THE EVOLUTION OF PAYMENT METHODS IN MEXICO. ARE THEY ETHICALLY DISRUPTIVE TECHNOLOGIES?

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ABSTRACT

The method of payment refers to the authorized mechanism by the financial system for performing the transaction of goods and services. The most instrument used in Mexico is cash, so in this study is identified that there is a lack in the acceptance and use of the other payment instruments in Mexico (for example, digital instruments). This study aims to complement applied research in the area of acceptance of technologies and the disruption and ethical implications. In addition. Outcomes for this study will expect that the application of the model described will confirm a positive factor regarding the acceptance of account holders of digital payment methods.

INTRODUCTION

A payment method (PM) is an asset that is used as money. In an economy, the PM is the basic tool for interchanging or acquiring goods and services by transferring monetary assets. There are two kinds of PM: Banknotes and Coins. The process for monetary assets transferring is simple, first the available balance of the individual and second, the mechanism to make the financial transaction (hard cash). However, the mechanisms for paying methods have been evolved, such as debit or credit cards, cashier or personal checks, electronic transfer, mobile apps, etc.

For the proper functioning of payment systems, it is essential to have reliable, efficient, and secure financial instruments. These instruments must provide certainty to economic agents that their financial transactions will be completely secure. Many countries have opted for technological instruments to improve their efficiency. The trend in this context has been the adoption of a complicated telecommunications infrastructure and specialized software. In this sense, a problem can be observed: on the one hand, developing and emerging countries have difficulties in their implementation, on the other hand, the vague or null financial education of these countries generates a lot of mistrust among economic agents.

For example, credit card payments are a payment method associated with a line of credit granted by a bank. This bank is called the issuing bank (IB). The IB undertakes to pay for transactions carried out in establishments authorized to use its cards. On the other hand, suppliers of goods and services in accepting these methods of payment must establish a relationship with a bank. This bank is called the Acquiring Bank (AB). The AB must install Point of Sale (POS) Terminals to process possible transactions. To carry out these transactions, the participation of other financial entities is required: The processing companies that oversee the communication services between the banks and the Card Payment Associations (CPA). The CPAs will be responsible for establishing the operational and financial rules between the IB and the AB. As can be seen in the example, the transaction process seems simple, however, it requires a complicated infrastructure. This could cause distrust in consumers, and therefore not adopt the mechanisms.

According to the report "Financial Inclusion Panorama 2020", cash transactions have increased during the period from December 2010 to December 2018. The balance of banknotes and coins has experienced an average annual growth rate of 7.1% as a percentage of GDP. The largest number of transfers was carried out by internet banking (52%). POS terminals registered 975.5 million operations, while ATMs 517.4 million operations, in addition, transfers registered 350.4 million operations, followed by electronic commerce with 119.8 million operations and checks 50.5 million operations. Although a growing dynamism can be observed in the use of various payment methods, Mexico is still below the same dynamism as countries with similar per capita income (Del Río Chivardi et al., 2020).

According to the International Payment Bank, Mexico has 101 POS for every 10,000 adults and 29 POS transactions per adult per year, while countries like Brazil have 317 POS for every 10,000 adults and 79 transactions per adult per year. Turkey, for its part, has 394 POS for every 10,000 adults and 70 POS transactions per adult per year.

The paragraph above shows the continuing popularity of using cash to transact. As indicated in Hancock & Humphrey (1998), cash has characteristics that make it the most traditional method of payment in the world, they are Practicality, Divisibility, and Acceptance. When a minor transaction is made in cash the resources can be used immediately. However, when a transaction is of a larger amount, the use of cash represents certain disadvantages, such as an increase in the probability of illegal attacks. There is another implicit cost of using cash that can have negative effects on economic activity. This cost refers to the loss or deceleration of transactions, on the one hand, due to the lack of cash in the establishments and on the other hand the non-acceptance of these payment methods by them.

In recent times, technological advances (supported by generational gaps) have intensified the use of digital financial services in the world. This is some way to forces banking institutions to exploit the internal market through transfer systems and internet-based payment methods.

According to Asociación de Internet MX (2019), the Study on the Financial Services of Internet Users in Mexico 2019, 75% of Internet users has some financial service. The most used are credit and debit cards (mostly to make transactions online). The report also indicates that only 3% of people have downloaded and used financial systems (mobile apps). In turn, it points out that the main barriers for non-users are lack of liquidity, as well as the perception of not needing any service and lack of trust towards financial institutions. Users of financial services want to get from their financial service lower commissions, complete security, and the fulfilment of promises.

The previous scheme allows us to observe that the acceptance of other methods of payment (technological) can have important effects on the volume of transactions carried out in an economy. In this sense, it would be relevant to identify the acceptance factors that influence the end-users of these technologies. However, some factors prevent this correct acceptance. According to Tanwar et al. (2018), most users have concerns about privacy and their rights when using financial technologies. These concerns point to the possibility that malicious people carry out fraud, identity theft, civil liberties, among others. In this context, Hajebrahimi et al. (2018) and Noordin et al. (2018) pointed out that disruptive technologies built new markets and new cost networks while perturbing the existing markets with disruption. Windell & Kroeze (2009) shows that disruption could have negative economic effects in organizations due to the challenges and changes in a global market. In this study is assumed that technologies could be a real inconvenience for the strategic positioning for banking institutions due to the increase in people's mistrust of them.

LITERATURE REVIEW

The concept of globalization has been consolidated in recent decades through the evolution of information technologies. It has been observed that national markets adopt the trend of internationalization by expanding their borders and consolidating supply chains (León-Peña, 2008). In this sense, companies that compete in global markets have had to invest in technological infrastructure to compete in them. This investment is part of the consolidation of business strategies to be able to survive in the markets (Porter, 2003). The needs of companies in general terms will depend on the changes in the environment where they are competing. Thus, access to fast and timely information allows companies to develop information banks, not only about their customers but also about what happens in their environment, thus allowing them to generate market strategies and obtain competitive advantages from it.

In economic terms, the topic of technological disruption refers to the first concepts on innovation and its management described by Schumpeter, referring to the creative destruction of things or technology-push, generating new adoptions in the market. Also, the disruption will depend on the context where it is applied, that is; refers to the changes that it can have concerning time, innovation can arise through partial and continuous changes until considering radical changes in the product, in the production systems, or the strategic decisions of the company. As already mentioned, the term refers to a radical transformation. Disruption focuses on a transformation in the company about its business model and technological advance and its speed of change (Bower & Christensen, 1995).

A more specific concept is exposed in Mendoza-Tello et al. (2019). The authors point out that disruptive innovation is defined as a metric that directly affects certain components such as performance, consumer expectations, or market behaviour in the face of radical innovation. Zubizarreta et al. (2021) point out that disruptive innovation alters the characteristics of products and services in the market, providing them with greater value.

The previous concepts are not far from the initial line of the concept. In Christensen (2013) the effect of the entry of technologies for the success of the company is studied. In this text, the author describes some principles of disruptive technology that have an implication with the company and its success in adapting to these changes. The first principle explains the business-consumer relationship and the degree to which markets demand certain needs and are disparate with current advances in technology. This can cause a lack of interest in the consumer at a certain time, however, that need may develop in the future. The second principle is related to the reflection of innovation management with the allocation of resources. Christensen points out that this difficulty is influenced by the difference between the experience of those who implement the decisions and those who make the decisions, so it will be difficult for top managers to allocate resources to develop disruptive technologies. The third principle focuses on observing disruptive technologies as part of marketing planning. This means that entrepreneurs must know the market or, failing that, they must find a market that values the disruptive characteristics of the product.

The fourth principle in Christensen's general scheme indicates that the production capacities of companies are focused on their value networks and this allows finding new market niches in which to position certain products under certain characteristics in the environment. These activities are reflected in its behaviour around its profitability. The fifth principle adds the value of information and the risk that it carries. The author points out that access to information is not necessarily important to make important investments around disruptive technologies, but rather, information must be generated through quick access, establishing economic and flexible strategies in the market and the product. The sixth principle suggests a determination about the position that the company has regarding the technology that it wants to enter the market (disruptive or sustainable). Finally, the

author points out that there are entry and mobility barriers. This topic refers in a generalized way to the entrepreneur's mentality in investors and the difficulties to adjust the market changes in their business model, which constitute entry and mobility barriers applicable in the market.

The previous points offer an overview of what the topic of disruptive technologies offers in a market environment in general. It is assumed in economic terms that continuous technological changes can lead to technological disruption and in turn to radical changes in the markets or establishment of business strategies, and this would have implications for the environment. This research work will focus on terms of observing the perception of consumers about the possible effects of technological disruption in banking institutions.

As already mentioned, technological advance has increased exponentially. Banking institutions have not been the exception in this context. Financial services require more than ever a constant integration of technological means, on the one hand, to compete in the market and on the other hand to offer better services to their clients (Vives, 2019). The integration of technologies oriented to the cloud machine learning will require strong investments in addition to a strategic change at the corporate level to position itself within the market as a pioneer. These changes are often of particular interest to the leaders of these institutions. A study carried out by Forbes Staff (2020) indicates that from the period of health contingency worldwide, the use of financial services through electronic devices increased. This change suggests a process of disruption in the business strategies of financial groups, that is, orienting their model to technological and digital strengthening, not only to end-user applications but also to the technology that supports the service.

In this sense, those responsible for financial institutions must consider studying the market in which they are competing. These studies should focus on the way that service consumers adopt and adapt to new systems and what their main implications are. Carbo Valverde & Rodríguez Fernández (2019) point out that acceptance strategies should not only be based on aspects of market demand, but it is also important to consider aspects of supply; that is, designing proposals that allow satisfying the digital needs detected in consumers of financial services.

Cryptocurrencies have gained ground in the last decade as a method of payment. According to Mendoza-Tello et al. (2019), this type of unregulated method of payment can be considered a disruptive innovation due to its high technological use. The application of technological resources, especially in services, also leads to establishing security strategies and establishing trust in the consumer. In the case of cryptocurrencies, the authors point out three key points to consider: User trust, the usefulness of the instrument, and popularity.

Concerning the above and again following Christensen cited in (Gobble, 2016), he points out that disruptive innovations regularly originate under certain characteristics based on low-level support points, that is, low-end products or services. In this sense, it is very difficult for financial institutions to establish a low-end service. On the one hand, certainly, the disruption could focus on serving an unattended market niche, however, this can be considered partially disruptive, since consumers of financial services can access another method of payment other than digital. On the other hand, the disruption could focus in a better way on the quality of the service that is being provided to the consumer, the disruption strategies would have to focus on the characteristics indicated by Christensen. Faced with this scenario, this research work aims to develop a model that makes it possible to explain to decision-makers of financial services the degree of acceptance that consumers have towards their digital services. This leads us to question the following, given the substantial changes in technology worldwide, added to the adoption of these by institutions, can this evolution be considered as a disruptive action in the market?

Another important point to highlight in this type of research is to evaluate the degree of acceptance that consumers have of this technological revolution. The next section will roughly review the most widely used technology acceptance models to perform these measurements.

TECHNOLOGY ACCEPTANCE MODELS

As mentioned in the previous section, it was commented on the needs of consumers and the strategic bases that businesses must follow to satisfy them. In recent times, businesses and economies in the countries were affected by COVID19, however, financial institutions managed to establish strategies to enhance their digital services.

The above, in business terms, is directly related to consumer satisfaction. This action also increases trust and, in turn, loyalty towards the institution (Delgado-Ballester, 2003). Many studies focus on explaining the influence of certain variables (such as a trust) on consumer behaviour regarding the acceptance of a product or service. There are various quantitative methodologies in the academic literature that allow measuring the degree of acceptance through trust, however, the results that could be obtained would vary with the context where they are being applied, for example, individual or collective contexts, based on accumulated experiences, expected results, social or political environment, perceived risks, etc.

The evaluation of digital tools for financial services goes beyond familiarity as an enhancement of trust and the intention of use. The consumer's attitude towards the adoption of an innovation can be traced back to studies such as the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975). This theory is based on describing the attitudes of individuals and their association with key objects. As a result of these studies, new models have developed that attempt to explain the acceptance and intention to use technology specifically for information systems, the most common being Technology Acceptance Model (TAM) developed by (Davis, 1985). Davis suggests that both the attitude towards the use as well as the intention to use technology will depend on the perception of utility and the perception of ease of use of the technology. These perceptions in turn will be influenced by external factors with emphasis on technical and social aspects and factors that have moderating implications among the variables. Venkatesh, Morris, Davis, & Davis (2003) elaborate a unified theory that tries to explain the intention of adoption and use of technologies. This theory arises because of TAM and other models of technology acceptance. Like TAM, UTAUT suggests that four factors (expectation of effort, expectation of performance, social influence, and the facilitation of conditions) explain the behaviour towards the use and in turn the intention to use the technology.

Although it has been commented throughout this work that a disruption in financial services is not based one hundred percent on their technological structure if it can be said that they make use of technology to develop in the market, and this would lead to a disruption progressive. Therefore, it is essential that the institutions that work in this market develop strategies based on precise elements that allow explaining the degree of consumer acceptance. In this sense, sociological currents study and try to explain (from a micro-social perspective) the relationships between individuals and their behaviour within a social entity. Consumer behaviour is highly relevant, and its study allows us to identify new opportunities and market segmentation, taking into consideration that human beings by nature are a social entity and will always seek to link into social groups that are ad hoc to their needs or tastes. These links can influence the behaviour of the individual and their future decisions (Noor et al., 2013), for example in other types of products or services such as fashions in clothing, music, books, etc.

A factor mostly used by researchers in the study of consumer behaviour is social influence. Studies on this factor are very diverse, for example, Venkatesh, Morris, & Ackerman (2000) point out that “it refers to the perceived social pressure to influence behaviour or not”. In this case, the norms attached to society have a higher impact on the individual in a degree of "obedience" rather than by conviction. Initially, this factor was introduced in the acceptance models to measure the degree of the implication that co-workers or higher orders have in the personnel that will operate a certain system in a company. Subsequently, the construct was used not only to measure its involvement in a closed context but in a more extensive context that encompasses the consumer's social environment. In this way, studies of acceptance of technology applied to technological implants have been carried out using cognitive-affective-normative models (Pelegrín-Borondo et al., 2016) where the role of subjective norms has direct implications on the consumer at the time of deciding to use or adopting the innovation.

Regarding the digital aspects, it is common to find variations in the acceptance models. These variations are adjustments that researchers make to try to get closer to the reality of the environment. Oliveira et al. (2014) carried out a study to know the degree of acceptance of Mobile Banking through a combination of main constructs of three acceptance models UTAUT, Initial Trust Model (ITM), and Task-Technology-Fit (TTF). They found that this combination explained some determinants in consumer behaviour regarding their intention to accept. These determinants explain the initial confidence, the expectation of performance, and the characteristics of the technology. Another study (Warsame & Ireri, 2018) points out the use of some moderating variables in the acceptance models. Some of them are directly related to normative elements such as religious beliefs, trust, and social influences. The result of the study showed an influence of these variables on the intention to use microfinance and mobile banking in everyday use environments. Similarly, Baptista & Oliveira (2015) pointed out that habits and culture were the variables with the greatest impact in reducing uncertainty and explaining the acceptance of mobile banking.

In previous paragraphs, it was pointed out that the perceived quality of a product or service is an element that the consumer values highly and can be a fundamental factor in reducing the perceived risk. The study of perceived risk is found in Jacoby & Kaplan (1972). The authors identify five variants of perceived risk: financial, performance, physical, psychological, and social risk. The behaviour of these variables is usually independent, each one concerning the others, that is, if the perception of risk increases in one, the others may remain with the same value, however, variables may also present increases or decreases in the values. The psychological and social risk factors respond directly to the general concept of subjective norms and could have implications in ethics. Several studies (Jaradat et al., 2018; Lee, 2009; Senyo & Osabutey, 2020) have focused on explaining the perceived risk, however, the results differ in each study. While some authors point out the importance of the perceived financial risk around the intention of use, other authors point out that its effects are not considered. Despite the above, the importance of evaluating these variables in mobile banking, inclusion, and financial services environments, in general, are considered.

THE MODEL

The ordered PROBIT model is used to estimate relationships between a dependent, ordinal, and categorical variable and a set of independent variables. Examples of ordinal and categorical variables are values on statements such as: "completely disagree", "disagree", "somewhat agree" or "completely agree". If the categorical variable has only two results, a traditional PROBIT model is estimated; if the variable has more than two results and they cannot be ordered, a multinomial model is estimated.

In the ordered PROBIT model, the underlying value is estimated as a linear function of the independent variables and a set of cut-off points. The probability of observing the outcome i corresponds to the probability that the estimated linear function, plus random error, is within the range of cut-off points estimated for the outcome.

$$P_r\big(outcome_j = i\big) = P_r(k_{i-1} < \beta_1 x_{1j} + \beta_2 x_{2j} + \cdots + \beta_m x_{mj} + u_j \leq k_i) \quad (1)$$

Where u_j is assumed to be a normal distribution. The model is a generalization of the probit model for two outcomes. In ordinal models, the β_i allows us to identify the direction of change in the probability in the presence of a change in the variable x_i, only that it is not as simple as the traditional model because now more than two outcomes must be calculated, in other words:

$$\frac{\partial P_r(y = k_1|x)}{\partial x_i}, \frac{\partial P_r(y = k_2|x)}{\partial x_i}, \ldots, \frac{\partial P_r(y = k_n|x)}{\partial x_i} \quad (2)$$

Considering that these changes depend on the number of categories k_i, which are established in the dependent variable y.

The mentioned before is applicable in technology acceptance models, where the intention to adopt or use technology and the response, which is typically given in an ordinal and categorical form according to a Likert scale, is intended to be explained; the application of the ordered Probit model is more than relevant since it allows measuring how each of the constructs x_i can affect the probability in the intention to use such technology.

Therefore, the model can be stated as follows: the dependent variable y is defined as how much a person agrees to adopt a new technology, where this variable can take the following values: "completely disagree=1", "disagree=2", "slightly agree=3" and "completely agree=4". The ordered probit model allows us to calculate, based on the explicative variables and the error component, what is the probability that a person is willing to accept a technology among a cut-off of values defined for the variable y, that is:

$$P_r(somewhat\ agree < \beta_1 x_{1j} + \beta_2 x_{2j} + \cdots + \beta_m x_{mj} + u_j \leq completely\ agree) \quad (3)$$

Consequently, this methodology complements the analysis of the TAM and UTAUT models, since it quantifies how changes in the explanatory variables can affect the probability of acceptance of the technology, as well as measuring which of these variables has the greatest impact on the probability of acceptance, and not only analyzes the relationship between the explanatory variables and the intention to adopt.

DISCUSSION

This study aims to complement applied research in the area of acceptance of technologies or the context of innovation. In addition, the area of acceptance of payment methods (traditional and digital) in Mexico has not yet been exploited, so this work aims to be a pioneering study in this emerging area of financial systems. Although this work is in process, it is expected that the application of the model described in this study will confirm a positive factor regarding the acceptance of account holders of digital payment methods.

Some expected contributions will be discussed in this study. In the first instance, technology acceptance models are regularly based on exploratory methodologies and not so much on confirmatory ones (Chin & Dibbern, 2010). The methodology used in this study brings the researcher closer to a more probable reality in the environment, that is, a verifiable analysis (García de los Salmones et al., 2006). This research work will try to take as a confirmatory basis the main factors of the models of acceptance and use of technology, for example, the perceived utility and ease of use (Davis, 1985) complemented with other factors such as social influence, effort expectations and performance and enabling conditions (Venkatesh et al., 2003). The study will seek to demonstrate that there is a high probability that consumers of financial services accept the use of digital technology concerning the results of (Oliveira et al., 2014; Zhou et al., 2010) where direct implications were found between the effort and performance expectations factors in the acceptance of digital banking services.

In a second instance, this study will integrate the risk factor as a predictor of social influence and with disruptive implications in the organization (Windell & Kroeze, 2009), this means that the more experience the consumer of financial services has, trust and confidence will increase. consumer uncertainty will decrease (Sanchez-Franco, 2009). Financial risks comprise several areas (Jacoby & Kaplan, 1972), however, this study will discuss the approach that financial and social risk areas have towards the main factors of technology acceptance. Due to the nature of the construct, the measurement of this factor is expected to be negative due to uncertainty, lack of information, and consumer experience.

The discussion above shows several factors that influence the acceptance of technology. These factors have been studied over time in various areas. This study proposes a new consideration for the main factors that influence the acceptance of technology by including the factors that will influence the social and ethical perspective, as well as consumer trust and safety. The equations above show the theoretical framework for forecasting the acceptance of technologies, which for the case study will be digital payment methods. The equations were modelled based on the ordered PROBIT methodology. This methodology will provide the base structure for the elaboration of the research hypotheses.

Finally, the results of this research will have implications for the theoretical basis of technology acceptance models. There are various points of view in the area, however, this study aims to show the potential of social influence and its possible diversifications, as well as factors that can help to better explain the social construct. The development of these models will also meet the practical needs of both researchers and decision-makers in banking institutions regarding a better understanding of consumer behaviour and its constant evolutions.

KEYWORDS: Payment methods, Banking, Disruptive Technologies, Financial market.

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