

# The Failure of Mobile Payment: Evidence From Quasi-Experimentations

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## ABSTRACT

With the increase use of mobile phone and diffusion into people's everyday life as trusted communication devices, businesses have recently begun exploring their potential as payment devices. While many mobile payments were introduced in different parts of the world, some of them were successful, and others failed to achieve their expected benefits. In this paper we conduct a quasi experiment with 175 potential users in Kuwait in order to shed light on the following two issues: *Why do mobile payment services fail? And what do providers need to do to better persuade adopters to use the mobile service?*

## General Terms

Experimentation, Human Factors,

## Keywords

Mobile payment, failure of mobile payment, quasi experimentation, factors affecting mobile payment acceptance.

## 1. INTRODUCTION

The number of mobile phone in use over the world has reached 3.74 million [8]. With the rapid diffusion of these devices, many studies of adoption of mobile devices and services have also emerged in recent years.

Mobile payment (labeled hence forth as m-payment) is one of the recent hottest research direction; and is rapidly expanding and is expected to reach \$10 billions in total revenue by 2010 [9]. M-payment has several benefits: it enables users to perform their transaction independent of location, and it complements the wide range of existing e-payment systems, such as digital credit cards, digital wallets systems, micro-payment systems, stored value payment systems (smart cards), accumulated balance digital payment systems, peer-to-peer payment systems, digital payment checking systems, and electronic bill payment systems.

While there are many examples of successful applications such as London city traffic tolls via SMS ([www.cclondon.com](http://www.cclondon.com)), there are also many examples of discontinued m-payment initiatives that failed to attract sufficient numbers of consumers, such as Paybox

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in Germany, the Simpay initiative in Europe, and several smart card systems [15, 18]. Strikingly many of these efforts failed. For example, most of the dozens of m-payment services available in EU countries and listed in the ePSO database in 2002 have been discontinued [2]. The difference in the rapid diffusion of the Visa Electron smart card or eBay/PayPal, compared to the problems with m-payment initiatives is striking. [Dahlberg et al.](#), [6] questioned why Visa Electron and PayPal succeeded while m-payment services failed. They suggest that researchers need to conduct more studies in order to shed light on the factors that attract consumers, merchants and banks. In another study [Dahlberg and Öörni](#) [5] in Sweden reported that m-payment was ranked as the least frequently used e-payment alternative after cash, on-line bank cards, credit cards, Internet bank buttons, and Visa Electron. An apparent conclusion is that these services have failed to meet consumers' payment needs [5, 13]. A deeper understanding of consumers' motivations to adopt m-payment is needed to design and launch m-payment services successfully [11].

*This paper aims to answer the following question: Why do mobile payment services fail? And what do providers need to do to better persuade adopters to use the mobile service?*

In this paper we report on the findings from a pioneering study conducted in Kuwait about factors that lead potential consumers to accept or reject a mobile payment technology in Kuwait, named Mnet.

## 2. LITERATURE REVIEW

Our review of the literature on adoption of mobile devices and services reveals that most research has been conducted in developed countries in Asia, Europe, and the U.S., and less was reported about mobile payment failure.

Researchers have examined a variety of issues, including consumers' and merchants' adoption of m-payment services [6], comparison of different alternatives for electronic payments [3], economic analysis of m-payments and identification of the relevant stakeholders in the market [1]. There have also been several review papers [1, 6]. Given the large number of studies of adoption of mobile devices and services, our review focuses only on those studies related to consumers' adoption of m-payments – thus omitting studies that focus on merchants' adoption.

[Szmigin and Bourne](#) [15] interviewed 25 students in the UK on why they use of a form of electronic cash, Mondex. Their results indicate that all respondents compared this new mode of electronic cash (Mondex) with traditional forms of cash. In general, traditional cash was preferred in most situations, due to

problems associated with the complexity of using Mondex, as well as security issues.

Khodawandi et al. [10] studied the factors that led over 4,000 German consumers to adopt or not to adopt m-payment. Results revealed several drivers for adoption: One-third said that they would adopt m-payments to replace other forms of payment and 17% said they would use m-payments for micro-payment transactions. Factors inciting them to use m-payment include ease-of-use, fast processing time, and ubiquitous availability. However, respondents also identified several barriers such as perceived lack of security, complexity, lack of familiarity with m-payments, and complexity of using it.

Chou et al., [3] studied consumers' preferences for four e-payment alternatives (credit card, stored-value card, smart card, and the telecommunication billing system). They compared these four alternatives in terms of three general classes of factors (technological, economic, and social), with several criteria included within each factor. Based on interviews with 43 Taiwanese adults, they found that stored value cards (Smartcards) were the preferred form of e-payment.

Valcourt et al. [17] conducted a survey of 130 Canadian youths regarding the use of in m-payment for movie tickets. They reported that 76% of respondents expressed interest in purchasing movie tickets with a mobile phone, and 78% stated their intention to use a service that would charge their purchases to their monthly mobile phone bill.

Nysveen et al., [12] investigated antecedents of mobile service adoption for four specific services (text messaging, contact, e-payment, and gaming). Their study of 171 Norwegian users revealed that perceived enjoyment exerts the strongest effect on intent to adopt, followed by perceived usefulness, perceived ease of use, and social norms. Results also reveal that social norm had the weakest effect of the constructs these researchers examined.

Mallat [17] discussed consumer's behavior to adopt m-payment Using interviews with 46 subjects (teenagers, students, and parents), results suggest that PU of m-payment depends on certain situational factors, such as a lack of other payment modes and urgency (i.e., time pressure). Reported barriers to adoption of m-payment included complexity of payment procedures, lack of widespread merchant acceptance, premium pricing for such payments, and perceived risks.

Dahlberg and Öörni [5] focused on how 978 consumers in Finland intend to change their payment habits (m-payment and electronic invoices) on two periods of times: during the next 6 months and next five years. Authors used diffusion of innovations theory and found that among factors studied that affect intention to use, perceived ease of use exerts the most determinant of m-payment and electronic invoices.

Rouibah [14] investigated factors affecting mobile payment in Kuwait using a variation of technology acceptance model. They included in their model six variables that potential impact on intention to use mobile payment. These variables were social norms (SN), perceived enjoyment (PE), trust, perceived usefulness (PU), and perceived ease of use (PEOU). Based on regression analyses, Rouibah's [14] findings reveal that only perceived usefulness, perceived ease of use, perceived trust and perceived enjoyment affect positively intention to use. Social

norms was not correlated with intention to use. In addition, results revealed different attitudes among male and female.

Other studies focused on the role played by gender in technology adoption. For example, Venkatesh and Morris [20] developed and tested an extension technology acceptance model with 342 users introduced to a new system (156 women and 186 men). They found that men's decisions to use technology are more strongly influenced by their perception of usefulness, while women's decisions are based more on perceptions of the technology's ease of use

A detailed analysis of the past literature review on electronic and m-payment reveals the following observations.

*First*, there is little about successful model adoption of m-payment systems, which will guide m-payment provider to take off.

*Second*, although millions of dollars have been spent on building m-payment systems, reports showed that potential users may not be using these systems, despite their availability (e.g. [2, 15, 18]), and it is unclear how to help m-payment provider to take off.

*Third*, while many past studies focused on m-payment perceptions based questionnaires, none past study investigated the moderation effect of experimentations (live demonstration) and gender and on new mobile payment intention to adopt.

*Forth*, moreover, while there more studies on how m-payments are perceived by consumers in well developed countries, there is a lack of knowledge/awareness on how they are perceived in developing countries, except very few studies [14].

In order to make significant contribution in the field o mobile payment, this study aims to explore the following research model (which is partially based on previous studies [14] through the mediation of three important variables : gender, treatment (lecture vs. live demonstration) and available electronic payment (credit cards, ATM card, CashU card, and smart card "internet banking card"

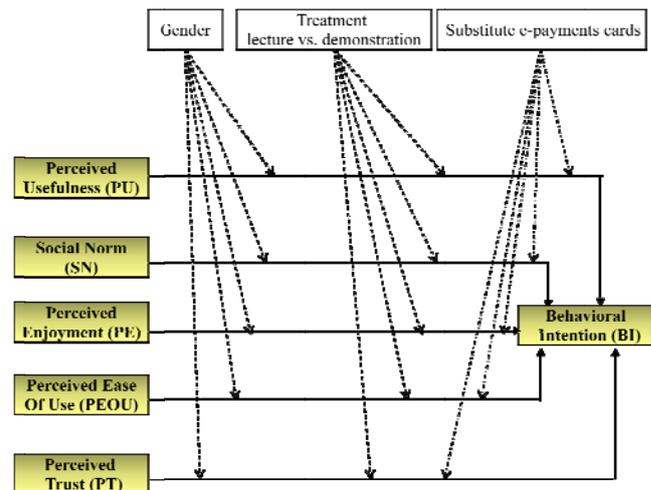


Figure 1. Research model for quasi-experimentation

### 3. RESEARCH METHODOLOGY

Since the purpose of this research is to examine motivational factors, drivers and barriers for intention to use Mnet, a mobile

payment technology in Kuwait. Due to the novelty of the technology, our research approach is exploratory and presents findings from a quasi-experiment. The purpose of this phase was to identify factors that respondents believe would make Mnet easy or difficult for them to use. We describe each stage of our research program in detail, below.

### 3.1 The Quasi Experimentation for Collecting Quantitative Data

This study is based on a quasi-experiment that the author designed and conducted in nine sections of an undergraduate course titled "Introduction to Management Information Systems." Each section received one of two possible treatments – either a simple, introductory overview of Mnet m-payment using traditional lecture techniques, or an introductory lecture supplemented by several "live" demonstrations of using Mnet to pay bills using a mobile phone. In the remainder of the paper, we refer to these two treatments as the "lecture" vs. the "live demonstration." We label this phase of the study as a quasi-experiment – rather than a (true) experiment [4], because subjects were not randomly assigned to the two treatment conditions. Instead, each course section was randomly selected for one of the treatment conditions; all students enrolled in that section received the same treatment. Since it is possible that students in various course sections may differ from each other (e.g., based on age, gender, prior exposure to Mnet, or other factors), we specifically test to assess whether students assigned to the two treatment conditions differ in terms of any background variables.

### 3.2 Measures of Variables

Besides experimentation we distributed a questionnaire after the two treatments which asked respondents several questions related to variables of the research model. The survey was designed to measure six distinct variables: two exogenous constructs (SN and PE) and four endogenous constructs (PEOU, PU, perceived trust, and intention to use). Besides demographic variables (e.g., age, gender, years of education), we asked subjects about their prior familiarity with Mnet – including whether they had ever registered for Mnet account. In addition, we included several additional items that might be associated with students' likelihood of using Mnet. In developing the questionnaire, we first chose the latter items, based on a review of studies on mobile commerce that had been published in leading academic journals. We identified any factors that had been shown to be correlated with user adoption of m-commerce and m-payment in these studies. Next, the first author held a brainstorming session with 20 students enrolled in an undergraduate course on e-commerce that specifically covered the topic of m-payments. Based on this input from students, we added several more items to the questionnaire, asking subjects for example, whether they owned a mobile phone, an ATM card, a credit card, or whether they currently had other payment forms – including a smartcard or a CashU card (an online payment system used in Arab countries). These new items were nominal variables (yes/no). We also asked students to report their GPA and their number of years in the university – both on 5-point interval scales.

The six constructs (SN, PE, PEOU, PU, perceived trust, and intention to use) were created using 5-point Likert scales ranging from "strongly agree" to "strongly disagree," with a "neutral" mid-point. We used four items to measure intention to adopt Mnet, with two drawn from were selected from Venkatesh and

Davis [19], and two items that we created specifically for our study (INT3 and INT4).

In addition, four items each were selected from Venkatesh and Davis [19] to measure PU and PEOU. We used four items to measure perceived enjoyment, with three of them based on Venkatesh and Davis [19], and a fourth item that we created specifically to fit the context of Mnet: "In the future, using Mnet would be an agreeable way of passing time."

Subjective norm was measured with three items: Two borrowed from Taylor and Todd [16] to assess whether subjects would use Mnet if they believed that their friends (SN1) and family members (SN2) wanted them to use it. We created a third item (SN3), which asked subjects whether they believed that the instructor who demonstrated Mnet in their class section wanted them to use Mnet. Perceived trust was measured using four items from Gefen et al., [7], customized to fit the Mnet context.

### 3.3 Procedure of Data Collection

Subjects in nine course sections received either the "live demonstration" or the "overview lecture" treatment. All subjects were first initiated to m-commerce services and different e-payment methods, including mobile payment. Those who participated in the "live demonstration" were initiated and introduced to m-payment Mnet with several live orders from different merchants. The CEO of Mnet participated in four of the course sections by providing an overview of the company, the shareholders, benefits of Mnet, and describing the steps for creating an Mnet account, and for completing payment using Mnet. He then ran several live demonstrations, for example, randomly selecting students and asking them whether they want to attend a movie at the cinema that day, and placing an order to have flowers delivered to the school. These transactions for movie tickets and flowers were completed via mobile phone and detailed steps for performing the transaction were demonstrated to students.

In contrast to the "live demonstration" treatment, the "lecture treatment" simply had the first author introduce subjects to Mnet, using traditional lecture methods – without any live demonstration. Following this exposure to Mnet, the instructor distributed questionnaires to each student, assured them of anonymity, provided sufficient time for them to complete the questionnaires, and then collected them.

## 4. RESULTS AND DISCUSSION

Of the 265 students enrolled in the introduction to *management information system* course, 232 were present in class on the day that we conducted the quasi-experiment. We received responses from 188 students (an 81% response rate). Of these 188 participants, our results showed that 13 students (8.6% of the sample) had previously used Mnet. Since the goal of our study was to examine the factors that would affect future adoption of Mnet, we omitted these 13 subjects from our analyses. This included 101 responses from students who saw the "live demonstration" of Mnet, plus 72 who saw the "lecture overview" of Mnet. All data were coded and entered into SPSS version 14. All remaining analyses are based on 173 respondents.

#### 4.1 Demographic Data and Behavior of Respondents with E-payment

Nearly 68% of respondents were female, which is very similar to the percentage at women students at Kuwait University overall. The majority of respondents (93%) were less than 25 years of age. In addition, 91% of respondents had been in college more than two years, and 90% owned a mobile phone – which indicates a very high penetration of mobile technology in Kuwait. With regard to electronic payment methods, the survey results revealed that credit cards were the form of electronic payment that most subjects owned (69.4% had a credit card), followed by ATM card (59.5%), then Internet cards (15.6%) used to purchase products online. We found that just a small fraction of subjects had used a similar digital payment technology called CashU (9.8%). CashU is a stored value card, which is one of the largest internet payment solutions in the Middle East, which allows users to pay for goods and services, and transfer money online without risk of theft ([www.cashu.com/](http://www.cashu.com/)). These results differ greatly from results reported by Chou et al. [3], who studied Korean adults, where they found that stored value cards has the highest rate of adoption among the four e-payment alternatives they studied (credit card, smart card, stored value card, and electronic billing)

#### 4.2 Reliability and Factor Analysis

We first performed an Exploratory Factor Analysis, based on Principal Components Analysis, to assess convergent and discriminant validity. This analysis, using a Varimax (orthogonal) rotation identified six factors, with all items loading greater than 0.5 and no cross-loadings. The results from the factor analysis showed that nearly all items exhibited strong convergent and discriminant validity. The only items that raised concerns at this stage were the two new items that we created for Intention to adopt Mnet (INT3 and INT4), which exhibited cross-loadings on PU that were higher than their loadings on the correct factor. Due to these cross-loadings, we deleted these items – using the remaining two items to measure Intent to adopt Mnet.

Next, we computed internal reliability for each construct. With the exception of Trust and Social Norms, all constructs exhibited strong internal reliability (i.e., Cronbach alpha values exceeding 0.70). This included Intent to adopt (alpha = 0.751); PU (alpha = 0.843), PEOU (alpha = 0.811); and Perceived enjoyment (alpha = 0.833). For Trust, internal reliability was medium (alpha = 0.64), however, after removing two Trust item (TR1 and TR4) we increase internal reliability to an acceptable level (alpha = 0.759). For Subjective Norm, internal reliability was 0.691, just slightly below the desired threshold of 0.70.

#### 4.3 Results of ANOVA Analysis

Given that our quantitative study was a quasi-experiment (rather than an experiment), it is possible that pre-existing subject attributes may be correlated with the treatment to which subjects were assigned. Before we conducted further analyses on the data, we performed an ANOVA to determine whether subjects in the two treatment conditions differed on any attributes. Our results revealed differences in one demographic variable (gender) and one background value (owning a Smartcard). The ratio of women was much higher in the live demonstration treatment (93% women) than in the lecture overview group (49% women). The larger proportion of women in the live demonstration treatment is a by-product of the fact that some course sections consisted only of women and others, primarily of men. We also found that a

much larger fraction of subjects in the live demonstration treatment group owned a Smartcard, compared to the lecture overview group (21% vs. 8%). Since it is possible that having a Smartcard is associated with subjects' beliefs regarding intention to adopt Mnet, we included this as a covariate in our analyses below.

Since gender is an important construct in our conceptual model, we also conducted an ANOVA analysis based on gender. We found that gender had a significant effect on all constructs in our conceptual model, except for PEOU and Trust. Women scored significantly higher than men on Intent to adopt Mnet, PU, Perceived enjoyment, and Social norms. We also noted that women were less likely than men to own an ATM card (50% vs. 75%,  $p < .01$ ) or a CashU card (5% vs. 20%,  $p < .01$ ), but Smartcard ownership was not significantly different (14% vs. 20%).

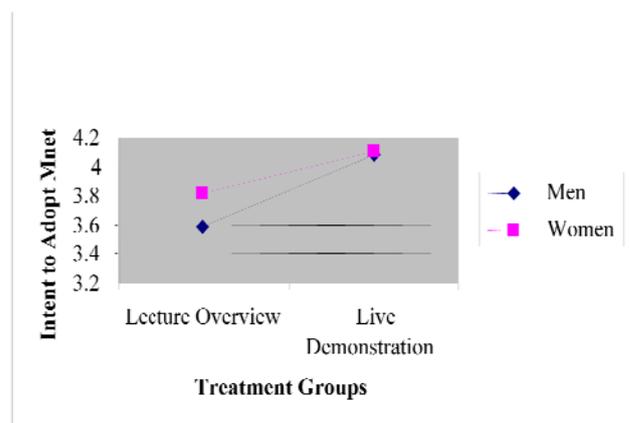
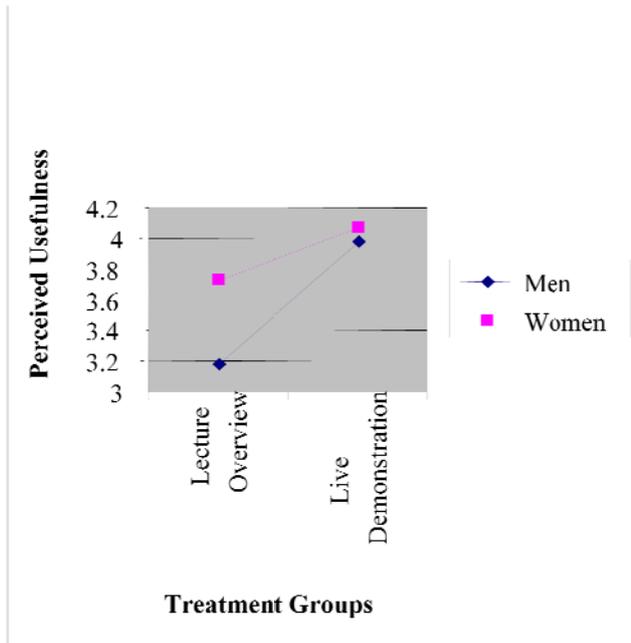


Figure 2. Interaction of Gender and Treatment in predicting intention to use Mnet

Both figure 2 and 3 reveal that men values (perceived usefulness intention to use of Mnet) are much lower than those of women before the live demonstration and lecture treatment.



**Figure 3. Interaction of Gender and Treatment in predicting Perceived usefulness**

We performed one additional set of analyses – which was to assess how much the live demonstration influenced subjects’ beliefs and intentions regarding Mnet for men and women separately. While, in general, the live demonstration had a very strong affect on most constructs in our research model (i.e., increasing subjects’ Intent to adopt Mnet, their perceptions of its PU, Perceived Enjoyment, and Trust), this effect differed somewhat for men and women. As shown in Table 1, PU increased significantly for both men and women; whereas Intent to adopt increased significantly for men who saw the live demonstration ( $p < .01$ ) (compared to the men who saw the lecture overview); but there was a weaker difference for women ( $p < .01$ ).<sup>1</sup> Conversely, PU and Perceived enjoyment increased significantly for women who watched the live demonstrated, compared to women into the lecture overview (both  $p < .05$ ), but there was no significant difference in either of these constructs for the men.

One implication of this is that most consumers – who have little awareness of Mnet or its distinctive value as a payment method – will have a preconceived notion that it is a substitute for other, existing payment methods (e.g., Smartcards, CashU cards, or credit cards). This means that for individuals who are likely to already have such payment methods (particularly men), it is critical that any advertising or other information about Mnet

feature a live demonstration (or allow subjects to use Mnet to make a simulated payment themselves), in order to combat this misperception that the m-payment Mnet technology is a simple substitute for existing payment methods. While women may be just as likely as men to regard Mnet as a substitute form of payment, the fact that women are less likely than men to already have other payment methods (e.g., CashU cards, credit cards and ATM cards), means that this misperception about Mnet being a substitute will not so as much to dissuade women from adopting Mnet, as it will for men.

<sup>1</sup> Women were less likely than men to own a SmartCard or a CashU card. So the women in the overview lecture group were more likely than men to intend to adopt Mnet – since they were less likely to have a Smartcard or CashU card already. So women’s Intent to adopt was already higher than that of men in the overview lecture condition – thus women’s Intent to adopt Mnet did not increase when they observed the live demonstration as much as did the men’s Intent to adopt Mnet.

**Table 1. Impact of treatment (live demonstration vs. lecture treatment) on subjects' beliefs**

Construct	Mean values for Men (n=56)			Mean values for Women (n=117)			P-value change?	
	Lecture (n=37)	Live (n= 19)	change	Lecture (n=35 )	Live (n=82 )	change	Men	Women
Intent to adopt	3.58	4.08	0.50	3.81	4.10	0.29	p<.05	p<.016
Perceived Usefulness (PU)	3.18	3.98	0.80	3.73	4.07	0.34	p<.000	p<.006
Perceived Ease Of Use (PEOU)	3.88	4.13	0.25	3.64	4.11	0.47	n.s.	p<.001
Perceived Enjoyment (PE)	3.57	3.83	0.26	3.59	4.02	0.43	n.s.	p<.027
Social Norm (SN)	3.11	2.94	0.17	3.43	3.42	-0.01	n.s.	n.s.
Perceived Trust	3.93	4.13	0.20	3.90	4.28	0.38	n.s.	p<.02

## 5. DISCUSSIONS AND CONCLUSIONS

The study reveals that, as potential Mnet adopters, men and women have different beliefs vis-à-vis Mnet. In particular, without a live demonstration of Mnet, men make the assumption that they don't need to adopt Mnet if they already own a Smartcard or a CashU card. However, once the live demonstration occurs, men no longer perceive Mnet as just a substitute for Smartcards or CashU cards. Thus, in the absence of a live demonstration of Mnet, those with favorable attitudes to Mnet will tend to be those subjects who don't already own a SmartCard or CashU card, and women are more likely to belong to this group, compared to men. Such a finding emphasizes the importance of live demonstration in persuading subjects of the value of Mnet. This is an important finding of the study with promising potential implication.

Results of this study extend previous studies on mobile payment and m-commerce in different ways:

*First*, our results prove that live demonstration is a significant predictor of m-payment adoption. It seems also it plays an important factor in persuading potential users to use m-payment. Such result is totally new in the field of m-payment since none study testes it and succeeds to demonstrate it. However, if we consider that live demonstration is somewhat offering experience to potential consumers, then this result is in line with previous findings related to experience given to IT users [16].

*Second*, the effect o live demonstration also extends that of Dahlberg and Öörni [5] who found that only PEOU is the most determinant of intention to adopt m-payment and electronic invoice in Finland.

*Third*, results of this study also highlight the moderate role of gender and perceived enjoyment on intention to adopt m-payment. This study succeeds to reveal that potential men users and women users have different attitudes and via-a-vis of m-payment, thus confirm findings of previous studies [12, 20] Perceived enjoyment is a stronger predictor of BI to use Mnet by both groups; however, it is stronger for male users. PU is also a predictor of intention to

adopt for both groups, but it is stronger predictor for male users. Such result confirm findings of Venkatesh and Morris [20] but partially Nysveen et al., [12] who found that PU is a significant determinant of BI only for male users.

Results suggest that advertising efforts for Mnet must try to either: (i) include an actual live demonstration of how Mnet works (e.g., on television advertising or through video clips shown on the web) or (ii) explain to potential adopters that Mnet is different from Smartcards and CashU cards, and is a complementary form of electronic payment rather than a substitute. These steps are necessary in communicating the benefits of Mnet to potential adopters; otherwise they will assume that Mnet is a simple substitute for existing payment cards, which will deter potential adopters – especially men. Perhaps the present failure to follow these recommendations is a possible explanation for why Mnet has not enjoyed widespread adoption in Kuwait since its debut in May 2005, and stopped its business starting 2008.

## 6. ACKNOWLEDGMENTS

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