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Article

Exploratory Study on Understanding Intention of M-banking Use based on Trying and Behavioral Reasoning Theory

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Abstract: The present study seeks to examine the intention of the new technology adoption of software-based mobile banking (M-banking) by considering two theories with a combination of structural equation modeling (SEM) and interpretive structural modeling (ISM). The combined role of these two theories (and two combined methods) is examined for the first time. The object of this study consists of 385 customers of Iranian banks. Data are collected through a questionnaire and analyzed using the structural equation model. Since the structural equation model is used to validate variables and determine the impact intensity, the ISM method is applied to understanding mutual influences amongst the variables' dimensions and finding the magnitude of effects of these variables on attitude. The results of hypothesis testing show that logical and illogical reasons for M-banking adoption significantly affect customers' attitudes toward the use of M-banking. The results of ISM show that "Usage Barrier" has the highest impact among its elements. As the two theories are combined and examined to classify the intensity of the effects, the factors in adoption behavior are investigated for an understanding of the effect of new technologies of mobile banking applications on its use.

Keywords: Mobile Banking, Technology Adoption, Behavioral Reasoning Theory, Theory of Trying, SEM-ISM approach, Theory combination.

1. Introduction

In the banking system, conducting the customers' transactions quickly and avoiding waste of time are the most pivotal element of the success of banks. Customers, in the severe competition of banks, consider the technology, speed, and technical expertise of banks as great value to choosing a bank. Mobile banking (M-banking) currently provides customers with access to a broad range of banking services, including account transfer, savings, and virtual payment completion (Farah et al., 2018; Gu et al., 2009; Laukkanen and Lauronen, 2005). M-banking improves customers' relationships with banks and increases the efficiency and effectiveness of banking services. However, customers have resisted the adoption of new technologies for various reasons, including perceived risks, fear of lacking effective use, and lack of familiarity with the Internet and its services (Claudy et al., 2015). Researchers believe that the deployment of e-banking improves the quality of services and reduces 60 to 70 % of bank charges (Akinci et al., 2004). e-banking also creates a complete transformation in the banking system by communicating rapidly with customers and providing services based on their individual needs. Such advantages, especially in developing countries, have persuaded banks to use technology to offer remote services and succeed in a highly competitive financial service market. In this regard, investigating the causes and factors affecting adopting an essential aspect of e-banking, namely, M-banking, can help reduce the costs and increase banks' productivity.

According to a CNBC forecast, approximately three-quarters (72.6 %) of the world (nearly 3.7 billion people) will use their smartphones solely to access the Internet by 2025 (Handley, 2019). WARC estimates that 51 % of the global population access the Internet via only their smartphone (Handley, 2019). Also, the official statistics by the Information Technology Organization of Iran (ITO) show that one of two people in Iran has a smartphone, which means that there are 40 million smartphone users in this country. Perceiving what elements motivate customers to accept M-banking provides insights into how banks can change the reverse attitudes toward using M-banking. Previous studies examined attitude-based and trust-based models in developing self-service technologies

(SST) adoption (Curran and Meuter, 2007; Shi et al., 2008; Bock et al., 2012; Wang et al., 2012). Young Internet users are more likely to adopt and use M-banking services than other users because banking services are less expensive and more compatible with their lifestyle (Abedini et al., 2015).

We aim to investigate the factors affecting the adoption of new technologies based on these two theories, which are not examined in previous studies. The result provides more profound insight with a combination approach. In this regard, Hubert et al. (2018) found the combination of theories in the field of technology acceptance beneficial and stated that each theory has a unique contribution to understanding the process of adoption. Meanwhile, the variety of theories offers novel insights and the need to combine models in the field of technology acceptance has been emphasized by Venkatesh (2003) who provided a unified view of the user's adoption behavior.

Based on previous studies such as Khaba and Bhar (2018) and Jain and Raj (2016), interpretive structural modeling (ISM) has been used to develop a hierarchy and contextual relationship of variables in each dimension of the "theory of trying" and "behavioral reasoning theory" in the structural model. These studies show that a combination of these two methods can effectively increase the understanding of interrelationships between components of a series of factors affecting a goal or object. Accordingly, the research questions (RQs) of the present study are formulated as follows.

RQ1. What factors are affecting M-banking adoption based on the theory of trying and behavioral reasoning theory, and what is their impact?

RQ2. Which theory plays a more critical role in explaining and defining the attitudes and intentions of bank customers?

RQ3. Which dimension of variables determined has a dominant effect based on the ISM method?

2. Literature review and hypothesis development

In this study, behavioral reasoning theory and theory of trying have been used to interpret the formation of attitudes toward M-banking. Based on the literature in the field of M-banking adoption, the adoption of M-banking and its related attitudes have not been examined in the form of an integrated framework of these two theories although the factors affecting the development of attitudes and the adoption of M-banking have been studied from the perspective of the above theories (Gupta and Arora, 2017; Chaouali et al., 2017). On the one hand, the scope of studies in the field of M-banking adoption based on behavioral reasoning theory is limited, and most studies just examined the adoption based on reasons for or against it. On the other hand, it is not enough to deal with attitude towards M-banking adoption as a single component. Rather, an important interfering factor in the adoption of M-banking needs to be considered as a multidimensional concept. The reason is that answers the questions and ambiguities about how attitudes are formed in different situations (Xie et al., 2008) among traditional theories of attitude. Therefore, in this study, the theory of trying is used to cover the ambiguous situation. In fact, unlike other adoption models, the theory of trying postulates that the coexistence of different attitudes in a hierarchical way (Bagozzi, 2007) is beneficial in addressing different “problematic” behaviors. Indeed, in contrast to traditional attitudinal theories, the theory of trying addresses the case that individuals may try a specific technology, but fail to adopt it (Bagozzi et al., 1992). Learning how to use the technology is a barrier for many customers and the likelihood of failure outweighs the success in many cases (Bagozzi et al., 1992; Xie et al., 2008). This may lead them to develop a negative attitude toward new technology adoption (Bagozzi et al., 1992). Thus, it is useful to examine the forming process of M-banking adoption through Behavioral Reasoning Theory and Theory of Trying.

2.1. Behavioral Reasoning Theory (BRT)

Ajzen succeeded in presenting the BRT in 1985 while researching and developing the theory of reasoned action (TRA) model in the article ‘*From Intentions to Actions, A Theory of Planned Behavior*’. He added the predictive variable of the sense of behavioral control to the original model of the TRA to explain why individuals intend to do a behavior but fail to do it due to their uncertainty or control of that behavior. According to social psychology, the adoption and resistance factors or non-adoption are not merely logical opposites (Westaby *et al.,* 2010). This concept describes how to use BRT (Westaby, 2014) and is used to examine the relative effect of the adoption and the factors of resistance in a separate structure. Westaby (2005b) described the reasons as "specific mental factors" that people illustrate their predicted behavior with anticipated, concurrent, and subsequent reasons. More reasons have been hypothesized under the two dimensions of "reasons for" and "reasons against" to execute a conceptual behavior. "Reasons for" and "reasons against" are distinguished for implementing a conceptual behavior and understood as "to subsume pro/ com, benefit/cost, and facilitator/constraint" (Westaby, 2005a). BRT has recently been used in several studies to understand the adoption of innovation (Chatzidakis and Lee, 2015; Claudy *et al.,* 2015; Behboudi and Koshksaray, 2017; Claudy, Peterson, and& O'Driscoll, 2013; Westaby *et al.,* 2010), and it is the basis for explaining behavioral intention in this study. One of the BRT's unique aspects is to assume that specific reasons affect attitudes toward behavior and intention (Westaby, 2005b). Claudy *et al*. (2015) used BRT to

provide innovation in services, which includes changeable values, and *reasons for/against* including flexibility, convenience/safety, and accessibility. Westaby (2005b) claimed that reasons describe the validity of incremental forecasting procedure compared to the concept of traditional belief. According to Hsee (1996), the justification mechanism plays a vital role in shaping judgment, and reasons affect the formation of attitudes (Guata & Arora, 2017). Therefore, the following hypotheses are formulated in this study.

H1: Consumers' attitudes toward M-banking adoption will be positively influenced by their reasons for M-banking adoption.

H2: Consumers' attitudes toward M-banking adoption will be negatively influenced by their reasons against M-banking adoption.

2.2. Theory of Trying

The theory of trying is helpful for cases where individuals may try a particular technology but fail to adopt it (Chauli *et al.,* 2017). This theory assumes that people's attitudes toward technology adoption are subject to three attitudes: attitude toward success, attitude toward failure, and attitude toward learning to use technology. Accordingly, it is assumed that individuals probably have a generally positive attitude toward adopting M-banking. When they have a positive attitude toward failure, they probably have a negative attitude toward M-banking adoption. The theory proposes a three-dimensional approach to conceptualization similar to the three possible responses to the potential outputs of behavioral adoption: try and succeed, try but fail, and learn how to use technology (Gupta and Arora, 2017). Therefore, the attitude toward the adoption of new technology is influenced by the combined effects of (i) attitude toward trying and success, (ii) attitude toward trying and failure, and (iii) attitude toward learning how to use technology. Based on the theory of trying, it is likely that bank customers shape their attitude toward M-banking adoption based on their attitude toward success, failure, and learning which shape the real attitude towards adoption. Therefore, according to previous studies, the relationship between the dimensions of the theory of trying and attitude toward M-banking adoption is tested for the following three hypotheses.

H3: Attitude toward success has a positive effect on attitude toward M-banking adoption.

H4: Attitude toward failure has a negative effect on attitude toward M-banking adoption.

H5: Attitude toward learning to use M-banking has a positive effect on attitude toward M-banking adoption.

Most behavior models try to predict the intention which is considered to be a strong predictor of behavior. An attitude that represents a person's evaluation is defined as "a psychological proneness that is expressed by evaluating a specific entity with a certain degree of favor or disfavor" (Eagly and Chaiken, 1993). Based on the theory of reasoned action (Fishbein and Ajzen, 1975), the theory of planned behavior (Ajzen, 1985), and the technology acceptance model (TAM) (Davis, 1989), attitude is a powerful predictor of intention. In the context of M-banking (Aboelmaged and Gebba, 2013; Lule et al., 2012; Shaikh and Karjaluoto, 2015; Wessels and Brennan, 2010) and internet banking (Hanafizadeh et al., 2014), attitude is one of the key predictors of adoption of the new technology. Therefore, the following hypotheses are tested.

H6: Attitude toward M-banking adoption has a positive effect on intention of adopting M-banking.

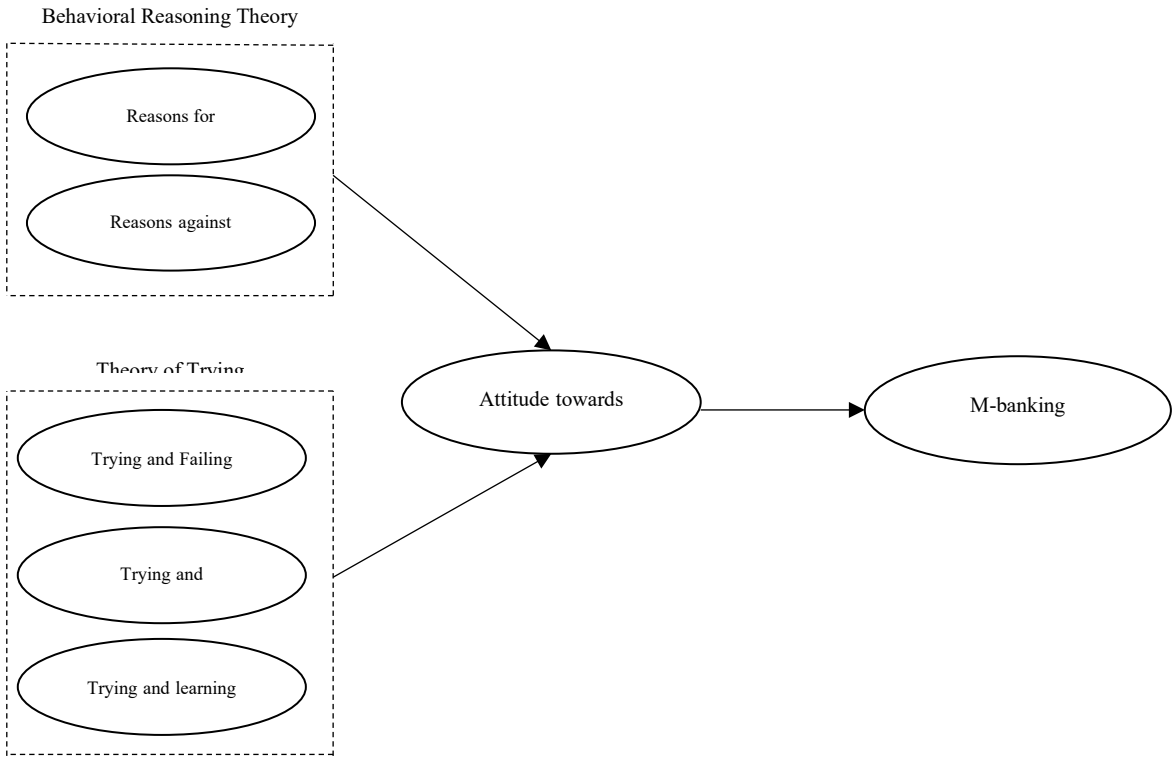

Figure 1. Conceptual research model.

3. Research Methodology and Data Analysis

3.1. Sample

In this study, 385 customers of banks in Iran who had at least one bank account and a smartphone with the capability to install and activate an M-banking app were recruited. Data were collected through an online questionnaire. The incomplete cases were excluded during the analysis of collected questionnaires, and only the fully-completed questionnaires were coded and examined. To reduce the error of understanding the text of the questions, the necessary instruction was included in the text of the questionnaire. Table 1 shows the demographics of the respondents. According to the results reported in Table 1, 61% of respondents were male, 41% were between 30 and 40 years old, about 42% had postgraduate degrees, and about 19% had earned between 20 and 30 million Iranian Rials.

Table 1. Demographic characteristics of respondents (n=385)

Characteristics	Items	%
Gender	Male	61
	Female	39
Age	<20	2.1
	20-30	26.2
	30-40	41
	40-50	28.6
	+ 50	2.1
Education attainment	Diploma degree	11.9
	Associate degree	6.2
	undergraduate degree	39.2
	postgraduate degree	42.6
	Ph. D	0
Income*	Less than 20 million IRR	16.1
	Between 20 million IRR-30 million IRR	18.7
	Between 30 million IRR-40 million IRR	14.3
	Above 40 million IRR	16.4

3.2. Questionnaire

The questionnaire consists of two main parts. The first part contains general or demographic questions about the respondent. The second part includes questions about measuring the variables of the conceptual model, including the dimensions of BRT (values and reasons) (Gupta and Arota, 2017), the dimensions of the theory of trying including trying and failing, trying and succeeding, and trying and learning (Taylor et al., 2001), attitudes toward adoption (Gupta and Arora, 2017), and intention to adopt M-banking (Gupta and Arora, 2017). The questionnaire has the Likert five-point scale, ranging from totally agree (5) to disagree (1). The 7-point semantic differential scale is used for questions related to the theory of trying.

The validity of the research instrument and the content validity are examined by using the Lawsheh CVR method (Hanafizadeh et al., 2014; Abedini et al., 2015; Abedini et al., 2020) by considering the opinions of 15 experts. 49 % of the experts are the criteria to accept the validity of the research instrument. The result indicated that the percentage of acceptance is higher than 49 %. To measure the reliability of the questionnaire, internal consistency is examined by calculating Cronbach's alpha.

30 questionnaires were distributed among experts for reflecting their opinions in the questionnaire. After considering the necessary amendments, the final questionnaire was distributed. The Cronbach's alpha of the questionnaire was 0.91 which is acceptable as it was above 0.7. Cronbach's alpha was also calculated for each research variable to find out the reliability of the research instrument.

4. Data Analysis and Validity Assessment

The analysis of the questionnaire survey result was carried out in the field of behavioral theories (Gupta and Arora, 2017; Chaouali *et al.,* 2017) by using AMOS software. First, the quality of the measurement models was evaluated. As shown in Table 2, factor loadings of less than 0.4 were excluded from the analysis (Martins *et al.,* 2014). Cronbach's alpha and composite reliability were greater than the recommended value (0.7), indicating good reliability (Hair *et al.,* 2013). For each construct, the average variance extracted (AVE) varied from 0.547 to 0.647, which exceeded the recommended value (0.5). Thus, the model had

convergent validity (Bagozi and Yi, 1981). In addition, the results showed that the model had discriminant validity for each variable as the square root of the AVE exceeded its correlation with other variables. Therefore, the proper measurement of the factors is reliable (Fornell and Larcker, 1981).

Table 2. Measuring variables

Variables	Items	Estimate	CA	CR	AVE
Reasons for					
Convenience	Q1	0.702	0.780	0.849	0.642
	Q2	0.680			
	Q3	0.634			
Ubiquitous	Q4	0.501			
	Q5	0.526			
	Q6	0.731			
Relative Advantage	Q7	0.517			
	Q8	0.629			
	Q9	0.644			
Reasons against					
Usage Barrier	Q10	0.702	0.848	0.815	0.588
	Q11	0.592			
	Q12	0.624			
Risk Barrier	Q13	0.683			
	Q14	0.546			
	Q15	0.388			
Tradition Barrier	Q16	0.684			
	Q17	0.505			
	Q18	0.249			
Trying and success	Q19	0.669	0.802	0.795	0.632
	Q20	0.706			
	Q21	0.594			
Trying and learning	Q22	0.664	0.779	0.744	0.580
	Q23	0.481			
	Q24	0.686			
Trying and Failing	Q25	0.612	0.704	0.710	0.647
	Q26	0.470			
	Q27	0.668			
Attitude towards adoption M-banking	Q28	0.752	0.718	0.726	0.572
	Q29	0.734			
	Q30	0.561			

Intention to adopt M-banking	Q31	0.783	0.712	0.783	0.547
	Q32	0.749			
	Q33	0.684			

Researchers believe that standard method variance or common method error leads to potential problems for the construct validity of the model in behavioral research (Podsakoff *et al.,* 2003). There are several methods to decrease the possibility of standard method variance in sample data . Regarding suggestions offered by previous researchers, the following methods are considered.

(1) All participants were guaranteed of being anonymous and privacy preservation.

(2) All participants were informed that there was no true or false answer.

(3) All participants have presented the real case scenarios with genuine questions

(Chang *et al.,* 2010; Chopdar *et al.,* 2018).

Also, Harman's single-factor test was used. It is a widely used technique to control common method variance (Podsakoff *et al.,* 2003). Based on this technique, all observed variables are counted in the exploratory factor analysis, and the number of factors that are essential to account for the variance is investigated. When only one factor is determined or among the extracted factors, one factor indicates a considerable variance of the overall variance of factors (over 50 %), indicating significant standard method error. As a result, after using the mentioned method, the amount of variance was 33 %. In this regard, there is no standard method error in this research. After assuring the proper measurement of the constructs and their reliability and validity, a structural model was used to test the research hypotheses, and its results were analyzed.

5. SEM Result

Considering the path coefficients and their importance (Table 3), there is a significant positive relationship between BRT with two dimensions of "reason for" and "reason against" and attitude toward M-banking adoption. According to the results obtained from the structural model, the *t*-value of logical reasons for M-banking adoption is 3.178, and its path coefficient is 0.160. The *t*-value of logical reasons for M-banking non-adoption is 2.661, and its path coefficient is 0.136. This shows that the logical reason influences M-banking adoption more than non-adoption. Concerning the dimensions of the theory of trying, failure and success in using M-banking have a significant positive impact on attitude toward M-banking adoption. The structural model results confirm the significant effect of "attitude toward success," as one of the dimensions of the theory of trying with the *t*-value of 2.916. Also, the impact of "attitude toward success" on attitude toward M-banking adoption has the value of 0.159. Another dimension of the theory of trying, attitude toward failure, and attitude toward success influence the attitude toward M-banking adoption with the *t*-value of 8.665. Also, the effect of "attitude toward failure" on attitude toward M-banking adoption has the value of 0.841. The third dimension of the theory of trying, attitude toward learning, did not significantly affect attitude toward M-banking adoption (*t*-value of 1.066), which is less than 1.96. In addition to measuring the significant relationship between BRT and the theory of trying, the relationship between attitude toward M-banking adoption and intention to adopt was tested. Attitude toward M-banking adoption had a significant effect on the intention to adopt with a *t*-value of 10.315, and the impact of attitude on the intention to adopt had a *t*-value of 0.860. The findings from the structural model are reported in Model 2 and Table 3.

Table 3. Summary of hypotheses testing results

Hypothesis	*Relationship*			*E.st*	*t-value*	*P*
H1	Reason for	→	Attitude towards adoption	.160	3.178	.001
H2	Reason against	→	Attitude towards adoption	.136	2.661	.008
H3	Trying and succeeding	→	Attitude towards adoption	.159	2.916	.004
H4	Trying and failing	→	Attitude towards adoption	.841	8.665	.000
H5	Trying and learning	→	Attitude towards adoption	.058	1.066	.287
H6	Attitude towards adoption	→	Intention adopt M-banking	.860	10.315	.000

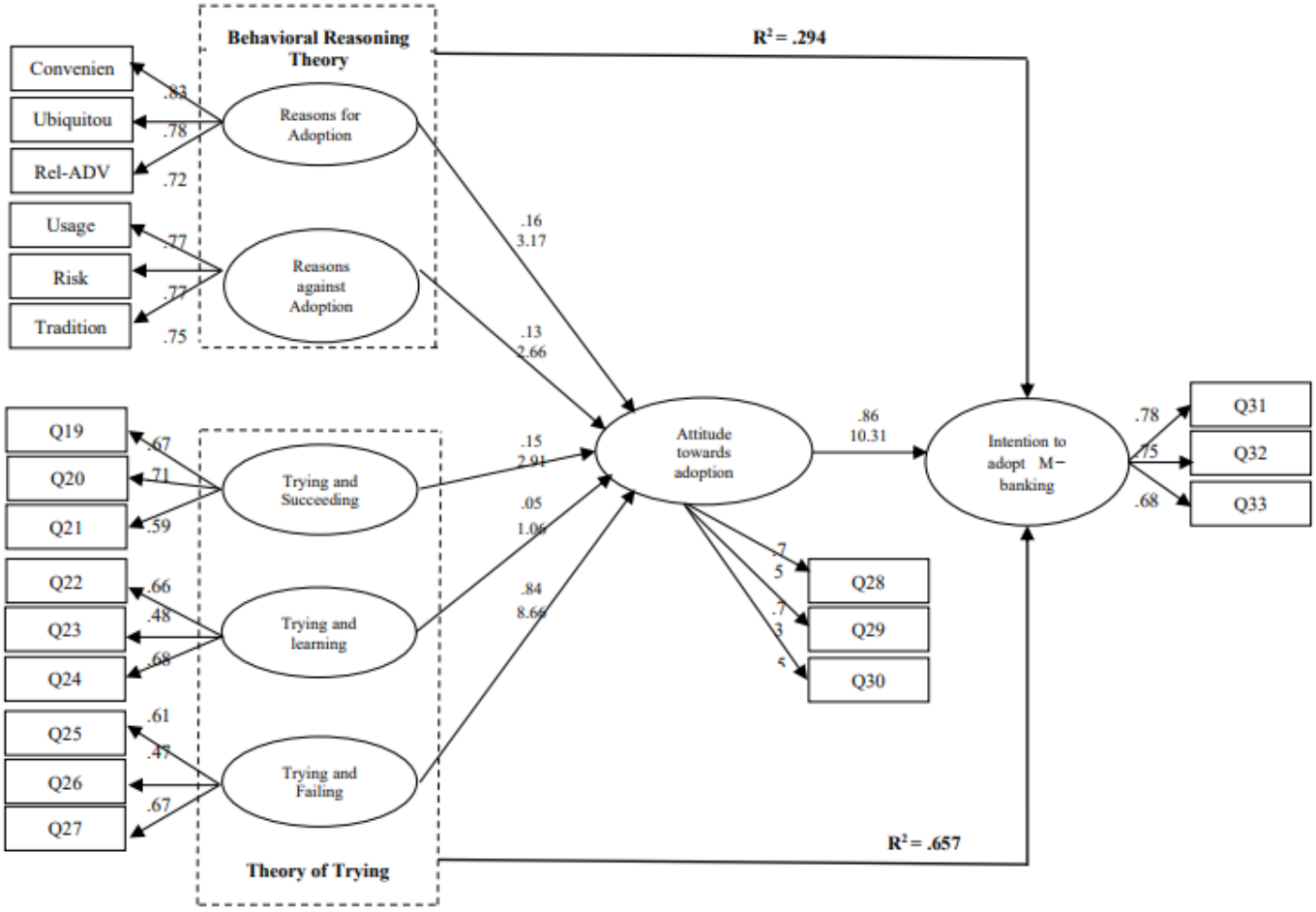

Figure 2. Analytical model.

Table 4. Confirmatory factor analysis

	(df)	P	CMINI/DF	CFI	IFI	NFI	RMSEA	Lo	Hi	PCLOSE
Model 1	428	.000	1.933	0.903	0.906	.961	0.013	0.109	0.118	.000

Note: CFI = comparative fit index; **RMSEA** = root mean square error of approximation; **Lo**/**Hi** = lower and upper limits for a 90 per cent confidence interval around RMSEA; **PCLOSE** = closeness of fit for RMSEA

6. ISM Methodology and Data Analysis

The interpretive structural modeling (ISM) approach was first developed by Warfield to analyze complex systems. In this approach, systems are examined by identifying interactive infrastructural relationships between the components and particular elements of the system and the formation of a hierarchical structure of the relationships that exist between these components (Fu *et al.,* 2017). In ISM, digraph theory is utilized to introduce and present units associated with the system and interactive relationships that exist between these units. Furthermore, other methods and theories, including matrix operation theory and computer-aided calculations, are utilized to establish an interpretable structural model (Chang *et al.,* 2013).

ISM is composed of the following step.

Step 1: Identification of the indicators, criteria, and factors of interest

Step 2: Determination of the strength of the interactive relationships between the factors and the formation of a structural self-interaction matrix (SSIM). The strength of relationships is determined through pairwise comparisons of the factors.

Step 3: Aggregation of the opinions of experts and the formation of a judgment matrix

The geometric mean is utilized for the aggregation of the opinions of experts. Accordingly, the geometric mean is calculated for the corresponding elements (entries) of the pairwise comparison matrices and then will restrain to an integrated or aggregate matrix.

The geometric mean for entries "a_{ij}" of fuzzy numbers is calculated from the following equation (Jeng, 2015).

$$a_{ij} = \left(\prod_{k=1}^{K} a_{ij}^{K}\right)^{1/K} \quad (1)$$

where *K* denotes the number of experts.

Step 4: Normalization of the aggregated judgment matrix

The normalized matrix is obtained from the aggregated judgment matrix. Accordingly, the value of γ is first calculated from Eq. (2).

$$\gamma = max_{1\le i\le n} \sum_{j=1}^{n} u_{ij} \quad (2)$$

where γ was calculated, all the entries in the elements of the judgment matrix are divided by the value of γ. Thereby, each of the entries of the judgment matrix is normalized, and finally, the normalized matrix is obtained (Abdullah and Zulkifli, 2015).

Step 5: Defuzzification of the normalized judgment matrix

In this step, the normalized judgment matrix of experts' opinions is defuzzified using equation three and implemented on each of the elements. If *X* is one of the fuzzy entries of the aggregated matrix of the expert opinion (Gumus *et al.,* 2013), then

$$m = \frac{c-a+b-a}{3} + a \quad (3)$$

Step 6: Calculation of threshold

When all fuzzy numbers in the normalized matrix were defuzzified, then, the defuzzified matrix was obtained and a threshold is calculated by arithmetic mean of all the elements and entries in the matrix (Kavilal *et al.,* 2017):

$$C = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij}}{n} \quad (4)$$

Step 7: Formation of the incidence matrix

The incidence matrix is formed after the threshold is calculated. The elements of the defuzzified matrix are separately compared with the threshold value. If an element has a value higher than the threshold, then a number is assigned to the corresponding entry. Otherwise, it is identified as zero (Wang *et al.,* 2018).

Step 8: Formation of the initial reachability matrix

The initial reachability matrix is formed through the summation of the incidence matrix with the identity matrix.

$$M = R + I \quad (5)$$

Step 9: Formation of the final reachability matrix

The final reachability matrix is formed by inserting the transmissibility factor. Transmissibility in ISM is assumed to be infrastructural. If element "a" drives element "b", and element "b" drives element "c," then element "a" drives element "c." This is the concept of transmissibility. For the identification of the internal relationships between the elements, the initial reachability matrix needs to rise to power until the following equation is satisfied. (Jia *et al.,* 2014)

$$M^* = M^K = M^{K+1}, K > 1 \quad (6)$$

Step 10: Formation of the entry, exit, general, and leveling sets

In this step, the entry, exit, and general sets are formed with the final reachability matrix. The entry set includes its element and other elements that drive the element. The exit set includes its element and other elements that are derived from the element. When the entry and exit sets are determined, the general set is determined for each element (Thakkar *et al.,* 2008).

Step 11: Plotting a structural model

When the levels of the elements are determined, a graph is plotted from the final reachability matrix by removing the relations defined by transmissibility (Chang *et al.,* 2013).

7. Results

ISM method starts with compiling the questionnaire. This questionnaire composes of the interactive relationships between the factors between “No relationship” to “Completely associated”. Expert decisions are collected and used to find out how the variables or factors are interrelated. The methodology is interpretive as the judgment of the group decides whether and how the variables are related. It is structural too based on the relationship. An overall structure is extracted from a complex set of variables.

The opinions of six experts in mobile marketing were employed. Reliable results were obtained according to the initial reachability matrix, the final reachability matrix, and the digraph plotted by the ISM approach (Fig. 3). According to the results, the component of the "usage barrier" was first identified as the key and foremost factor which influence the creation of positive or negative attitudes of customers toward accepting M-banking. In other words, the barriers to using M-banking perceived by the user considerably influence the user's judgments and assessments of the tools in the banking industry. Then, the components of trying and learning are respectively identified as important factors. Also, the three components such as convenience, trying and success, and trying and failure are classified at the same level with similar importance in influencing users' attitudes toward M-banking. Finally, the three components including relative advantage, risk barriers, and traditional barriers are classified at the same level of similar importance in influencing users' attitudes toward M-banking. Also, these three factors have less importance than the other

six factors. Another result of the ISM approach is the internal interactions between these nine components. According to the results, their visual format is drawn in a diagram that depicts interactions between the components, which means driving and dependence.

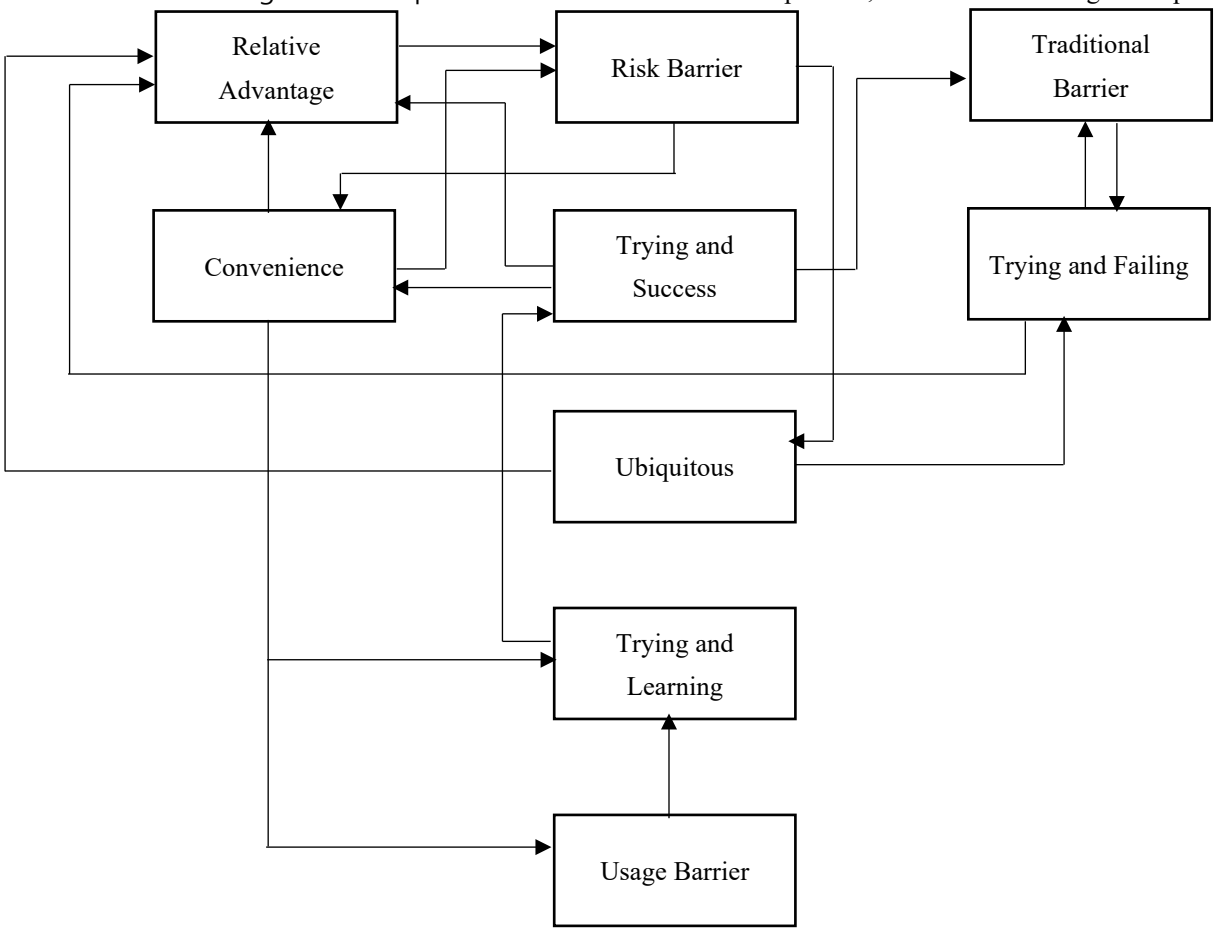

Figure 3. ISM diagram.

8. Discussion and Conclusion

The results of testing the hypotheses show that logical reasons for adopting M-banking have a significant effect on the bank customers' attitudes toward M-banking adoption. Therefore, to strengthen the attitude toward M-banking adoption, it is advisable to reinforce the customers' logical reasons for adopting the technology. One of the most important logical reasons for adopting M-banking is related to its easy use where saving time and energy plays a key role. Therefore, the banks need to pay attention to the features that speed up the performance of banking affairs. In addition, to facilitate the use of M-banking, reducing the complexities of this system and mobile software is necessary so that users can easily do their banking operations just by clicking a button. Another logical reason for adopting M-banking relates to the accessibility of the M-banking system. Mobile banking applications and their supporting systems are designed to provide uninterrupted services. Alternative backup systems transfer data quickly when backup systems fail to work at certain moments. Having competitive capabilities is another factor contributing to the adoption of M-banking. In other words, banks need to diversify their banking activities and develop M-banking applications to make users feel M-banking is advantageous. Having features such as fast and free access to account information, and the ability to perform banking operations at any time and receive financial and account reports with just one click can generate competitive advantages.

Results also showed that the customers' attitudes toward success in M-banking significantly affect their attitudes toward M-banking. Therefore, banks need to reinforce the customers' attitudes toward success when using M-banking to strengthen the customers' attitudes toward the adoption of M-banking. Users' satisfaction with the use of M-banking plays a key role in their

attitudes toward success, so it is recommended that bank employees explain the advantages of mobile bank applications to the customers and help them install and use these applications. They also need to encourage the customers to use them. Another factor that improves users' attitudes toward success is a pleasant feeling that a user experiences when using this system. Thus, it is recommended to provide a comprehensive report or feedback on their latest banking operations immediately after the operations are completed, reassuring the users that their banking operations are successful. Also, to help the customers satisfy with M-banking services, it is important to assure the security of this system as well as the protection of their account information. Therefore, banks need to provide one-time passwords for their customers.

Customers' attitudes toward learning to use M-banking do not significantly affect their attitudes toward M-banking adoption. Therefore, to enhance the customers' attitudes toward M-banking adoption, banks need to strengthen their attitudes toward users′ learning. In this regard, bank employees need to educate their customers on how to work with bank applications to facilitate the effective use of the M-banking system. The education makes users feel confident and enjoyable. Brochures and instruction cards are regarded as helpful tools for education, so banks need to provide the tools and install them on mobile phones freely.

The customers' attitudes toward M-banking adoption significantly affect its use. Therefore, banks need to change customers' attitudes. The key point in creating a favorable attitude emanates from the advantages of these applications. Therefore, customers need to be given the necessary information on the diversity of their services, and in general, all the benefits hrough massive promotions.

In this study, a combination of fuzzy interpretive structural modeling (ISM) and structural equation modeling (SEM) approaches were employed to investigate the importance of components influencing bank customers' attitudes towards accepting M-banking and identifying internal interactions between the components of M-banking. The importance of factors influencing customers′ attitudes was investigated and presented in a hierarchical diagram. The conventional ISM approach was combined with the set of fuzzy numbers to overcome the shortcomings of the traditional approach with experts' opinions about the level and strength of the relationship between the two components. The results show that the usage barrier is considered as an important factor in the creation of customers′ attitudes toward accepting M-banking. Trying and learning and ubiquitousness were identified as important factors that contribute to the customers' attitudes toward M-banking. The three components such as convenience, trying and success, and trying and failure are at the same level of importance in influencing the users' attitudes toward accepting M-banking. The other components including relative advantage, risk barriers, and traditional barriers are classified to have the least contribution to the users' attitudes. Relative advantage and trying and failing are identified as the most influential components while relative advantage, risk barriers, and traditional barriers are identified as the most sensitive and vulnerable components. Due to the importance of ease of use and ability to access the applications, the convenience, and easiness to use M-banking software. To promote the technology associated with the applications, it is necessary to define processes that facilitate the usage of such applications and investment in line with training users and planning carefully.

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References

1. Abdullah, L., & Zulkifli, N. (2015). Integration of fuzzy AHP and interval type-2 fuzzy DEMATEL: An application to human resource management. *Expert Systems with Applications*, *42*(9), 4397–4409.
2. Abedini K., Amir, Franklin, Drew, & Heidarzadeh H. (2015). The relationship between e-lifestyle and Internet advertising avoidance, *Australasian Marketing Journal*, *23*, 38-48.

3. Abedini Koshksaray, A., Ardakani, A. (Arsalan), Ghasemnejad, N., & Qhodsikhah Azbari, A. (2020). The effect of customer orientation coaching on employee's individual performance and financial and non-financial performance: A case of Tejarat bank in Iran. *International Journal of Islamic and Middle Eastern Finance and Management*, *13*(3), 437–469.
4. Aboelmaged, M., & Gebba, T. R. (2013). Mobile banking adoption: an examination of technology acceptance model and theory of planned behavior. *International journal of business research and development*, *2*(1).
5. Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Action-control: From cognition to behavior, Edited by: Kuhl, J and Beckman, J. 11–39. Heidelberg: Springer.
6. Ajzen, Icek. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes.
7. Akinci, S., Aksoy, S., & Atilgan, E. (2004). Adoption of internet banking among sophisticated consumer segments in an advanced developing country. *International Journal of Bank Marketing*, *22*(3), 212–232.
8. Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human relations*, *45*(7), 659–686.
9. Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the association for information systems*, *8*(4), 3.
10. Behboudi, M., & Koshksaray, A. A. (2017). Online Advertising. *International Journal of Innovation in the Digital Economy*, *8*(4), 1–17.
11. Bock, G.W., Lee, J., Kuan, H.H. & Kim, J.H. (2012). The progression of online trust in the multi-channel retailer context and the role of product uncertainty. *Decision Support Systems*, *53*, 97–107.
12. Chang, A. Y., Hu, K. J., & Hong, Y. L. (2013). An ISM-ANP approach to identifying key agile factors in launching a new product into mass production. *International Journal of Production Research*, *51*(2), 582–597.
13. Chang C. W., Chou F. C., Hung P. Y. (2010). Evaluation of bio aerosol sampling techniques for *Legionella pneumophila* coupled with culture assay and quantitative PCR.
14. Chaouali, W., Souiden, N., & Ladhari, R. (2017). Explaining adoption of mobile banking with the theory of trying, general self-confidence, and cynicism. *Journal of Retailing and Consumer Services*, *35*, 57–67.
15. Chatzidakis, Andreas & Lee, Michael. (2013). Anti-Consumption as the Study of Reasons Against. *Journal of Macromarketing*. *33*. 190–203.
16. Chopdar, Prasanta & Korfiatis, Nikos & Sivakumar, VJ & Lytras, Miltiadis. (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. Forthcoming. 10.1016/j.chb.2018.04.017.
17. Claudy, M.C., Garcia, R. and O'Driscoll, A. (2015). Consumer resistance to innovation—a behavioral reasoning perspective. *Journal of the Academy of Marketing Science*, *43*, 528–544.
18. Claudy, Marius & Peterson, Mark & O'Driscoll, Aidan. (2013). Understanding the Attitude-Behavior Gap for Renewable Energy Systems Using Behavioral Reasoning Theory. *Journal of Macro-marketing*. *33*. 273.
19. Curran, J.M. & Meuter, M.L. (2007). Encouraging existing customers to switch to self-service technologies: put a little fun in their lives. *Journal of Marketing Theory and Practice*, *15*, 283–298.
20. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319–340.
21. Eagly, A. H., & Chaiken, S. (1993). The psychology of attitudes. Harcourt brace Jovanovich college publishers.
22. Farah Maya, Muhammad Junaid Shahid Hasni, Abbas Khan Abbas, (2018). Mobile-banking adoption: empirical evidence from the banking sector in Pakistan. *International Journal of Bank Marketing*.
23. Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention, and behavior: An introduction to theory and research. *Philosophy and Rhetoric*, *10*(2).
24. Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research* (18:1), 39–50.
25. Fu, K., Xia, J. B., Zhang, X. Y., & Shen, J. (2017). System structural analysis of communication networks based on DEMATEL-ISM and entropy. *Journal of Central South University*, *24*(7), 1594–1601.
26. Gu, J.C., Lee, S.C. & Suh, Y.H. (2009). Determinants of behavioral intention to mobile banking. *Expert Systems with Applications*, Vol. 36 No. 9, pp. 11605-11616.
27. Gumus, A. T., Yayla, A. Y., Çelik, E., & Yildiz, A. (2013). A combined fuzzy-AHP and fuzzy-GRA methodology for hydrogen energy storage method selection in Turkey. *Energies*, 6(6), 3017-3032.
28. Gupta, A. & Arora, N. (2017). Consumer adoption of m-banking: a behavioral reasoning theory perspective. *International Journal of Bank Marketing*, Vol. 35 Issue: 4.
29. Hair, Joseph F. and Ringle, Christian M. and Sarstedt, Marko. (2013). Editorial - Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance. *Long Range Planning*, *46(*1-2), 1–12.

30. Hanafizadeh, P., KEATING, B., & Khedmatgozar, H. R. (2014). A systematic review of Internet banking adoption. *Telematics and Informatics*, *31*(3), 492–510.
31. Hanafizadeh, Payam & Behboudi, Mehdi & Abedini Koshksaray, Amir & Jalilvand Shirkhani Tabar, Marziyeh. (2014). Mobile-banking adoption by Iranian bank clients. *Telematics and Informatics*. *31*. 62–78.
32. Handley, l. (2019, Jan 24). Nearly three-quarters of the world will use just their smartphones to access the Internet by 2025. CNBC. https://www.cnbc.com/2019/01/24/smartphones-72percent-of-people-will-use-only-mobile-for-internet-by-2025.html
33. Hubert, M., Blut, M., Brock, C., Zhang, R. W., Koch, V., Riedl, R. (2018). The influencing of acceptance and adoption drivers on smart home usage, *European journal of marketing*. *53*, 1073–1098.
34. Jain, V., & Raj, T. (2016). Modeling and analysis of FMS performance variables by ISM, SEM and GTMA approach. *International journal of production economics*, *171*, 84–96.
35. Jeng, D. J. F. (2015). Generating a causal model of supply chain collaboration using the fuzzy DEMATEL technique. *Computers & Industrial Engineering*, 87, 283–295.
36. Jia, P., Diabat, A., & Mathiyazhagan, K. (2014). Analyzing the SSCM practices in the mining and mineral industry by ISM approach. *Resources Policy*, *46*, 76–85.
37. Kavilal, E. G., Venkatesan, S. P., & Kumar, K. H. (2017). An integrated fuzzy approach for prioritizing supply chain complexity drivers of an Indian mining equipment manufacturer. *Resources Policy*, *51*, 204–218.
38. Khaba, S., & Bhar, C. (2018). Analysing the barriers of lean in Indian coal mining industry using integrated ISM-MICMAC and SEM. Benchmarking: *An International Journal*.
39. Laukkanen, T. & Lauronen, J. (2005). Consumer value creation in mobile banking services. International Journal of Mobile Communications, *3*, 325–338.
40. Lee, H., Harindranath, G., Oh, S. and Kim, D.J. (2015). Provision of mobile banking services from an actor–network perspective: implications for convergence and standardization. *Technological Forecasting and Social Change*, *90*, Part B, 551–561.
41. Lule, I., Omwansa, T. K., & Waema, T. M. (2012). Application of technology acceptance model (TAM) in m-banking adoption in Kenya. *International journal of computing & ICT research*, *6*(1).
42. Podsakoff, P & MacKenzie, Scott & Y. Lee, J.-Y & P Podsakoff, N. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*. *88*. 879–903. 10.1037/0021-9101.88.5.879.
43. Martins, C., Oliveira, T., & Popovic, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management*.
44. O'Driscoll, A., Claudy, M. and Peterson, M. (2013). Understanding the Attitude-Behavior Gap for Renewable Energy Systems Using Behavioral Reasoning Theory. *Journal of Macro-marketing 33*(4) 273–287.
45. Shaikh, A. A., & Karjaluoto, H. (2015). Mobile banking adoption: A literature review. Telematics and informatics, *32*(1), 129–142.
46. Shi, W., Shambare, N. & Wang, J. (2008). The adoption of internet banking: an institutional theory perspective. *Journal of Financial Services Marketing*, *12*, 272–286.
47. Thakkar, J., Kanda, A., & Deshmukh, S. G. (2008). Interpretive structural modeling (ISM) of IT-enablers for Indian manufacturing SMEs. *Information Management & Computer Security.*
48. Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly*, *27*, 425-478.
49. Venkatesh, V., Thong, J.Y. and Xu, X.(2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, *36*, 157–178.
50. Venkatesh, V. and Davis, F.D.(2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46, 186–204.
51. Wang, C., Harris, J. & Patterson, P.G. (2012). Customer choice of self-service technology: the roles of situational influences and past experience. *Journal of Service Management*, *23*, 54–78.
52. Wang, W., Liu, X., Qin, Y., Huang, J., & Liu, Y. (2018). Assessing contributory factors in potential systemic accidents using AcciMap and integrated fuzzy ISM-MICMAC approach. *International Journal of Industrial Ergonomics*, *68*, 311–326.
53. Warfield, J. N. (1974). Toward interpretation of complex structural models. IEEE Transactions on Systems, Man, and Cybernetics, (5), 405–417.
54. Wessels, L., & Drennan, J. (2010). An investigation of consumer acceptance of M-banking. *International Journal of bank marketing*.
55. Westaby, J. D., Versenyi, A., & Hausmann, R. C. (2005). Intentions to work during terminal illness: An exploratory study of antecedent conditions. *Journal of Applied Psychology*, *90*, 1297−1305.
56. Westaby, J.D. (2005b). Behavioural reasoning theory: identifying new linkages underlying intentions and behavior. *Organizational Behaviour and Human Decision Processes*, *98*, 97–120.

57. Westaby, J.D. (2005a). Comparing attribute importance and reason methods for understanding behavior: an application to internet job searching. *Appl. Psychol*. *54* (4), 568–583.
58. Westaby, James & Pfaff, Danielle & Redding, Nicholas. (2014). Psychology and Social Networks A Dynamic Network Theory Perspective. *The American psychologist*. *69*. 269–84. 10.1037/a0036106.
59. Westaby, James & Probst, Tahira & Lee, Barbara. (2010). Leadership decision-making: A behavioral reasoning theory analysis. *Leadership Quarterly*. *21*. 481–495. 10.1016/j.leaqua.2010.03.011.
60. Xie, C., Bagozzi, R. P., & Troye, S. V. (2008). Trying to prosume: toward a theory of consumers as co-creators of value. *Journal of the Academy of marketing Science*, *36*(1), 109–122.