BARRIERS TO THE ADOPTION OF MOBILE PAYMENT IN ITALY

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ABSTRACT

Mobile payments provide several benefits, for consumers and merchants alike. Yet, on a worldwide scale their usage is still low. Also, the barriers to mobile payment usage are still a rather unexplored topic in the literature, which is instead focused on adoption behavior. Accordingly, our objective is to investigate the factors that hinder mobile payment usage by consumers. The theoretical framework for our analysis combines the Technology Readiness Index (TRI) and the Innovation Resistance Theory (IRT). To empirically assess the model, we gathered data on mobile payment usage in Italy through a web-based survey. The analysis confirms the negative impact of the usage, risk and tradition barrier, while the image barrier has a significant positive effect. Finally, we find that segmenting consumers adds value to the IRT.

Keywords: *Mobile payments; Innovation Resistance Theory; Technology Readiness Index; Cluster analysis*

1 INTRODUCTION

Paying is one of the most important economic activities. The progress of information technology has enabled dramatic innovation in electronic payments, and their adoption has continued to grow, thanks to their increased safety and convenience (Tee & Ong, 2016). A recent trend that is receiving growing attention is mobile payments (Oliveira et al., 2016), defined by the European Central Bank (ECB) as payments *"where a mobile device is used at least for the initiation of the payment order and potentially also for the transfer of funds*"[1].

Mobile payments provide several benefits, for both consumers and merchants, from increased convenience, security and speed, to reduced transaction costs (Slade et al., 2013). Nevertheless, their adoption by consumers is still low on a worldwide level (Moghavvemi et al., 2021).

Accordingly, the objective of the present paper is to investigate the barriers to the usage of mobile payments on the consumer side, analyzing both users and non-users. Several studies have already analyzed the adoption and usage of mobile payments in a range of countries (Guhr et al., 2013; Humbani & Wiese, 2017, 2018; Rafdinal & Senalasari, 2021; Shin & Lee, 2014; Wiese & Humbani, 2020). However, extant research is mainly focused on who adopts mobile payments and why, whereas identifying the barriers to adoption could provide more valuable insights for both practitioners and scholars (Laukkanen,

[1] https://www.ecb.europa.eu/services/glossary/html/glossm.en.html#598

2016; Talwar et al., 2020). Indeed, only few studies try to investigate consumer resistance towards mobile payments (Ghosh, 2022; Kaur et al., 2020; Talwar et al., 2021).

Also, more broadly, Lee et al. (2021) argue that numerous empirical studies in behavioral Information Systems (IS) theory research fail to yield relevant knowledge because they confirmatively test self-evident axiomatic theories; that is, theories that are *"acceptable as self-evident truth without the need for further empirical testing"* (Lee et al., 2021, p. 148).

Finally, there is little academic research on the segmentation of users of mobile payment, even though it could be pivotal in understanding the usage of mobile payments (Jaiswal et al., 2023; Wiese & Humbani, 2020).

To address these gaps, our study first clusters consumers based on their score for the Technology Readiness Index (TRI), which reflects consumers' attitude towards technology in general (Ram & Sheth, 1989). Subsequently, we investigate the factors that hinder the use of mobile payments by applying the Innovation Resistance Theory (IRT) (Ram, 1987; Ram & Sheth, 1989). In particular, we test the validity of the theory across the clusters to determine whether there are disconfirming boundary conditions; i.e., whether there are conditions under which the theory is no longer valid, as suggested by Lee et al. (2021).

The remainder of the paper is organized as follows. Section 2 describes the Italian payments landscape, underpinning its relevance. Section 3 presents the theoretical framework and Section 4 explains the sampling and data collection. Results are presented and discussed in Sections 5 and 6, respectively. Section 7 concludes.

2 THE ITALIAN PAYMENTS LANDSCAPE

The Italian context serves as an interesting case to examine mobile payment usage. According to statistics published by the European Central Bank (2021), the infrastructure for the acceptance of electronic payments is well developed. As of 2020, at 60,647 per million inhabitants, the number of POS terminals was almost double the EU average of 32,663. The number of payment cards per capita (1.99) was also above the EU average (1.92), albeit less pronounced. Nevertheless, actual usage of electronic payments in Italy is still low. In 2020 the number of card payments per capita per year amounted to 81, compared to 146 in the EU (European Central Bank, 2021).

A similar observation can be made concerning mobile payments. In 2021, there were 43.14 million smartphone users in Italy, a penetration rate of 73.0% (Statista, 2022) , compared to 79.5% in Europe (Statista, 2023). However, the usage of such phones to make payments is still very low. In 2021 only 8.3% of all transactions at the POS were paid for by means of a mobile device, substantially less than the 14.4% in the EU (Statista, 2021).

3 THEORETICAL FRAMEWORK

3.1 TECHNOLOGY READINESS INDEX

We resorted to the TRI because it is important to investigate the technology readiness of consumers (Wiese & Humbani, 2020). The mere existence of a new technology such as mobile payments does not necessarily imply that consumers are fully ready to adopt it (Guhr et al., 2013). An interesting feature of the TRI is that it is not a measure of competence or knowledge about a specific technology, but rather reflects a consumer's

attitude towards technology in general (Badri et al., 2014). This allows us to analyze and cluster both users and non-users of mobile payments, suiting the goals of the paper.

The TRI was first developed by Parasuraman (2000) and then updated and simplified by Parasuraman & Colby (2015). The TRI 2.0 is composed of four dimensions: optimism, innovativeness, discomfort, and insecurity. Optimism is defined as *"a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives"* (o.c., p. 60). Innovativeness is *"a tendency to be a technology pioneer and thought leader"* (ibid.). Both optimism and innovativeness are considered motivators; i.e., factors that drive technology readiness. Discomfort is described as *"a perceived lack of control over technology and a feeling of being overwhelmed by it"* (ibid.), whereas insecurity is *"distrust of technology, stemming from skepticism about its ability to work properly and concerns about its potential harmful consequences"* (ibid.). Discomfort and insecurity are inhibitors; i.e., factors that hinder technology readiness.

By using the TRI 2.0, Parasuraman & Colby (2015) identify five clusters, namely: (1) explorers, who are highly tech-oriented, with a high degree of motivation and a low degree of resistance; (2) pioneers, who have both strong positive and negative views about technology; (3) skeptics, who have less extreme beliefs about technology; (4) hesitators, who are risk-averse and tend to have a very low degree of innovativeness; and (5) avoiders, who are tech-resistant and tend to have a low degree of motivation.

Since its first formulation, the TRI has been widely used to investigate the adoption of technologies in a variety of contexts. The TRI has also been used to investigate mobile payments adoption in different countries and setting (e.g. Guhr et al., 2013; Humbani & Wiese, 2017, 2018; Rafdinal & Senalasari, 2021; Shin & Lee, 2014; Wiese & Humbani, 2020).

3.2 INNOVATION RESISTANCE THEORY

We resorted to the IRT because it is the most frequently used theory when analyzing barriers to the adoption and usage of digital innovations, as it provides crucial information on how consumers react to them (Talwar et al., 2020).

The IRT was first formulated by Ram (1987) and subsequently modified by Ram & Sheth (1989). The IRT identifies five barriers that obstruct the adoption of an innovation. These five barriers can be grouped into functional and psychological barriers.

Functional barriers emerge when consumers perceive significant changes resulting from the adoption of the innovation (Ram & Sheth, 1989, p. 6). There are three functional barriers, namely: (1) the usage barrier, which refers to the usability of the innovation and the adjustments that consumers need to undergo to use it (Laukkanen, 2016; Ram & Sheth, 1989; Talwar et al., 2020); (2) the value barrier, which arises from the comparison of an innovation's performance and monetary worth with its alternatives (Ram & Sheth, 1989); and (3) the risk barrier, which is the degree of risk inherent in an innovation (o.c.).

Psychological barriers are more likely to arise if the innovation conflicts with consumers' prior beliefs (o.c.). According to the IRT, there exist two types, namely: (1) the tradition barrier, which arises when the innovation creates a cultural change for consumers, thereby requiring them to deviate from previously established traditions (o.c.); (2) the image barrier, which occurs when the identity acquired by the innovation – based on the product category or the country of origin – creates a negative perception, leading to an undesirable image of the innovation itself (o.c.).

The IRT has been applied to investigate consumers' resistance towards mobile payments in different countries and settings. For instance, Kaur et al. (2020) use IRT to analyze the barriers related to mobile payments in India, but focus on users' intention to use and recommend it. Talwar et al. (2021), also for India, examine smartphone users who did *not* use mobile payments during the COVID-19 pandemic. Other authors integrate IRT with alternative IS theories or constructs. Ghosh (2022), for example, adds habitual use of cash, surveillance, and technology to IRT, and investigates the barriers to adoption among Indian consumers. Migliore et al. (2022), for their part, integrate IRT with the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) to investigate the adoption gap between China and Italy.

3.3 RESEARCH MODEL AND HYPOTHESES

We applied the IRT to formulate a research model to measure the impact of the functional and psychological barriers on the decision to use mobile payments. Our analysis differs from previous studies because it tests the IRT first on the total sample and then across different types of consumers, which are identified using the TRI.

We test the hypotheses by means of a binary logit model that compares users and non-users. The independent variables are the five IRT barriers, as defined in section 3.2.

Extant studies show that the usage barrier is negatively associated with the intention to adopt and use digital innovations, such as mobile commerce (Moorthy et al., 2017). Similarly, both Kaur et al. (2020) and Ghosh (2022) find that the usage barrier lowers the intention to adopt mobile payments for Indian consumers. Hence, H_1 reads:

H_1: The usage barrier negatively impacts the usage of mobile payments.

The second functional barrier is the value barrier. If an innovation does not provide any advantage compared to the existing products, then consumers are likely to resist it (Ghosh, 2022). Extant studies confirm that the value barrier hinders the adoption of technologies such as mobile banking (Laukkanen, 2016), mobile commerce (Moorthy et al., 2017), and mobile payments (Ghosh, 2022; Kaur et al., 2020; Talwar et al., 2021). Accordingly, it is proposed that:

H_2: The value barrier negatively impacts the usage of mobile payments.

The third and final functional barrier is the risk barrier. If consumers perceive an innovation as risky, they may decide not to use it until they acquire additional knowledge about it (Ram & Sheth, 1989). Scholars have documented that the risk barrier can inhibit the adoption of mobile commerce (Moorthy et al., 2017) and mobile payments (Kaur et al., 2020; Talwar et al., 2021). Thus, based on the existing literature, it is proposed that:

H_3: The risk barrier negatively impacts the usage of mobile payments.

The tradition barrier is the first psychological barrier. Very often, consumers are used to certain routines (Ghosh, 2022). If they are asked to deviate significantly from what they are accustomed to, the resistance towards the innovation is greater (Ram & Sheth, 1989). Previous studies have confirmed the negative relationship between the tradition barrier and the adoption of mobile commerce (Moorthy et al., 2017) and mobile payments (Talwar et al., 2021). Thus, we propose that:

H_4: The tradition barrier negatively impacts the usage of mobile payments.

The second and final psychological barrier is the image barrier. Consumers tend to associate an innovation with an image that can be derived from the innovation itself; for instance, the product class or industry, or the country of origin (Ram & Sheth, 1989). If

the association is not favorable, consumers may resist the innovation (o.c.). The negative relation between the image barrier and mobile payment adoption has been confirmed by Ghosh (2022) and Talwar et al. (2021). For this reason, it is posited:

H_5: The image barrier negatively impacts the usage of mobile payments.

Importantly, the aim of the paper is also to test the validity of the IRT across the identified clusters. Wiese & Humbani (2020) cluster South African mobile payment users based on their TRI, showing that the clusters differ in terms of demographic characteristics *and* also in terms of mobile payment usage. Hence, consumers in different clusters may well value the IRT barriers differently. For instance, hesitators are highly risk-averse (Parasuraman & Colby, 2015) and may, therefore, give more importance to the risk barrier. Similarly, avoiders are tech-resistant consumers, with a very low degree of motivation (Parasuraman & Colby, 2015). They may thus be more attached to tradition and to traditional payment instruments. As a consequence, for them the tradition barrier might be the greatest impediment. For these reasons, we propose that:

H_6: The impact of the IRT barriers on the decision to use mobile payments differs across the identified clusters.

4 METHOD

Our target population is composed of adult Italian consumers. To collect the data, we designed a questionnaire that included constructs and scales derived from previous studies (Laukkanen, 2016; Migliore et al., 2022; Parasuraman & Colby, 2015). To measure the items, we used a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree".

The questionnaire was administered in Italian. Since the questions drawn from the literature were in English, the questionnaire was first drafted in English and afterwards translated into Italian by the main author. The Italian version was then double-checked by the corresponding author and other Italian-speaking colleagues from Politecnico di Milano.

The questionnaire was administered by Ipsos. To ensure representativeness, we resorted to quota controls for age, gender and region. The survey was carried out between November and December 2022, using the Computer-Assisted Web Interviewing (CAWI) methodology. A total of 1,795 answers were gathered.

5 RESULTS

5.1 ASSESSMENT OF TRI FACTOR STRUCTURE

To assess the general data structure, we conducted a Principal Component Analysis (PCA) using Varimax Rotation of the factor loadings. The third discomfort item, DIS3, was discarded as it had a factor loading below 0.5. Hence, we performed a second factor analysis, without DIS3. The scree plot of Eigenvalues confirmed a four-factor solution, which explained 74% of the variance in the items. We then computed the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. This was equal to .84, which confirms that the data are suited for factor analysis. The factor loadings for the items are all strong. The factors were named according to the literature. Reliability was checked by computing Cronbach's alphas for all constructs, which were all above (or very close to) the cut-off value of 0.7.

5.2 CLUSTER ANALYSIS

We opted for two-step cluster analysis because it can handle larger datasets than the traditional K-means approach and does not require the number of potential clusters to be determined a priori, as the technique can identify the optimal number (McGarigal et al., 2000). Overall, the analysis confirmed the five-cluster solution described in the literature, as shown in Table 1.

	Total sample	CLUSTERS				
		Explorers	**Pioneers**	**Skeptics**	**Hesitators**	**Avoiders**
	100%	14.48%	20.66%	26.24%	17.22%	21.40%
GENDER						
Male	48.33%	51.26%	53.24%	51.72%	49.28%	36.68%
Female	51.67%	48.74%	46.76%	48.28%	50.72%	63.32%
AGE						
18-33	21.68%	22.16%	27.61%	20.68%	24.94%	14.21%
34-45	22.22%	25.91%	22.42%	24.11%	19.23%	19.63%
46-59	30.95%	31.94%	28.89%	31.19%	27.35%	34.88%
60-75	25.15%	19.99%	21.08%	24.02%	28.49%	31.28%
EDUCATION						
Low	40.73%	27.04%	36.76%	37.33%	41.42%	57.42%
Medium	41.60%	50.23%	42.14%	44.83%	41.30%	31.54%
High	17.67%	22.73%	21.10%	17.84%	17.27%	11.04%
MOBILE PAYMENT						
Users	17.23%	25.82%	24.79%	17.28%	14.70%	6.10%
Non-users	82.77%	74.18%	75.21%	82.72%	85.30%	93.90%

Table 1 – Descriptive statistics and cluster distribution results

5.3 ASSESSMENT OF IRT FACTOR STRUCTURE

To assess the general data structure in terms of the IRT, we again conducted a PCA using Varimax Rotation of the factor loadings. The two value barrier items VB1 and VB2 have a low correlation (0.3279) and a low Cronbach's alpha (0.4939), showing that the reliability of the factor value barrier is an issue. For this reason, we decided to maintain VB1 and VB2 as stand-alone variables. The poor internal consistency of the value barrier scale might be due to the phrasing of the items. In particular, VB1 refers to the general advantages that mobile payments might provide, while VB2 specifically refers to the possibility to better control one's spending. Since both items represent a comparison of mobile payments' performance with its alternatives, H_2 is divided into two hypotheses and rephrased as follows:

H_{2a}: VB1 negatively impacts the usage of mobile payments.

H_{2b}: VB2 negatively impacts the usage of mobile payments.

Next, we ran a second PCA, maintaining only the factors related to the remaining four barriers. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is equal to 0.8081,

showing that the data are suited for factor analysis. The factor loadings for the items are all strong. The factors were named according to the literature.

5.4 IRT REGRESSION ANALYSIS

We test the proposed hypotheses by running a logistic regression where the dependent variable is "mobile payment user", which is equal to 1 if the respondent has used mobile payments at least occasionally in the past year, and equal to 0 otherwise. The independent variables are "usage barrier", "risk barrier", "tradition barrier", and "image barrier" – together with VB1 and VB2 as standardized stand-alone variables. Results are shown in Table 2.

The results support hypotheses H_1, H_{2b}, H_3, H_4, whereas hypotheses H_{2a} and H_5 are not supported. Subsequently, we tested the model in every cluster (Table 2) Importantly, the results are different for the total sample and the clusters, supporting H_6.

Independent variables	**Total sample**	**Explorers**	**Pioneers**	**Skeptics**	**Hesitators**	**Avoiders**
	Coeff.	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**
Usage barrier	-0.3707**	-0.4823*	-0.4738**	-0.3890*	-0.1392	-0.5371
VB1	-0.1156	-0.1492	-0.1028	-0.2409	-0.3597	-0.0947
VB2	-0.4572**	-0.5195*	-0.4080*	-0.4573*	0.0147	-0.4039
Risk barrier	-0.3303**	-0.2495	-0.0960	-0.4788**	-0.6197**	-0.1032
Tradition barrier	-0.1957**	-0.3211	-0.2388	-0.2938*	0.1152	0.0149
Image barrier	0.1761*	0.0374	0.1771	-0.0815	0.2939	-0.2109
Constant	-1.9227**	-2.5634**	-1.4799**	-2.4090**	-1.9361**	-2.6600**
GOODNESS-OF-FIT						
Nagelkerke R^2	0.228	0.336	0.180	0.348	0.106	0.181
Chi-square value	263.071**	68.338**	47.846**	110.273**	18.87**	26.275**
Hosmer-Lemeshow	11.41	12.58	4.78	7.43	11.47	22.92**

Table 2 – Logistic regression results.

**** p-value ≤ 0.01; * p-value < 0.05.**

6 DISCUSSION

The objective of the paper is to analyze which barriers prevent consumers from using mobile payment instruments.

First, the usage barrier has the expected negative impact on the use of mobile payments. Traditional payment instruments, such as cash, are still widespread in Italy, and paying with cash remains a habit for the majority of consumers, implying that switching to mobile payment requires a significant adjustment. Our result is also consistent with the findings of previous studies on mobile payment (Ghosh, 2022; Kaur et al., 2020).

Interestingly, VB1 does not play a significant role in inhibiting consumers from using mobile payment methods, whereas VB2 does. As mentioned in Section 5.3, VB1 refers to general advantages that mobile payment instruments may provide compared to other

payment instruments. Conversely, VB2 specifically refers to the possibility granted by mobile payments to better control one's spending. This result suggests that when deciding whether to actually use mobile payment or not, consumers value specific benefits, such as the possibility to better control their own spending.

The third significant barrier identified by the analysis is the risk barrier. If consumers perceive mobile payment as risky, they will refrain from using it. This result is in line with previous literature (Kaur et al., 2020; Talwar et al., 2021).

The tradition barrier has a negative effect on mobile payment usage, too. The use of cash is still predominant in Italy (Innovative Payments Observatory, 2022). This suggests that starting to use a cashless instrument may require a cultural change for consumers, thereby constituting a barrier. This result contrasts with the papers of Ghosh (2022) and Kaur et al. (2020), which both find the tradition barrier to play no significant role in inhibiting, respectively, mobile payments adoption and intention to use. However, both studies examine the Indian context, where mobile payment usage is more widespread compared to Italy (Statista, 2021). Italian consumers may thus well perceive mobile payments as a bigger cultural change.

Finally, the image barrier has a significant and positive impact on the decision to use mobile payment. Previous literature found mixed results, with Ghosh (2022) and Talwar et al. (2021) providing evidence in favor of the hypothesis, whereas Kaur et al. (2020) found that the image barrier does not play a significant role.

The paper also aims to verify the validity of the IRT across the clusters, to determine whether there are conditions under which the theory is no longer valid.

The only barrier for which the results for all clusters are the same as that for the full sample is VB1, in that the barrier is never significant. In all other cases, there are differences – which demonstrates the value added of the cluster analysis. Overall, the barriers that remain valid in the highest number of clusters are the usage barrier and VB2 – both significant in three clusters.

6.1 THEORETICAL CONTRIBUTIONS

The paper tested the classic IRT model in a developed country, namely Italy, where the usage of mobile payments is still low. We first tested the IRT model in the total sample, to assess what are the barriers to usage of mobile payment. Then, we combined the IRT with cluster analysis based on the TRI, in a response to Lee et al. (2021). Our theoretical contributions are as follows.

The two items of the value barrier – VB1 and VB2 – turned out to be not correlated, which suggests that there is a difference between specific and general value, at least where mobile payment is concerned. This is confirmed by the results of the model. Apparently, a general benefit is important when consumers consider whether to adopt a technology, but no longer when deciding upon actual usage. In the latter case, individuals value the presence of specific benefits and a generic statement about potential values is no longer enough.

Finally, the different results obtained for the different segments confirm that cluster analysis does indeed enrich the IRT. Consumers have different attitudes towards technology in general, and this affect the factors they value when deciding both whether to adopt and use a specific innovation.

6.2 PRACTICAL CONTRIBUTIONS

From a practical perspective, the study provides knowledge about the factors that can help mobile payment providers increase the reach of their products.

First, our analysis suggests that usability is a barrier to actual usage. The usage barrier refers to the effort that a user has to make to use the innovation. Thus, providers could try to develop easy-to-use products with a straightforward user experience, so that their usage does not bring drastic changes to users' daily payment habits.

The tradition barrier is also significant. This might be more difficult to overcome for mobile payment providers because it has to do with consumers' habits and cultural background. However, the importance of the barrier suggests that it should be tackled to raise the usage of mobile payments. An important role could be played by public institutions, which could develop policies to increase the awareness among consumers of the importance and benefits provided by mobile payment instruments.

The results on the value barrier are mixed. Mentioning generic benefits provided by mobile payment does not foster usage, but providing specific benefits does. This suggests that mobile payment providers should try to understand the needs of consumers and try to provide products that answer those specific needs. Providers could also exploit communication campaigns to highlight the benefits provided by their products.

Further, the risk barrier is a significant impediment to actual usage. Hence, when the goal is to foster usage, mobile payment providers are encouraged to also focus on factors that make users feel secure while paying with their smartphones. In doing so, providers should guarantee the safety of their products and clearly communicate this to their customers, thereby reassuring them.

Finally, and crucially, given the importance of the clusters, the above suggestions are likely to be more effective if targeted to a segment of consumers, instead of everyone without distinctions.

7 CONCLUSION

Barriers to mobile payment usage are still a rather unexplored topic in the literature. Thus, our study applied the IRT to the Italian context, to investigate which factors are preventing consumers from using mobile payment services. The analysis provides practical implications by highlighting the barriers that both mobile payment providers and public institutions should tackle to enhance mobile payment usage in Italy.

Most importantly, the results show that cluster analysis does enrich the IRT, thereby suggesting for future research that segmenting consumers adds value when investigating the barriers to adoption and use of a technology.

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