A Systematic Approach to Explain the Delayed Deployment of Mobile Payments in Switzerland

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Abstract

Despite the predicted success of mobile payments, the market remains immature in most countries. This can be explained by a number of technical and business issues. Mobile technology environments are becoming more complex, uncertain, and disruptive. As such, the strategic assessment of technologies remains a challenging activity. In this paper we present a systematic approach to analyze the mobile payment industry. To decompose the problem we identified two potential disruptions which could occur in this market. As we cover both the technological and the organizational aspects, we provide a more complete picture of the status of mobile payments in Switzerland. Moreover, this approach intends to unveil the factors delaying the deployment of mobile payments in Switzerland.

1 Introduction

Despite all the different issues hindering their deployment, mobile payments are still seen as a natural evolution of payment processes by most experts. The great uncertainty surrounding this market has led to many speculations. Current understanding of the situation is relatively unclear. In order to analyze this market in a holistic manner, we need to conduct a structured analysis taking into account a number of different perspectives.

To decompose the analysis problem, we identified two potential disruptions that could occur in the mobile payment market. The first was a technology-based disruption (i.e. a shift from card-based to phone-based solutions) and the second was an organization-based disruption (i.e. a switch from a dominant operator-driven to a more self-organized solution). We used various methods such as interviews, the delphi technique, and multi-criteria decision-making (MCDM) to analyze the factors enabling or disabling the two disruptions.

Our research question is to design a systematic approach to analyze rigorously the mobile payment market and its potential disruptiveness. We formulate and explore the hypothesis that multi-criteria decision-making (MCDM) methods are suitable for strategic technology assessment and foresight. Based on this approach, we design (build and evaluate) an IT artefact (i.e. Group Decision Support System, GDSS) to support our analysis. All of this should help us better understand the reasons for the delayed deployment of mobile payment in Switzerland.

We conducted three consecutive rounds of interviews in Switzerland over the past two years. In order to obtain a broader overview of the market, we interviewed relevant experts working for different industries. This diversity of experts facilitates market analysis from multiple points of view.

In this paper, we present the results we obtained during the multiple rounds of interviews using our systematic approach. This consists of modeling the problem, building a tool to support the analysis, and evaluating the pertinence of this tool in a real environment. This research follows a design science research paradigm as described by March and Smith in [9].

This paper is structured as follows. In the following section, we present a brief overview of the mobile payment industry. In Section 3, we introduce a disruption matrix to segment the payment market. In Section 4, we describe our first analysis based on the Rafii and Kampas framework to detect disruptions [18]. In Section 5, we present our second round of interviews using the MCDM approach. In Section 6, we depict the third round of interviews backed up with the IT artefact. In Section 7, we provide a summary and an comparison of the three rounds. In Section 8, we discuss about previous research done in mobile payments. Finally, we draw some conclusions in Section 9.

2 The current status of the mobile payment industry

Mobile payments were predicted to be very successful. In 2001 and 2002, Forrester Research [7] and Gartner [1]

estimated the transaction value of mobile payments would reach more than $ 30 billion by the end of 2005. As of the beginning of 2006, the expected numbers are still far from being reached. More recently, Arthur D. Little published an update about the status of mobile payments. They estimate that m-payment transaction revenues will increase from $3.2 billion in 2003 to $11.7 billion in 2005 and $37.1 billion in 2008 [22]. Despite the ill-judged market evolution, there is still hope that mobile payments will become a successful service in either a near or further future.

Some countries are remarkably advanced in terms of technology and business cases. For instance, Japan (among other Asian countries) is a leader in mobile payments. NTT DoCoMo offers mobile payment services such as Edy[1] and Mobile Suica[2]. The potential of the Japanese market is judged to be very promising as the technology (i.e. RFID, NFC) is well diffused in the customer base and the number of merchants accepting these instruments of payments is great. These are two important requirements for a mobile payment system to be successful: (i) a customer and merchant base and (ii) the volume of transactions. In Japan, the two conditions seem to be fulfilled which has not been the case in either Europe or North America. Although there are some disparities between European countries (e.g. Austria, Spain, Croatia and Scandinavian countries are more advanced [22]), the European market is still rather immature in terms of technologies and business cases.

In Switzerland, some trials were launched recently to test mobile payments in different industries, such as parking, public transportation, and retail. The market remains at an early stage of development. The Swiss case is particularly interesting in terms of its actors. The financial institutions have great clout and expertise in the payment industry. However, mobile network operators (MNOs) own the mobile network infrastructure and have a large customer base that is less segmented (i.e. 3 national MNOs versus more than 150 banks). Merchants, especially retailers and public transportation companies, could also play an important role in terms of point of acceptance and volume of transaction. Given the number of actors, the analysis should involve experts from different industries to obtain multiple relevant perspectives. More detailed descriptions of the situation in Switzerland can be found in [15, 16].

3 A disruption matrix

We propose the use of a matrix to segment the payment market depending on the technology used and the service providers involved. These two axes of decomposition should provide a better overview of the market with its different initiatives. This matrix was already presented in [15].

[1] https://www.edy.jp

[2] http://www.jreast.co.jp/e/press/20040401/

The two potential disruptions are also illustrated in the matrix.

A technology is considered disruptive when its utilisation allows the design of products, services, and processes, with different attributes that have not been valued by existing customers [3] [23]. Disruptive technologies typically allow simpler, cheaper, more convenient-to-use innovations, offered by a disrupter or insurgent. They initially underperform existing products in mainstream markets and are adopted by unsophisticated customers at the low end of the market. Eventually, the innovations can improve and become a competitive threat, dramatically transforming the marketplace and displacing incumbents.

Different methodologies, instruments and decision-support systems have been proposed to identify and forecast potential disruptive technologies [3] and other discontinuous innovations [12], using, among others, technology roadmaps [23], text mining [13], and multi-criteria decision-making [18].

In our case, the first potential disruption is technology-based (i.e. a shift from card-based to phone-based solutions). Today, card-based payment schemes are widely accepted. The card technology is well known and used in many industries. However, with the high penetration of the mobile phone and the digitalization of the payment process, phone-based solutions could become an inherent threat for current card-based schemes.

The second disruption is organization-based (i.e. a switch from a dominant operator-driven to a more self-organized solution). Financial institutions and MNOs are dominant actors in the mobile payments market. However, merchants or newcomers could launch independent payment schemes that could compete with the current ones operated exclusively by financial institutions.

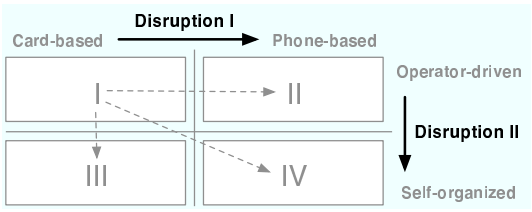

Figure 1. The Disruption Matrix

As can be seen in the matrix, there are four cells used to classify payment schemes and analyze the market. The cells on the top represent the solutions launched by financial institutions and MNOs together or separately. On the bottom, the cells correspond to the payment systems offered by newcomers and intermediaries. On the left, payment solutions are based on card technology. On the right, the cells symbolize payment schemes using mobile telephony.

4 Step I: A disruption analysis

A promising approach to detect disruptions is proposed by Rafii and Kampas [18]. They propose a decision-making instrument for identifying, rating, and weighting the contributing factors that make the disruption more or less likely to succeed in each stage. This analytical methodology aims at scoring and graphing the disruptiveness profile with its disabling and enabling forces.

4.1 The framework

Rafii and Kampas suggest that a disruption innovation process consists of the six following stages: "Foothold market entry", "Main market entry", "Customer attraction", "Customer switching", "Incumbent retaliation", and "Incumbent displacement". They claim that a disruption introduced by an insurgent can fail or seriously damage an incumbent's business at each stage.

4.2 The data collection process

To evaluate the different contributing factors present at each stage, we conducted several exploratory interviews with Swiss mobile payment experts. These practitioners work for different mobile payment service providers including a financial institution (Telekurs Multipay), a MNO (Swisscom Mobile), a mobile application service providers (Echovox), a contactless smartcard system providers (PolyRight, formerly SportAccess), and a public transportation company (the public transportation of Lausanne,TL) Each of them was questioned about one of the possible disruptions on the mobile payment market. These interviews consisted in open and semi-open questions and took place between April and June 2004, each lasting on average two hours.

4.3 Results of the disruption analysis

Concerning the first disruption, mobile phones might become a new channel for financial institutions. Moreover, the physical form of cards could disappear in the long term. Most of the interviewees agreed that mobile phones might be a good physical support for future payment schemes. However, MNOs might not displace the current payment service providers. They could probably gain market share with a mobile micro-payment payment scheme operated without the banks. Although, in the short term, the market and technology might not yet be ready for such an evolution.

The evaluation of the second disruption shows that there is potential for self-organized solutions to succeed. However, there are substantial barriers to overcome in the main market entry. In fact, the most difficult activity is bringing together consumers and merchants to adopt the scheme. However, the performance of certain schemes as they are personalized make them very attractive. Moreover, the cost is usually lower than the current payment schemes. Despite these potential benefits, no independent payment schemes in Switzerland have genuinely threatened the financial institutions.

More detailed results can be found in [15].

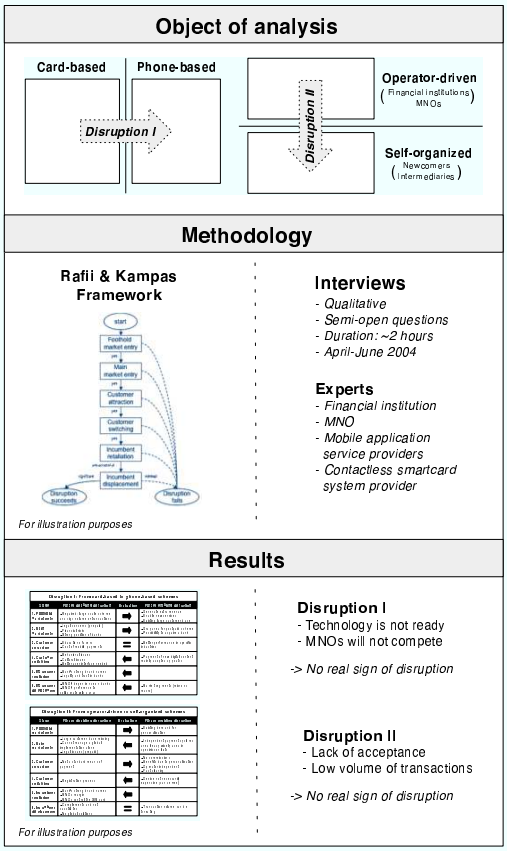

Figure 2. Summary of Step I

4.4 Conclusions for the disruption analysis

A statement on which all the interviewees agree is that mobile payments are still predicted to be a natural evolution in the payment industry. However, there are some business and technological issues to overcome before mobile payments can really take off. As MNOs are more likely to collaborate than compete with financial institutions, the success of mobile payments could remain in the hands of the banks. They should not wait too long as other independents could offer better solutions to specific market segments. Needless to say that for now, the threat is still weak

as the implementation of a payment scheme and behavioral change do not happen overnight. However, independent and phone-based solutions are already entering the market as complementary payment instruments. Therefore, the switch from a complement to a substitute is not excluded if the adoption and rate of use is sufficiently elevated.

This analysis helped illustrate the disruptive profile of mobile payments giving a new perspective to observe the market in a structured way. However, there were still facets of the market that were not seen through our first exploratory study. For this purpose, we propose in the next sections the use of a multi-actor, multi-criteria approach to assess and forecast the different preferences of the market and eventually detect potential disruptions.

5 Step II: Exploration of MCDM for technology assessment and foresight

Technology assessment and foresight is a complex activity for decision makers. There are a relatively high number of parameters to consider in order to have a complete picture of the market. By definition, multicriteria analysis is a very good candidate method to deal with this type of complex problem. However, it has not been extensively explored in this context.

Salo et al. have suggested the use of multi-criteria methods for technology foresight and concluded that there is potential "*in terms of lending rigour and transparency to foresight process*" [20].

5.1 The MCDM method

For this analysis, we used the MCDM method ELECTRE I [2], initially designed for decision-making and not for an application in technology foresight process.

This approach allows the decision maker to reveal the ideal technology with a maximum of advantages and a minimum of inconveniences in the function of various criteria.

ELECTRE I gives the possibility to model a decision making process by using the concordance and discordance indexes and the outranking relations. The concordance index measures the degree of dominance of one action over another, based on the relative importance weightings of the decision criteria. The discordance index measures the degree to which an action is worse than another [19]. In summary, concordance and discordance indices can be viewed as measurements of satisfaction and dissatisfaction that a decision maker senses when choosing one action over another.

The outranking relations are usually obtained with a combination of a high level of concordance and a low level of discordance. These levels are fixed by a concordance and a discordance threshold which can be seen as severity levels over and under which an action could outrank another.

The results could be presented with outranking graphs that are easily understandable. If technology A outranks B, an arrow will go from A to B (A $\rightarrow$ B). When there are not any outranking relationships between two technologies, it means that they are incomparable. In other words, we cannot indicate which one dominates the other. If an arrow goes from A to B and B to A, it just means that the two technologies are equivalent.

We also used an extension of ELECTRE I for group decision making proposed by Bui and Jarke [4]. This feature enabled us to have a multi-actor approach.

The complete description of all the algorithms used for this analysis and the following one can be found in [16].

5.2 The data collection process

For this study, we collected empirical data from six key Swiss experts involved in different industries. We conducted each structured interview separately from May and June 2005. On average, each interview lasted between 45-60 minutes.

To represent the mobile network operators, we interviewed a manager in the strategic department responsible for mobile payment at Swisscom Mobile. On the side of the financial institutions, we collected data from a mobile payment expert working for Telekurs Multipay, a leader for cashless payment transfers in Switzerland. We also interviewed project managers working on the mobile payment trial of PostFinance. To diversify opinions, we met an expert working for PolyRight (a Kudelski Group company) which has very strong expertise in contactless payment schemes. We also interviewed mobile payment experts of the SBB, the national railway transport company in Switzerland. In this industry, we also collected data from another project manager at the TL (public transportation of Lausanne). In summary, we interviewed experts working for the major actors in the financial, telecommunication, public transportation, and contactless card industries in Switzerland.

The MCDM method requires a large number of data and the time granted by the experts was somewhat short. Thus, we had to find a way to collect the data in a very easy process for the experts. We opted for the use of the "Pack of Cards" technique proposed by Simos [21]. The idea is to give to the experts cards with the name of each criterion inscribed. Then, we asked the expert to manipulate these cards, rank them, inserting blank cards to reinforce ranking differences. It appears that the active participation by the decision-markers in the procedure gives them an intuitive understanding of the approach [19].

We first proposed to the experts a set of criteria extracted

from the literature and also validated with one of the experts. Each expert was allowed to add any other relevant criteria for themselves or remove insignificant criteria. Once they considered that the set of criteria covered all the evaluation aspects of a technology, the experts first had to ”play” with the criteria cards and rank them in order of importance. Then, they could to use blank cards to emphasize the gap of importance from a group of criteria to another. The next step was to play with the technology cards, group and rank them. Finally they were asked to evaluate the groups made with a proposed scale (weak, fair, average, good, excellent).

From these preliminary data, we computed the model to find the first results. Then, experts were shown their own results. At this point, they could still change their evaluations if they were not satisfied.

5.3 PylaDESS: a tool to support our analysis

To process the data collected, we used a computerized-based tool (PylaDESS) developed in our research group. A more complete description of the two implemented algorithms and the tool can be found in [16].

5.4 The MCDM model to analyze Disruption I

In this analysis, the objective was to evaluate a number of potential **alternative** technologies for payment schemes. This was done with the intention to possibly uncover early signs of a potential technology-based disruption. We selected three types of cards: (i) *Smartcards* (chip-based), (ii) *Contactless cards* (RFID-based), and (iii) *Magnetic cards* (with magnetic stripes). We included two phone-based technologies, one using a *phone remote network* (e.g. GSM, GPRS) and another one based on *phone proximity networks* (e.g. Bluetooth, RFID, Infrared). We also included *money* (i.e. cash) for benchmarking purposes.

To evaluate the technologies, a first collection of criteria was proposed to the experts. From this set, they had to select the relevant ones and eliminate the others. They could also add other criteria if desired. Each expert had to feel that every criteria covered their domain of technology evaluation. We emphasize that the experts had to select the relevant criteria to evaluate technologies and not solutions (i.e. business cases and models).

The **criteria** used by experts were from the following list: *ease of use, cost, reliability, user/market acceptance, security, flexibility, value proposition improvement, maturity, speed, and scalability*.

From the set of data, we discovered that ease of use, cost, and reliability were the most important criteria for most experts to evaluate the potential technologies.

5.5 Preliminary results with the MCDM approach

The first results were obtained with the collected data from six experts involved in different industries. The results are presented in forms of outranking graphs. However, due to the limited space, we decided not to include them in this paper as they can be found in [16].

The preliminary results of this analysis show that some experts are, either consciously or not, pushing the solution they use or sell. This could be partly due to the fact that these experts know best the technology they work with.

In general, the mobile phone-based technologies do not perform well as reliability, acceptance, maturity, ease of use, and cost are evaluated to be insufficient compared to other technologies. During the interviews, all the experts recognized a future potential of these technologies for payment purposes. However, they all felt that the current market is not yet ready and some technical improvement should be done, especially in terms of the user interface.

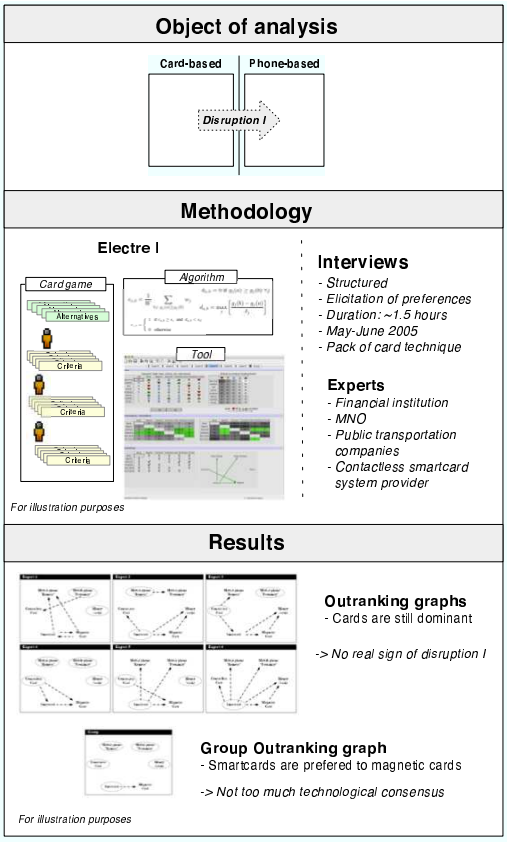

Figure 3. Summary of Step II

There is a group consensus on only one outranking relation. Every expert judged smartcards better than magnetic cards. The reliability and security dominance of the smart-

card explained this outranking relation. This is a trend that can be observed in the current market. To enhance security and reliability, financial institutions have already started to replace their classic magnetic cards with smartcards.

5.6 Conclusions for the first MCDM approach

Our analysis showed that the experts' positions are still contradictory for several technologies. Therefore, a reevaluation of the preferences using a Delphi technique could be desirable to unveil more precise results to confirm our initial insights. However, some obvious trends can still be observed, such as the relative dominance of the card-based solutions.

Even though the preliminary results may have seemed weak at first sight, they nevertheless provided a fairly realistic view of the current Swiss market.

Using a MCMD method helped us to study the market with a more structured approach. Moreover, the GDSS we developed was very useful for data input, computations and outcome visualization. This would not have been possible without the help of a dedicated computerized tool.

The promising preliminary results encouraged us to continue our research by developing the GDSS and involving more experts. Furthermore, we planned to analyze the second disruption using the same approach but with some improvements in terms of interview process and visualization of the data. This further analysis is presented in the next section.

6 Step III: An improved MCDM approach

We had promising results with our first attempt to use a MCDM approach to study Disruption I with a limited number of experts. We decided to extend this research by continuing to explore the same approach to analyze Disruption I and II with more experts and some improvements to our tool.

6.1 Methodology

We continued to use the MCDM method with the group decision feature. However, it differs on two aspects: we conducted interviews to collect data to analyze the first and the second disruption and the card game was computerized. The experts directly played with the computer to input their weights and evaluation. They could even get their results immediately. This gave us the opportunity to discuss about the results during the same interview. The interaction with the experts and the visualization of the data and results were greatly enhanced during this round of interviews. We also observed a significant gain of time with this new interview procedure.

6.1.1 The data collection process

First, we contacted the experts by email to request a meeting. As we wanted to complete the first disruption analysis and start the second disruption analysis, we aimed to involve former and new experts, with fifteen in total. For the first disruption, we completed our base of six experts by adding some important financial institutions (UBS, Credit Suisse, Corner Bank, Datatrans), a telco (Orange), and major retailers (Migros, Coop, McDonald's). As the second disruption analysis focuses on the organization side of mobile payment, we involved experts from different types of companies such as financial institutions (UBS, Credit Suisse, PostFinance, Viseca, Datatrans), MNOs (Swisscom Mobile, Orange), retailers (Migros, Coop, McDonald's, and public transportation companies (SBB-CFF, TL). Retailers and public transportation companies were crucial actors to include in the analysis as they are potential insurgents who could cause a disruption in the market.

The first part of the interview was to introduce our research and explain the data collection process. Then, we asked them to choose a set of criteria to evaluate the technologies (disruption I) or the organization (disruption II). To help them, we show them a list established by previous experts. They could add or remove criteria from the list depending on the aspects relevant to them. Each criterion was described with a standardized definition.

Once they finished choosing their set of criteria, they had to select each criterion from a list to start the card game. Using the computer, the experts had to rank the criteria by importance. The most important criteria are placed on top and those less important on the bottom of the screen (see Figure 4).

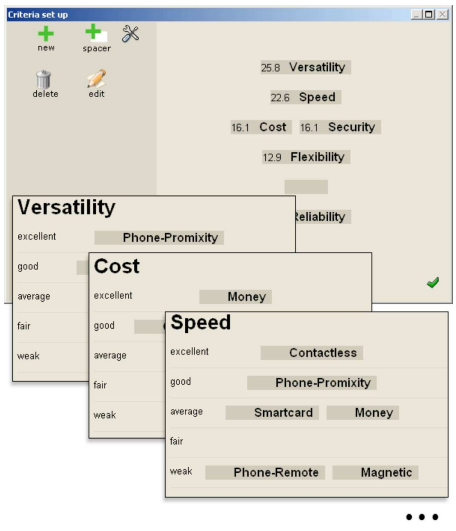

Figure 4. Computerized card game

Table 1. Organization-based MCDM model

Alternatives	**Short description**
Independent solution	This solution is provided by one merchant or an independent alone.
Consortium solution	This solution is provided by multiple merchants.
Financial institutions solution	This solution is provided by banks and card companies
Telcos solution	This solution is provided by one or many telcos.
Financial institutions & Telcos solution	This solution is provided by financial institutions and telcos.
Criteria	**Short description**
Cost	Profitability for the merchant (financially)
CRM	Performance in terms of customer relationship management
Differentiation	Competitive advantage gained with the solution
Flexibility	Capacity to adapt the solution to the needs
Interoperability	Ease of integration with other systems and actor
Risk	Financial risk for the merchant
Scale	Number of potential participants and capacity to grow
Security	Perceived security, trust, and privacy from a customer point of view

The weights are calculated in real-time using the "Pack of Card" technique, already presented. When the experts were satisfied with the relative weight of each criterion, they could validate the ranking.

The next step was to elicit the preference of the experts by using a verbal scale varying from weak, fair, average, good to excellent. The experts had to place the cards on the scale for each criterion. The data collection ended when evaluations were made for each selected criterion. With this done, we could run the computation of the model and show the results to the experts. We usually started a discussion to check that the experts were satisfied and understood the results obtained.

6.1.2 PylaDESS: the improvements

The manual card game was not the most effective method to collect the data. As we acquired experience during our second round of interviews, we adapted our tool for the third round accordingly. We computerized the card game so the data could be inserted automatically. Moreover, the results could be found in real-time which improved interaction with the experts.

Besides the card game, we also added some visualization and computing features. We considered that the data should be fully exploited. Therefore, we developed some modules to conduct data cross-analysis. The objective of this feature was to discover if there were any industry-wide patterns (i.e. if experts from the same industry agree more).

6.1.3 The MCDM models for Disruption I and II

To study Disruption I, we used the same model as the second round of interviews (see Section 5.4).

For Disruption II, we focused on the organizational level of mobile payment solutions. The alternatives selected are different combinations of actors involved which could provide a mobile payment solution. The first two represent the *Self-organized* solutions and the remaining alternatives the *Operator-driven* solutions. The alternatives and criteria can be seen in Table 1.

6.2 Results of the improved MCDM approach

As we studied the two identified disruptions, the results are presented in the two following subsections. Due to the limitation of space and the great number of input and outcome graphs, we had to select only a few sample of graphs.

6.2.1 Results for Disruption I

By adding more experts to the second round, we confirmed our first results that clearly show that the card-based solutions are still preferred. Additionally, we selected two graphs which could be useful to illustrate this domination.

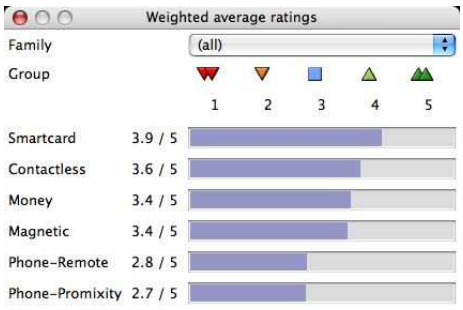

Figure 5. WSM results for Disruption I

As can be seen in Figure 5, we computed the ranking of the technologies using the Weighted Sum Model (WSM) [8]. The data used are the same ones we collected to run Electre I. Cards had generally better scores compared to mobile phones solutions. This logically confirmed the results we obtained with Electre I.

Another graph is the group proximity map (see Figure 6 showing the preferences of each actor.

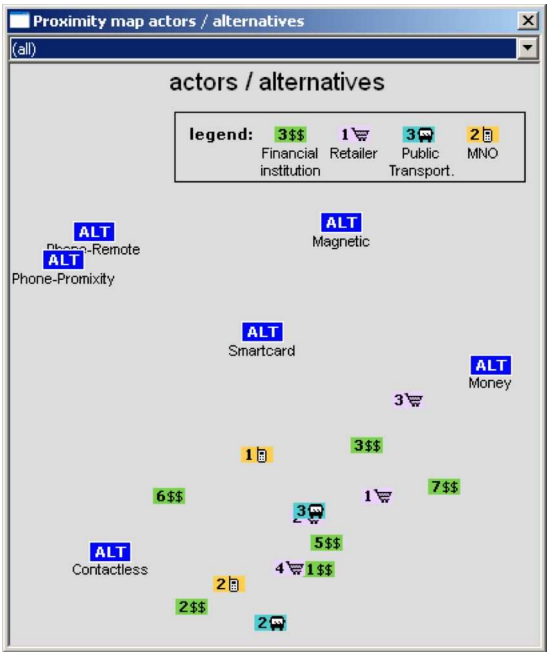

Figure 6. Proximity map for Disruption I

In this graph, we want to warn that only the distances from an actor to solutions are relevant to observe. The shorter the distance the greater the actor prefers the solution. As can be seen, phone-based solutions are quite far from the actors. The actors are anonymous but are thus depicted as numbers and distinguished with an icon representing their industry.

6.2.2 Results for Disruption II

The results of our organization-based study are not as clear. Based on a short term vision, the second disruption might not occur. However, in the future, there is no warranty for financial institutions that they will be threatened as there are weak signals that some actors already like independent and consortium solutions.

To support our findings, TowerGroup recently noted that financial institutions that ignore elvolving payment models risk being supplanted by more nimble and far-sighted competitors. Moreover, they should consider non-traditional payment players such as telecommunications companies which could steal market share with mobile payments [11]. This shows that financial institutions should be monitoring their environments to limit the risk of unexpected disruptions.

In our analysis, we could observe that retailers and public transportation companies rather like self-organized solutions (i.e. independent and consortium). This is not surprising as they already offer their own payment schemes to customers. However, their solutions are still very limited because of the few points of acceptance and the segmented customer base. Moreover, they still do not reach a volume of transaction that could threaten the financial institutions.

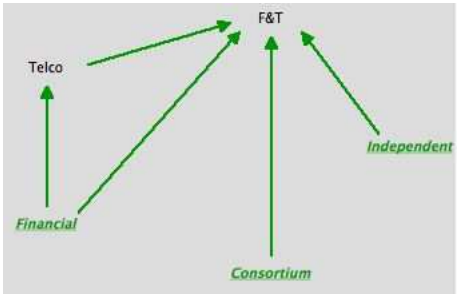

Figure 7. The outranking graph of a public transportation company

As an illustration, we selected Figure 7 which is the outranking graph of a public transportation company. This graphs clearly shows that three types of solutions belong to the kernel of best solutions: Financial, Independent, and Consortium. This seems to represent well the current situation as public transportation companies already offer these types of solutions.

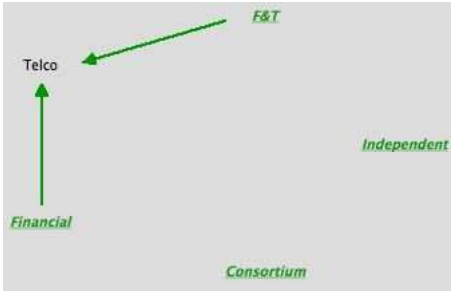

Figure 8. The consensus outranking graph of the MNOs

Observing the world of the MNOs, we discovered that they did not evaluate themselves as highly as one might

	STEP I	STEP II	STEP III
Objective	- Disruption I - Disruption II	- Disruption I	- Disruption I - Disruption II
Methodology	Interviews (April - June 2004) Semi-open questions	Interviews (May - June 2005) MCDM - multi-actor Electre I	Interviews (December 2005 - January 2006) MCDM - multi-actor Electre I
Tools	Rafii and Kampas framework	Card game Pyladess	Computerized card game Pyladess improved
Experts	6 experts from: - MNO - Financial institution - Mobile application service providers - Contactless smartcard system provider - Public transportation company	6 experts from: - MNO - Financial institutions - Contactless smartcard system provider - Public transportation companies	15 experts from: - MNOs - Financial institutions - Retailers - Public transportation companies
Results	*Disruption I:* Market is not ready for phone-based solutions (technology and business issues) *Disruption II:* Self-organized solutions have some potential but also very important limitations -> No real signs for Disruption I and II	*Disruption I:* Cards are still prefered to phone-based solutions for payments -> Disruption I unlikely to happen	*Disruption I:* Cards are still prefered *Disruption II:* Situation less clear for the long term. Independent and consortium solutions were rather well evaluated by many actors. -> No disruptions in the short term

Figure 9. Summary of Step I, II, and III

think they would. In fact, the consensus outranking graph of the MNOs shows that they prefer the financial institutions solutions or the combination of financial institutions and MNOs (see Figure 8). This is a comment that has been made by the experts themselves. They do not want to become payment service providers as they lack expertise in this domain. By combining the efforts of financial institutions and MNOs, they might both benefit from their respective knowhow.

6.3 Conclusions for the improved MCDM approach

Our main findings in this round are not too surprising as they were already found in the disruption analysis of the first round of interviews. Some trends were confirmed with a more detailed analysis. We got a better overview of the industries' preferences. This could also explain why there has not been any technological and organizational consensus. This could also justify the delayed deployment of mobile payments in Switzerland.

Our improved approach facilitated the interaction with the experts and enabled a significant gain of time during the data collection process. Moreover, the addition of some features such as the implementation of the WSM method and some visualization modules (e.g. proximity map) were very useful to analyze the data from different perpectives.

7 Summary of Step I, II, and III

Conducting three consecutive rounds of interviews with different or quite similar methodologies and tools brought up some interesting findings. Moreover, using different perspectives and adding more experts provided a richer analysis. Figure 9 summarizes the three analyses in terms of objective, methodology, tool, experts, and results.

8 Related work

There has been a considerable amount of research focusing on the adoption of mobile payments using a consumer centric view [24, 14, 6, 17]. Most of these research efforts led to a better understanding and describe the adoption factors influencing the consumer in its intention to use the payment solution. Other research has focused on finding the most critical factor of success and the different requirements of mobile payment systems [10]. Only fewer studies were done with an analytic method based on MCDM methods in the mobile payment context [5] . To the best of our knowledge, our systematic approach based on a multi-actor MCDM method supported by a GDSS type of tool is original and offers a rather promising start to study mobile payments using different perpectives.

9 Conclusion

The results we obtained with our systematic approach were very satisfying in terms of the insights acquired about the mobile payment industry in Switzerland. The three rounds of interviews helped us unveil a certain number of aspects that were delaying the deployment of mobile payments.

Moreover, the results showed that the two disruptions, especially Disruption II, are still relevant to study. In terms of organization, the situation is not clear as some experts seem to appreciate self-organized solutions. In terms of technology, the current situation might change with upcoming technologies such as NFC, which has been mentioned several times by experts as a very good candidate for mobile payments. A further step would be to include NFC in our model to see how the market react to its introduction.

The three consecutive analyses distributed in time could almost constitute a delphi process as the experts were aware of our previous research before they participated to the interviews. So far, the integration of the Rafii and Kampas approach, Electre I extended with a group decision feature, the Pack of Cards technique, and the pseudo-delphi gave us encouraging results to analyze the mobile payment market from different perspectives.

This rather robust approach could likely be used in other settings (e.g. other countries) which could constitute a further line of research for us.

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