1.763				
SI	0.860	2.860	0.893	0.898	0.926	0.758
	0.864	2.349				
	0.847	2.634				
	0.910	2.920				

Source: Authors analysis

Table 2. Discriminant validity (HeteroMontrait Ratio)

	BI	EE	FC	PE	SI
BI					
EE	0.826				
FC	0.689	0.627			
PE	0.974	0.813	0.731		
SI	0.668	0.64	0.848	0.736	

Table 3. Discriminant validity (Fornell-Larker)

	BI	EE	FC	PE	SI
BI	0.84				
EE	0.859	0.865			
FC	0.604	0.564	0.849		
PE	0.831	0.794	0.634	0.823	
SI	0.59	0.576	0.841	0.641	0.87

Table 4. SRMR model fit

	Saturated model	Estimated model
SRMR	0.072	0.072
d_ULS	1.098	1.098
d_G	0.93	0.93
Chi-square	592.64	592.64
NFI	0.742	0.742

The analysis involved testing the goodness of fit value is 0.544, which exceeded the 0.36 limit propound by (Tenenhaus *et al.*, 2005), thus showing the goodness of fit and the Standardized Root Mean Square Residual (SRMR), should be below 0.08 suggested by (Hair *et al.*, 2024) as shown in Table 4.

The blindfolding technique is then used to evaluate the model's predictive relevance (Q2), indicating that the model has predictive ability. The values of Q2 for the endogenous variables can be identified to be greater than zero (Hair *et al.*, 2017) 0.352 for mobile application adoption intention.

Table 5. Results of hypothesis testing

	Beta	M	STDEV	T-Value	P-Value	Decision
EE - BI	0.528	0.525	0.067	7.871	0.000	Accepted
FC- BI	0.103	0.106	0.085	1.216	0.224	Rejected
PE - BI	0.371	0.371	0.083	4.449	0.000	Accepted
SI - BI	0.039	-0.036	0.084	0.462	0.644	Rejected

The model was evaluated using a bootstrapping approach with 5,000 resamples to test the hypotheses and determine the significance of the path coefficients. Table 5 outlays the Correlation of the study and is examined using the path coefficient (Hair *et al.*, 2019).

6. Results and Discussions

The present study explored the factors driving women rural entrepreneurs towards the intention to adopt mobile applications in business operations. The UTAUT model with Performance expectancy, effort expectancy, social influence, and facilitating conditions as predominant constructs were tested.

The Performance expectancy of women rural entrepreneurs has positively influenced behaviour intention (β = 0.371 with P 0.000 < 0.05, t = 4.449), indicating rural women entrepreneurs' faith towards using mobile applications to increase performance. Hence, the formulation of hypothesis 1 is accepted. It is in line with studies (AlMas *et al.*, 2024; Puriwat *et*

al., 2021; Yu *et al.*, 2012). In our study a well-designed application with diverse features for business operations can personalize its services, engage customers, and increase brand recognition, leading to a competitive edge and enhanced productivity.

Effort Expectancy has positively influenced behaviour intention ($\beta = 0.528$ with P $0.000 < 0.05$), signifying entrepreneurs' ease of using mobile applications. Therefore, hypothesis 2 is accepted. It is consistent with the study conducted by (Nandru & SenthilKumar, 2024; Lee *et al.*, 2001). In the present study, rural women entrepreneurs' digital literacy and knowledge of using mobile applications determine their perceived ease of use. The user-friendly mobile applications incorporating regional languages and customized application increases their intention to adopt.

Social influence is expected to affect positively the behaviour intention of entrepreneurs as they witness the influence of peers adapting to technology to survive in the digital era (Geber *et al.*, 2022). However, the current research shows an insignificant effect of social influence ($\beta= 0.039$, with P $0.644 > 0.05$), indicating a fear of using technology within the social circle in which they live. It is bounded by social trust and social norms of the society (Maleki, 2023). It can lead to social isolation in business. Further trustworthiness of the application, privacy, and security concerns are also impeding them from adoption intention.

The facilitating condition involves providing resources, digital infrastructure, and training to support the use of technology, which contributes to a positive impact on behavioural intention. However, the current study shows an insignificant effect of facilitating conditions on behaviour intention ($\beta = 0.103$ with P $0.224 > 0.05$), presaging the fact that lack of assistance and timely support, and limited resources can prevent individuals from accepting web-based technology (Kamaghe *et al.*, 2020). Further affordability of the right handset, basic training on mobile applications, and lack of internet connectivity constraints the adoption of mobile apps in business among entrepreneurs.

7. Conclusion

This empirical study examined the key factors influencing the adoption of mobile applications among rural women entrepreneurs in India. The proposed research framework was based on the Unified Theory of Acceptance and Use of Technology. The findings supported the proposed model depicted in Figure 2. Structural model analysis revealed that performance expectancy and effort expectancy were the most significant predictors of behavioural intention to adopt mobile applications for business purposes. Conversely, social influence and facilitating conditions did not significantly impact the intention to adopt mobile applications. Consequently, the overall results indicated that hypotheses H1 and H2 were the strong determinants in shaping the intention to adopt mobile applications in business, while H3 and H4 were found to be insignificant.

This study emphasizes theoretical insight into the literature on technology adoption, particularly on rural women entrepreneurs' acceptance of mobile applications using UTAUT. In the context of less developed countries, the findings emphasize improving rural entrepreneurs' behaviour intentions toward technology adoption. Furthermore, research may offer helpful direction for digitalizing rural businesses. The results point to the significance of social influence, which indicates entrepreneurs' self-motivation to adopt new technologies in rural areas. Additionally, the study can provide inspiration and support for rural business owners who intend to embrace technology. It can also be utilized to create training and support initiatives specially designed with prospective rural business entrepreneurs. The research aids app developers in creating applications that meet end users' requirements and expectations. The government ought to be involved in developing and overseeing programs aimed at encouraging ICT use among rural businesses. Ultimately, the findings imply that an individual's acceptance of technology will be enhanced by digital awareness, expertise, and self-motivation toward using digital technologies.

The study has certain limitations, the rural entrepreneur's intentions toward mobile applications

were only observed, not users' actions, so this might be expanded to the entrepreneur's acceptance and use of technologies. The study has taken only the key beliefs on user acceptance of technology, more constructs and complex relationships like digital literacy, perceived trust, etc can increase its robustness. Moreover, this study is cross-sectional and can be done as longitudinal research where the same respondent is observed over a while. Further, the study focused on rural entrepreneurs' intention toward mobile business applications; this can be expanded to the adoption and use of different technologies among different populations or a comparative study among different communities and regions, which will give a broader aspect of the problem. A gender-based study can determine the more adverse effects of digitalization in rural areas. Finally, the study was confined to individual user acceptance and can be broadened to the organizational context.

Rural areas can gain from technological progress by expanding their revenue sources and opening up new economic options. It can lower transportation expenses, raise political participation, and enhance service quality. Policies should guarantee high-quality bandwidth connectivity, fortify infrastructure, digitally upskill the labour force, and involve rural areas in the policy-making process to improve the behaviour intention of rural entrepreneurs towards technology adoption.

8. References

Abed, S. S. (2021). Women entrepreneurs' adoption of mobile applications for business sustainability. *Multidisciplinary Digital Publishing Institute*, *13*(21), 11627-11627. https://doi.org/10.3390/su132111627

Abubakar, F. M., & Ahmad, H. B. (2013). The moderating effect of technology awareness on the relationship between UTAUT constructs and behavioral intention to use technology: A conceptual paper. *Australian Journal of Business and Management Research*, *3*(2), 14-23. https://doi.org/10.52283/NSWRCA.AJBMR.20130302A02

Al Sayegh, A. J., Ahmad, S. Z., AlFaqeeh, K. M., & Singh, S. K. (2023). Factors affecting e-government adoption in the UAE public sector organizations: The knowledge management perspective. *Journal of Knowledge Management*, *27*(3), 717-737. https://doi.org/10.1108/JKM-09-2021-0681

Ali, M. B., Tuhin, R., Alim, M. A., Rokonuzzaman, M., Rahman, S. M., & Nuruzzaman, M. (2024). Acceptance and use of ICT in tourism: The modified UTAUT model. *Journal of Tourism Futures*, *10*(2), 334-349. https://doi.org/10.1108/JTF-06-2021-0137

AlMas, A., Alsaber, A., & Nafea, R. (2024). Understanding the Factors that Influence the Intention of Kuwaiti Entrepreneurs to Use Technology Using the UTAUT Model. *Sustainable Innovations in Management in the Digital Transformation Era* (pp. 1-13). Routledge. https://doi.org/10.4324/9781003450238-1

Al-Saedi, K., Al-Emran, M., Ramayah, T., & Abusham, E. (2020). Developing a general extended UTAUT model for M-payment adoption. *Technology in Society*, *62*, Article 101293. https://doi.org/10.1016/j.techsoc.2020.101293

Arfi, W. B., Nasr, I. B., Khvatova, T., & Zaied, Y. B. (2021). Understanding acceptance of eHealthcare by IoT natives and IoT immigrants: An integrated model of UTAUT, perceived risk, and financial cost. *Technological Forecasting and Social Change*, *163*, Article 120437. https://doi.org/10.1016/j.techfore.2020.120437

Asamoah, D. A., Dinsmore, J. B., & Swani, K. (2024). Benefits, barriers, and facilitators of developing B2B mobile applications. *Journal of Business and Industrial Marketing*, *39*(3), 537-552. https://doi.org/10.1108/JBIM-10-2022-0457

Bayonne, E., Marin-Garcia, J. A., & nnAlfalla-Luque, R. (2020). Partial Least Squares (PLS) in operations management research: Insights from a systematic literature review. *Journal of Industrial Engineering and Management*, *13*(3), 565-597. https://doi.org/10.3926/jiem.3416

Byun, D. H., & Finnie, G. (2011). Evaluating usability, user satisfaction and intention to revisit for successful e-government websites. *Electronic Government, 8*(1), 1-19. https://doi.org/10.1504/EG.2011.037694

Camilleri, M. A. (2024). Factors affecting performance expectancy and intentions to use ChatGPT: Using SmartPLS to advance an information technology acceptance framework. *Technological Forecasting and Social Change*, *201*, Article 123247. https://doi.org/10.1016/j.techfore.2024.123247

Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. *Frontiers in Psychology*, *10*, Article 1652. https://doi.org/10.3389/fpsyg.2019.01652

Chatterjee, S., Gupta, S. D., & Upadhyay, P. (2020). Technology adoption and entrepreneurial orientation for rural women: Evidence from India. *Technological*

Forecasting and Social Change, *160*, Article 120236. https://doi.org/10.1016/j.techfore.2020.120236

Chin, W. W. (1998). Commentary: Issues and opinions on structural equation modeling. *MIS Quarterly*, vii-xvi.

Chong, A. Y. L. (2013). Predicting m-commerce adoption determinants: A neural network approach. *Expert Systems with Applications*, *40*(2), 523-530. https://doi.org/10.1016/j.eswa.2012.07.068

Chopdar, P. K., Korfiatis, N., Sivakumar, V. J., & Lytras, M. D. (2018). Mobile shopping apps adoption and perceived risks: A cross-country perspective utilizing the Unified Theory of Acceptance and Use of Technology. *Computers in Human Behavior*, *86*, 109-128. https://doi.org/10.1016/j.chb.2018.04.017

Cirera, X., Comín, D., & Cruz, M. (2022). *Bridging the technological divide: Technology adoption by firms in developing countries*.

Dahlman, C. J., Mealy, S., & Wermelinger, M. (2016). Harnessing the digital economy for developing countries. *OECD Development Centre Working Papers*. https://doi.org/10.1787/4adffb24-en

Diamantopoulos, A., Riefler, P., & Roth, K. P. (2008). Advancing formative measurement models. *Journal of business research*, *61*(12), 1203-1218. https://doi.org/10.1016/j.jbusres.2008.01.009

Edo, O. C., Ang, D., Etu, E. E., Tenebe, I., Edo, S., & Diekola, O. A. (2023). Why do healthcare workers adopt digital health technologies cross-sectional study integrating the TAM and UTAUT model in a developing economy. *International Journal of Information Management Data Insights*, *3*(2), Article 100186. https://doi.org/10.1016/j.jjimei.2023.100186

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Geber, S., & Friemel, T. N. (2022). Tracing-technology adoption during the COVID-19 pandemic: The multifaceted role of social norms. *International Journal of Communication*, *16*, 20.

Gnanasaranya, S. (2017). Adoption Of Icts by women microentrepreneurs in rural areas - A study in Dindigul district, Tamil Nadu, India. *International Journal of Knowledge Management and Practices*, *5*(2).

Goswami, A., & Dutta, S. (2016). E-commerce adoption by women entrepreneurs in India: An application of the UTAUT model. *Business and Economic Research*, *6*(2), 440-454. https://doi.org/10.5296/ber.v6i2.10560

GSMA (2023) The mobile economy 2023https://www.gsma.com/solutions-and-impact/connectivity-for-good/

mobile-economy/wp-content/uploads/2023/03/270223-The-Mobile-Economy-2023.pdf

GSMA. (2024). The mobile economy report. https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2024/02/260224-The-Mobile-Economy-2024.pdf

Gunasinghe, A., & Nanayakkara, S. (2021). Role of technology anxiety within UTAUT in understanding non-user adoption intentions to virtual learning environments: The state university lecturers' perspective. *International Journal of Technology Enhanced Learning*, *13*(3), 284-308. https://doi.org/10.1504/IJTEL.2021.115978

Gupta, V., Rubalcaba, L., Gupta, C., & Pereira, L. (2024). Social networking sites adoption among entrepreneurial librarians for globalizing startup business operations. *Library Hi Tech*, *42*(3), 947-974. https://doi.org/10.1108/LHT-05-2022-0234

Hair, J. F., Matthews, L. M., Matthews, R., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: Updated guidelines on which method to use, *1*(2), 107-107. https://doi.org/10.1504/IJMDA.2017.087624

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Hair, J. F., Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long range planning*, *45*(5-6), 320-340.

Hair, J. F., Sarstedt, M., Ringle, C. M., Sharma, P. N., & Liengaard, B. D. (2024). Going beyond the untold facts in PLS-SEM and moving forward. *European Journal of Marketing*, *58*(13), 81-106. https://doi.org/10.1108/ejm-08-2023-0645

International Data Corporation (2024), Quarterly Mobile Phone Tracker. https://www.idc.com/promo/smartphone-market-share

Iqbal, U. P., Jose, S. M., & Tahir, M. (2023). Integrating trust with extended UTAUT model: A study on Islamic banking customers-banking adoption in the Maldives. *Journal of Islamic Marketing*, *14*(7), 1836-1858. https://doi.org/10.1108/JIMA-01-2022-0030

Islam, M. T., & Khan, M. T. A. (2021). Factors influencing the adoption of crowdfunding in Bangladesh: A study of start-up entrepreneurs. *Information Development*, *37*(1), 72-89.

Jain, P., & Rekha. (2017). Impact of demographic factors: Technology adoption in agriculture. *SCMS Journal of Indian Management*, *14*(3), 93-102.

Kabra, G., Ramesh, A., Akhtar, P., & Dash, M. K. (2017). Understanding behavioural intention to use information technology: Insights from humanitarian practitioners. *Telematics and Informatics*, *34*(7), 1250-1261. https://doi.org/10.1016/j.tele.2017.05.010

Kamaghe, J. S., Luhanga, E. T., & Michael, K. (2020). The challenges of adopting M-learning assistive technologies for visually impaired learners in higher learning institution in Tanzania. https://doi.org/10.3991/ijet.v15i01.11453

Kamau, J. (2024). Determination of financial resource leakage and its impact on value delivery in secondary schools: A case study of Nakuru county, Kenya. *International Journal of Business Management and Processes*, *6*(2), 25-37.

Kapinga, A. F., Montero, C. S., & Mbise, E. R. (2019). A mobile marketing application for entrepreneurship development: Codesign with women entrepreneurs in Iringa, Tanzania. *Electronic Journal of Information Systems in Developing Countries*, *85*(2), Article e12073. https://doi.org/10.1002/isd2.12073

Kaufmann, L., & Gaeckler, J. (2015). A structured review of partial least squares in supply chain management research. *Journal of Purchasing and Supply Management*, *21*(4), 259-272. https://doi.org/10.1016/j.pursup.2015.04.005

Kelman, H. C. (1958). Compliance, identification, and internalization three processes of attitude change. *Journal of Conflict Resolution*, *2*(1), 51-60. https://doi.org/10.1177/002200275800200106

Koomson, I., Martey, E., & Etwire, P. M. (2023). Mobile money and entrepreneurship in East Africa: The mediating roles of digital savings and access to digital credit. *Information Technology and People*, *36*(3), 996-1019. https://doi.org/10.1108/ITP-11-2021-0906

Le, T. T., Jabeen, F., & Santoro, G. (2023). What drives purchase behavior for electric vehicles among millennials in an emerging market. *Journal of Cleaner Production*, *428*, 139213.

Lee, J., & Runge, J. (2001). Adoption of information technology in small business: Testing drivers of adoption for entrepreneurs. *Journal of Computer Information Systems*, *42*(1), 44-57. https://doi.org/10.1080/08874417.2001.11647038

Lorenz, G. V., & Buhtz, K. (2017). Social Influence in technology adoption research: A literature review and research agenda. In Proceedings of the 25th European Conference on Information Systems (ECIS), Guimarães, Portugal, June 5-10, 2017 (pp. 2331-2351). ISBN 978-989-20-7655-3 Research Papers. http://aisel.aisnet.org/ecis2017_rp/148

Maleki, A., Funk, C., Moghaddam, K., Tajeddin, M., & Simba, A. (2023). A cross-national study of entrepreneurial intent: the contextual effect of social trust and trust in government. *Journal of Small Business and Entrepreneurship*, 1-23. https://doi.org/10.1080/08276331.2023.2199635

Malik, A., Suresh, S., & Sharma, S. (2017). Factors influencing consumers' attitude towards adoption and continuous use of mobile applications: A conceptual model. *Procedia Computer Science*, *122*, 106-113. https://doi.org/10.1016/j.procs.2017.11.348

Manrai, R., Goel, U., & Yadav, P. D. (2021). Factors affecting adoption of digital payments by semi-rural Indian women: extension of UTAUT-2 with self-determination theory and perceived credibility. *Aslib Journal of Information Management*, *73*(6), 814-838. https://doi.org/10.1108/AJIM-12-2020-0396

Moghavvemi, S., Phoong, S. W., & Lee, S. T. (2017). Impact of perceived desirability, perceived feasibility and performance expectancy on use of IT innovation: Technology adoption decisions and use behaviour. *Journal of Business Research and Insights*, *3*(1). https://doi.org/10.31357/vjm.v3i1.3639

Momani, A. M. (2020). The unified theory of acceptance and use of technology: A new approach in technology acceptance. *International Journal of Sociotechnology and Knowledge Development*, *12*(3), 79-98. https://doi.org/10.4018/IJSKD.2020070105

Mourtzis, D., Doukas, M., & Vandera, C. (2017). Smart mobile apps for supporting product design and decision-making in the era of mass customization. *International Journal of Computer Integrated Manufacturing*, *30*(7), 690-707. https://doi.org/10.1080/0951192X.2016.1187295

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, *41*(6), 1029-1055. https://doi.org/10.1111/etap.12254

Nandru, P., & Senthilkumar, S. A. (2024). Exploring the factors affecting mobile payment adoption intention among women street vendors in India. *SDMIMD Journal of Management*, *15*(1). https://doi.org/10.18311/sdmimd/2024/32806

Nassar, A. A., Othman, K., & Nizah, M. A. B. M. (2019). The impact of the social influence on ICT adoption: Behavioral intention as mediator and age as moderator. *International Journal of Academic Research*

in Business and Social Sciences, *9*(11), 963-978. https://doi.org/10.6007/IJARBSS/v9-i11/6620

Neumeyer, X., Santos, S. C., & Morris, M. H. (2020). Overcoming barriers to technology adoption when fostering entrepreneurship among the poor: The role of technology and digital literacy. *IEEE Transactions on Engineering Management*, *68*(6), 1605-1618. https://doi.org/10.1109/TEM.2020.2989740

Nnaji, C., Okpala, I., Awolusi, I., & Gambatese, J. (2023). A systematic review of technology acceptance models and theories in construction research. *Journal of Information Technology in Construction*, *28*.

OECD Going Digital Toolkit. (2023). Development. https://goingdigital.oecd.org/theme/6

Olasina, G. (2015). Factors influencing the use of m-Banking by academics: Case study SMS-based m-Banking. *The African Journal of Information Systems*, *7*(4), 4.

Onaolapo, S., & Oyewole, O. (2018). Performance expectancy, effort expectancy, and facilitating conditions as factors influencing smart phones use for mobile learning by postgraduate students of the University of Ibadan, Nigeria. *Interdisciplinary Journal of e-Skills and Lifelong Learning*, *14*, 095-115. https://doi.org/10.28945/4085

Pradhan, P., Costa, L., Rybski, D., Lucht, W., & Kropp, J. P. (2017). A systematic study of Sustainable Development Goal (SDG) interactions. *Earth's Future*, *5*(11), 1169-1179. https://doi.org/10.1002/2017EF000632

Puriwat, W., & Tripopsakul, S. (2021). Explaining social media adoption for a business purpose: An application of the UTAUT model. *Sustainability*, *13*(4), Article 2082. https://doi.org/10.3390/su13042082

Purwanto, E., & Loisa, J. (2020). The intention and use behaviour of the mobile banking system in Indonesia: UTAUT Model. *Technology Reports of Kansai University*, *62*(06), 2757-2767.

Richter, N. F., Hauff, S., Ringle, C. M., & Gudergan, S. P. (2022). The use of partial least squares structural equation modeling and complementary methods in international management research. *Management International Review*, *62*(4), 449-470. https://doi.org/10.1007/s11575-022-00475-0

Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. *The international journal of human resource management*, *31*(12), 1617-1643. https://doi.org/10.1080/09585192.2017.1416655

Rotondi, V., Kashyap, R., Pesando, L. M., Spinelli, S., & Billari, F. C. (2020). Leveraging mobile phones to attain sustainable development. National Academy of Sciences, *117*(24), 13413-13420. https://doi.org/10.1073/pnas.1909326117

Sarstedt, M., & Cheah, J. H. (2019). Partial least squares structural equation modeling using SmartPLS: A software review. *Journal of Marketing Analytics*, 7, 196-202. https://doi.org/10.1057/s41270-019-00058-3

Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., & Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. *Psychology and Marketing*, *39*(5), 1035-1064. https://doi.org/10.1002/mar.21640

Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, *5*(1), 105-115. https://doi.org/10.1016/j.jfbs.2014.01.002

Shahadat, M. H., Nekmahmud, M., Ebrahimi, P., & Fekete-Farkas, M. (2023). Digital technology adoption in SMEs: what technological, environmental and organizational factors influence in emerging countries? *Global Business Review*. https://doi.org/10.1177/09721509221137199

Sobti, N. (2019). Impact of demonetization on the diffusion of mobile payment service in India: Antecedents of behavioral intention and adoption using extended UTAUT model. *Journal of Advances in Management Research*, *16*(4), 472-497. https://doi.org/10.1108/JAMR-09-2018-0086

Srinivasan, N. (2015). Mobile applications: A game changer for rural women entrepreneurs? *Unveiling Women's Leadership: Identity and meaning of leadership in India* (pp. 126-136). London: Palgrave Macmillan UK. https://doi.org/10.1057/9781137547064_11

Summers, K. H., Baird, T. D., Woodhouse, E., Christie, M. E., McCabe, J. T., Terta, F., & Peter, N. (2020). Mobile phones and women's empowerment in Maasai communities: How men shape women's social relations and access to phones. *Journal of Rural Studies*, *77*, 126-137. https://doi.org/10.1016/j.jrurstud.2020.04.013

Sur, D., Gupta, S. D., & Upadhyay, P. (2020). Technology adoption and entrepreneurial orientation for rural women: Evidence from India. *Technological Forecasting and Social Change*, *160*, 120236-120236. https://doi.org/10.1016/j.techfore.2020.120236

Tannady, H., & Dewi, C. S. (2024). Exploring role of technology performance expectancy, application effort expectancy, perceived risk and perceived cost on digital behavioral intention of GoFood users. *Jurnal Informasi Dan Teknologi*, 80-85. https://doi.org/10.60083/jidt.v6i1.477

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, *48*(1), 159-205. https://doi.org/10.1016/j.csda.2004.03.005

TRAI. (2024). TRAI Report. https://trai.gov.in/release-publication/reports/performance-indicators-reports

Trivedi, S. K., Patra, P., Srivastava, P. R., Kumar, A., & Ye, F. (2022). Exploring factors affecting users' behavioral intention to adopt digital technologies: The mediating effect of social influence. *IEEE Transactions on Engineering Management*, *71*, 13814-13826.

Ullah, S., Kiani, U. S., Raza, B., & Mustafa, A. (2022). Consumers' intention to adopt m-payment/m-banking: the role of their financial skills and digital literacy. *Frontiers in Psychology*, *13*, Article 873708. https://doi.org/10.3389/fpsyg.2022.873708

United Nations. (2015). *Sustainable development goal 5 and 8: Ensure healthy lives and promote well-being for all at all ages*. https://www.un.org/sustainabledevelopment/health/

Ustun, A. B., Karaoglan-Yilmaz, F. G., Yilmaz, R., Ceylan, M., & Uzun, O. (2023). Development of UTAUT-based augmented reality acceptance scale: A validity and reliability study. *Education and Information Technologies*, *29*(9), 11533-11554. https://doi.org/10.1007/s10639-023-12321-3

Utomo, P., Kurniasari, F., & Purnamaningsih, P. (2021). The effects of performance expectancy, effort expectancy, facilitating condition, and habit on behavior intention in using mobile healthcare applications. *International Journal of Community Service and Engagement*, *2*(4), 183-197. https://doi.org/10.47747/ijcse.v2i4.529

Vaithilingam, S., Ong, C. S., Moisescu, O. I., & Nair, M. S. (2024). Robustness checks in PLS-SEM: A review of recent practices and recommendations for future applications in business research. *Journal of Business Research*, *173*, Article 114465. https://doi.org/10.1016/j.jbusres.2023.114465

Venkatesh, V., & Zhang, X. (2010). Unified theory of acceptance and use of technology: US vs. China. *Journal of Global Information Technology Management*, *13*(1), 5-27. https://doi.org/10.1080/1097198X.2010.10856507

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425-478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 157-178. https://doi.org/10.2307/41410412

Yu, C. S. (2012). Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. *Journal of Electronic Commerce Research*, *13*(2), Article 104.

Zhang, L., & Hu, D. (2024). National digital development strategy and its practice in India. *Countries and Regions: Dynamic Interconnectivity* (pp. 137-181). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-2835-0_6