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Ranking information system success factors in mobile banking systems with VIKOR

Abbas Toloie-Eshlaghy[1] and Mahmonir Bayanati[2]

[1]Industrial Management Department, Science and Research Branch, Islamic Azad University, Tehran, Iran.

[2]Information Technology Management Department, Science and Research Branch, Islamic Azad University, Tehran, Iran.

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ABSTRACT

Mobile banking system plays a major role in mobile commerce. As wireless networks are existed, today new generation of electronic commerce applications are emerged and expanded, that are known as mobile commerce. In this field one of services that served in bank industry with cell phones is mobile banking. Although many studies have been conducted to assess users' satisfaction with mobile applications, none has focused on ranking the effective alternatives. So the goal of this article is to extract the effective alternatives of user's satisfaction and rank them with VIKOR. The research extract 42 alternatives based on Delone and McLean's Revised Model and chooses 21 effective alternatives by expert's ideas and then ranking them. VIKOR shows that data accuracy and security are ranked as first and second alternatives.

Introduction

The Internet revolution, which has spread visibly since the 1990s, fundamentally changed the banking business sector in terms of the variety of financial services and how they are provided. In particular, the Internet has significantly affected internal banking processes. The biggest change is in banks' service channel, which has changed from branch offices in the past to incorporate CDs/ATMs (cash dispensers/automated teller machines), phone banking, PC banking, Internet banking and mobile banking. (Kim et. all, 2008)

Internet banking allows customers to conduct financial transactions on a secure website operated by their retail or virtual bank, credit union or building society. People can perform financial transactions such as an account to account transfer, bill payment, wire transfer, loan application, new account creation, etc.(http://en.wikipedia.org). Mobile banking (Internet banking using mobile devices, also known as M-Banking, SMS Banking, etc.) can be used to perform balance checks, account transactions, payments, etc. via a mobile device such as a mobile phone (Rajnish et al., 2007).

Considering that Internet banking in Iran has 63% growth in 2011 comparing with 2010 but there is not such growth in using mobile banking, and mobile bank cannot play a major role in Iranian bank transactions (http://ebinews.com). Iran is not the only country experiencing this phenomenon; countries such as Finland, China, Japan and Taiwan also are dealing with a similar problem (Suoranta and Mattila, 2004; Mallat et al., 2004; Scornavacca and Barnes, 2004; Laforet and Li, 2005; Laukkanen and Lauronen, 2005; Luarn and Lin, 2004; Riivari, 2005; Laukkanen, 2007; Kim et al., 2008). For example, less than 1% of banking transactions in Taiwan were conducted via mobile banking in 2003 (Luarn and Lin, 2004). Even though mobile banking technology and applications are available, international usage rates have remained fairly low (Suoranta and Mattila, 2004).

What is the reason behind the belated dissemination of mobile banking, when it benefits both banks and their customers? The reason can be found in these systems' limitations (tiny screens and keypads and slower transaction speeds than Internet banking) compared to Internet banking, and in users' distrust of wireless transactions' security, although mobile banking does offer users a financing method that is cheaper, safer and more convenient than Internet banking wherever and whenever they need it (Luarn and Lin, 2004; http://www.agri-bank.com/Static/OLB/MobileBank.asp).

From the perspective of banks that develop mobile banking, a great number of customers should use mobile banking in order to produce a high return on their investment. Of course, users will embrace mobile banking if they consider its actual value in terms of time, cost and effort. Therefore, the factors that affect acceptance of mobile banking are complicated by the relationships among them. Yet, little research has studied mobile banking. In particular, almost no research has ranked the factors that affect on mobile banking Internet diffusion rate. This study's aims are twofold. First, it examines mobile banking from an information system perspective, based on DeLone's and McLean's IS (Information System) success model (1992, system quality and information quality). Second, it ranks the information system success factors in mobile banking system.
Exploring mobile banking factors hopefully will increase our understanding of how they influence customers. This kind of study will be able to offer some information system and design guidelines and strategies for companies involved in mobile banking. The rest of the paper is organized as follows: Section 2 presents the theoretical background. Section 3 describes the research model and hypotheses. Section 4 presents the research methodology, and Section 5 describes the analysis and findings

Tele:

E-mail addresses: toloie@gmail.com

of our research. Section 6 shows the discussion and implications, and the Section 7 concludes with limitations and suggestions for further research. In Iran, mobile banking is defined as banking transactions using mobile devices such as cell phones, PDAs (Personal Digital Assistants), smart phones and other devices (except for laptops). It can be considered a type of Internet banking because it requires Internet access.

This study therefore regards mobile banking as something of an information system. The study is based on DeLone & McLean's (1992) IS success model and ranking information system success factors in mobile banking systems with VIKOR. Following is an explanation of why the IS success model was introduced and why factors like trust and security is an important factors in mobile banking.

DeLone and McLean (1992) reviewed IS success measures and devised a model of the interrelationships between six IS success factors: (1) system quality, (2) information quality, (3) IS use, (4) user satisfaction, (5) individual impact and (6) organizational impact, as in the Fig. 1 (Wang and Liao, 2008). Based on prior studies, DeLone and McLean (2003) updated their model of IS success by adding a ''service quality" measure. In general, the IS success model consists of three dimensions – system quality, information quality and service quality, as in the Fig. 2. Whether service quality should be included in the IS success model is controversial.

According to DeLone and McLean (2003), ''to measure the success of a single system (individual system), 'information quality' or 'system quality' may be the most important quality component. For measuring the overall success of the IS department, as opposed to an individual system, 'service quality' may become the most important variable." Therefore, service quality is important for mobile banking; however, it was excluded from this study's model because this study is based on individuals and individual mobile phone banking systems.

DeLone and McLean (1992) insisted that an information system's quality affects the extent of its utilization and its users' satisfaction, ultimately influencing the behaviors of individuals and the organizations to which they belong. As the quality of an information system, DeLone and McLean (1992) proposed the quality of the information system itself, in addition to the quality of the information that is the product the information system provides. Mobile banking can be considered a type of information system. System and information quality are very important elements of mobile banking (Aladwani and Palvia, 2002; Palmer, 2002).

Unlike conventional information systems, however, mobile banking involves using a very small terminal screen that limits the amount of content that can be displayed. Therefore, how information is organized and presented is extremely important. Evaluating mobile banking services' quality requires ranking the factors that affect the users more. System quality is based on the productivity model, which evaluates the extent of information system resource and investment utilization. System quality is important in the Internet and mobile environments. Furthermore, information quality signifies the quality of information output by the system, rather than the quality of the system itself. System quality and information quality are important factors in the IS success model, which determines users' trust in financial transactions. Because mobile banking does not involve face-to-face contact, high system quality and information quality are critical to ensure users' trust and security (Kim and Benbasat, 2003). Thus, we assume that the IS success model combined with interface design and trust can be adapted to customer satisfaction in the mobile banking context.

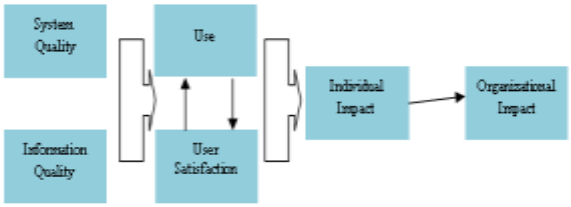

Figure 1: DeLone and McLean's Model (1992)

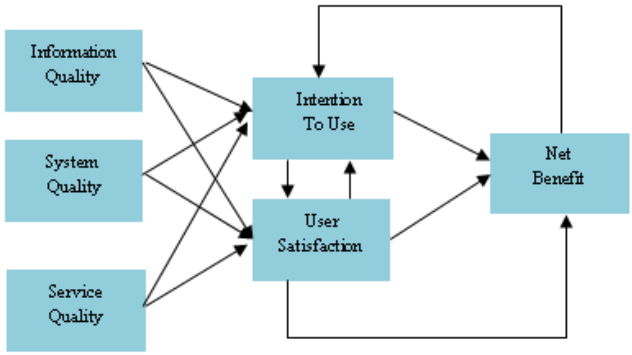

Figure 2: DeLone and McLean's (2003) updated IS success model

Research model and hypotheses

The IS success model (DeLone and McLean, 1992) explains the impact of IS at the individual and organizational levels. The research model used in this paper (Fig. 2) builds on the individual level constructs of system quality, information quality and service quality, and their subsequent impact on trust and customer satisfaction.

System Quality

The concept of system quality, first introduced by DeLone and McLean (1992), was defined as quality manifested in a system's overall performance and measured by individuals' perceptions (DeLone and McLean, 2003; Liu and Arnett, 2000; Schacklett, 2000). Vendors are faceless on the mobile banking, so their systems' quality becomes the ''online storefront" by which first impressions are formed. It stands to reason that if a consumer perceives a vendor's system to be of high quality, that consumer will be likely to have high levels of trust in the vendor's competence, integrity and benevolence, and will be willing to spend money with that vendor (McKnight et al., 2002a, b). Given that this study is based on DeLone's & McLean's model, it attempts to rank the factors as in table1.

Table1: System Quality Factors

Easy Learning Easy Using Availability Knowing User Needs System Benefits Output Accuracy	System Quality

Information Quality

The quality of information, as assessed by customers, usually influences their satisfaction (Bharati and Chaudhury, 2004; Kim et al., 2008; Misic and Johnson, 1999). Gallagher (1974) also used customers' perception of an information system's value to determine information quality. Another study underscored information's perceived importance and utility; but others do not consider information quality separately, but as an

integral part of satisfaction. The above argument leads to the following factors in table2.

Table 2: Information Quality Factors

Security Connection Usefulness On Time Clarity Content	Information Quality

System Use

The degree and manner in which staff and customers utilize the capabilities of an information system. For example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use (Peter, DeLone and McLean, 2008). Also System use refers to active interaction between a user and the interface in terms of browsing, searching, or any other type of interactivity. Based on system use definition the following factors are shown in table3.

Table 3: Information Use Factors

Length of using Real Use opposite to Reported Use Kind of Using Motivation of Using	Information Use

User Satisfaction

User satisfaction is a common measure of IS success, for which several standardized instruments have been developed and tested (Zviran and Erlich, 2003; Doll et al., 2004). User satisfaction is a critical construct because it is related to other important variables, including systems analysis and design. Satisfaction has been used to assess IS success and effectiveness, the success of decision support systems, office automation success and the utility of IS in decision making (Zviran et al., 2006).

In web-based systems, in particular, satisfaction can depend on numerous factors, including web design, content, and navigation and information structure. From a marketing perspective, satisfaction depends largely on performance; however, product experience alone does not determine overall satisfaction (Anderson and Sullivan, 1993). Research has shown that the expected performance level and knowledge of outcomes that were not experienced are also important. When people evaluate outcomes, they compare their experienced results with results that might have occurred had they chosen differently (Kahneman and Miller, 1986). The following table4 is shown the factors.

Table 4: User Satisfaction Factors

Personal Satisfaction Whole Satisfaction Information Satisfaction User Happiness	User Satisfaction

Net Benefit

As DeLone and McLean defined, net benefit is the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations.

For example: improved decision making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development(Peter, DeLone and McLean, 2008). As a result table 5 shows the net benefit factors.

Table 5: Net Benefit Factors

Personal Impact Learning Impact on Decision Making Personal Effectiveness Personal Efficiency Problem Identification Spending Money for Information Organizational Impact Save Money for Personnel Costs Decrease Personnel Increase Productivity Increase Income Decrease Work Service Efficiency	Net Benefit

Service Quality

The quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. SERVQUAL, adapted from the field of marketing, is a popular instrument for measuring IS service quality (Pitt et al., 1995). The above explanation leads to the following table6 factors.

Table 6: Service Quality Factors

Staffs' Uniform and Appearance in Technical Support Doing What Is promised by Technical Support Staffs Interests of Technical Support Staffs for solving the problems Giving Urgent Services by Technical Support Staffs Not Being Too much Busy to Answer Users Requests Make Sense of Confidence in Users by Technical Support Staffs Politeness of Technical Support Staffs Knowledge of Doing Work in Technical Support Staffs Personal Attention to the Users by Technical Support Staffs Right Perception of Users' needs by Technical Support Staffs	Service Quality

Hypothesis

1. Based on DeLone and McLean Model, there are some effective factors that affect mobile banking systems.
2. Based on DeLone and McLean Model, there are some effective factors that affect mobile banking systems more.

Research Methodology

Measures

After developing the research framework, we conducted a series of personal interviews with three mobile banking professionals in Iran to assess the external validity of our research model. Based on our review of related literature and the comments gathered from our interviews, we created a survey instrument using a multiple item method. Each item was measured on a 10 point Semi Metric scale, with answers ranging from ''10" to ''100". The items in the survey were developed by adapting existing measures validated by other researchers, or by converting the definitions of the construct into a questionnaire format.

We define the initial version of the survey through extensive pretesting by 10 academics with significant expertise in studying mobile banking. The survey was further tested on 15 students enrolled in an MIS course at an Iranian university.

Data collection procedure

Data were collected using a self administered Persian version of the questionnaire. To avoid cross cultural methodology issues, backward translation (with the material translated from English into Persian and then back into English, versions compared, and discrepancies resolved) was used to ensure consistency between the Persian and original English versions of the survey (Mullen, 1995; Singh, 1995).

The experts of Keshavarzi Bank of Iran assisted with this survey by answering questioner with Semi Metric scale. As described before in Semi Metric scale, we ask about each item with 10 numbers between 10 and 100. Also, the sample of this study's targets was set to be experts who manage mobile banking systems. It should be noted that in Iran, there is just one type of mobile banking, and that is SMS Banking. Therefore, in order to rank mobile banking factors, we asked experts of mobile banking systems who are managing the system also have information about security of mobile banking networks.

As we extract 41 factors from reviewing the literature of the Information System Success Factors in Mobile Banking Systems, now we should select 50% of more affective factors for ranking. So due to gathered questioners, we choose the effective factors which gain at least 50 out of 100 based on Semi-Metric method. This is one of the positive points of semi-Metric method; this method helps researchers to find opinions with percentage easily.

Analysis and findings

Analysis method

Analysis Method of this survey is VIKOR. The VIKOR (VlseKriterijumska Optimizacija I Kompromisno Resenje in Serbian, means Multi criteria Optimization and Compromise Solution) method introduced the multi criteria ranking index based on the particular measure of closeness to the ideal/aspired level solution and was introduced as one applicable technique to implement within MCDM.(Opricovic, 1998) The VIKOR method was developed as a multi criteria decision making method to solve discrete decision problems with non-commensurable and conflicting criteria. (Opricovic et. all, 2002, Opricovic and et. all, 2004, Opricovic et. all, 2007, Tzeng and et. all, 2002, Tzeng and et. all, 2005)

This method focuses on ranking and selecting from a set of alternatives in the presence of conflicting criteria, which could help the decision makers to reach a final decision. (Opricovic, 1998) these methods rank and select alternatives based on all established criteria, using the same criteria for each alternative. However, in practice the decision maker often simultaneously manages or improves the achieved rate of progress in one or several projects (plans); he therefore needs to know the unimproved gaps of the projects or aspects of a project ('projects or aspects of a project' is abbreviated to 'projects/aspects') so as to improve them to achieve the minimum/zero gaps. However, when these unimproved gaps of the projects/aspects need to be ranked, because they each have their own individual criteria, the traditional methods are unsuitable for dealing with them. Therefore, this research proposes a method for solving these problems.

Weighing Method

After gathering the expert's ideas with Semi-Metric scale, and choosing 21 effective factors out 41 factors, now we should make the decision matrix, normalize it, and calculating weighs of each factor with Entropy method, that explain in details below:

First step: The decision matrix as shown below is the idea of each expert on each factor:

X_n	….	X_2	X_1	
r_{1n}	….	r_{12}	r_{11}	A_1
r_{2n}	….	r_{22}	r_{21}	A_2
.	….	.	.	.
.	….	.	.	.
.	….	.	.	.
r_{mn}	…	r_{m2}	r_{m1}	A_m

Second step: calculating P_{ij} for each number in decision matrix:

$$p_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}; \forall i, j$$

Third step: calculating E_j for each column with following formula:

$$E_j = -k \sum_{i=1}^{m} \left[p_{ij} . Ln P_{ij} \right]; \forall j$$

$$k = \frac{1}{Lnm}$$

Forth step: calculating d_j and w_j for each alternatives, with the following formula:

$$d_j = 1 - E_j; \forall j$$

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j}; \forall j$$

Calculated weighs are shown in table below:

Table 7: Calculated Weighs Table

Alternatives	Weighs
Availability	0.06108881
Knowing User Needs	0.060019986
Output Accuracy	0.075111
security	0.01188
Usefulness	0.052095
On Time	0.045121
Length of using	0.014855
Whole Satisfaction	0.040332
Information Satisfaction	0.034578
User Happiness	0.095392
Impact on Decision Making	0.056483
Personal Efficiency	0.034578
Spending Money for Information	0.02474
Save Money for Personnel Costs	0.045121
Decrease Personnel	0.041188
Increase Income	0.051352
Doing What Is promised by Technical Support Staffs	0.052095
Giving Urgent Services by Technical Support Staffs	0.032825
Politeness of Technical Support Staffs	0.053157
Knowledge of Doing Work in Technical Support Staffs	0.043548
Right Perception of Users' needs by Technical Support Staffs	0.07444

VIKOR Method

The VIKOR method began with the form of LP-metric, which was used as an aggregating function in a compromise programming method and developed into the multi criteria measure for compromise ranking.

We assume the alternatives are denoted as A_1, A2,…., Ai,….,A_m. W_j is the weight of the j^{th} criterion, expressing the relative importance of the criteria, where j=1,2,…,n, and n is the

number of criteria. The rating (performance score) of the j^{th} criterion is denoted by f_{ij} for alternative A_i. The form of LP-metric was introduced by Duckstein and Opricovic and is formulated as follows:

$$L_i^p = \{\sum_{j=1}^{n}[w_j(|f_j^* - f_{ij}|)/(|f_j^* - f_j^-|)]^p\}^{1/p},$$

$1 \le p \le \infty$,i=1,2,….,m

The VIKOR method is not only generated with the above form of LP-metric but it also uses $L^{p=1}{}_i$ and $L^{p=\infty}{}_i$ to formulate the ranking measure. (Opricovic et. all, 2002, Opricovic et. all, 2007, Tzeng and et. all, 2002, Tzeng and et. all, 2005)

$$S_i = L_i^{p=1} = \sum_{j=1}^{n}[w_j(|f_j^* - f_{ij}|)/(|f_j^* - f_j^-|)]$$

$$Q_i = L_i^{p=\infty} = \max_j\{w_j(|f_j^* - f_{ij}|)/(|f_j^* - f_j^-|) \mid j = 1,2,...,n\}$$

When p is small, the group utility is emphasized (such as p=1) and as pin creases, the individual regrets/gaps receive more weight. (Friemer and et. all, 1976, Yu, 1973) In addition, the compromise solution min $L^p{}_i$ will be chosen because its value is closest to the ideal/aspired level.

Therefore, in min S_i min S_i and min Q_i , express to minimize the sum of the individual regrets/gaps and min Q_i express to minimize the maximum individual regret. In other words, min S_i emphasizes the maximum group utility, whereas min Q_i emphasizes selecting minimum among the maximum individual regrets. Based on the above concepts, the compromise ranking algorithm VIKOR consists of the following steps.

Step 1: Determine the best f^*_j, and the worst f^-_j values of all criterion functions, j=1, 2,…., n. If we assume the j^{th} function represents a benefit, then f^*_j = max f_{ij} (or setting an aspired level) and f^-_j = min f_{ij} (or setting a tolerable level). Alternatively, if we assume the j^{th} function represents a cost/risk, then f^*_j = min f_{ij} (or setting an aspired level) and f^-_j = max f_{ij} (or setting a tolerable level). Moreover, we propose an original rating matrix and a normalized weight-rating matrix of risk as follows:

	criteria		criteria
	$c_1 \; L \; c_j \; L \; c_n$		$c_1 \; L \; c_j \; L \; c_n$
alternatives	$A_1 \begin{bmatrix} f_{11} & L & f_{1j} & L & f_{1n} \\ M & M & M & M & M \\ A_i & f_{i1} & L & f_{ij} & L & f_{in} \\ M & M & M & M & M \\ A_m & f_{m1} & L & f_{mj} & L & f_{mn} \end{bmatrix}$	normalized $\Rightarrow$ $\times w_j$	$A_1 \begin{bmatrix} w_1r_{11} & L & w_jr_{1j} & L & w_nr_{1n} \\ M & M & M & M & M \\ A_i & w_1r_{i1} & L & w_jr_{ij} & L & w_nr_{in} \\ M & M & M & M & M \\ A_m & w_1r_{m1} & L & w_jr_{mj} & L & w_nr_{mn} \end{bmatrix}$
	$f_1^* \; L \; f_j^* \; L \; f_n^*$		
	(Original data)		(Normalized data)

Where, $r_{ij} = (|f_j^* - f_{ij}|)/(|f_j^* - f_j^-|)$, f_j^* is the aspired/desired level and f^-_j is tolerable level for each criterion.

Table 8: Determining f_{i*} and f_i^-

Alternatives	f_i^*	f_i^-
Availability	90	40
Knowing User Needs	90	50
Output Accuracy	100	60
security	100	80
Usefulness	100	60
On Time	100	50
Length of using	100	60
Whole Satisfaction	100	50
Information Satisfaction	100	60
User Happiness	100	40
Impact on Decision Making	100	60
Personal Efficiency	90	70
Spending Money for Information	100	50
Save Money for Personnel Costs	100	80
Decrease Personnel	100	60
Increase Income	100	70
Doing What Is promised by Technical Support Staffs	90	70
Giving Urgent Services by Technical Support Staffs	80	50
Politeness of Technical Support Staffs	70	40
Knowledge of Doing Work in Technical Support Staffs	100	70
Right Perception of Users' needs by Technical Support Staffs	80	40

Step 2: Compute the values S_i and Q_i,i=1,2,…,m, using the relations:

$$S_i = \sum_{j=1}^{n} w_j r_{ij},$$

$$Q_i = \max_j\{w_j r_{ij} \mid j = 1,2,...,n\},$$

Table9: Determining S_i and Q_i

Alternatives	S_i	Q_i
Availability	0.0002445207	0.0000569266
Knowing User Needs	0.0002354996	0.0000381434
Output Accuracy	0.0000991677	0.0000214465
security	0.0000747111	0.0000314843
Usefulness	0.0002544396	0.0000569266
On Time	0.0002576905	0.0000503749
Length of using	0.0002873740	0.0000569266
Whole Satisfaction	0.0001429871	0.0000292304
Information Satisfaction	0.0001849656	0.0000308982
User Happiness	0.0001938060	0.0000381434
Impact on Decision Making	0.0003400371	0.0000629686
Personal Efficiency	0.0002790139	0.0000411976
Spending Money for Information	0.0001972445	0.0000381434
Save Money for Personnel Costs	0.0003283388	0.0000415872
Decrease Personnel	0.0003422630	0.0000472265
Increase Income	0.0003177551	0.0000629686
Doing What Is promised by Technical Support Staffs	0.0002845199	0.0000629686
Giving Urgent Services by Technical Support Staffs	0.0002866865	0.0000419791
Politeness of Technical Support Staffs	0.0003148490	0.0000569266
Knowledge of Doing Work in Technical Support Staffs	0.0002192014	0.0000411976
Right Perception of Users' needs by Technical Support Staffs	0.0002342928	0.0000569266

Step 3: Compute the index values R_i, i=1, 2,…., m, using the relation

$$R_i = v(S_i - S^*)/(S^- - S^*) + (1-v)(Q_i - Q^*)/(Q^- - Q^*)$$

Where $S^*=\min S_i$ (or setting the best $S^*=0$, $S^-=\max S_i$ (or setting the worst $S^-=1$), $Q^* = \min Q_i$ (or setting the best $Q^*=0$, $Q^-=\max Q_i$ (or setting the worst $Q^-=1$), and $0 \le v \le 1$, where v is introduced as a weight for the strategy of maximum group utility, whereas $1-v$ is the weight of the individual regret. In other words, when v>0.5, this represents a decision making process that could use the strategy of maximum group utility (i.e., if v is big, group utility is emphasized), or by consensus when $v \approx 0.5$, or with veto when v>0.5.

Step 4: Rank the alternatives, sorting by the value of $\{S_i, Q_i$ and $R_i | i=1,2,\ldots,m\}$, in decreasing order.

Table 10: Ranking of Factors with VIKOR

Alternatives	R_j	Rank
Availability	0.7445829	14
Knowing User Needs	0.50154154	7
Output Accuracy	0.04570445	1
security	0.12087306	2
Usefulness	0.76311942	5
On Time	0.69030048	11
Length of using	0.82466709	17
Whole Satisfaction	0.22132606	3
Information Satisfaction	0.31985845	4
User Happiness	0.42362456	5
Impact on Decision Making	0.99584027	21
Personal Efficiency	0.61963861	9
Spending Money for Information	0.43005039	6
Save Money for Personnel Costs	0.71650817	12
Decrease Personnel	0.81043653	16
Increase Income	0.95419985	20
Doing What Is promised by Technical Support Staffs	0.89208994	19
Giving Urgent Services by Technical Support Staffs	0.64338763	10
Politeness of Technical Support Staffs	0.87601219	18
Knowledge of Doing Work in Technical Support Staffs	0.50786131	8
Right Perception of Users' needs by Technical Support Staffs	0.72546901	13

Discussion and implications

One of the important issues in this study is the role output accuracy plays in assessing the degree of satisfaction of mobile banking users. As in Internet banking, mobile banking involves processing banking tasks without having face-to-face contact with bank staff. Such actions inevitably involve risk and uncertainty, and eliminating these things requires more effort in mobile banking than in Internet banking. Consequently, the quality of mobile banking and users' trust levels affect the degree of satisfaction with mobile banking. This study shows that output accuracy is the most important factor that affects users' satisfaction in mobile banking services, which corresponds with the results of other studies about the relationship between output accuracy and Internet banking or online shopping malls. These results suggest that output accuracy is the most important variable in user satisfaction for the mobile banking environment. Another point of interest in this study is how the security of mobile banking service affects information system success. As mentioned earlier, this study found the ranks of each variable of mobile banking factors; this may help managers of information systems to decide better about their mobile bank systems due to the rank and priority of each variable.

While system quality and information quality were classified as significant variables for information system success, impact on service quality was not. This suggests that system quality and information quality must be provided to success mobile banking systems, but that service quality is not as important. It is possible that since mobile banking is a very utilitarian transaction, service quality has a relatively minor impact compared to system or information quality; still service quality indirectly affects information system success. It is not an element that can be dismissed.

Still, given that system quality and information quality are factors that should be provided in mobile banking, it can be said that in the future convenience and design quality will be important factors. In particular, in the case of Iran, every interface menu is text-based. Therefore, a new menu needs to be developed that emphasizes graphics that cater to the nature of mobile phones

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