

# The use of mPOS in Mexico

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**Abstract.** Economies around the world are migrating to either “cashless” or “less cash” models. Latin America is no exception. Mexico, with its considerable population and large economy, including many small and medium enterprises, already offers a variety of mPOS brands. Despite this, most literature on cashless societies has focused on developed countries and other innovative emerging nations such as Nigeria, leaving the Latin American region out of its scope. This paper presents a model of mPOS use in Mexico based on a survey of graduate and undergraduate students. Using structural equation modelling (SEM) variables such as lifestyle, ease of use and carbon footprint produced interesting results. The study finds that users' lifestyle is the highest predictor of mPOS in Mexico. Also, carbon footprint predicts mPOS use while the user's perception of ease of use did not predict the mPOS use. The study also concludes that mPOS in Mexico will promote a green environment and make Mexican society healthy. Managerial wise, this study suggests that the mPOS service providers in Mexico should pay closer attention to mPOS users' lifestyle. Besides, mPOS service providers should consider the carbon footprint and lifestyle when addressing their product to a specific customer segment.

**Keywords:** mPOS, lifestyle, ease of use, carbon footprint, emerging economy, cashless.

## 1 Introduction

As economies migrate to cashless technologies, mobile point of sale technology (mPOS) has attracted the researcher's attention. This development is valid for a variety of developed countries and some emerging ones. However, that is not Mexico's case, a country with a vast population and many small and medium enterprises, where mPOS technology has been around for about ten years. Although cash is still in use, the country's insecurity and more recently, the pandemic may be encouraging users to use cashless technologies.

Worldwide consumers are using cards for payments more frequently and even for small transactions [1]; a behavior which is driven, in part, by more people holding cards (in emerging market economies (EMEs) and greater availability of point-of-sale (PoS) terminals. Traditional POS terminals used to be fixed and installed on counters. However, according to [1], lower-cost smartphone or tablet-based POS terminals have

emerged, encouraging even smaller businesses to invest in them. In addition to the economic incentive behind cashless technologies a growing concern for our environment may also be contributing to their adoption.

A mobile Point of Sale (mPOS) is an electronic device, which uses an internet connection and a credit/debit card to process payments for goods and services through a mobile phone. It is therefore a simple and inexpensive way for small businesses to process payments. For users, this technology requires them to carry less cash. Although there is considerable research on new payment systems, we see more news articles than scientific studies on mPOS. This is particularly true for the Latin American context, where the literature is scant.

In Mexico, we constantly see mPOS companies advertised to small and medium enterprises (SMEs). Micro, small, and medium enterprises represent 99.8% of total business units in the country [2]. It is therefore crucial for such businesses to have access to cheaper payment methods (the cost of an mPOS terminal varies between \$299 and \$3,999 Mexican pesos with commission starting at 3%) with quick processing times (cash available within three days) without having to go through a bank. Some mPOS terminals also allow the business owner to defer payments, which represents an advantage for the customer but a higher cost for the business.

There are currently 10.8 million mPOS users in Mexico and this number is expected to grow to 19.6 million by 2024 [3]. Although this may seem like a small number compared to the country's population, it will represent a penetration rate of 14.6%. If we compare this to the mPOS transaction value globally, according to the same source, China is in first place (with the highest penetration) and Mexico is in 13th place.

Researchers have been concerned with the study of new technologies to replace cash. [1] analyzed payment methods from cash and standard cards, contactless cards, RFID stickers and mobile payments (NFC and remote). This study found that the most popular electronic payment method in history was contactless cards (used in offline mode and without printing paper slips). This method is even faster than cash. However, [4] find that few societies are close to a "cashless" or even "less cash," model. In fact, there has been a resurgence in the use of cash that appears to be driven by store-of-value motives rather than by payment needs. While there may still be an interest in cash, the current pandemic has brought about concerns with hygiene, reinforcing the usefulness of cashless methods. Cashless technologies also offer a partial solution to Mexico's crime problem and its concern with safety. Not carrying cash can be an attractive option for citizens.

Understanding of the factors that affect the use of this technology among Mexican consumers is essential. Our research question is: *What is the impact of ease of use, carbon footprint and lifestyle on mPOS use in the context of a developing economy such as Mexico?* We constructed a survey with 249 responses and used structural equation modelling (SEM) to confirm that risk is the highest predictor of mPOS awareness in Mexico. This paper begins by presenting a review of the literature on the topic, focusing on the variables of ease of use, carbon footprint and lifestyle. In the methodology section, we present the sample, questionnaire development, measure-

ment model and assessment. The final part of the paper presents the results along with a discussion section that considers practical and policy implications.

## **2 Reviewed Literature and Hypotheses Formulation**

Some research streams have used well-known theories to explain the adoption and use of mPOS technology, such as UTAUT, TAM or TPB. This paper presents a model of mPOS use in Mexico using ease of use, carbon footprint reduction, and compatibility with lifestyle. Hence, the three variables proposed were used to hypothesize on mPOS technology due to their relevance in the mobile context.

### **2.1 Lifestyle**

An important stream of literature on lifestyle and technology, has looked at the effectiveness of novel ICTs, such as Internet and mobile applications to improve lifestyle and is therefore found commonly in medical journals [5]; [6]. That is, it has focused on the effect of the technology on a healthy lifestyle. Other literature streams have focused on studying the role of technology on digital lifestyles in an educational context. Such is the work of [7], who study the ‘digital lifestyle’ afforded by technologies and how this impact on students’ values and attitudes, their level of digital literacy, and approach to their studies. They find that the ‘digital lifestyle’ did not always create a balanced way of life. This is because connectedness to information, abilities to engage in the uses of technologies in multiple contexts and while completing other tasks, as well as student’s expectations of speed and reliability impacted at times on their personal, social, and emotional lives. Therefore, technology appears to be affecting the personal lifestyle.

A third stream of literature is the one that looks at the effect of lifestyle in the adoption of a technology. For example, studies that find that lifestyle patterns have a significant impact on mobile banking applications users [8]. Other recent studies have highlighted the age and generational difference between users as factors that determine technology adoption [9]. Student populations are usually young and have slightly different lifestyles to older ones, however a mix of students that includes graduate ones can provide a wider view where lifestyles may vary. However, not only students but most humans globally engage in mobile activities either for personal or work matters. Hence, lifestyle is an important variable to hypothesize on mPOS technology due its relevance in the mobile context and we therefore define it as:

H1: Personal lifestyle has a positive impact on the use of mPOS.

### **2.2 Reduction of Carbon Footprint**

The carbon footprint left by the production of good and the delivery of services is a growing global concern, and the use of mobile technologies is no exception. Energy

consumption and carbon emissions may concern mobile users. Considering the increase in the number of mobile phones in use in the world today, the carbon footprint of such technology becomes an important concern. In 2020, there are 14.2 billion devices in use and by 2023 that number is expected to grow to 16.8 billion [3].

Annual per capita carbon emission targets have been established in the global and production of carbon emissions is projected to decline between 2010 and 2030 in all G20 economies except China, India, Indonesia, the Russian Federation, Saudi Arabia, and Turkey [10]. Mexico performs under the current policies and NDC scenarios, however, it was responsible for 1.5% of global greenhouse gas GHG emissions in 2017 [11].

Researchers have shown that ICT adoption can in fact contribute to a reduction in energy consumption and CO<sub>2</sub> impact [12]. Recent data indicate that there is more potential for carbon emissions reduction in other sectors, which could deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020 [13].

There is a considerable amount of research on “green IT” [14]; [15]; [16]; [17], that is, on the effects of technology on carbon emissions and studies on IT policies and their impacts on IT production and use [18]. The impact of individual attitudes on the adoption of carbon-reducing technologies has been studied before [10] and although there is a body of IS research, which looks at this, [19] finds that more empirical research on the factors influencing adoption of green technologies is needed. The current pandemic showing the effects of carbon footprint on our ecosystem and health may impact the use of technology. The study of user knowledge and care about carbon footprint is therefore useful and can be stated as:

H2: Perceived knowledge of a reduced carbon footprint has a positive impact on the use of mPOS.

### **2.3 Ease of Use**

Ease of use is “the degree to which a person believes that using a particular system will be free of effort” [20]. Ease of use is a variable that has been traditionally studied following the UTAUT model. An example of this is the work of [21], who finds that ease of use significantly impacted on users’ trust in mobile social software for recreational purposes and its eventual use. TAM was used by [22] to show that ease of use significantly impacts the adoption of mobile technology and should therefore be studied with caution.

Perceived ease of use and attitude were found to be jointly responsible in determining the subscribers’ intention to use of 3G mobile service [23]. Other research on convenience has found it tends to be the most affecting perceptions of consumers on usefulness and ease of use [24] in a mobile commerce context. Perceived ease of use also affects customer satisfaction [25], and one can, therefore suggest it will affect the use of technology. This is important information for software developers to pay more attention to mPOS’ ease of use function.

Different results are presented by [26], who find that we found that ease of use was less significant in understanding repurchase intention to use mobile technologies. Our study focuses on the user's use of the technology when presented with it as a form of payment, it is then interesting to find out if users consider ease of use an important factor when using mPOS. Hence, the last hypothesis formulation is as follows:

H3: Ease of use has a positive impact on the use of mPOS.

### **3 Methodology for the study**

This study adopts quantitative methodology [27] to generate knowledge and create understanding about mPOS and how it affects the Mexican society. It helps to learn about student population and to examine questions about the tertiary students as the sample population. Earlier study has used tertiary students to identify the online shopping behaviour [28].

The data analysis was done using the SmartPLS (v. 3.3.3) statistics software. Descriptive statistics were used to illustrate the basic features of the data, and inferential statistics were used to probe the assessed questions, proposed model, and formulated hypotheses were tested with SmartPLS bootstrapping with 5000 subsamples and two-tailed with a significance level of (0.05).

#### **3.1 Questionnaire Design**

The questionnaire was designed and administered in Spanish (the official language in the country), but later translated the gathered data into English Language through a native speaker with proficiency of both Spanish and English language. Also, the questionnaire was managed through Qualtrics online survey platform. 5-point Likert scale characterize the questions with minimum of disagree (1) and maximum of strongly agree (5) and established on the earlier studies. The study adapts and reuses the life-style variable with modification from [29]. Likewise, the variable of Carbon footprint from [30]; [19]; [12]; and ease of use from [31]; and mPOS use from [32].

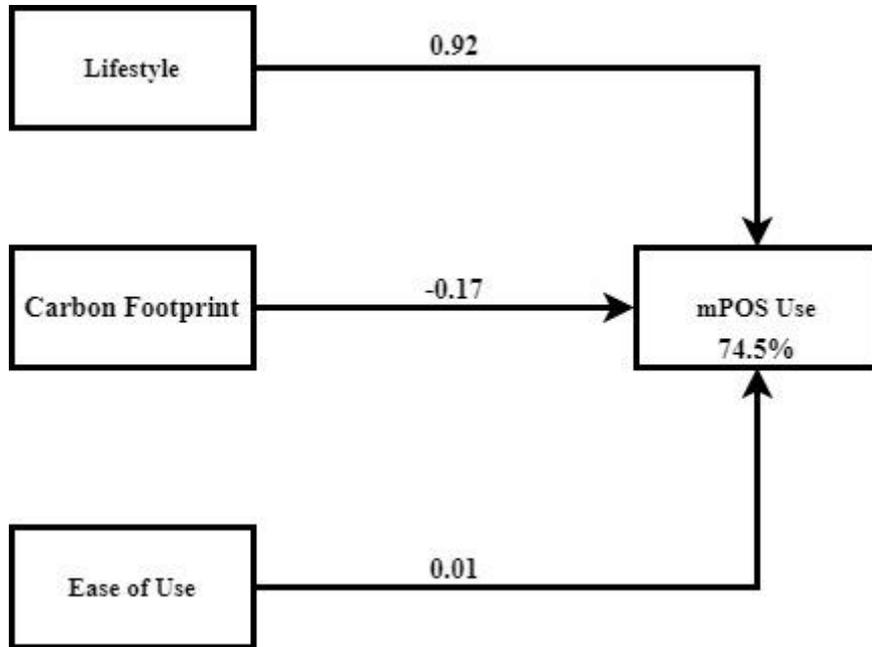


Fig. 1. Proposed mPOS Use Model.

### 3.2 Sampling for the study

The study is based on a survey of undergraduate and graduate students. The survey was directed to students from the Universidad de las Américas, Puebla (UDLAP), one of the country's best private universities in Mexico. The university has a student population of 10,000. Therefore, the study has a 320-person sample size, with an 85% confidence level, and a 4% margin of error. Out of the 320-questionnaire administered, only 249 were relevant after the data cleaning process. The study used SPSS v. 26 for descriptive analysis and the results show that the age group that are younger than 21 accounts for 1 (0.4%), age bracket 21 – 25 years old accounts for 234 (94%) while age group 26 and above accounts for 14 (5.6%). The participants age bracket 21 – 25 dominate the survey. Regarding technology proficiency, 9 participants fall to the category of a beginner (3.6%), 122 participants are technology proficient at intermediate level (49%), 113 are advanced users (45.4%) and only 5 participants are technology proficient at expert level (2%). Majority of the participants are intermediate technology users (details in Table 2).

## 4 Results

mPOS is inevitable for a country like Mexico with population of 127.6 million. mPOS disruptions is advancing to replace the traditional point of sale and it is extremely

useful to prevent long queue in the stores and its portability and cost effectiveness are of importance to the retailing stores. The interoperability of mPOS with other systems is another strength of mPOS. A recent paper confirmed the interest of the corner store owners in using mPOS adaptation that they called Point of Sale Tablet (POST) in Baltimore City, Maryland. The study utilised descriptive statistics and carried out a variance structural equation modelling [33]. This study reports the results under measurement and structural model.

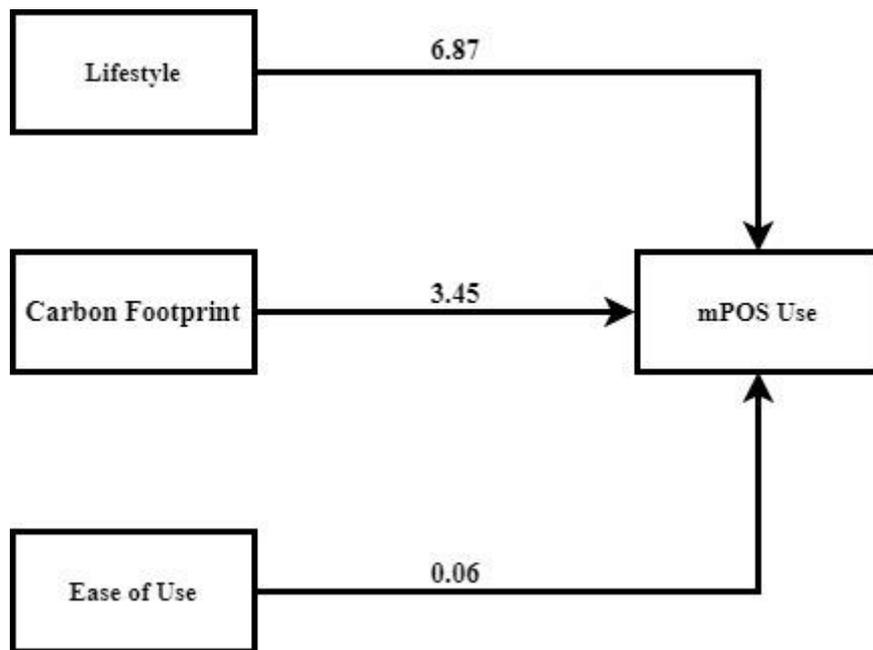


Fig. 2. mPOS Use Model.

#### 4.1 mPOS use measurement model

The use of partial least square structural equation modelling (PLS-SEM) is progressing with SmartPLS data analysis software because of its simplicity and user-friendly interface [34]; [16]. This study considered the data quality based on different metrics before embarking on structural equation modelling and take a cue from the study of [35]. The results of measurement model shows that the composite reliability of the three variables conform to the established thresholds of 0.7 and average variance extracted also conform to the thresholds of 0.5. The study tests the internal consistency and establishes the convergent validity of the variables utilized. The factors loading were above 0.5. Regarding the effect size of the variables, compatibility with lifestyle had the highest effect size of 0.975, followed by reduction of the carbon footprint with 0.102 while the ease of use had no effect size. As related in the existing literature, compatibility with lifestyle had large effects while carbon footprint had small

effect size on mPOS use [36]. Table 1 and 3 gives full account of the quality criteria of this study.

**Table 1.** Measurement threshold for mPOS use model.

Variables and Items	Factor Loading	$f^2$	Composite Reliability	Average Variance Extracted
Lifestyle		0.975	0.893	0.736
Lifestyle1	0.873			
Lifestyle3	0.861			
Lifestyle4	0.841			
Carbon Foot-print		0.102	0.960	0.923
Carbon Foot-print1	0.939			
Carbon Foot-print3	0.981			
Ease of Use		0.000	0.920	0.793
Ease of Use2	0.808			
Ease of Use3	0.934			
Ease of Use4	0.924			
mPOS Use		-	0.964	0.931
mPOS Use1	0.965			
mPOS Use2	0.964			

*Note: The authors removed the variables that had low threshold (<0.5).*

#### 4.2 mPOS use structural model

This study used three independent variables (compatibility with lifestyle, reduction of carbon footprint and ease of use) to predicts mPOS use with three hypotheses (H1 – H3). That is, mPOS use (H1) in Mexico is compatible with user’s lifestyle ( $\beta = 0.92$ ,  $T=6.87$ ,  $P=0.001$ ). Also, the mPOS use in Mexico reduces the carbon footprint and promote green environment ( $\beta = -0.17$ ,  $T=3.45$ ,  $P=0.001$ ) and perceived ease of use of mPOS device increases its use in Mexico ( $\beta = 0.01$ ,  $T=0.06$ ,  $P=0.954$ ). The ease-of-use p-value is greater than 0.05 and the hypothesis was rejected. On the other hand, compatibility for the lifestyle is the highest predictor of mPOS use. The hypotheses formulated for compatibility for lifestyle and reduction of carbon footprint was accepted (Figures 1, 2 and Table 4). The model of mPOS use explained 74.5% of the variance.

**Table 2.** mPOS use demographic values.

Demographic	Indicator	Frequency	Percent
Age	Younger than 21	1	0.4
	21 – 25 years old	234	94
	26 and above	14	5.6
Technology Proficiency	Beginner	9	3.6
	Intermediate	122	49
	Advanced	113	45.4
	Expert	5	2

**Table 3.** mPOS use discriminant validity values.

	Carbon Footprint	Ease of Use	Lifestyle	mPOS
Carbon Footprint	0.960			
Ease of Use	0.499	0.890		
Lifestyle	0.424	0.842	0.858	
mPOS	0.220	0.694	0.851	0.965

**Table 4.** Tested Hypotheses

	Original Sample	Standard Deviation	T Statistics	P Values	Hypotheses Validation
Lifestyle -> mPOS Use	0.917	0.133	6.873	0.001	Accepted
Carbon Footprint -> mPOS Use	0.174	0.050	3.450	0.001	Accepted
Ease of Use -> mPOS Use	0.009	0.155	0.057	0.954	Rejected

## 5 mPOS results discussion

Small businesses and individuals are moving towards alternative payment system in Mexico due to the pricey fees charged by the existing banks and due to the bank's excessively complicated administrative procedure. Despite the benefits of alternative payment system, there is still a gap in mPOS adoption, use and continuous use in Mexico. For instance, a study [37] proposed a mPOS fourteen (14) years ago with added value of construction and maintenance cost reduction. After fourteen (14) years

some countries are still in between acceptance and resistance of the alternative payment solution. This study employed descriptive, measurement and structural statistics to explain the phenomenon of mPOS and to answer the research questions. The study intends to know why compatibility with lifestyle, reduction of carbon footprint and ease of use are the determinants of mPOS use in Mexico. Earlier research defined compatibility as “perceived cognitive distance between an innovation and precursor methods for accomplishing tasks” [38]. Inferring from the earlier definition, this study define compatibility with lifestyle as a behaviour of mPOS users based on their preference. This study found the compatibility with lifestyle as the highest predictor of mPOS use and this result align with the recent study of [39]. The corresponding study found that customer lifestyle compatibility influences intention to use the food delivery apps. The higher the perception of compatibility with lifestyle, the higher the mPOS use. The effect of carbon footprint is a global phenomenon [40]. Another study found that exposure to information supporting the conspiracy theories reduces participants of the study intentions to reduce their carbon footprint. Reduction of carbon footprint predicts the mPOS use which indicates that the higher the perception of carbon footprint reduction, the higher the mPOS use. Contrary to other results, ease of use is not significant in this study. This result aligns with the study of [31]. This result shows that understanding how to use the mPOS is not yet clear for the Mexican. The study also concludes that mPOS in Mexico will promote a green environment and make Mexican society healthy. Theoretically, this study integrates user’s habits and green driver to showcase mPOS use model. First, this study shows the direct relationship of compatibility with lifestyle and reduction of carbon footprint as drivers of mPOS use. This result shows path to cashless and green economy in Mexico.

### **5.1 mPOS use managerial discussion**

Managerial wise, this study suggests that the mPOS service providers in Mexico should pay closer attention to mPOS users' lifestyle. Besides, mPOS service providers should consider the carbon footprint and lifestyle when addressing their product to a specific customer segment.

### **5.2 mPOS use limitations and future discussion**

This study was only limited to the University students and a single country but since mPOS disruption is a global phenomenon, the future researcher should test the model of this study in other countries. The researcher should add some psychology variables such as anxiety, mood, and satisfaction to add the perspective of emotional attachment to mPOS.

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