

Selection of M-Payment Business Models using Analytic Network Process**Abid Ali***Department of Information Technology, University of Haripur, KPK, Pakistan*

E-mail: abidali@uoh.edu.pk

Abstract

The emerging technologies continuously change the structure of business processes. The dramatic improvements in wireless communication and mobile technologies make m-payment, a reality of today's world. Different organizations are approaching towards this mode of payment for their added values. The core concept in m-payment process is the selection and application of best business model. There are many business models but still market is searching for any dominant model. This work aims to optimize the selection process of business models by applying the Analytic Network Process, which is one of the MCDM approaches. According to results, the most important selection criteria are user centric architecture and response to market trends. And on the basis of the relative importance of the given selection criteria, the most dominant business model is collaboration model.

Key words: Mobile payments; Mobile payment business models; Analytic Network Process

1. Introductions

The dramatic adaptation and amazing growth of mobile devices and latest wireless technologies provide complex battle field for innovative applications. There are many emerging applications but location base information and financial services are more prominent and critical in its nature. M-Commerce is shifting paradigm of commerce where mobile devices and telecommunication technology are biggest pillars. There are many and innovative applications of m-commerce. Out of these applications, support of financial activities, mobile payments and banking are well known and widely discussed in literature. Today's business market is extremely dynamic and organizations have to fight every day for their long term stay in the market. They are constantly searching new and innovative ways to reengineers their business process. M-Payment and m-shopping are among these innovative applications which provide focus point for many financial organizations. The use of m-payment has been proposed for online payment services to deal with security and trust problems in electronic transactions [1]. There are different stakeholders which have different level of involvement in the implementation of m-payment system. These stakeholders have conflictive interests which makes the m-payment implementation more complex. It is very complex to introduce m-payment system because there are multiple stakeholders with their corresponding success factors. The immaturity of market and unresolved strategic, technical and demand issues makes m-payment adaptation uncertain. There are different stakeholders with diverse interests and different roles in the implementation of m-payment system so huge investment of effort is needed in selection mechanism of suitable business model. The aim of this investment is to optimize different business parameters. The parameters like multiple criteria and conflicting objectives are circulating in mind while analyzing the selection mechanism. Creating or selecting a useful business model would be a complex problem as it mostly depends on balancing multiple or even conflictive stakeholder's requirements [2]. Considering the above scenarios we hypothesize that which characteristics are exercise more support for which business models and how much this support provide contribution to the concern business model. This work surveys five m-payment business models from literature and

industry reports and ten different evaluation criteria. To test out hypothesis, ANP (Analytic Network Process) was applied to find relative worth of each criterion and elaborate selection mechanism. The purpose of ANP is to model the subjectivity, impreciseness, uncertainty during selection process of specific m-payment business models.

2. Literature Study

Many attempts have been exercised to explore and analyze m-payment business models. [2] Performed an empirical evaluation of m-payment business models using ELECTRE, which is one of the MCDM methods. [3] Proposed a decision framework by applying AHP approach which divide the problem in small parts by providing hierarchical structure. [4] proposed a framework in order to categorized m-payment business models. This framework produce six partial models i.e. threat model, capital model, distribution and communication model, value proposition model, market model, implementation model. [5] Employed the Analytic Hierarchy Process to quantitatively analyze the m-payment systems. [6] Provides a framework in which he derived evaluation criteria for m-commerce business models. [7] Extended the m-payment business model by introducing three new parameters i.e. mobile marketing service provider, mobile customer relationship management and trusted service manager. [8] Did an extension by introducing risk as new variable, and discuss its relevancy in the field. New dimensions of consumer's intention to use m-payment services were explored for relevant companies. [9] Analyzed the consumer technology adaptation model by extending it to trust and risk perspective and highlighting non user adaptation of m-payment proximity. In their study on how nascent mobile payment markets emerge, [10] showed how firms from different industries struggled to agree on the architecture of a mobile-payment market and how that led to resource allocation deferment. They revealed that the contributing companies had a history of supremacy in their respective industries and lacked collaboration experience. Similarly, [11] found that differences in strategic objectives and interests between banks and mobile network operators lead to the dissolution of a mobile payment platform in the Netherlands. [12] Proposed a multi-level framework, consisting of micro and macro levels, to depict cooperation strategies in mobile-payment ecosystems. Their framework is grounded on market cooperation theories, technology ecosystem theory, and business ecosystems theory. To validate their framework [12] conducted a case study in Denmark. The conclusion was that "market cooperation strategy in mobile payment ecosystems can be understood as a balance between defensive and offensive technology-based strategies". [13] Investigated the impact of openness strategies on the market potential of platforms, using a multi-level framework as well. Their research draws on the experiences of multiple cases from different mobile payment markets. This work demonstrated that a number of strategic, technological, and user-related decisions have to be made before the launch of a mobile payment platform in order not to limit its diffusion potential. The unveiled conditions are necessary but not sufficient for ensuring success.

3. The M-Payment

Even though the term Mobile-payment includes all mobile devices including PCs and PDAs, the general use of the term often refers to mobile devices with mobile phone capabilities [14]. Mobile-payment can be categorized in two major parts and difference between these two depends on the location of the customer (purchaser), relation to the merchant (seller), and different use scenarios. Mobile payments also are classified as remote payments or proximity payments [15]. Proximity payments also named as point of sale payments refer to payment approach where customer is in close proximity to the merchant. In this approach, the credentials are stored on the mobile phone and exchanged within a small distance using barcode scanning or RFID technology [16]. Near field communication (NFC) is seen as the most

promising technology in proximity payments; gaining higher popularity among consumers and merchants as well. The customers' base for the technology is getting larger, as it offers them more convenience and security [15, 17].

3.1 The m-payment business models

This section provides the overview of existing m-payment business models which are reported from literature and industry. There are many parameters for the success of m-payment system like current technology, competition and business models. Advantages and disadvantages of each business model have been reported from literature. Although several MP (mobile payment) efforts exist, still today there is no dominating m-payment business model in the market. The fundamental components make business models viable systems, able to improve without ambiguity the transaction technology in different economic environments. The input to business modelling phase is concept of service, defined business associated to service, positioning decision of company and corresponding market value

3.1.1 Operator Centric model

The management and decision making of the whole business process can be carried out by operator managers. Other stockholders have not any concerns to the payment process. The prepaid card and telecommunication bills are two modes of payment in this model. The limitation of this model is that, that it cannot support macro payment [18].

Example: NTTDOCOMO

3.1.2 Bank Centric model

Banks are responsible for whole business process while operators have not any concerns but operators charge the banks due to use of SIM-based application technology for their m-payment purpose [18]. Both micro and macro payments are supported in this model.

Examples: Pay box2

3.1.3 Operator Centric with bank interface model

Operators are responsible for whole business process but banks are also involved in payment process. This model solves the issues in previous models by providing both macro and micro payments. This model in comparison with previous two models provides a unique user interface for communicating with several accounts in different banks [2].

3.1.4 Peer-To-Peer model

A new approach is adopted by this model by introducing third party for payment purposes using the infrastructure provided by banks and operators. This model supports both micro and macro payments [18].

Examples: PayPal3

3.1.5 Collaboration model

Multiple actors have roles in the m-payment process so a wise collaboration is vital component. Collaboration model provide the sketch for collaboration among different stack holders. Operators and bank have focus on their functions [18].

Examples: SEMOPS4

3.2 Evaluation Criteria

This is most critical part of research where MCDM mechanisms are involved is the selection of criteria and alternates. A through literature survey and discussion with industry experts have been carried out in order to identify the decision making parameters and alternates for proposed framework. In this regard the

most exciting work has been done by [6] which propose a frame work for the analysis of m-commerce business models. This work extends the work of Sharma by implying it to m-payment business models.

3.2.1 Service related factors

Service related factors can be categorized in following types.

1) Interface

Every business model has a set of customers. The interface models the interaction between the business model and customer. The customer experience and success depends on characteristics of business models. These characteristics may be the ease of use, accessibility and expediency which have relative values for different business models. All aspects associated to customers can be modeled using interface. Out of these aspects, the most important are, selection of target customers, the channel of contact and type of relationship which company wants to maintain with customers [19].

2) Service Offering

Service affordability is a major determining factor which ensures success of m-commerce. Service affordability can be characterized as level of access, usage fee and subscription. Service offering can be defined set of services which maintain connectivity between different functional blocks of a business model's value chain [6]. This set aid business model to create market and capture value. The cost of service and technology is very important decision making factor in term of customer economic status and sometime service cost may outweigh the perceived benefit.

3) Value Proposition

The value proposition explains the sketch of services and products of a business model. The investment in the products and services of a company can be justified by value proposition. This factor represents business logic and bundle of products. There are many competitors in market and their competitive intensity is very high. The value proposition is used to differentiate among these competitors.

4) Dynamicity

Business models changes and evolve with time due to change in external variables so such property is represented by dynamicity. The viability of business model depends on dynamic nature of business model. The current business global scenario is extremely dynamic and new and ongoing changes in business environment justify company adaptability. The companies must regularly review their business models in order to make sure their presence in market. The m-payment business models services should evolve from proprietary solutions to standardized and cooperative solutions by sustaining their market membership. The viability is badly affected by static nature of business model and their unwillingness to adopt new changes makes them even less viable.

5) Scalability

There are many new techniques are emerging in research to sustain business and market value of different products. One of these techniques is polymorphism. There are different and diverse market parameters and today's business models must be scalable to these parameters. These market parameters may be different service platforms, locations etc. the m-payment service scalability may depends on banks, mobile network operators and third party which participate in m-payment service [2]. The scalability measure the capability of business model to either handle rising amounts of takings with ease, or to be readily swollen. Literature predicts that in future, gracious or agile networks will be more attractive and substitute linear and traditional value chains.

6) User centric architecture

The telecom and software industries are very dynamic in term of new applications and technologies. The mobile devices are becoming more and more smart by making it smaller and by increasing its processing and storage capability. So there should be user centric business models which exploit the synergies of innovative mobile technologies. These technologies keep the customers at top priority. User is an important stakeholder which has decision making authority for accepting or rejecting new system.

3.2.2 Organization related factors

1) Organizing model

The collaboration among organizations sub departments and other external organizations is very important due to centralized approaches. The sketch of this collaboration can be modeled using organizing model. The organizing model explains the sketch that how service provide or internal departments offering single service , organize business processes, value chain, organization or business strategies ,partnership and collaboration with external partners for offering qualitative services and products. The organizing model also describe the arrangement of participating entities which offering diverse services across the value chain. In every business model, different responsibilities are assigned to each participant. The viability of a business model can also be enhanced by allocating proper people according to skill set.

2) ROI

ROI (Return on Investment) arrangements: shows desirable investment details in an organization and cost structure of different services and products. Both these components help in explaining one of the extremely important drivers of a business case. ROI provide detail view about the investment structure, associated risks and revenue stream of different actors in the value chain. There should be well defined mechanism for the description of entire business model and its generated value chain. RIO measure can be used for sustaining business model. The literature justifies the needs of frameworks for each participant ROI in order to keep involved it.

3) Collaboration & Partnership

Many efforts have been exercised and concluded that there is need cooperation among various players to create sustainable m-payment market. Different barriers have been reported in literature, in which lack of cooperation among key players is very critical. Different key players have their own strengths and weaknesses but successful business depends on strong partnership [19]. External collaboration and partnership are more important factor for the success of m-payment. These factors also provide consideration extensions of associated roles and responsibilities of different actors and their participations. The carrier dominancy is much greater than openness in current mobile market and it requires more severe partnerships with tightly coupled arrangements rather than loose co-operations.

4) Response to market trend

To be successful in global market, m-payment services should have range of criteria which have to be fulfilled i.e. the requirements should not be only business or technology based but also economic base and should have origin in social and cognitive sciences. Market needs can be considered as the **critical success factors** for a mobile commerce proposal and this has taken first priority from technological factors. An organization's proper responsiveness towards change in market trends gives it superiority in a highly spirited environment. Organizations face new challenges due to dynamic market trends and redirect them towards initiatives uptake. No business model can be survived in isolation and it is lying face down to external market forces. The market tendency is very dynamic and there are many emerging

factors which control this tendency such as increase in customer expectation, technology innovations and so forth. All these scenarios force organizations for evolution and adaptability.

4. Research Methodology

This research is based on the assumption of Interpretivism i.e. reality is socially constructed, multiple interpretation and realities exist and scientific research is time and context dependent [6]. An online survey was done in order to identify the relative importance of each factor in comparison to other factors. Survey provide a comprehensive system for collecting information to describe ,compare or explain knowledge, attitudes and behaviors over large populations.

4.1 Sample selection

ANP is decision making method and also users have less understanding about m-payment business models so we used an expert pool in order to avoid inconsistencies during data analysis. Different and well known m-payment companies, service providers and financial institution were searched using internet. Then profiling was done in order to find most relevant people from industry. Then individual emails were sent to find their consent.

4.2 Questionnaire design

There were total 21+100 comparisons. In order to achieve maximum response rate, a transitive property was used to resize the questionnaire. We compare each criterion with their consecutive criterion only one time and rest of comparisons were determined using transitive property. The survey was done in two phases i.e. in first phase relative comparison was done of each criterion. In second phase supporting intensity level of each criterion with respect to each m-payment model was determined. Fig 1 shows format of the question used for AHP. Table 1 shows saaty scale which measure relative importance of one factor over other.

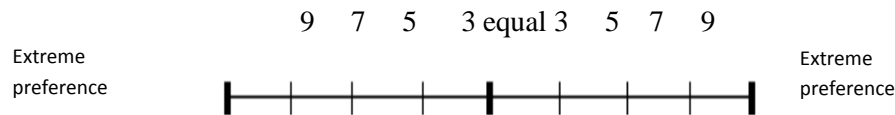


Fig.1 AHP questionnaire format

Table 1 :Saaty scale [5]

Intensity level	Definition	Explanation
1	Equal preference	Two factors equally preferred. the objective
3	Somewhat more preference	One is slightly favoured over other on the basis of judgment and experience
5	Much more preference	one is strongly favoured over other
7	Very much more preference	Very strongly preference.
9	Absolutely more preference	Extreme preference
2,4,6,8	Intermediate values	When compromise is done.

4.3 Research questions

In this study following research questions were investigated.

Q.1. what is the relative importance of reported m-payment service and organizational related factors in the selection of an m-payment business model?

Q.2. Which business model is more appropriate on the basis of these factors reported in Q1?

5. Mobile Payment Business Models Evaluation: An MCDM approach

Owing to the changes and decomposition of conventional production hierarchy and the broader coverage of responses to strategic objectives and customer preferences from the operational-level decisions, more effective multiple criteria decision-making and soft computing techniques and their integration are largely demanded for achieving autonomous and automatic decisional intelligence [25]. Yet, we believe that more theory based empirical research is needed to enhance the current understanding of the mobile payment services market. Since there are several stack holders in the system, a viable and sound business model needs to be developed that will provide a frame work for revenue sharing.

Decision making in software engineering is very complex to its unique nature. The nature of software can be attributed by complexity, conformity, non-visibility and changeability. This complexity increases exponentially when there multiple and conflicting requirements. To ease this situation, MCDM approaches provide best tools. These techniques have capability in ranking different criteria and alternates. These techniques can be characterized by reducing cost and time and increasing accuracy of decisions. With this characteristic, decision makers have the possibility to easily examine the problem and scale it in accordance with their requirements [2]. In this section we will introduce one of the MCDM methods named as ANP and then by using this method and applying that to expert's opinions, a comparison between the mentioned business models will be made.

5.1 Analytic Network Process

The Analytic Network Process (ANP) is the enhance version of AHP and one of the well-known MCDM (Multi Criteria Decision Making) method introduced by [21]. The basic structure of the ANP is an influence network of clusters and nodes contained within the clusters [18]. There is concept of inner and outer dependencies i.e one cluster elements are connected with other cluster elements which is termed as outer dependency and if it is the same cluster then it is called inner dependencies. In outer influence one compares the influence of elements in a cluster on elements in another cluster with respect to a control criterion and in inner influence one compares the influence of elements in a group on each one. The ANP also provide the structure for decision making so that elements of one group can be connected with elements of another group based on user requirements in order to investigate the process to design various scales. There are two networking groups in ANP: the first group contains the layers of internal inter-reactions or the network criteria and sub-criteria; the second ground contains the network of mutual influence for elements in the criteria and sub-criteria groups. This is the reason why the mode of thinking used in ANP is capable of mimicking human thinking more than AHP in decision making [23–24]. The Fig 2 shows the network structure of criteria, sub-criteria and alternates. The tables 2, 3, 4 are super matrix, Weighted Super matrix and Limit Matrix. These are intermediate results generated through ANP software.

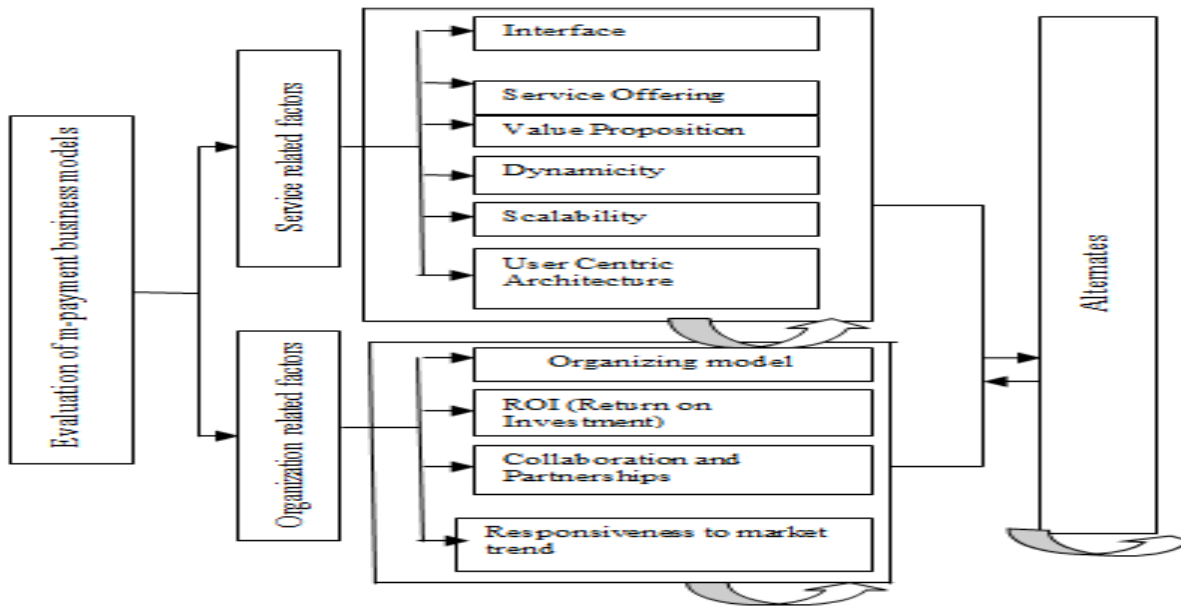


Fig 2. ANP Network Process

Table 2. Super matrix

Nodes	Interface	Service offering	Value Preposition	Dynamicity	Scalability	User centric architecture	Organizing model	ROI(return on investment)	Collaboration & Partnership	Response to market trend	Bank centered model	Operator centered model	Operator centered using bank	Peer to peer	Collaboration model
Interface	0.0	0.096	0.095	0.139	0.113	0.113	0.09	0.09	0.09	0.09	0.424	0.149	0.334	0.224	0.048
Service offering	0.05	0.0	0.049	0.05	0.068	0.068	0.046	0.046	0.046	0.046	0.034	0.051	0.156	0.391	0.133
Value Preposition	0.139	0.133	0.0	0.139	0.156	0.156	0.116	0.116	0.116	0.116	0.174	0.396	0.184	0.147	0.075
Dynamicity	0.139	0.239	0.233	0.0	0.279	0.279	0.2	0.2	0.2	0.2	0.054	0.075	0.037	0.05	0.227
Scalability	0.336	0.266	0.312	0.336	0.0	0.384	0.274	0.274	0.274	0.274	0.123	0.224	0.064	0.08	0.133
User centric architecture	0.336	0.266	0.312	0.336	0.384	0.0	0.274	0.274	0.274	0.274	0.192	0.106	0.225	0.108	0.384
Organizing model	0.051	0.038	0.051	0.051	0.051	0.051	0.0	0.048	0.09	0.09	0.366	0.256	0.14	0.227	0.156
ROI(return on investment)	0.16	0.129	0.16	0.16	0.16	0.16	0.2	0.0	0.245	0.245	0.278	0.472	0.456	0.122	0.088

Collaboration & Partnership	0.395	0.184	0.395	0.395	0.395	0.395	0.395	0.4	0.476	0.0	0.665	0.233	0.108	0.141	0.227	0.272
Response to market trend	0.395	0.648	0.395	0.395	0.395	0.395	0.395	0.4	0.476	0.665	0.0	0.124	0.164	0.263	0.424	0.484
Bank centric model	0.21 1	0.03 6	0.13 9	0.10 2	0.12 3	0.11	0.26 1	0.18 9	0.25 8	0.04 4	0.0	0.0	0.0	0.0	0.0	0.0
Operator centric model	0.111	0.088	0.127	0.102	0.123	0.11	0.175	0.189	0.151	0.142	0.0	0.0	0.0	0.0	0.0	0.0
Operator centric with bank interface	0.316	0.255	0.277	0.197	0.234	0.334	0.261	0.366	0.258	0.311	0.0	0.0	0.0	0.0	0.0	0.0
Peer to peer model	0.21 1	0.21 6	0.12 7	0.11 4	0.12 3	0.11 1	0.07 5	0.06 5	0.07 6	0.16 8	0.0	0.0	0.0	0.0	0.0	0.0
Collaboration model	0.251	0.405	0.329	0.485	0.396	0.335	0.227	0.19	0.258	0.336	0.0	0.0	0.0	0.0	0.0	0.0

Table 3. Weighted Super matrix

<i>Nodes</i>	Interface	Service offering	Value Proposition	Dynamicity	Scalability	User centric architecture	Organizing model	ROI(return on investment)	Collaboration & Partnershin	Response to market trend	Bank centered model	Operator centered model	Operator centered using	Peer to peer	Collaboration
Interface	0.0	0.024	0.024	0.035	0.028	0.028	0.037	0.037	0.037	0.037	0.282	0.099	0.223	0.149	0.032
Service offering	0.012	0.0	0.012	0.012	0.017	0.017	0.019	0.019	0.019	0.019	0.022	0.034	0.104	0.261	0.089
Value Proposition	0.035	0.033	0.0	0.035	0.039	0.039	0.048	0.048	0.048	0.048	0.116	0.264	0.123	0.098	0.05
Dynamicity	0.035	0.06	0.058	0.0	0.07	0.07	0.082	0.082	0.082	0.082	0.036	0.05	0.024	0.034	0.151
Scalability	0.084	0.066	0.078	0.084	0.0	0.096	0.113	0.113	0.113	0.113	0.082	0.149	0.043	0.053	0.089
User centric architecture	0.084	0.066	0.078	0.084	0.096	0.0	0.113	0.113	0.113	0.113	0.128	0.07	0.15	0.072	0.256

Organizing model	0.026	0.019	0.026	0.026	0.026	0.026	0.0	0.016	0.03	0.03	0.122	0.085	0.047	0.076	0.052
ROI(return on investment)	0.08	0.064	0.08	0.08	0.08	0.08	0.065	0.0	0.08	0.08	0.193	0.157	0.152	0.041	0.029
Collaboration & Pathnership	0.197	0.092	0.197	0.197	0.197	0.197	0.131	0.156	0.0	0.218	0.078	0.036	0.047	0.076	0.091
Response to market trend	0.197	0.324	0.197	0.197	0.197	0.197	0.131	0.156	0.218	0.0	0.041	0.055	0.088	0.041	0.161
Bank centric model	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.06	0.06	0.01	0.0	0.0	0.0	0.0	0.0
Operator centric model	0.028	0.022	0.032	0.025	0.031	0.028	0.046	0.049	0.039	0.037	0.0	0.0	0.0	0.0	0.0
Operator centric with bank interface	0.079	0.064	0.069	0.049	0.058	0.083	0.068	0.095	0.067	0.081	0.0	0.0	0.0	0.0	0.0
Peer to peer model	0.053	0.054	0.032	0.029	0.031	0.028	0.02	0.017	0.02	0.044	0.0	0.0	0.0	0.0	0.0
Collaboration model	0.038	0.101	0.082	0.121	0.099	0.084	0.059	0.049	0.067	0.087	0.0	0.0	0.0	0.0	0.0

Table 4.Limit Matrix

Nodes	Interface	Service offering	Value Preposition	Dynamicity	Scalability	User centric architecture	Organizing model	ROI(return on investment)	Collaboration & Partnership	Response to market trend	Bank centered model	Operator centered	Operator centered using bank interface	Peer to peer	Collaboration model
Interface	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
Service offering	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
Value Preposition	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
Dynamicity	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067

Scalability	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087
User centric architecture	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102
Organizing model	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034
ROI(return on investment)	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
Collaboration & Pathnership	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138
Response to market trend	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151
Bank centric model	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
Operator centric model	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027
Operator centric with bank interface	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058
Peer to peer model	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Collaboration model	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063

5.2 Prioritization of criteria and alternates

The tables below show the output of the study. Table 5 shows the prioritization of service related factors and table 6 shows the prioritization of organization related factors. The prioritization of reported m-payment business models can explored in table 7.

Table 5. Service related factors

factor	Relative value	ranking
Interface	0.054	5
Service offering	0.033	6
Value Preposition	0.055	4
Dynamicity	0.067	3
Scalability	0.087	2
User centric architecture	0.102	1

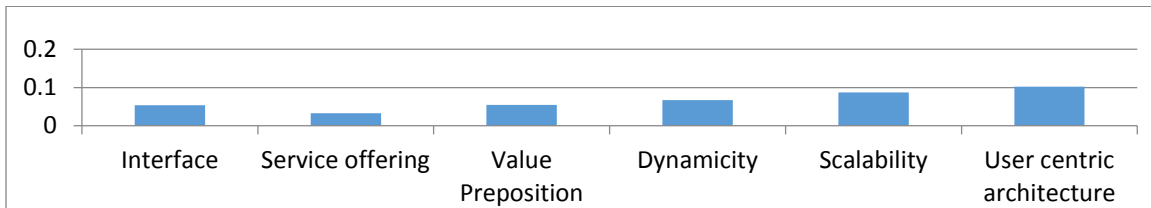


Table 6. Organization related factors

Factors	Relative value	Ranking
Organizing model	0.034	4
ROI(return on investment)	0.075	3
Collaboration & Partnership	0.138	2
Response to market trend	0.151	1

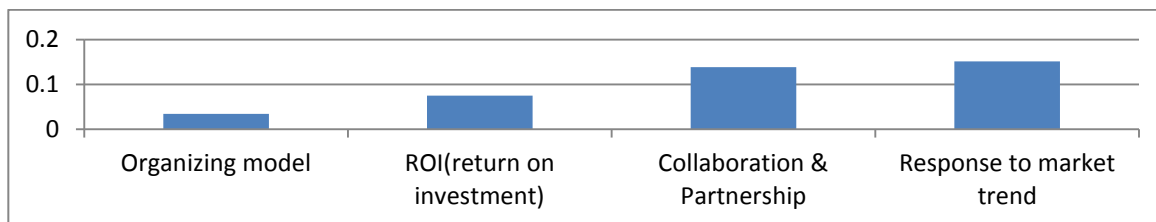
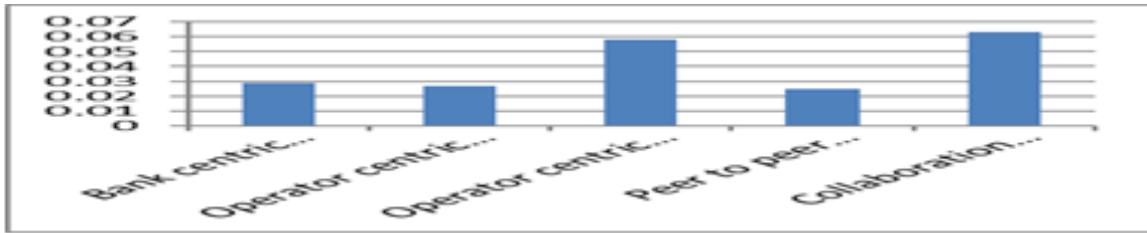


Table 7. Altemates

Business model	Relative value	Ranking
Bank centric model	0.029	4
Operator centric model	0.027	3
Operator centric with bank interface	0.058	2
Peer to peer model	0.025	5
Collaboration model	0.063	1



6. Discussion and Future work

According to results, the user centric architecture and scalability are more important decision parameters and in case of organization related factors the response to market trend and collaboration & partnership have much importance in the selection of m-payment business models. The most important output of this is that, collaboration model is more favorable under the mentioned criteria and then operator centric using bank interface. The limitation of this work is the application of conventional set theory which depends on “yes” and “no”. In future directions other intermediate values between these extreme values can be modelled to enhance the precision of membership function. In future other MCDM approaches can be combined with fuzzy system to enhance the precision of membership and to test and justify the result obtained. A case study research should be conducted to validate the results produced in this work.

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