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Exploring Consumers' Payment Behaviours at Completing Micro-Transactions with Vending Machines in Sweden

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ABSTRACT

This thesis empirically investigated factors that affect consumers' choice of payment options including cash, credit card and mobile payment, in completing micro-transactions with vending machines. For the purpose, a theory-informed qualitative study was conducted through semi-structured interviews in combination with observations. As a result, we found that consumers choose cash/coins as a priority payment with vending machines because they are traditionally perceived as cash-operated machines. However, since Sweden is moving toward a cashless society, credit card is suggested to be the most compatible with the purchase habit of Swedish people. Despite the compatibility, credit card payment with vending machines is perceived as insecure because of vagueness of transaction, pay without pin code and potential risk of financial fraud. For mobile payment, the findings suggest that perceived advantage of using mobile payment with vending machines are efficiency, security and privacy. Several barriers to consumers' acceptance of mobile payment are also identified, which includes complexity and the lack of social influences.

SAMMANFATTNING

Denna uppsats behandlar en empirisk undersökning av faktorer som påverkar konsumenters val av betalningsmedel, detta inkluderar kontant, kredit och mobilt betalningsmedel vid microtransaktioner hos försäljningsautomater. För att uppfylla syftet används en teoribaserad kvalitativ studie genom semi-strukturerade intervjuer i kombination med observationer. Vi fann att betalningsmedel för försäljningsautomater traditionellt sett uppfattas vara kontanta medel, vilket resulterar i att konsumenter prioriterar att använda kontanter. Emellertid, eftersom Sverige rör sig mot ett kontantfritt samhälle föreslås kreditkort vara mer kompatibelt med svenska folkets handelsvanor. Trots denna kompatibilitet är kreditbetalning i försäljningsautomater uppfattat som osäkert på grund av vagheten i transaktionen, att betala utan pin kod och en potential risk för bedrägeri. Vad gäller mobil betalning finner studien att det anses vara en fördel vid betalning i försäljningsautomater då det ger effektivitet, säkerhet och exklusivitet/en mer privat dimension. Ett flertal barriärer för konsumenters acceptans av mobil betalning identifieras i studien. Detta inkluderar komplexitet och otillräckliga sociala influenser.

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1. INTRODUCTION

Sweden is in rapid transition towards a cashless society, where credit cards are becoming the most common form of payment (CBS, 2012). According to the World Payments Report, the penetration of credit card usage in Sweden is among the highest in the world (Capgemini 2011). Riksbank reports that the number of card payments at point of sale (POS) has increased nine-fold between 1998 and 2011, indicating a very rapid transition (Riksbank 2013). At the same time, new ways of payment based on mobile payment have emerged with the growing penetration of smart phones. Many Swedish companies, such as Accumulate, Infospread, iZettle, Klarna, Payair, PayEx, and Seamless, have entered the market with their own mobile payment solutions. Some Swedish banks have also developed their own smart-phone applications for payments in shops (Markendahl & Apanasevic 2013).

Despite the diminishing use of cash, it remains as a means of payment and is primarily used for purchases under 100 SEK (Riksbank 2013). The purchasing of these low-value services or goods (under 100 SEK) could be called micropayment (Isern-Deyà et al. 2012). In comparison with payment systems that are designed to manage large money transactions, micropayments present their own functional and security requirements since efficiency is as much important as security, even though the trade-off between the two is usually hard to balance (Isern-Deyà et al. 2012). To lower the cost of individual transactions, this kind of services is sometimes provided through machines instead of by human clerks, and their management and trust issues are consequently different than those of the transaction at manned point-of-sale (POS) terminals.

In Sweden, typical micropayment transactions can be observed at parking lots and on buses. In this thesis, we focus on the micro-transactions carried out with vending machines. As a system for buy and sell products, payment procedure is the most important part of interaction that happens between these machines and cosumers. Additionally, growing numbers of vending machines are currently in transition from being only cash-managed towards handling credit cards and mobile payments and, subsequently, will help us to see the future direction of micropayment. Credit cards and mobile payments both seem to be the potential method to supersede cash and take over the responsibility for micropayment. However, little is known about customers' practical purchase behaviour and perception in terms of different payment solutions for completing micro-transactions. A systematic comparison is also missing.

1.1. Problem Formulation and Purpose

The objective of this thesis is to explore consumers' payment behaviour with vending machines by empirically investigating the factors that are relevant for the payment contexts including cash/coins, credit card and mobile payment. The perceived advantages and disadvantages of using each payment solution in purchase process will also be identified. The overall research question motivating the present study is:

- What factors influence consumers' choice of payment options, including cash, credit card and mobile payment, in completing micro-transactions with vending machines?

More precisely, by looking into the whole process of what happens before, during and after a payment, the study focuses on the two following perspectives:

- What inspires consumers to change from one payment method to another?
- What are the consumers' concerns when choosing between different payment solutions?

2.BACKGROUND

2.1. Vending machine in Sweden

Vending machines have been playing an important role in people's daily life. By offering snacks and beverages through an unmanned system, vending machines are designed to provide convenient and efficient services to people who feel hungry on street. Traditional vending machines are mostly coin-operated while some of them accept certain values of paper money. Nowadays, with the developing of new ways of payment methods some looking-forward companies have started to move with the times, thus vending machines which support credit cards and mobile payments are emerging.

A study carried out in 2009 argues that vending machines have a bright prospect in Sweden for following reasons (Febrio et al. 2009). Firstly, they have always been placed at the most strategic spots, such as, metro stations, universities and offices, among which metro stations are the most crowded places thereby vending machines are most densely distributed there (Ibid). Additionally, due to the long operating time of metro (from 5:00 am to 1:00 am at Stockholm metro station) vending machines are useful for people, who frequently commute during the day, to gain energy when the ordinary shops are closed at night and when they have little time to have a regular meal during the day time.

Although the payment method of many Swedish vending machines are still coins only, a vending machine company called Selecta has improved their products to be able to support credit card and mobile payment as well as cash/coins. The instructions of each payment solution at Selecta vending machines will be demonstrated in the following section.

2.1.1. Payment Procedures at Selecta Vending Machine

Cash/Coins



Figure 1: Cash/coins payment procedure at Selecta vending machine

As the most traditional payment solution for using vending machine, cash/coins users would find it is easy to complete purchases if they follow the introduction correctly. Step one is to insert coins or paper money into the corresponding slot, as indicated in the picture above. Step two requires user to input the number of item which they want to buy. At this moment, the machine should start working and then drop the selected item down into the retrieval unit. Last step is to take the item out from the machine, and importantly, remember to get the change back if you've paid more than the tagged price.

Credit Card



Figure 2: Credit card payment procedure at Selecta vending machine

With an attached point of sale terminal, the vending machine enables users to use their credit card by either insert it in or swipe it through. After the card got read successfully, users will go to next step to choose the number of the item, and the rest of operations are as same as using cash/coins.

Mobile Payment



Figure 3: A consumer is using SMS-purchase at Selecta vending machine

The mobile payment technology being used for the vending machines is Short Message Services (SMS). To complete the order, consumer need to text the code affixed to the vending machine and the purchase amount to the number “72-117”. Within seconds, the display on vending machine will show that the item can now be selected. After the item gets retrieved successfully consumers will receive a purchase confirmation by a text message.

In addition to use the build-in text function of mobile phone, one can also conduct SMS-purchase via application like WyWallet. The application WyWallet is a payment services based on mobile phones in Sweden. Launched in the summer of 2012, the Wywallet is now supporting multiple payment services including money transfer between individuals, online and offline shopping, and most importantly SMS-purchase. In order to send SMS through WyWallet user must be registered with a WyWallet account.

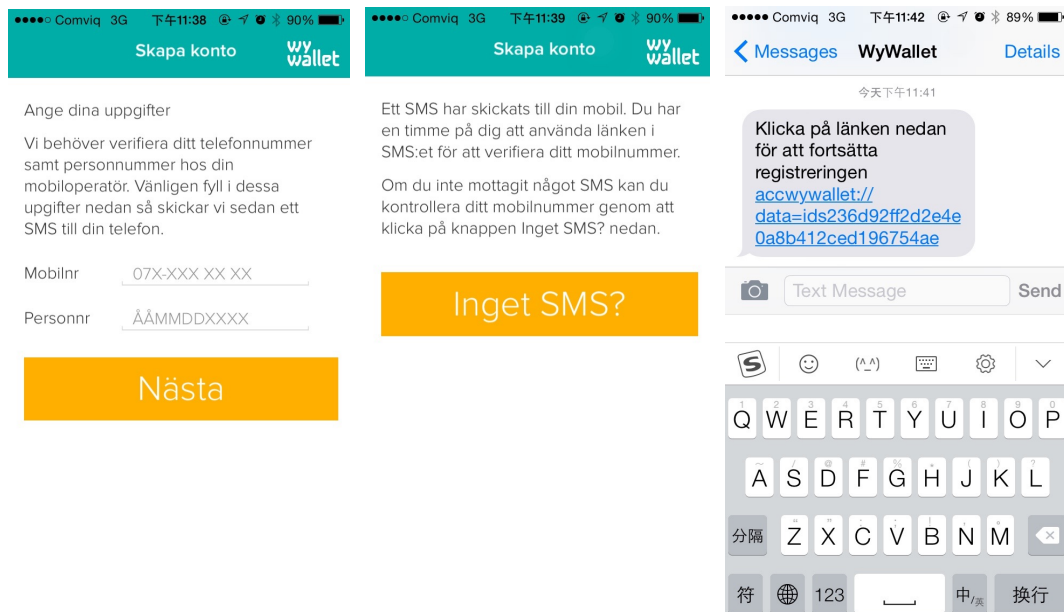


Figure 5: Get started with WyWallet

The registration starts with verifying user's telephone number. Within seconds, the user will get a message sending from WyWallet which includes a link. The user needs to leave WyWallet application and open the message, then click the link to go back to the application to continue with the registration. In next step, if the user wishes to connect the account with his/her credit card, the system will lead the user to a different interface and then go back again when the credit card connection is finished.

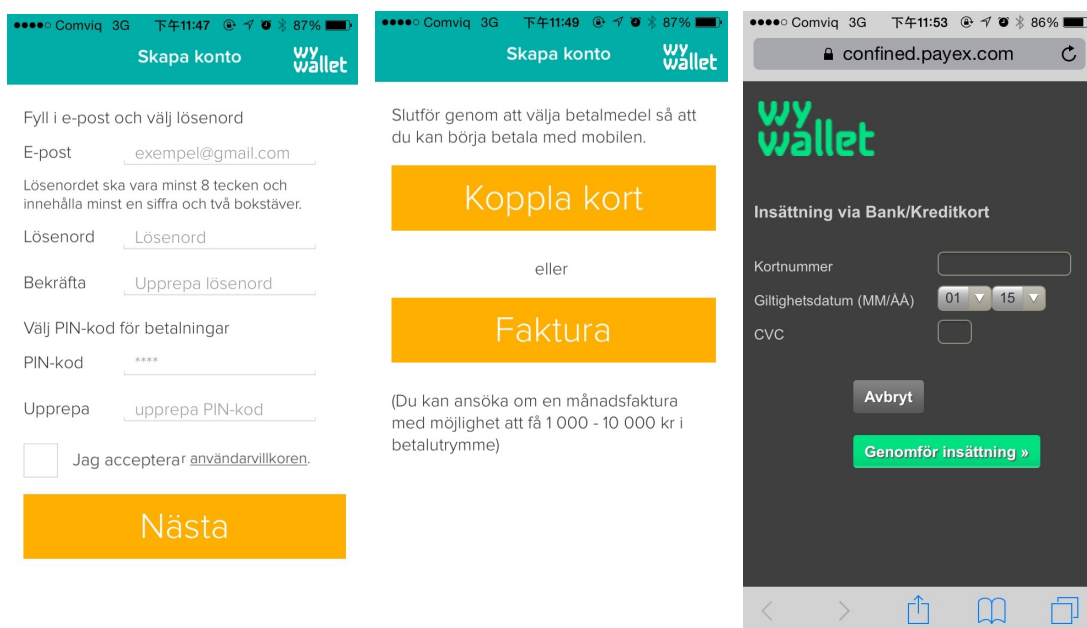


Figure 6: Register a WyWallet account and choose bill method

After the registration is completed, user can find SMS-purchase at the home page and start using it by clicking the icon in the bottom right corner. In SMS-purchase page, user is required to input a telephone number (e.g. “72-117” when purchasing at Selecta vending machine) as well as a message including the machine’s code and the purchase amount. For example, the pictures below show that a user is trying to buy an item cost 10 SEK from a vending machine named 2irja. When the user confirms the information by clicking “Skicka” (send), the system then jumps to text function to send the purchase message.

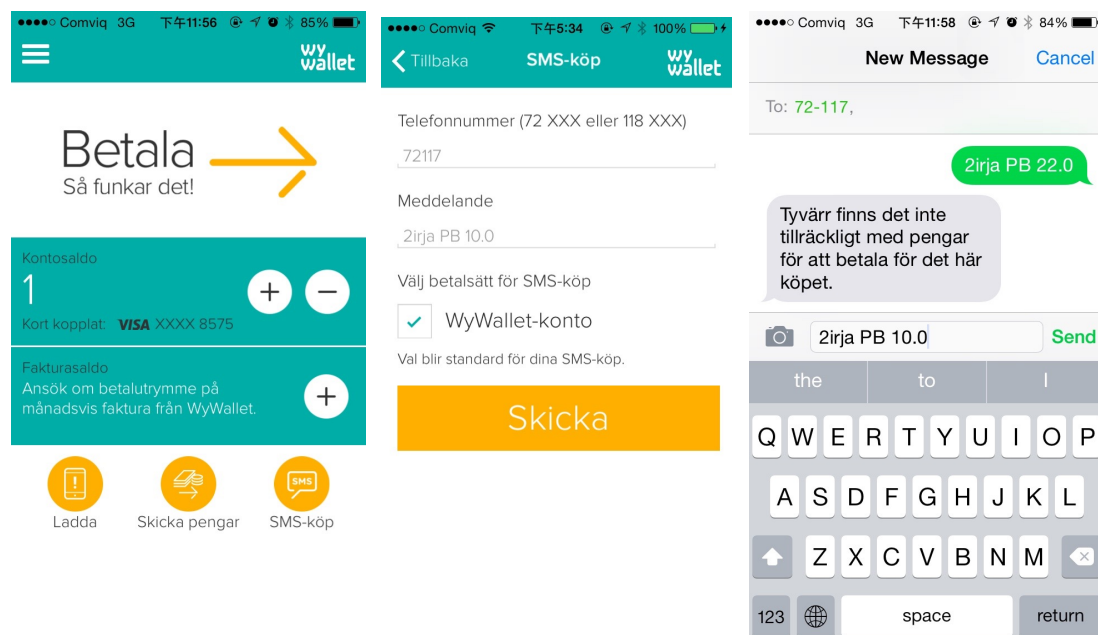


Figure 7: Use SMS-purchase via WyWallet

WyWallte is not the only application that can be used for SMS-purchase. The Selecta Vending Machine Company had recently introduced a specialized smart phone application for using SMS-purchase with their products. With this application, consumers can easily find the nearest vending machine and select it with a simple click instead of manually input the vending machine’s code. After the amount gets approved, the system will open the text and automatically fill in the number “72-117” and the purchase message.

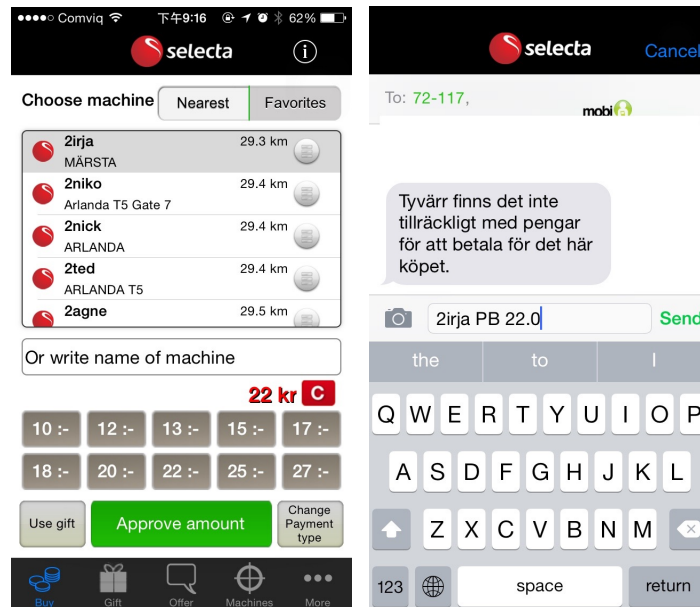


Figure 8: Screenshots from Selecta for iOS

With Selecta users can also send gift money to their friends and use the money received to pay for purchases.



Figure 9: Send gift money to friends via Selecta

Both WyWallet and Selecta can now be downloaded from Apple Store and Google Play. So far, the end-user billing for SMS service have been mainly based on the phone bill (subscription or prepaid card) and credit card.

2.2. Relevant Studies

Numerous studies have been conducted about consumer choice in payment methods, in particular on consumer's preference between cash, check, debit and credit card payments at the POS terminal (E. C. Hirschman 1982; Humphrey et al. 2001; Rysman 2007). Merchant acceptance of payment method is obviously a critical element, which has been found to be influential on payment choice (Rysman 2007). For example, as merchants are billed for every card transaction, some merchants do not accept cards if the amount is small (Talls & Trinh 2012).

Another element that can influence the consumers' choice of payment method is the price of the payment method (Humphrey et al. 2001; Mallat 2007). Humphrey et al. (2001) performed a case study in Norway where the price of paper means of transaction (e.g. check, mail giro) at bank services has been deliberately increased by the local government in order to encourage consumers to transfer to electronic transactions. Mallat (2007) found that premium pricing is a critical factor that often will discourage consumers from using mobile payments. When using a vending machine, it is not uncommon for the cost of mobile payment to be higher than the price of the item purchased.

Hirschman (1982) proposed that consumers' preference for payment system is strongly related to their perceived characteristics of each payment method. For example, cash is perceived as providing less transaction record and security (E. C. Hirschman 1982). On other hand, although debit and credit cards are at present dominant ways of payment, they have been found to be time consuming and tedious for low value transactions (Bertilsson & Hult 2013). However, mobile payment has been proposed as the optimal solution to facilitate micropayment due to the possibility to reduce the number of small purchases paid by cash (Dahlberg & Mallat 2002; Ondrus & Pigneur 2006).

Much research in payment literature, both in the form of empirical inquiries and conceptual development, has been focused on facilitating consumers' adoption of mobile payment. The findings indicated that behavioural beliefs (Yang et al. 2012), perceived usefulness (Cheong & Park 2008; Hillman et al. 2014), and perceived convenience (Talls & Trinh 2012) were considered as important factors that positively related to mobile payment adoption. However, it is unclear whether the use of mobile payment will prevail since the market is still at an early age (Ondrus & Pigneur 2006). In this environment, Talls & Trinh (2012) suggested mobile payment to fill the gap between cash and credit cards, where consumers have to use cash because other alternatives are not available.

At the moment, several solutions have been launched with the aim of getting an early

advantage in the mobile payment market in Sweden, which includes WyWallet, Swish, SEQR, etc. (Bertilsson & Hult 2013). The most widely adopted technology for today's mobile payment services is short message services (SMS), which has been used for many years for applications such as TV voting, parking and for public transportation (Markendahl & Apanasevic 2013). In addition to SMS, some other mobile payment services provide possibilities for consumers to perform P2P money transfer (e.g. Swish), and in-store payments through QR-codes (e.g. SEQR).

However, there is no consensus of technology standard in mobile payment in Sweden. Since different stakeholders focus on different technologies so as to enable different mobile payment solutions, a high market fragmentation has become a potential obstacle for the adoption of mobile payment services, in this sense, traditional credit/debit cards seem to be a better solution (Markendahl & Apanasevic 2013).

3. THEORETICAL FRAMEWORK

The theoretical background of this thesis is drawn from the diffusion of innovations theory (Rogers 2003), in conjunction with trust and security (Gefen et al. 2003), situational factors (E. Hirschman 1982) and money's payment ritual (Crump 2011).

3.1. Rogers – Diffusion of Innovation theory

Diffusion of innovation is a multidisciplinary theory that can be used to study the adoption of new technology through social factors (Mallat 2007). Despite the widespread adoption of credit cards in the Swedish payment market, their involvement in micropayment, for example in vending machines, is relatively new. The diffusion of innovation theory is suitable for this study as it provides a constructive framework through which the consumers' perceptions of new technologies can be qualitatively investigated. In this study, the theory is thus applied to analyse the performances of all payment alternatives with vending machines.

The diffusion of innovation theory determines five characteristics of innovations that affect individuals' decisions to adopt the innovation (Rogers 2003, p. 219-266):

- *Relative advantage* is the degree to which an innovation is perceived as being better than the idea it supersedes.
- *Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.
- *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use.
- *Trialability* is the degree to which an innovation may be experimented with on a limited basis.
- *Observability* is the degree to which the results of an innovation are visible to others.

Of the five attributes, relative advantage, compatibility and complexity have provided the most consistent significant relationships to the adoption of innovation (Tornatzky & Klein 1982) and are thus applied in this study.

3.1.1. Relative Advantage

Perceived relative advantage is a broad and amorphous characteristic that can be extended to many other attributes (Tornatzky & Klein 1982). According to Rogers (2003, p. 220), relative advantage is "often expressed as economic profitability, as conveying social prestige, or in other ways." Previous research in information system (IS) has measured relative advantage in terms of usefulness, effectiveness, and time

saved (Davis et al. 1989; Moore et al. 2015). In the context of payment, consumers would choose a specific payment method because it is perceived as being better than other alternatives as regards to certain characteristic(s). For example, previous study has highlighted people's preference for using mobile payments because of the perceived advantage of avoid queuing and ability to pay remotely (Mallat 2007).

3.1.2. Compatibility

Among all the five attributes, compatibility is the one that most frequently addressed in the research of innovation characteristics (Tornatzky & Klein 1982). As discussed in the diffusion of innovation theory, the compatibility of an innovation can be evaluated through consistency with previous ideas and/or clients' practical requirements (Rogers 2003, p. 240). In either case, compatibility, like relative advantage, is positively related to the adoption of new technologies. Regarding payment methods, the compatibility with consumers' purchase habits is expected to affect their choice of payment systems.

3.1.3. Complexity

In many situations, complexity seems to be a barrier for people to accept new ideas (Rogers 2003, p. 257). Numbers of payment systems have ended in failure because issues with complexity and usability, for instance smart cards and mobile banking (see Laukkanen & Lauronen 2005; Szmigin & Bourne 1999). As will become clearer in the Result section, complexity would cause negative impact on consumers' attitude towards corresponding payment method.

3.2. Trust and Security

In traditional contexts, consumers' trust has been found to be affected by the perceptions of the salesperson's trustworthiness (Doney & Cannon 1997). Transactions through unmanned services, for example vending machines, are thus face a situation in which consumers trust might be inherently low. Gefen et al. (2003) asserts trust as a crucial factor that influencing consumers' willingness to conduct e-commerce transactions. Moreover, Mallat (2007) state the importance of trust in payment service providers. Therefore, perceived security and trust are expected to influence the consumer choice in payment methods.

3.3. Use Situation

Prior research has found that situational factors can also influence consumers' choice of payment systems (Mallat 2007). To be more specific, "Consumers find themselves using an unfamiliar payment system (or a familiar one in an unusual way) because of unanticipated or novel circumstances" (Hirschman 1979). Mallat et al. (2008)

conducted a customer survey in a research of mobile ticketing service adoption in Helsinki Public Transportation, which suggests that users attempt to change purchase plans under certain situational conditions, for example, when a periodic travel card had expired or when in a hurry.

3.4. Money's Payment Ritual

Baker and Jimerson (1992) argue that in a cashless society, money's payment rituals are changed. For example, the "buy now, pay later" philosophy has been found to affect American people's way of purchase and their attitude towards money (Feinberg 1986). Maurer (2012) argued that money in mobile payment is perceived as less liquid. In other words, the material money has been replaced by a notional value that stored in consumers' electronic account and only need to be transacted at specific points in the payment chain (Maurer 2012). From cash to mobile payment, the form of money is keep changing. A question would now arise, what is money?

From an economic perspective, money has several roles in society: it is used as a medium of exchange, a unit of account, a standard of deferred payment and a store of value (Belk & Wallendorf 1990). Crump (1992) characterises money through two properties, one is the capability of being countable as a well-understood unit; the other is the capability to circulate, as he said, "money must, sooner or later, be transacted". Contemporary money is more complex as it consists of different forms (e.g., coins, bank notes, checks, credit cards) and each of them is used for different types of transactions. Some money, for instance, saving deposit, is an important store of value, but lacks the capacity of being a medium of exchange, a means of payment, a standard of deferred payments, or a unit of account (Melitz 1969). The difference in perceived characteristics would thereby influence how the money is spent (Levav & McGraw 2009; Hirschman 1979).

4. METHODOLOGY AND DATA COLLECTION

To answer the research question, a theory-informed qualitative study was conducted through observations and semi-structured interviews. Qualitative study has been suggested as to uncover and interpret participants' understanding of the phenomenon that they involved (Merriam 2014). It is thus suitable for an explorative study out of which consumers' behaviour and perceptions toward their choice of payment are investigated. Additionally, the present study is built against the theoretical framework, which also provides guidelines for data analyses (Malterud 1993; Merriam 2014).

4.1. Observations

Observation is frequently used in collecting data from qualitative research as it provides first-hand information of the research (Merriam 2014, p.136). The present study started with the observations conducted at Stockholm Central Station, where several vending machines produced by Selecta are placed in the middle of the platform, usually near escalator, stairway or waiting area so as to take advantage of the large flow of passenger traffic. Since the study is aiming to explore consumers' behaviour in a public place, the observer was hidden from the participants and being a complete spectator (Merriam 2014, p.125). An observation spot was chosen in the waiting area near a bench close to two vending machines. This way, the observer appeared as a waiting passenger sitting on the bench, got a good view for observation and still maintain the interference to a minimum. The observation notes were written down and thereafter used to refine the follow-up interview questions.

4.2. Semi-structured Interviews

In order to get a holistic understanding of the phenomenon that investigated, interview was also used in this study (Merriam 2014, p.136). Interviews were conducted after consumers had completed a transaction with vending machine, which enabled the observer to ask them what they were thinking with regard to specific behaviours that had witnessed on-site. In order to minimize preconception driven by relevant literatures and theories, interview questions were all semi-structured making room for unexpected findings. Another strength of semi-structured interviews lies in flexibility. In other words, compare to structured interviews, the semi-structured interviews are more suitable for exploration of perceptions because the questions of which are more flexible and open-ended (Merriam 2014, p.90; Barriball & While 1994).

4.3. Data Analyses

Handwritten notes from observations were kept, and all the interviews were

audio-recorded and transcribed into words and descriptions for data analyses. The descriptive raw data were further devised by assigning shorthand designation to the data collected, the process of which is called coding (Merriam 2014, p.173). The coding followed the qualitative clustering method addressed by Miles & Huberman (1994), they suggest that similar patterns or characteristics should be grouped and then conceptualized. The list of codes was subsequently mapped to the theoretical framework. Additional codes were also kept if they need to be shown in the result analysis or discussion.

4.4. Validity and Reliability

Validity of a qualitative research represents how accurate the result reflects the reality (Merriam 2014, p.213). With regard to validity, the present study applied triangulation in data collection process, which means to use multiple methods crosschecking data collected through observations or interviews (Ibid). For example, some insights gained from interview comments can be checked either against the same consumer's behaviour during the observation or the previous study relevant to the phenomenon of interest.

However, since the consumers at the metro station are always in the middle of travel, the duration of the interviews were severely restricted. Some of the interviews got interrupted because the consumer has to take off when the train came. Generally, the interviews last between one to five minutes. In addition, as the vending machines included in this study represent only a small subset of all the vending machines operated by the Swedish retail chain, the demographic data are not representative of all the consumers.

Reliability refers to “the extent to which research findings can be replicated” (Merriam 2014, p.220). Reliability is hard to achieve in a qualitative study because human behaviour is never static (Ibid). Moreover, the semi-structured interviews are difficult to reproduce and therefore the answers may differ when the study is replicated.

4.5. Ethics

With the aim to explore consumers purchase behavior at the vending machines, all consumers who have been observed to use the vending machines were considered as potential participants for this study. However, observer would first ask permission before each time conducting the interviews with participants. Only the results from those consumers who agreed to participate the interviews were used in this study. Voice recording had also approved by participants before the interviews started. All the participations were voluntary and anonymous.

5.RESULTS

5.1. Consumers' Characteristics

In total, thirty-six people were observed using the vending machine in this study. Thirty of them agreed to participate in an interview. Of the thirty that agreed to participate in the interview, fifteen people paid by cash/coins, ten people used credit cards and five people paid with their mobile phones. The participants' age varies between 16-18 for the youngest and over 60 for the oldest. Overall, thirteen women and seventeen men were participated. The full characteristics of the participants can be found in Table 1.

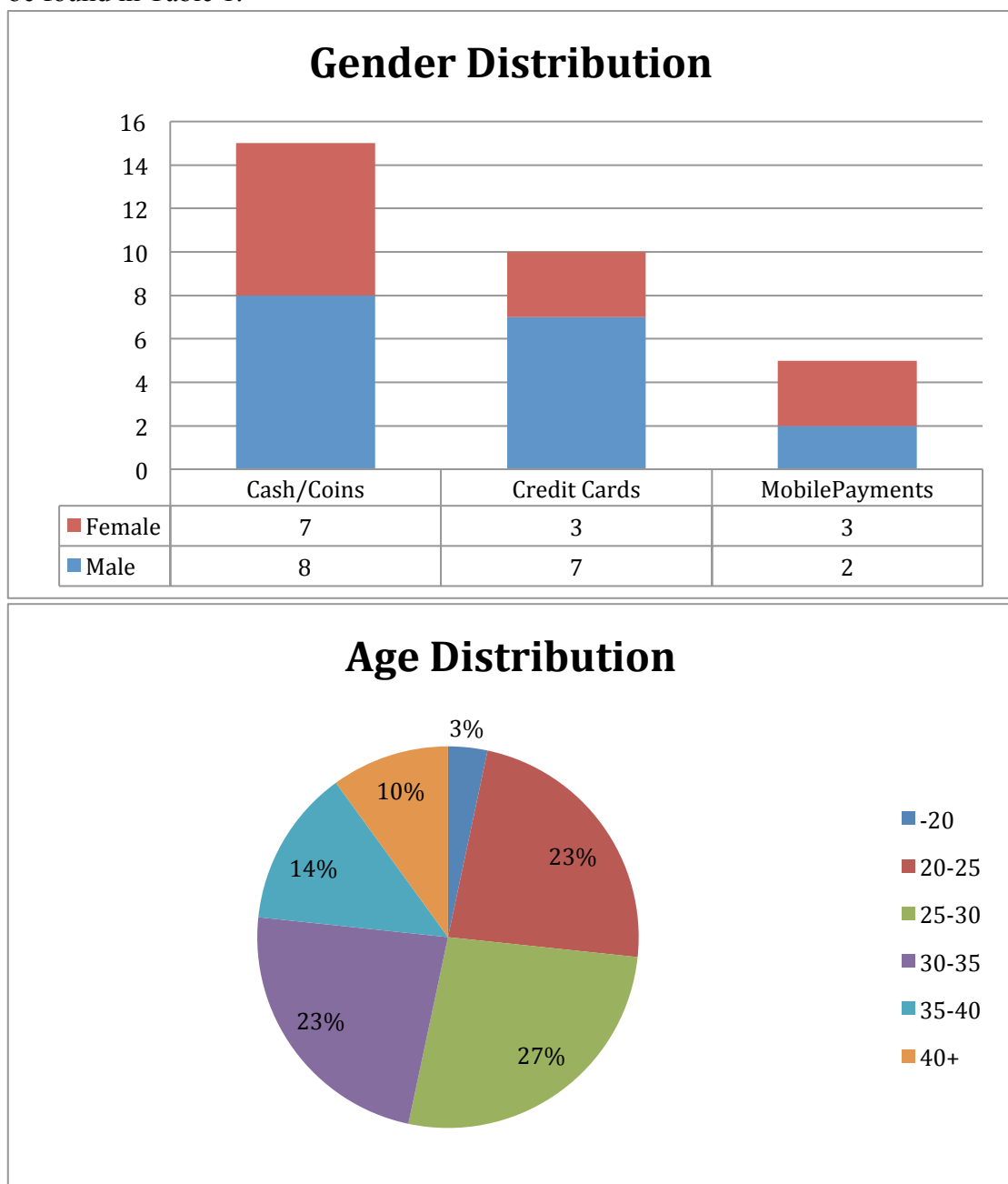


Table 1: Participants demographic distribution

5.2. Observation and Interview Results

5.2.1. Relative Advantage

Transactions with both credit card and mobile payment were found to be more efficient than with cash/coins, as it was time consuming to count dozen of coins or to find exact amount of cash. Efficiency was considered as critical for small money transaction especially in this context where consumers are always in hurry to catch the train.

Excerpt 1: A lady was trying to buy a chocolate bar from the vending machine. After the item was selected, she looked into her purse and picked every coin out, quickly checked, then put them into the coins slot one by one while muttered as if counting the amount. The vending machine started functioning meanwhile the train was coming. She squirmed, bended over and put her hand into retrieval unit to get her chocolate bar out as soon as it dropped down from shelf. But due to the time pressure she didn't find it and left with nothing but an upset face.

Some interviewees noted that using non-cash payment solutions could avoid gaining small value coins. In this respect, one consumer believed that using cash frequently would increase the amount of coins holdings since you always get changes back, and this was considered as a hassle.

"It's very easy (to use mobile payment), you don't have to take out your card or your money, don't have to wait for change, just one message and it's all done." (Student)

Another perceived advantage of using mobile payment is that SMS provides consumers a clear view of what they have purchased, which likes a shopping receipt stored in the mobile phone. In comparison to credit card, SMS can also give consumers precise confirmation and feedback at the end of each transaction.

"It (SMS service) shows very clear of my shopping history, which I really like. I can always go back and check where my money has gone." (Young adult)

5.2.2. Compatibility

The results suggest that the most frequently chosen payment method was due to consumers' habit. Both credit cards and mobile payments were considered advantageous because people have them available most of time. Credit card, however, was more frequently mentioned to be consumers' habitual payment solution.

"I always buy stuff with my card, everyday... No (I don't use mobile payment), because I always have my card on the top of it (she then shows me her mobile phone with a protective case which has pockets for storing cards)." (Middle-aged)

"SMS is always fast and I have my phone in my hand almost all the time." (Young adult)

Moreover, many interviewees proclaimed that they do not have or have very little cash with them nowadays, and further stated that lack of exact value of cash/coins could be a problem.

"I don't have cash, never. Since 10 years ago." (Young adult)

"It's not like you always have coins or small bills with you so it's better to use the SMS." (Young adult)

5.2.3. Complexity

Consumers' concern of complexity was mainly focused on the discussion of using mobile payment with vending machines. The other payment alternatives seemed to be more familiar. Those who had tried mobile payment but failed to make it work perceived it as very tedious and difficult, especially in the set up phase. They stop trying it because the failure made them feel frustrated and unhappy.

"Yes, (I've tried to use mobile payment) only for once. It took a lot of time to set up. It was the first time I got things stuck in the machine, so I never tried that again." (Young adult)

"The set up process was very confusing. I'm not sure if the network was working well, so I gave up." (Middle-aged)

People who had not tried mobile payment were slightly more positive, if they had seen other consumers successfully using mobile payment. In addition, the findings also show that recommendation from families or friends can reduce the perceived complexity of using mobile payment.

"Yes, I've seen some people using it. It seems easy and fast, I think I'll try it sometime." (Young adult)

The influence of complexity was particularly apparent in older generations. This is an expected result that older generation would find it is more difficult to adopt new technology than younger generation. Some evidence has been suggested that age

difference has a significant impact on older adults' performance of computer-based tasks (Sharit & Czaja 1994). One interviewee believed that mobile payment is too complex to use for people like his age (63 years old) and, on the other hand, he was always satisfied with using credit card to purchase stuff due to its simplicity.

5.2.4. Trust and Security

The findings indicate that consumers' attitudes have polarized toward trust and security in using credit card. Those who preferred it argued that credit card has already been part of life and they have never had any problem with it, while those who argued against it perceived using credit card as a risk in general and even less secure when it is used by machine. In fact, most of interviewees were negative to the idea of using credit cards with vending machines, and the main reason was because of uncertainty, which consequently leads to the feeling of insecurity.

"I don't use credit card (with vending machines). Because you don't know when you'll have trouble with the card, it happened to me sometimes, the purchase hasn't completed but the money was gone. So I don't use card." (Young adult)

"I don't like paying by card. Because, you know, the money in the plastic card is virtual while cash is physical so that I can feel in control of it. For me it's more comfortable to use physical money." (Middle-aged)

In addition to the lack of control, vagueness of transaction was also considered as a factor that causes the uncertainty of using credit card. One consumer described a situation where he was unsure whether or not the payment has been charged, with a result that he made the order twice:

"I swiped my card, but nothing happened so I tried again, this time I inserted my card into the machine. I got really upset when I found that I have to do it all over again. It worked out, then I left, but suddenly I wondered what if they've token my money away when I swiped my card at the first time? Anyway, it didn't cost very much so I haven't check with my bank account afterwards, but still made me feel bad." (Student)

No requirement to enter pin code to pay with credit card was considered both as strength and weakness for the participants. To the consumers who frequently use credit card with vending machines, it significantly reduced the time consumption so that the efficiency was raised. However, it was perceived as very unsafe to the most of consumers. One consumer proclaimed that it was too scary to use credit card without input pin code and he never used credit card (with vending machines) ever again.

Moreover, credit cards are considered as unsecure also due to consumers' past experience. Some interviewee noted that their entrust with credit card have nothing to do with the machine but their misfortune experience or bitter stories that heard from others.

"No (I don't use credit card). Because back to where I live, it's Hungary, once I used my credit card and lost all the money. I've been here for only two months. I don't believe (the credit system), though it might not be a problem in Sweden." (Middle-aged)

Majority of interviewees said that they were more willing to conduct payments with vending machines by cash/coins. However, in observation it has been found that some people might forget to get their change back after the completion of the transaction. Several interviewees also claimed that sometimes the machine takes in their money without gives out the item purchased.

"I paid with coins but the machine got stuck, didn't give me anything out. I have to call the company to get my money back." (Old generation)

"No, don't use cash with machines cause you never know (what will happen). I don't know if you can even use cash with this machine." (Middle-aged)

Surprisingly, none of the interviewees have shown concerns with mobile payment (SMS in this study) as regard to security issue. SMS is different from other payment methods since consumers can complete the whole transaction through their own smart phones instead of interact with machines. When asked about how do they pay for the SMS services, the answer shared by all the participants who use mobile payment was that the bills were charged from phone balance rather than from credit cards. The main argument for not connecting credit cards to SMS services was that it would arise security issues.

"(With mobile payment,) I buy stuff and the payment goes from my phone, I'll pay it through my phone bill... I try not to connect my card to the phone, cause I don't feel very safe with it." (Middle-aged)

Moreover, the money saved in mobile phone is always fixed which made consumers feel more peace than using credit cards because they know the limit of lost if bad situation occurred.

"I don't put a lot of money in my phone, so how much can I lose?" (Student)

5.2.5. Impact of Unexpected Circumstances

The impact of use situation on consumers' choice of payment methods was demonstrated in the observation as well as in the interview. It was frequently highlighted in the interviewee comments that their choices are dependent on the adequacy of cash/coins while other payment methods, either credit cards or mobile payments, were considered as back-up solutions when the cash/coins is insufficient.

Excerpt 2: A young couple with three children was standing on the platform waiting for the train. One of the kids pointed at the vending machine and asked for something. After the kid decided which item to buy, the mom took her wallet out and started counting coins. Then she shook her head, put everything back and talked to her child. But the kid insisted. The dad came to the rescue, suggested the mom to use credit card. She took her card out unwillingly, and bought a chocolate bar for her son.

In the follow-up interview, the same consumer described her purchasing experience as fine and unexpected since she has never used credit card with vending machines before. The short time for completing the order surprised her. However, when she was asked whether or not to keep using credit card with vending machine in the future, the answer was:

"It depends. If I have coins I think I'll use coins. Because they weight too much, I need to get rid of them." (Young adult)

Similarly, several interviewees mentioned that they have had used mobile payment to buy goods from vending machines, some of them even showed me the application they used on their smart phone. But although they know very well about how to use mobile payment, cash/coins is still considered as the main solution for micro-transactions with vending machines.

In addition to the insufficient cash/coins, lacking of alternative payment methods was perceived as another factor to facilitate consumer change from one habitual payment method to a new one. A student who always uses vending machine to buy snacks at school said that he started to use credit card because the system for cash payment was broken and left him with no other choices.

Furthermore, time pressure was also mentioned by some interviewees when they described the situations of which a different payment method would be used other than the usual one.

"I don't use my card so often unless I have to... If I don't have enough coins or if I

was in hurry to catch a train.” (Young adult)

5.2.6. Impact of Money’s Payment Ritual

According to the interviews, consumers who use mobile payment expressed less care of consuming money than those who use cash or credit cards, even though the mobile network operator (MNO) would charge them extra money for using mobile payment. They themselves might not be consciously aware but it could be captured from interviewee comments, such as:

“It is connected with my phone bill. You just buy and the payment goes from your cell phone, you know how it works.” (Young adult)

“It is paid through my mobile phone, I don’t know what do they call it, the money in my phone, and it costs 3 kronor for each message. I think it’s ok (to pay the extra fee).” (Student)

“It doesn’t matter (to pay more money for using mobile payment), I think it’s worth it.” (Young adult)

It was notable that all mobile payment users felt quite comfortable when conducting the transactions with the vending machine although very few of them acknowledge of how the money was transacted from their phone to either merchants or MNO. Their causal attitude towards the deducted money were completely different than the other people when they talking about payments through cash or credit card.

For consumers who pay their phone bill through pre-paid card the money that haven’t been used for phone call or Internet surfing is like deposit in their account while mobile payment provide them an opportunity to transact those money again. One student noted that he felt using mobile payment “in a way saved his money” since he could use his credit card in other “bigger” purchases like buying clothes or food.

“The problem is I can’t use them (pre-paid phone card) up with several phone calls every month. I started using mobile payment (with vending machine) because I found in this way I could get my money out of the money-box.” (Student)

6. DISCUSSION

The purpose of this study is to explore the factors that influence consumers' payment behaviour (using cash/coins, credit card or mobile payment) with vending machines. In order to achieve the purpose of this study, consumers' purchase activities and their perception of each payment method were investigated. The information was collected through observations and semi-structured interviews. Based on the theoretical framework, the findings will be further analysed and discussed as follow:

6.1. Relative Advantage

The findings suggest that perceived advantage is an important factor impacts on consumers' choice of payment. Particularly in the situation of conducting micro-transactions since efficiency is highly demanded here. In this sense, consumers attempt to choose using credit card or mobile payment, which were perceived as more efficient than cash/coins.

The influence of perceived advantage is shown to be stronger on mobile payment. In addition to efficiency, mobile payment is considered advantageous also because the ability to provide purchasing receipt. In other words, the mobile payment transaction always leaves electronic records, in form of sent messages for SMS services, which can be traced if any suspicious activity is detected.

Nevertheless, most of the consumers still considered cash/coins as the primary payment solution because they thought using vending machine would be a good opportunity to get rid of clunky coins.

6.2. Compatibility

Consumers' purchase habit is shown to be a critical factor that determines the most frequently chosen payment method. We found that although vending machines have been traditionally considered as cash-operated machines, the habitual payment method for most of the Swedish people nowadays is credit card. In fact, many interviewees claimed that cash/coins is disappearing from their life and credit card, in the contrary, is being used frequently due to the ubiquitous access to various payment services.

This high compatibility on one hand encourages consumers to abandon cash/coins, however on the other hand, inhibits the adoption of mobile payment. Though many consumers noted that smart phone has also been integrated into their everyday life, since credit card is functioning well they are reluctant to change to a new payment solution. Several consumers have been observed to use credit card during the

purchases with the vending machine and put the card back into their smart phone cover case afterwards. It is interesting to find that credit card and mobile phone are physically attached but not yet technically connected.

6.3. Complexity

The results indicate the significant influence for complexity to consumers' choice of payment solutions. To be more specific, the complexity of the set up procedure for mobile payment services is frequently cited as a hurdle to its adoption, especially for older consumers. A possible explanation for this might be that growing old always come along with physiological changes, and slow down the learning process (Chaffin & Harlow 2005). But no matter how old the consumer is, if we took a look at the set up procedure of some mobile payment applications, for example WyWallet as illustrated in the Background section, to register a new account would cost anyone a considerable amount of time with jumping out and in the application two times. Since many consumers have encountered complexity problem at the very beginning phase of using mobile payment (the set up phase), the first-time failure would consequently discourage them to continue with mobile payment. Additionally, the code and service number for using mobile payment at vending machine might be difficult to remember. Moreover, previous study has found that some consumers dislike the idea of having a separate account for mobile payment (Mallat 2007).

In contrary, as the most traditional payment solution, cash/coins is considered to be easy to use. Similarly, credit card transaction at the vending machines is also perceived as easy and convenient, which then results in the high compatibility with consumers' purchase habit.

6.4. Trust and Security

The findings show that many of the interviewees proposed strong concern and mistrust to use credit card, especially to use it with the vending machines. This result can be explained from three aspects. First and foremost, is the vagueness of transaction lies in the credit card payment procedure at vending machines. Lacking of clear instruction and system feedback cause consumers' confusion about the progress of the current transaction. Secondly, no requirement to enter pin code when using credit card with the vending machines is another factor leads to consumers feeling insecure. A possible explanation for this might be that in many credit card payment scenarios a transaction would not be considered as completed until consumers confirm the deduction and enter the pin code (or sign signature). Last but not least, some consumers considered using credit card is itself an unsafe activity due to either their past experience or the stories they have heard. An example of potential risk could be credit card skimming, a type of counterfeit fraud where fraudster will copy

consumers' genuine data on card's magnetic stripe to another through an electronic device known as a "wedge" or skimming device (Barker et al. 2008; Bhatla et al. 2003). This negative impression of credit card is somewhat inevitable, since the highly usage consequently increase the possibility of theft incidents (GC 2013). Baase (2003) also claimed that stealing one's identities through credit/debit card numbers is a common way of financial fraud.

Comparing to credit card, the results suggest that consumers' overall attitude towards mobile payment with respect to trust and security is positive. This result is likely to be related to the perceived privacy of using mobile payment. For many of us, mobile phone is a personal device, which has been integrated to our life at the individual level (Maurer 2012). Hence, unlike other payment methods that require consumers to conduct transaction with the help of the machines, mobile payment enables consumers to finish the transaction with only their own mobile phone. Moreover, the end-user billing for mobile payment services in this study is shown to be phone bill (prepaid or subscription). For prepaid users, in compare with credit cards a lost of mobile phone would not cause them to lose any more money than what has been transferred into the mobile payment account.

Different from credit card and mobile payment, cash/coins provide consumers a level of immediate security and trust because of its material presence. Cash/coins can be directly handled, and seen how the machines deal with them during the purchase. This physical property of cash/coins triggers consumers' feeling that the transaction is under control.

6.5. Unexpected Circumstances

According to the results, cash/coins is currently the primary way for people to purchase with vending machines while credit card or mobile payment are more likely to take place when cash/coins is inadequate. This result is in agreement with the findings of Dahlberg et al. (2008), which showed that newer payment methods would arise in the area where traditional payments are insufficient.

Addition to insufficient cash/coins, lacking of alternative choices and time pressure are two other unexpected circumstances in which consumers would change to use an unfamiliar payment method. In this respect, the ubiquitous access and efficiency of credit card and mobile payment make them to be more adequate to these certain circumstances. This result is consistent with the findings of Mallat (2007) who suggested that perceived advantage of payment method becomes more important in unexpected use situations.

Although several consumers have managed to set up mobile payment transaction in

unexpected purchasing circumstances, it still cannot replace cash/coins and credit card and become consumers' habitual payment method at micro-transactions with vending machines. One explanation for this might be because micro-transactions at vending machines have always been an individual activity, which does not require intervention of other social members. Previous study has found that social influences have significant impact on the perception of usefulness and ease of use toward new technologies (Lu et al. 2005; Yang et al. 2012). Regarding to social influences, the results show that some consumers, who currently use traditional payment methods, might want to try mobile payment if families or friends recommend it.

6.6. Money's Payment Ritual

It is interesting to note that consumers who use mobile payment showed little concern about the money deducted through mobile payment. This result may be explained by the fact that the money's payment ritual in mobile payment transaction has been changed. The two main billing solutions that being used for SMS services in Sweden are phone bill (prepaid card or subscription) and credit card. In this study, however, none of the consumers have connected their credit card with the mobile payment account because of the perceived insecurity.

On the other hand, mobile payment is considered to be a beneficial payment solution, especially for the consumers who pay through prepaid card. When using prepaid card, the money is deducted based on connection fee and the duration of connecting. Apart from these, the rest of money saved in phone balance will not be transacted unless consumers want additional services, such as extra Internet. Since consumers cannot directly withdraw money from the phone balance, mobile payment provides them an opportunity to transact the money again and thus cause consumers to be more willingness to pay.

Compared to prepaid card, phone bill with subscription is more similar to the bill with credit card since subscription also allows consumers to pay later. Several researchers have highlighted the enhancement of spending with credit cards' payment mechanism (Feinberg 1986; Prelec & Simester 2001; Roberts & Jones 2001). Roberts and Jones (2001) proposed that the more one relies on credit card, the less price-sensitive he/she is, and this phenomenon would thereby facilitate the money spending. Additionally, the findings show that consumers feel relatively more comfortable with respect to the trust and security of using mobile payment. In general, therefore, it seems that mobile payment is the optimal payment method for completing micro-transaction at the vending machines.

7. CONCLUSIONS

This study set out with the aim of investigating the factors that influence consumers' choice of payment options, including cash, credit card and mobile payment, in completing micropayment transactions with vending machines. The findings allow me to draw the following conclusions:

Cash/Coins – An Ageing King

The majority of consumers in this study have been observed to use cash/coins due to the fact that vending machines have always been perceived as cash-operated machines. During the interviews, most of people showed the high preference of using cash/coins, while both credit card and mobile payment were considered as back-up solutions when the cash/coins is insufficient. However, under the promotion of turning into a cashless society, less and less Swedish people are now carrying paper money or metal coins with them. Therefore, the disappearance of cash/coins seems to be all but a matter of timing.

Credit Card – A Problematic Middle-Aged

The findings suggest that among all the payment methods at the vending machines, credit card is the most compatible with consumers' daily life in Sweden. Almost all interviewees noted that they have credit cards and most of them use credit cards quite often in their everyday lives. However, the frequent usage does not mean that the consumers recognize credit cards as a secure type of payment solution. In fact, the perceived security issues, which consist of vagueness of transaction, pay without pin code and perceived risk of financial fraud, significantly inhibit consumers to change from using cash/coins to credit card when conducting micro-transactions with vending machines.

Mobile Payment – A Growing Child

Mobile payment for completing micropayment transactions with vending machines is seen as a convenient and relatively painless way of spending. However, despite the perceived advantages of using mobile payment including efficiency, security and privacy, mobile payment is currently at an early development stage. The study found that consumers' mental model of mobile payment transaction is not yet clear, and the end-user billing for mobile payment services is limited to phone bill. Furthermore, the results suggest that one of the main factors that inhibit consumers to adopt mobile payment is due to the complexity, especially for older consumers. Another critical factor hinders the acceptance of mobile payment at individual micro-transactions is the insufficient social influences.

7.1. Contribution to HCI

By empirically investigating the current payment system for vending machines, this study provides the designers in the industry with insights from a consumer's perspective. In order to improve the user experience during the purchase procedure with vending machines, designers should pay attention to the following aspects in terms of the three payment methods.

Cash/Coins

Despite the fact that less and less people are carrying money with them today, many people perceive using vending machines as a good chance to get rid of coins. Therefore this function should be retained.

Credit Card

Regarding to Nielsen's usability heuristics (1995), the result of this study indicates that the current credit card payment system with vending machines requires enhancements of instruction and system feedback. With the help of a clearer instruction, novice users would be able to use the system without making unnecessary mistakes. On the other hand, a well-designed system feedback will keep consumers aware of the payment progress and notice consumers if any error input caused the transaction failure. Besides, to make up the perceived uncertainty that results from paying without pin code, one suggestion might be to present consumers a confirmation message on the display screen before each time deducts money from the credit card. In this way, the user control and freedom of the system could also be enhanced by giving consumers a chance to approve or dismiss the ongoing money transaction. Furthermore, to overcome consumers' concerns on credit card payment security, designers need to clearly demonstrate the implications of errors in transaction procedure.

Mobile Payment

With regards to mobile payment at vending machines, the findings suggest that more attention should be paid to the usability of the current system. The consumers perceived the registration procedure that is required to use the mobile payment application as complex. One obvious drawback of the current registration procedure for WyWallet is that jumping between windows would decrease the perceived consistency of the system. Additionally, the code and service number are difficult for consumers to remember. Therefore, more effort needs to be made to develop easier and user-friendlier systems for mobile payment.

The findings indicate that the billing method of using phone bill in mobile payment transaction is considered as a success. However, the lack of positive social influence and emerged as a barrier to the adoption of mobile payment. In order to take

advantage of social influence, the Selecta has introduced Gift function to enable users to send gift money to their friends in address book. Nevertheless, since users cannot gain any benefit from sending money to others, this strategy does not seem promising. Hence, a better way of using social network to facilitate mobile payment adoption is needed.

7.2. Limitations and Suggestions for Future Work

As with any empirical research, this study has limitations. One of them is the time limitation of the interviews. Since most of the consumers at a metro station are travelling, some consumers might be in a hurry, and couldn't have enough time to retrieve memories of past experiences and answer the question to a deeper degree and a wider extend.

Conducting observations only at Stockholm metro station and only with Selecta vending machine lead to another limitation in terms of small sample size. In particular, the external validity, which refers to the extent to which findings can be applied to other situations, of this study is challengeable since one might not get the correct information as represented by a large population (Höst et al. 2006 as cited in Bertilsson & Hult 2013). A further study could evaluate the factors that influence consumers' choice of payment at micro-transactions with different situations (e.g. parking lots, buses) and with a larger sample size.

With a larger sample group, future research could take personal characteristics (Lu et al. 2005; Yang et al. 2012) and culture influences (Jarvenpaa 1999) as two additional factors, which might also be able to affect consumers' payment behaviour. Yang et al. (2012) argued that the willingness of an individual to try out a new information technology is influenced by the individual's personal characteristics. Additionally, the characteristics of an individual could be shaped by the culture he/she involved. For example, consumers from different cultural background might have different perceptions towards the trustworthiness of an information system (Jarvenpaa 1999). Future research is therefore required to further test and validate the findings of this study in different cultural contexts.

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APPENDICES

Interview Questions (Semi-structured):

Ease in question.	<ul style="list-style-type: none"> • How often do you use vending machine? What do you usually buy from it? • Is there any problem you have met during the purchase?
If the user just used cash/coins.	<ul style="list-style-type: none"> • Have you ever had the experience that you want to buy something but don't have enough coins? (If yes) How did you deal with that? • Have you ever tried to use credit card to buy stuff with vending machine? • (If no.) Why not? Have you ever used your credit card to buy goods from supermarket? • *Have you ever tried to use mobile payment? • *(If yes.) Why stopped using it? • *(If no.) If your friend or family recommends you to use mobile payments with vending machine, will you try it? <p><i>*(Same questions will also be asked to credit card users.)</i></p>
If the user just used credit card.	<ul style="list-style-type: none"> • How long have you been using card to buy stuff with vending machine? • What makes you think using credit card is a better way than using other payment solutions? • How would you rate the security of using credit card with vending machine? • Do you worry about privacy issue? Why? • ***
If the user just used mobile payment.	<ul style="list-style-type: none"> • How long have you been using mobile payment to buy stuff with vending machine? • What makes you think using mobile payment is a better way than using other payment solutions? • How would you rate the security of using mobile payment with vending machine? • Do you worry about privacy issue? Why? • How do you pay for the bills?
Last question.	<ul style="list-style-type: none"> • Ask for consumers' age (range).