

Feasibility Study of Mobile Payment for Vending Machine in Sweden

Project Management (IV2401)

iTECH – Group 6

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Abstract

As the mobile phone becomes a prominent communication device that is widely used in almost every part of the world, it is not only a portable device of communication any more. The rapid development of the applications planted inside the mobile device has made it an indispensable part of business today and mobile payment is a good representation. The mobile payment solution for customer financial transactions has been implemented in some regions of the world. However, there is no solution so far in Sweden to deal with automated point-of-sale of customer goods, particularly, the vending machine. This paper is focusing on the feasibility of mobile payment method for vending machine in Sweden. The feasibility study focuses on market analysis, finding and analyzing suitable mobile payment method and information flow analysis.

In order to provide payment convenience to users, besides cash payment, the vendors can consider some other payment methods such as credit cards, bank card, voucher code as well as mobile payment. However, the project team recommends mobile payment method as it is the trend nowadays as well being the most convenient way for small payments. People are reluctant to use credit card or access their bank account for small transactions. For mobile payment, they have peace of mind because there is not much risk involved in it regarding financial frauds.

The project team did literature research for mobile payment and similar case studies in mobile payment with vending machines. Feasibility analysis is conducted for mobile payment analysis and market analysis. Mobile payment analysis is performed by defining criteria for assessment and analyzing various mobile payment options. While for market analysis, the project team conducted survey and analyzed gathered data.

This report considers five main methods for mobile payment which are Direct Mobile Billing, Premium SMS (Short Message Service) & MMS (Multimedia Message Service) based transactional payments, Call and pay, Mobile Wireless Application Protocol (WAP) payment and Contactless NFC (Near Field Communication). After the analysis of the successful cases, relevant literature and considering the context of vending machine industry and local market, 9 most important factors are listed that should be considered when evaluating a mobile payment method. Based on the evaluation, we recommend premium SMS/MMS mobile payment method as suitable method for Sweden.

To address public opinion and acceptance of mobile payment method, survey was conducted to gather data for analysis. Analysis showed that more than 80% of people are willing to use mobile payment option for making payment on vending machine if it is introduced in Sweden. 90% of people who agree to use mobile payment will use it if there is no extra fee. Analysis addresses the factors that are important to be considered as these factors cause people not to use mobile payment. Besides the most recommended solution of mobile payment, analysis of other options is also made. The study costs 140 hours of each members in the team of five.

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Chapter 1 Business Case

1.1 Background

Introduction to the subject targeted

Today's rapid development of mobile technology is coupled with ongoing improvement of quality and quantity of mobile network technologies. Mobile technology has brought new features, applications, and as well as concerns to today's computer-based world. Mobile network technology has affected the mobile applications industry and created a whole new customer-based experience with the vast usage of mobile commerce applications and services. The high-speed mobile data network has created a new way and opportunity for business commerce. Another development that also boosts mobile network technology application is the advance development of mobile devices.

Nowadays, mobile device is also used as terminal for payment of some financial transactions. Currently mobile payment has been widely implemented in Sweden, as the main focus, for example SL, SJ and Vasttrafik's solutions, so it is not a new concept for Swedish community. There are several methods of mobile payment that have been implemented in Sweden and any other parts of the world [3]. Different kind of mobile payment solutions exist to serve the purpose e.g. SMS (Short Service Message), WAP (Wireless Application Protocol) and NFC (Near Field Communication).

Connection to existing and previous research

Mobile payment is defined as any payments where a mobile device is used in order to initiate, activate, and/or confirm this payment can be considered as a mobile payment [1]. Mobile network and device technologies also make it possible for mobile subscriber to make commercial and financial transactions. Implementation of mobile payment system is result of collaboration of different roles such as mobile user, telecom operator, IT/infrastructure vendor, bank and merchants.

Recently, mobile payment method has been materialized in the real world. In Switzerland and Austria, mobile payment for vending machine system has implemented as an optional payment method [2]. Coca Cola also introduced mobile payment option for its vending machines in some countries [3]. Based on current telecom market research, the mobile penetration rate in Sweden has increased from 103% (2005) to 123% (expected-2010) [4]. It means, currently, each person owns more than one mobile in average. Even in European standard, it is very high and thus Sweden is a potential market for mobile services, in particular: mobile payment business. In fact, currently in Sweden, mobile payment has been implemented in the tickets buying system. Several transportation runners use mobile payment as one of their payment options. Mobile payment is also being introduced in other area like retailing in Sweden as well [5].

Gap in this area

Nowadays, the payment method on vending machine is limited to cash payment only in Sweden, so that this limitation could be a barrier for customers' purchasing activities and also for vendors' successful revenue management.

Expected value creation

This feasibility study will be conducted for integration of mobile payment method for vending machines. The findings of the study may also serve as a stepping stone to others who have intentions to conduct further study in the area. The project team, proposes a project subject to investigate the feasibility of using mobile payment for vending machines in Sweden. Market analysis and information flow are the key value creations of the project.

1.2 Problem definition or opportunity description

Let's think about how many times a merchant loses the opportunities to grab more revenues when the customer wants to buy goods from vending machines but without sufficient cash in hands? Mobile payment could be a solution as it has been introduced in some countries around the world. So, the gap in target is "Whether or not the mobile payment for vending machine could be used in Sweden as there are in other few European countries?" In this project, project team will address this gap by investigating the feasibility of using mobile payment for vending machine in Sweden.

1.3 Aim /Purpose

Due to high mobile penetration rate in Sweden and the successful case in other European countries, through this project, the project team aim to research the feasibility of applying mobile payment solution on vending machine, in order to facilitate users in buying products by removing dependency from cash payment only, in Sweden.

1.4 Goal

The project goal is to conduct a feasibility study about mobile payment solution for vending machines in Sweden. Due to time restriction, the feasibility study will focus on only market analysis, finding and analyzing suitable mobile payment method and recommended information flow analysis.

1.5 Sub-Goals

- To conduct information survey, including literature about mobile payment concepts and methods and case studies about existing mobile payment solutions for vending machines around the globe.
- To compare existing mobile payment solutions.
- To collect and analyze public opinion on mobile payment for vending machine.
- To choose the most suitable solution for vending machine in Sweden.
- To define the suitable information flow.
- To complete the report.

1.6 Method

In this project, project team will start with literature researching and successful cases studying, together with which field study and questionnaire survey to collect public opinion about mobile payment on vending machine will be followed. In order to conduct a reasonable and logical conclusion, the project team will create criteria for mobile payments methods and information flow for mobile payment process, and analyze the survey results.

1.7 Disposition of the report

This report contains six chapters in general. Chapter 1 is the basic introduction to this project including background, problem definition, aim, goal, sub-goal and method used to process the project. Chapter 2 details the methodology constructing the whole project's process. Chapter 3 consists of related successful case studies, criteria for mobile payment methods and its evaluation, and information flow for mobile payments process. In chapter 4 the project team will analyze the survey results and combine the empirical analysis with theoretical result so that a conclusion can be generated. Chapter 5 mainly focuses on options available and considered, cost benefit analysis, and impacts and risks of this project. Conclusion and recommendation make up chapter 6.

Chapter 2 Methodology

2.1 Literature study

The literature study was the starting point of the project which included a short preliminary study in the pre-project phase. The preliminary study gave the project team a brief overview of mobile payment area as well as fundamental guidelines for the project. However, it is not sufficient and should be complemented by further study in the field.

The intensive and comprehensive literature study was conducted in two main areas:

- Related researches in mobile payment.
- Similar case studies in mobile payment with vending machine.

The study was mainly based on peer-reviewed conference, journals articles, book chapters and reputed organizational white-papers. The materials would contribute toward the extensive and necessary knowledge in the field of mobile payment. From the literature study, the project team aimed to investigate all current mobile payment methods such as SMS, WAP, NFC, etc. It also is based on the current knowledge about local market to propose the most suitable one for vending machine.

In addition, the similar case studies from other countries would give the team the foundation to analyze and compare mobile solution with vending machine in Sweden with other countries around the world. Due to the limit of scientific literature in this niche area, the study was performed in conjunction with supportive materials from the Internet.

2.2 Feasibility analysis

Due to the nature of the research of feasibility study, the project has to cover all aspects such as the technologies, public opinions, laws and regulations... Nonetheless, due to the time and resources limit of the project, the project team only focused on the three important and related (to information technology field) aspects, which are market acceptance, mobile payment method and underlying information flow. These three aspects will cover the customer, the technology and the interaction among different stakeholders respectively.

2.2.1 Mobile Payment Analysis

It contains two sub activities which are:

- Defining criteria for assessment
- Analyzing various options

By defining the criteria for assessment, there will be a solid base for the comparison between various mobile payment methods such as: simplicity, security, reliability, ease of use... These criteria were chosen based on the experiences of experts which published in various publications in the literature. Additionally, the project team added in criteria that are only specific to Sweden market such as the experiences of using mobile payment in transportation area. Based on the defined criteria defined, various mobile payment methods were analyzed, compared and discussed. The aim here is to recommend the most suitable mobile payment solution for vending machine in Sweden.

As various criteria have been considered, there was a potential skew in the final conclusion, which could be minimized but could not totally be eliminated.

2.2.2 Market Analysis

Public acceptance could be a make or break factor when a technology or process is introduced in a market. Without a sufficient support from the public, a critical mass will not be reached and the vendor will fail to make profit out of it. In this part, the project team tried to seek the market response to mobile payment for vending machine from both the public and the vending machine company, in which the public opinion acted as the key role in the analysis.

- Public acceptance survey
- Vending machine company interview (optional)
- Data analysis

For the public opinion about the new payment method, the team designed and conducted a survey with structured questions in order to collect public opinions and basic socio-demographic data (age range: teenager, students, working adults, senior and gender: male and female). The target of the survey will be anyone who lived in Sweden, especially those who using vending machines at least one a week. To make the survey objective, a wide range of people with different backgrounds and preferences should be addressed. Thus the team has conducted field surveys in 2 major cities (Stockholm & Gothenburg) as well as electronic survey form. The form had been broadcasted to students within DSV, friends and neighbors as well as the largest English-speaking community in Sweden (www.thelocal.se). The details of the questionnaire form could be found in the Appendix part of the report.

To have a more insight view of the mobile payment with vending machine in Sweden, the project team aimed to conduct an interview (optional) with Selecta AB, the biggest player in Sweden market. The objective was to have industrial perspective about mobile payment method. Through the interview could not be conducted, the team was informed that Selecta is currently undergone the internal testing phase of the payment method and will introduce it to local market in the near future. The information from Selecta indirectly shows their opinions about the method and its expected future in Sweden.

Lastly, the data analysis was conducted based on collected data from the survey and the experts' opinions about the new payment method with vending machine in Sweden.

2.2.3 Information Flow Analysis

The information flow will describe the general scenario of the purchase and the flow of information among the systems and stakeholders. The study covered some existing generic flows that have been used in vending machine industry together with those used in mobile payment in other industries. From the study, pros and cons of each model were analyzed and integrated together to form a recommend information flow for this particular mobile payment with vending machine scenario. It sets the starting point for any studies in practical usage of mobile payment.

Chapter 3 Theoretical Aspects

3.1 Case Study

The mobile payment business solution has attracted different business sectors from all over the world. Within the following, the project team will discuss three case studies that have been conducted on enterprises that launched mobile payment on their business applications, especially related to vending machine as a direct point of sales. The enterprises (companies) discussed are from different part of the world. The countries are:

3.1.1 Sweden

Mobile Payment has been widely implemented in Sweden for purchasing public transportation and mobile content using SMS premium content technology. For public transportation fare, any potential passengers could purchase it by texting a certain code and sending it using their mobile phone. Their phone balance, either Prepaid or Postpaid mobile subscription type, will be deducted as per the fare fee.

The combination of RFID technology and mobile payment has recently been launched for paying billing in limited-number of cafe shops. PayEx™, a Nordic vendor company, has taken an the opportunity to launch this new payment service, where the customer pays for products and services using nothing but his or her *NFC-enabled* mobile phone.

This payment method is possible with Direct Mobile Billing payment concept. The payment is charged to the user's PayEx™ *Konto* and is therefore independent of type of operator or phone bill. At the participating cafe shops, customers can easily swipe their mobile phone over the payment terminal and the transaction will take place. The concept has made its way to Scandinavians countries and is expected to be around in the near future, national-wide. [6].

With the success of mobile payment in transportation, stable and high technology infrastructure, it is not a surprise that mobile payment is expected to branch out in other technologies and sales areas, including vending machine.

3.1.2 Netherlands

The mobile payment for vending machine has been implemented in certain area in Netherland and Belgium. The method of payment is using Direct Mobile Billing concept, m-Purse or m-Wallet method. Each mobile customer should have an m-Purse account. This account could be recharged by 2 options. The first option is transferring money from their bank account to the m-Purse account. The second option is by uploading m-Purse credit from the prepaid cards.

The mobile payment is done by dialing and calling the number of displayed on the vending machine, Selecta™, without charging any phone costs. The vending machine will connect to the server via GPRS to get the validation on the customer account credit. This credit is shown in the display of the machine and the customer can make his choice. With this system there are no extra costs for the consumer and it can be used by each mobile phone. [7] The similar solution is also is introduced in Belgium.

3.1.3 Switzerland and Austria

The mobile payment in Switzerland has been also reached to the area of mobile payment in purchasing goods from vending machine with the NFC technology and SMS technology.

Contactless technologies like NFC set new priorities in the development of such solutions. Cashless payment at vending machines is seen as a good starting point. The concept of this mobile payment is by merging the technology of GSM/3G service and NFC solution embedded on mobile phone. Mobile Payment of vending machine is giving NFC solutions the chance to be accepted on the wider market, in particular in public and semi-public areas. NFC vendor provider is actively working closely with leading mobile phone manufacturers to bring a wide variety of NFC phones quickly to the market. This NFC-enabled mobile phone technology has been launched commercially for public use.

The next service that has been implemented is the SMS-based service without any modification towards mobile phone. It is currently only available for Post-paid (monthly subscription) telecom subscriber in Switzerland. The subscriber will be charged later in their monthly subscription bill published by their mobile operator. [8]

The same concept of SMS based has also been implemented in Austria with some modifications. In order to enjoy the service, the customer sends an SMS with the code of the vending machine to the SMS number shown on the vending machine. After a couple of seconds, the machine displays latest Paybox™ balance that you can then use to get that candy bar, soft drink or cigarette pack. The service will deduct the price of the goods from mobile subscriber Paybox™ account. Post paid mobile subscription of one of the major Austrian network operators could also enjoy this service for the postpaid subscribers. [9]

3.2 Mobile Payment Criteria

Nowadays mobile payment has become a commonly used payment method; however, it is still an optional method for the other legacy payment systems. The amount of each payment and mobile payment method used are varied. Thus to implement the payment solution in an effective way, the methods will need to be analyzed carefully. In this section, the project team will identify some important criteria to be considered and based on these; the suitable method for vending machine will be recommended.

Basing on the different authentication methods that the payment solution use, mobile payment solutions can be classified into four primary models [10]:

- Direct Mobile Billing
- Premium SMS, MMS based transactional payments
- Mobile web payment (WAP)
- Contactless NFC (Near Field Communication)

From the team research, currently there is another emergent payment solution, which has been implemented by Selecta in Netherlands and Belgium [7] in partnership with Crandy [11]. The solution could be named as Call and Pay [12]

However, different set of criteria will be considered under different point of view such as Provider, Merchant and Customers perspectives [13]. In [14][15][16], different set of criteria were also proposed for considering mobile payment solution. Among those, the team addressed the most important factors which are listed following:

- **Ease of use:** The degree to which the end-user could use the solution with least effort. For vending machine industry, it should be as easy as the cash payment system. The customers could use the method with a few lines of simple instruction.
- **Cost effectiveness:** The extra transactional cost that contributes to the final price of the product. It is particularly important for micropayment market, where a small price hike could lead to sustainable lost of customers.
- **Reliability:** The solution should operate with minimum fault in normal condition as well as withstand unexpected circumstances. This criterion is very important due to its link to finance and the distrust of the customers for the new payment method.
- **Security:** The solution relates to the protection of payment details and customers' identity besides preventing business fraud to happen. In short, it should cover the issues of anonymity, privacy and non-repudiation.
- **Flexibility:** This criterion takes into account how the new solution could be integrated with other payment methods. Besides, the solution could reach bigger pool of customer if it could work independently with the type of equipments the customers have.
- **Maturity:** The high maturity level of a solution could not ensure the success of its application with vending machine, yet it will reduce the technological risks during deployment.
- **Speed of payment process:** The speed of payment process in vending machine has to be very fast as the customer could not wait patiently for a micro payment transaction and get frustrated with delay.
- **Scalability:** The payment system should be easily scaled whenever, wherever it needs to be. If the solution requires a costly change in the legacy payment system or time-consuming maintenance, it could not be used effectively and efficiently with vending machine industry.
- **Social acceptability:** The new payment process could highly be affected by the market acceptance, which mostly comes from public's prior knowledge and previous experiences with existing mobile payment method. In Sweden, mobile payment based on premium SMS has been widely implemented and used in the public transportation ticket system [17]. It inevitably gives premium SMS method the edge over other competing methods in public opinions.

3.3 Mobile Payment method evaluation

Based on the defined criteria factors in the previous section, the project team has evaluated 5 mobile payment models in the scale of 3. In such, 1 means Low in satisfying required factor, 2 for Medium and 3 for High. The weight of each evaluated factor is assumed to be equal. Finally, the

score of each payment method over different criterion will be added up to determine the most suitable one. The team's judgment is also based on the context of vending machine industry and the understanding about local market.

	Direct Mobile Billing	Premium SMS and MMS-based transactional payments	Mobile web payment (WAP basing)	Contactless NFC (Near Field Communication)	Call and Pay
Ease of use	1=Low	3	2=Medium	3	3=High
Cost effectiveness	1	2	1	2	2
Reliability	3	2	1	3	3
Security	3	2	3	2	3
Flexibility	2	3	2	1	2
Maturity	2	3	3	3	2
Speed of payment process	2	2	1	3	2
Scalability	2	3	2	1	3
Social acceptability	1	3	2	2	2
TOTAL	17	23	17	20	22

Table 1: Mobile payment methods evaluation

From the derived score across different criteria, Premium SMS, MMS and Call and Pay methods come on top of the rest; with premium SMS slightly has an advantage edge. The analysis conclusion has a similar result with other cases of mobile payment solution with micro payment in Sweden and around the world. Therefore, the project team recommends the premium SMS payment method as the solution for vending machine in Sweden.

3.4 Information flow for Mobile Payment

Information flow describes the high level details associated with a given activity which identifies the major components involved for the successful transaction. It may include systems and infrastructure architectures details as well as the stakeholders.

Since the suggested payment method is “Premium SMS, MMS based transactional payment”, the team will shall recommend an appropriate Information flow for mobile payment for vending machine in Sweden. The information flow diagram based on payment scenarios in different successful case studies have been drafted and analyzed thoroughly based on the defined criteria. The proposed information flow will base on the purchasing scenario that allows both Pre-paid and Post paid users to make transactions on vending machines by sending SMS. The service customers need to choose product from vending machine and send only one SMS to complete the order. For post paid users, amount is added to their monthly bill and for pre-paid users; amount is deducted directly from their mobile phone balance.

The flow starts with the users send specifics code mentioned on the vending machine (vending machine identifier + product identifier) to Mobile Network Operator (MNO) via SMS.

Mobile Network Operator, on receiving SMS, “**verifies user details**”, accounts type, account balance (in case of prepaid user). The temporary customer ID (for Security reason) and order request are then forwarded to vendor together with the balance (in case of prepaid customer). Optionally, the customer will be informed about the low balance at the end of transaction.

Vending Machine Vendor, based on the order request from the MNO and the price of the product, will either accept the order and forward to the corresponding machine or reject it and notify MNO about it.

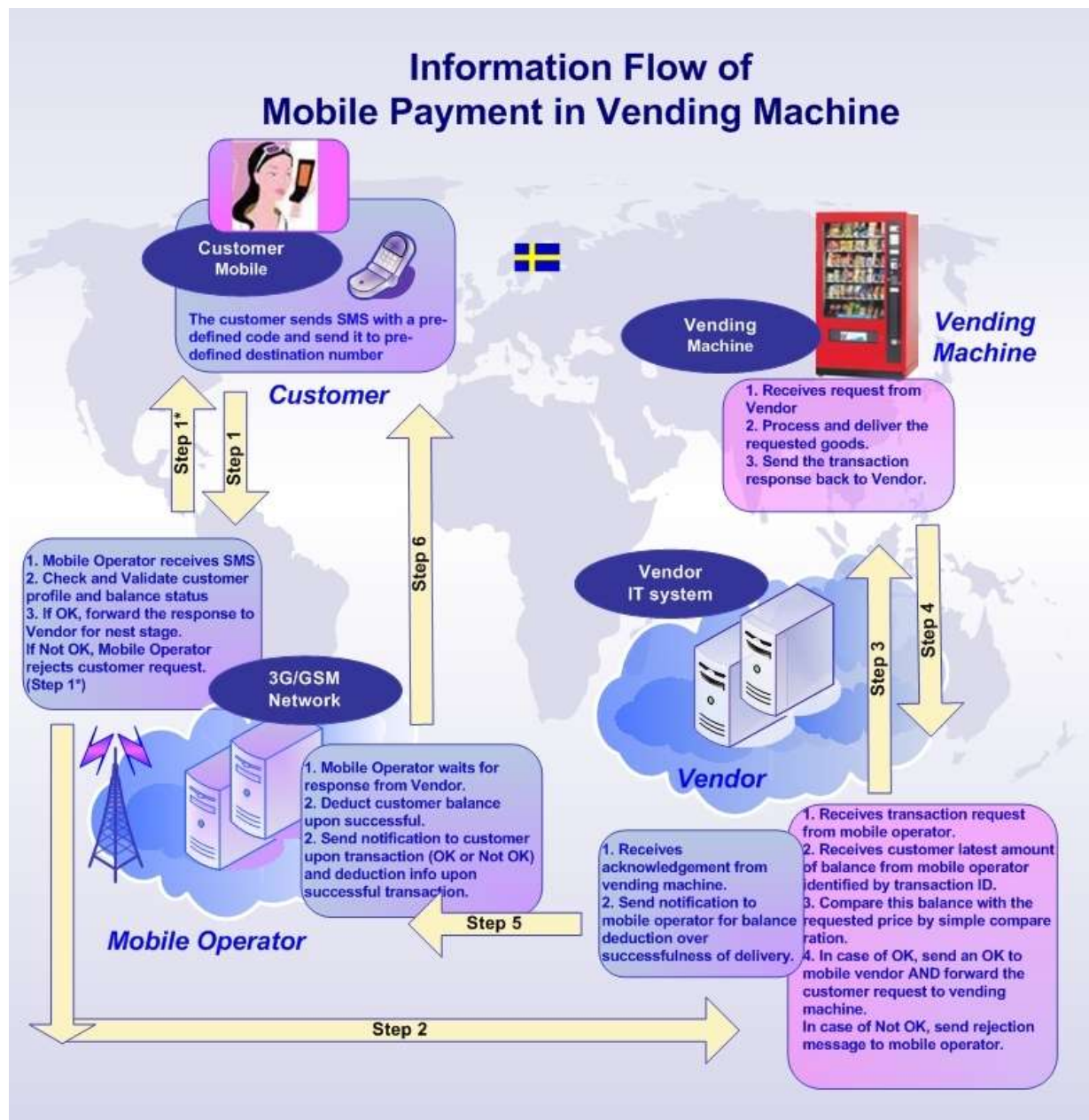


Figure 1: Information flow

Vending Machine is specially equipped with a GSM module for sending and receiving information over the air. Depend on whether the vending machine can fulfill the request; different notification messages “**transaction confirmation**” or “**transaction reject**” will be passed back to vending machine operator and then propagated to the MNO. After this point, for pre-paid users the service charge is deducted from user’s current balance and for post paid users, the service charge added to their monthly bill.

Discussion on proposed information flow

The above scenario will simplify the order process by restricting the user in product selection. In this scenario, users will lose the option to select/de-select products as he/she had to send the selection via SMS, but there is less communication between stakeholders which consequently reduces the transaction cost. Besides, it will enhance the security of the whole.

Besides, there could be another solution that allows the end-users choosing the product after they send SMS. In that scenario, user sends SMS, and vending machines allow user to select the products from vending machine. However, that solution is quite troublesome in implementation and requires an intensive communication. Thus the transaction cost and the response time will be quite high thus it is not suitable for micropayment situation like purchasing snacks from the machine.

Overall, there is no problem in carrying on mobile payment if user has post paid account. Because user can buy product and amount will simply be added to monthly bill. Nonetheless, in the case of pre-paid users, we need to verify the balance in user's account before he/she can purchase products. Thus the prepaid users are not the target customers in many mobile payment cases around the world. However, the team's recommended scenario solves this problem and allows payment for both Pre-paid and Post-paid user. The vendor will have user's information forwarded by MNO and uses this info to verify balance for pre-paid customer before the transaction ends.

Chapter 4 Empirical Work

The survey is conducted by online e-form as well as paper-based survey. There are 151 respondents in total spreading in 2 major cities of Sweden, Stockholm and Gothenburg. The following are the questions and analysis based on the survey result.

Age range: With the total of 90% of people took the survey is 16-50 years old, 45% each for 16-25 and 26-50 age range, respectively. The ranges between 16-25 and 26-50 are considered as the most productive and also are the most potential ranges in utilizing the mobile payment in vending machine. With the growing numbers of people in this range, the market of mobile payment in vending machine will grow too. (Figure 2)

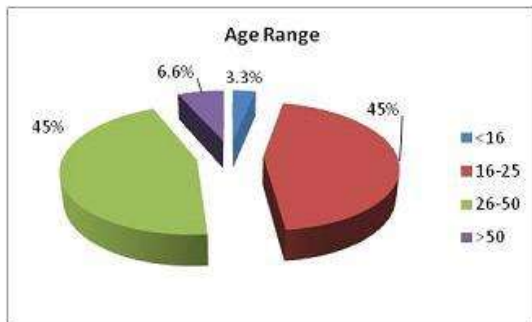


Figure 2: Age range of subjects

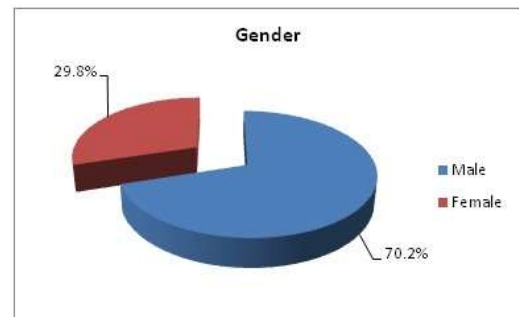


Figure 3: Gender of subjects

Gender: More than two thirds of respondents took the survey are male. (Figure 3)

Analysis Highlight #1: People who have experienced mobile payment compare to people who have not are on slightly the same percentage. Figure 4 shows that mobile payment in Sweden is basically accepted by people and should be seen a huge business opportunity. Mobile Payment still has a big space to improve and explore by the telecom and vending machine vendor in order to create more attractive and beneficial mobile payment business case, of vending machine in particular. As the technology gets more mature and advance, the mobile payment would be definitely going bigger in the future, which will also enable a successful revenue management.

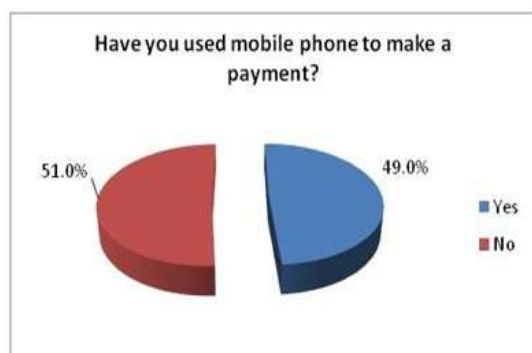


Figure 4: Mobile payment usage experiences

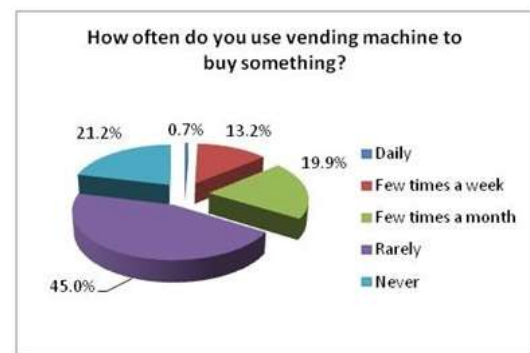


Figure 5: Vending Machine purchasing experiences

Analysis Highlight #2: Figure 5 above shows most people who took the survey had the experience of vending machine. Based on this figure, only 20% of them never use vending machine. Under this circumstance we can see that vending machine, which is placed on most strategic spots, has a very big market in Sweden. With mobile payment as an added feature, the transactions in vending

machine would only add more traffic in the future, not only for vending machine vendor, but also for telecom operator.

Analysis Highlight #3: Among those who have ever used vending machine, based on Figure 6 below, 80% have been in a situation that inadequate coins could be a barrier from using vending machine. From the ratio, we can see that this is a very serious problem, probably the biggest barrier for vending machine business. Mobile payment is expected to solve this big issue that is now considered as a big blocking wall of generating more revenue in vending machine.

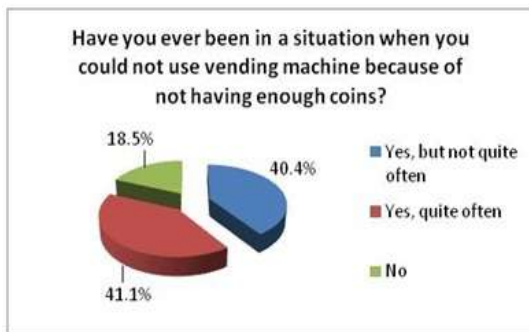


Figure 6: Problem encountered

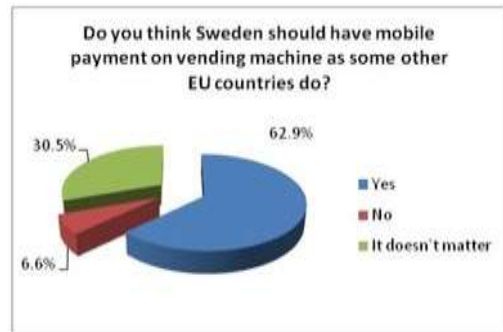


Figure 7: Sweden market opinion on mobile payment for vending machine

Analysis Highlight #4: More than 80% of people are not against using mobile payment on vending machine. Figure 7 (above) shows the majority of 62.9% positively agrees that Sweden should accommodate mobile payment in vending machine, nation-wide, as experienced in other EU counterparts. The success story of mobile payment has been spreading around Europe in particular.

Analysis Highlight #5: The majority of the respondents are willing to use the mobile payment in vending machine if it is introduced in Sweden. From Figure 8 (below), there is only 12.6% of them against it due to various reasons, as stated on its next question (Figure 9).

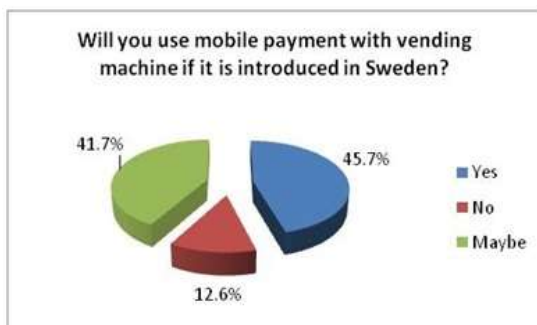


Figure 8: Public opinions toward mobile payment

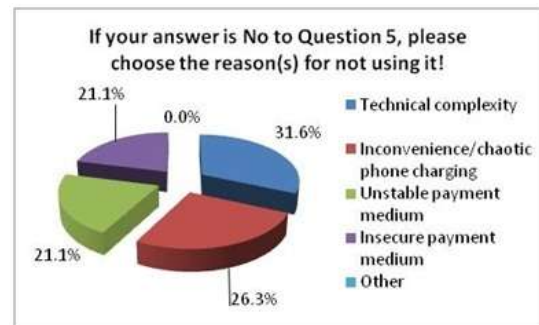


Figure 9: Public opinions toward mobile payment*

Analysis Highlight #6: According to the survey depicted in Figure 9, in order to enlarge the mobile payment market on vending machine, the company should notice these problems: technical complexity, security and stability of payment medium, and status of phone charging. Most the respondents concern about the technical complexity and inconvenience that they think they would face when the service is launched.

Analysis Highlight #7: Figure 10 (below) shows over 90% of people are willing to use mobile payment if there is no extra fee, but few are still willing to use it even if there is an extra small service fee, so, as depicted by Figure 11 below, there should be a proper way to solve the service fee in order to enable a successful mobile payment.

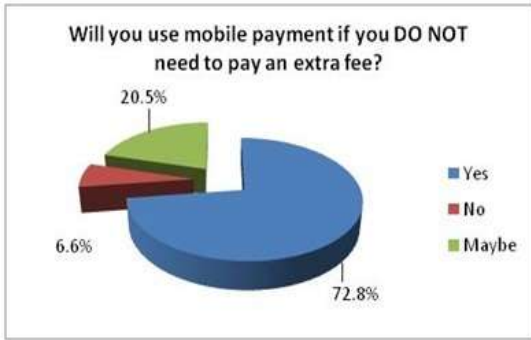


Figure 10: Potential buying pattern analysis



Figure 11: Potential buying pattern analysis*

Chapter 5 Options, Cost-Benefit and Impacts-Risks Analysis

5.1 Options Available and Considered

In this project, the project team considered to conduct the process in several different ways, which include: 1. Pure literature study; 2. Combine literature study and successful case study; 3. Besides theoretical material study, public opinion also plays an essential role; 4. Treat it as a business case, consider from both customer and vendor's perspectives, analyze the market and create a suitable information flow. After discussion and consideration, the project team decided to adopt the last two options which conducted through the whole project. During the process, sometimes the project team met the problems about dividing the project into different phases or conducting some issues together at the same time. Although according to original time schedule the task should be divided into several phases, under special circumstance some sub-tasks went through better if they are implemented together at the same time. As a result, to conduct the project better, the project team chose to make adjustment to meet unexpected situation, which also enables learning about change management during the whole process.

In order to provide the biggest convenience to users, besides cash payment, the vendors needs to consider some other payment methods such as credit cards, bank card, voucher code as well as mobile payment. However, in this project, the project team only focuses on mobile payment method as it is the trend nowadays as well being the most convenient way for small payments. People are reluctant to use credit card or access their bank account for small transactions. For mobile payment, they have peace of mind because there is not much risk involved in it regarding financial frauds. Based on the current research, the project team recommends, in the future, that payment method on vending machine should include cash payment and SMS.

5.2 Cost Benefit analysis

The project team consists of five members, which spent 14 weeks, at least 10 hours per week to complete the whole project. The project team divided their energy into theoretical material study, planning and discussing, fulfilling the project schedule, implementing field study, and completing final report. During this process, there is no economic cost.

From this project, the project team learnt more about mobile payment, including its development history and application, pros and cons of each solution and how they work, the suitable area used in, the process of whole mobile payment, its potential market and business intelligence etc. In addition, the most important and valuable issues the project team learnt are that how to manage a project efficiently, how to work as a team effectively, how to plan and conduct a suitable schedule for the project, how to introduce the project to others and get their cooperation, and how to make proper adjustment to meet unexpected changes during the process. This project strengthened the project team's ability of controlling and managing a project both from the whole perspective and from every detailed circle of implementation.

Moreover, the readers of this paper will know a new method of payment for purchasing products from a vending machine. For the audience of this project, the vendors, if they want to implement this mobile payment method, they should consider the following items.

Costs

1. Hardware and Software modifications cost for the existing vending machines with mobile payment support;
2. Training cost for new and existing employee to carry on daily Operational and Maintenance;
3. Provide technical and customer support for mobile payment for vending machine transaction;
4. Profit sharing with telecom operators.

Benefits

1. Onetime investment;
2. Value addition to company profile and high customer satisfaction;
3. Reduced number of employee.

This new way of payment would attract customers who are not able to use vending machine due to some special circumstances. For example, a customer at an international airport is less likely to buy things from vending machine because he or she does not have the local currency. With mobile payment option available, it is not a problem. (Note: in the condition of which mobile operators from both countries have roaming agreement that allows such transactions). Efficiency in performing tasks related to collecting and placing cash from/to vending machines. Though cash payment is not completely abandoned, but cash transaction will be reduced. Under this circumstance, financial integrity and attraction of new customers will be increased.

5.3 Impacts and Risks

For the project itself, struggling communication and cooperation among project team members, lagging in conducting project compared to project plan, and lack of sustainable business model for mobile payment become the main risks. The impact from this project more is represented on the attitude and cooperation within the project team. On the one hand, at the beginning, the project team was confident with the project until some unexpected problems happened. However, the project team did not give up and tried to solve the problem through everyone's effort and make suitable adjustments to conduct the project better. It turns out that it is the project team's insistence that makes the project developed in the right way. On the other hand, this project is a very good opportunity for the team to cooperate with others. After working together for almost 4 months, the project team members have encountered difficulties with different opinions and enhanced the ability of communicating and cooperating with others. The associated risks and the solutions for them have been clarified as in the Risk analysis section (Appendix 1).

In addition, the result of this feasibility study will make some impacts and risks to all stakeholders as below.

Impacts

1. Customer: Aware of a more convenient and friendly way of payment as they could be confident and worry-free about their pockets when purchasing goods from vending machines.
2. Merchant (Infrastructure Vendors): Open a new channel of payment that could increase the pool of potential customers and as thus increase the total revenue for the merchant. The

new payment method also helps to reduce the billing cost for collecting/distributing coins as well as ensure the integrity of company's financial data.

3. Mobile Operators: Open opportunity to optimize mobile traffic and average revenues per user (ARPU). They could also be benefited from the shared revenues with merchants.
4. Society: Change social pattern and opinion toward mobile payment. Thus it will increase the successful chance to introduce new innovative solutions to the society in the future.

Risks

1. Market: A potential problem of insufficient critical mass could make mobile payment service profitable and sustainable. The problem lies in acceptance of customers with the new payment method. The cooperation between MNOs and merchants in sharing revenues could be complicated. The new payment solution should also comply with governmental policies as well.
2. Technology: Undiscovered security breach that could prevent the solution to exist; Better payment procedures will be introduced in the near future that could make mobile payment solution unprofitable; Unexpected difficulty to integrate new mobile payment solution with existing vending machines and current payment method.

Chapter 6 Conclusions and Future Works

6.1 Conclusions and recommendation:

In order to deliver a feasibility study of mobile payment for vending machines in Sweden, this report evaluates mobile payment methods to find suitable method, analyze the selected mobile payment method, information flow and public opinion and acceptance.

To figure out suitable mobile payment method for Sweden, this feasibility study analyzes five main mobile payment solutions available nowadays. In order to evaluate each mobile payment method, the project team addressed 9 basic factors that serve as the grading criteria for the mobile payment methods. After the grading of each method according to the evaluation criteria, premium SMS/MMS gets the highest score and hence mentioned as the suitable solution for Sweden.

The report delivers a detailed information flow analysis (basing on premium SMS/MMS method) which contains the description of the main entities in the information flow, and the information exchange between the entities.

For the study of public opinion about mobile payment and its acceptance among public, the project team conducted a survey and analyzed the survey results. Mobile payment method as an optional payment method of purchasing from vending machine is accepted by most of the people in Sweden. And most of the people will use it if there is no extra fee by using mobile payment method, however, if there is extra fee, then much less people will still use it. So the report recommends the vendors to introduce the mobile payment method with no additional charges for users. 12.6% of the respondents refuse to use the mobile payment method for vending machine, and their reasons roughly distributed evenly among four reasons which are technical complexity, inconvenience, unstable payment medium and unsecure payment medium. So from this analysis, vendors should choose carefully in order to maximally avoid these problems and attract more customers.

While executing this project the team learnt how to manage a project, from the planning, executing to managing the changes and risks, other than clear insight in our project study area.

6.2 Future work

Future study can be made to extend the topic for current study area like conducting study on technical and organizational requirements and on unaddressed dimension like financial overview. This extended study will answer some important questions like, what type of equipment and technology will be needed to implement premium SMS mobile payment method, what are the costs involved in both the initial purchase and installation/operational costs of the equipment, what is the total start-up cost required in order to begin operations?

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Appendix 1 Project Plan

1- Risk analysis

Risk-from-customer analysis

Identified Risks	Probability	Impact	Contingency Plan
Insufficient critical mass of customers	Medium	High	Conduct survey with as big and diverse sampling as possible to cover every social-demographic aspect
Struggling cooperation between MNOs and merchants	Low	High	Analyze and derive a good information flow and revenue sharing model between different stakeholders
Undiscovered security breach	Low	Medium	Investigate the usage of existing security methods with Mobile payment solution
New payment methods will be introduced	Low	High	Reduce the time to finish the feasibility study of Mobile Payment
Difficulty to integrate with current payment solutions	Medium	Medium	Review and investigate the integration report from similar successful cases

Table 2 - Risk Analysis of Customer

Risk-from-project-team analysis

Struggling communication and cooperation inside team	Medium	Medium	Use Onstage project management platform to enhance communication and make task management transparent
Lagging in conducting project plan	High	Low	Tight control of project plan through milestones, assign sufficient buffer time
Lack of sustainable business model	Low	Medium	Review and compare different existing business models for Mobile Payment and choose the most suitable one

Table 3 - Risk Analysis of Project team

2- Project time estimate

No	Activity	Estimated Duration
1	Literature search	3 weeks
2	Similar case study	2 weeks
3	Collect information about the information flow	1 week
4	Literature analysis	2 weeks
5	Define evaluation criteria to evaluate mobile payment methods	1 week
6	Compare different solutions in vending machine context	1 week
7	Choose suitable solution for vending machine	2 weeks
8	Questionnaire preparation	1 week
9	Gathering data	2 weeks
10	Survey analysis	1 week
11	Analyze the prospect of implementation in Sweden	1 week
12	Define suitable information flow	1 week
13	Draft report	2 weeks
14	Report review and revise	1 week
	Total Working Time*	21 weeks
	*In-parallel Working Time=14 weeks	

Table 4: Project Time Estimate

3- Work Breakdown Model

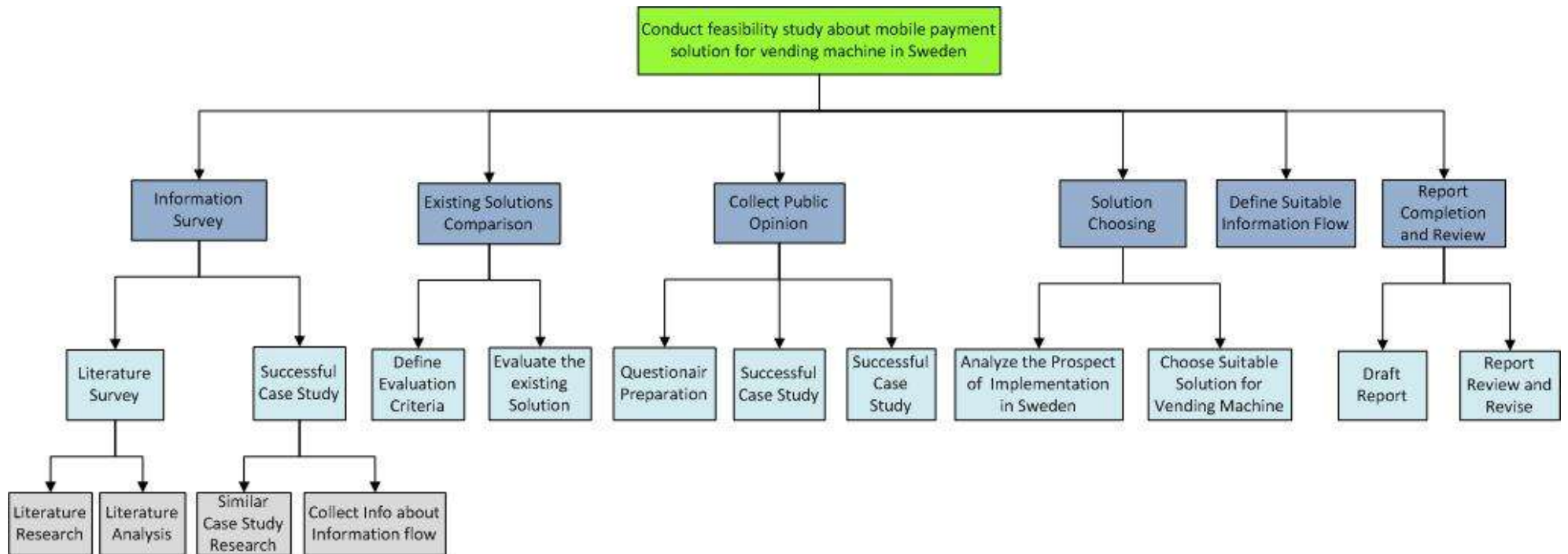


Figure 12: Work Breakdown Structure

4- Activity Network

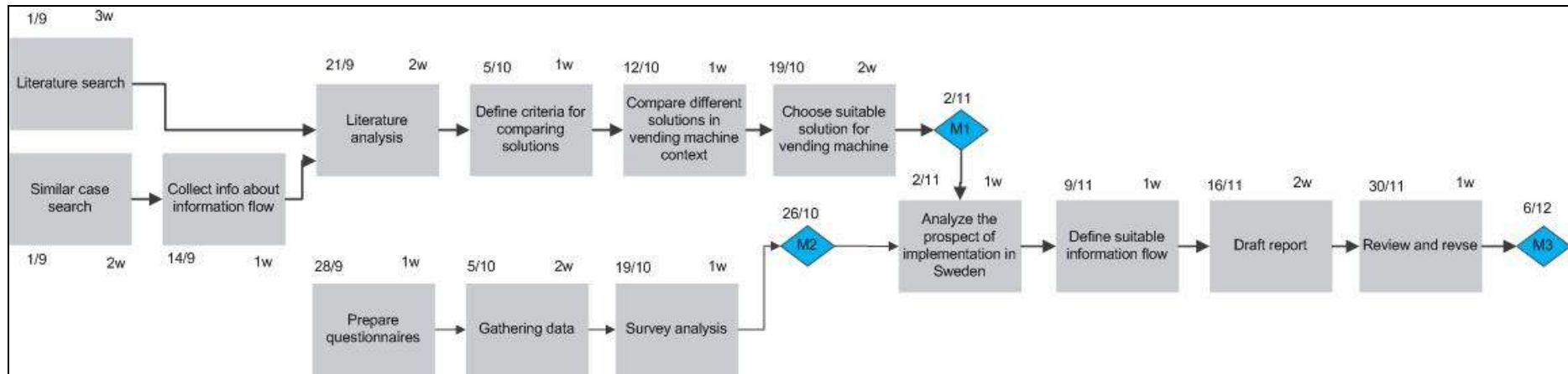


Figure 13: Activity network

5- Gantt Chart

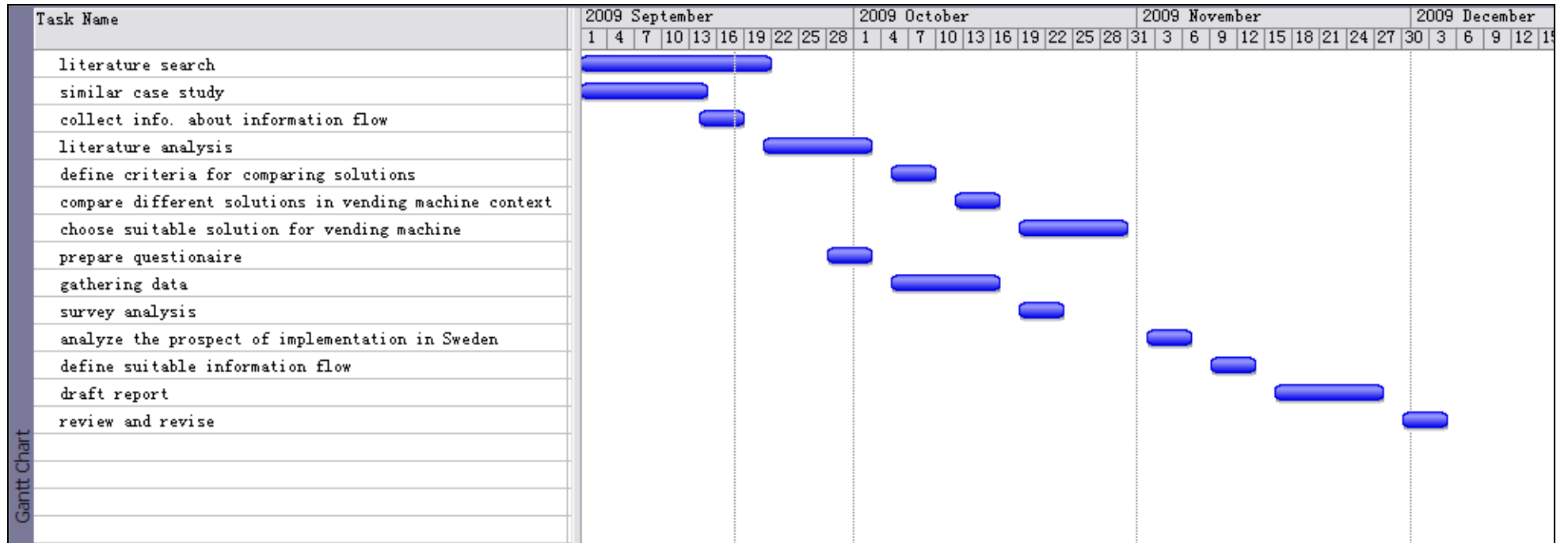


Figure 14: Gantt Chart

Appendix 2 Questionnaire

Mobile payment for vending machines

(Mobile Payment is being referred as using cell phone credit rather than cash to make payment)

Estimated Time: Less than 5 minutes

Topic: Acceptance of mobile payment method for vending machine among public

Subjects: Everyone. Especially people using vending machines at least once a week.

* Required

Age range *

<16 16-25 26-50 >50

Gender

Male Female

1- Have you used mobile phone to make a payment (for example, buy SL or SJ ticket) ever? *

Yes No

2- How often do you use vending machine to buy something (for example, cold drink, snacks, fruit, chocolate, water, coffee)? *

Daily Few times a week Few times a month Rarely Never

3- Have you ever been in a situation when you could not use vending machine because of not having enough coins? *

Yes, but not quite often Yes, quite often No

4- Do you think Sweden should have mobile payment on vending machine as some other EU countries do? *

Yes No It doesn't matter

5- Will you use mobile payment with vending machine if it is introduced in Sweden? *

Yes No May be

5b- If your answer is No to Question5, please choose the reason(s) for not using it.

Technical complexity Unstable payment medium
 Inconvenience / chaotic phone charging Insecure payment medium
 Other _____

6- Will you use mobile payment if you DO NOT need to pay an extra fee? *

Yes No May be

7- Will you use mobile payment if you need to pay an extra small service fee? *

Yes No May be

Thank you for your participation.