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Influence of Demographic Factors on Security and Privacy Concerns in Mobile Payments

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Abstract*: Mobile payment systems are rapidly surpassing traditional payment options due to their ease of use and efficiency. Their convenience, however, raises the question – how secure are these systems? There is a great deal of insecurity and risk for consumers as mobile payments involve a lot of financial information. Past research indicates that when involved in online activities and e-payments, consumers are specifically concerned about privacy and security. This study aims to understand influence of demographic variables on security and privacy concerns of consumers by conducting a survey of 1087 respondents in 4 major cities of the state of Gujarat, India. The results indicate that demographic variables age, occupation, annual income and city have significant relationship with security and privacy concerns of consumers towards mobile payments. The findings of this study can benefit mobile service providers, system developers and m-payment vendors to have an actionable segmentation of different target groups based on demographic variables. Practitioners can formulate relevant strategies to address security and privacy concerns which will ultimately facilitate adoption of mobile payment systems.

Keywords: Mobile payments, security, privacy, demographic variables, mobile service providers, m-payment vendors

I. INTRODUCTION

The arena of mobile payments is fuelled by convincing value propositions, favourable infrastructure, supportive rules and technologies of the next generation. Across the world, volume of digital transactions has risen bringing a shift in the payment industry's power dynamics, which is seeing a change towards mobile payments. As per [18], mobile payments are witnessing a booming growth and gaining momentum in terms of the number of digital transactions with a Compounded Annual Growth Rate of 12.7%. The progress is due to developing economies governed by booming Asian countries, expected to grow by 28.8 percent by 2024 (number of digital transactions) and projected to comprise half of the world's non cash transactions. The global market share of digital payments is anticipated to reach USD 10.07 trillion by 2026 [17].

Due to the advancement of technology, the digital payment domain has seen a substantial growth. New technologies such as m- wallets, smart phones, Quick Response (QR) codes and Near Field Communication Technology (NFC) have led to increased digital penetration and affected the manner of communication and connectivity of customers with payment providers.

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M-payment providers like Apple, Google, PayPal, Samsung along with retailers and banks are exceptionally hopeful about mobile payment scenario. Risk management becomes a crucial area to focus regarding the digital payment systems due to introduction of new payment modes and fast acceptance of non-cash payment systems in India. Any infringement of payment security would impact meticulously developed trust of customers. Though the regulators are encouraging use of mobile payments for multiple purposes, occurrences of fraudulent activities can make customers insecure about this mode. Hence, it is required that all parties involved in mobile payment ecosystem make continuous efforts to give security a top priority for their businesses. As the need is high to secure digital payments, participants such as banks, government, card companies, e-commerce firms, financial technology firms are aggressively working to safeguard their clients. As the payment industry is coming up with new instruments to foster adoption of digital payments, it has also created possible risks and fears related to information privacy. This affects the customer trust about digital payments. A couple of situations generating risk are explained below:

Table I: Risk areas for digital payments

Device Competency	Devices are having inadequate processing capacity and memory to fully implement recognized safety protocols in line with current standards. Due to this, period security updates cannot be easily processed by these devices.
Data Leakage	Contemporary payment modes are having the capacity to produce huge amount of information, which is a possible target for cyber criminals. The compromised data is likely to encompass private information which can subsequently be used to control and track users illegally.
DDoS Attacks	Default password settings and open remote access allow remote control of the system by attackers. Particularly, IoT instruments need least or no user contact, making it even harder for the users.

To foster adoption of digital payments, it is required that sufficient risk and safetystandards are implemented. The approach to handle such type of concerns rest on the nature of industry, business model, location, payment modes and the kind of scams taking place.

II. LITERATURE REVIEW

From the view point of the consumer, the perceived level of security can be defined as the subjective probability with which consumers have faith that their commercial transactions will not be seen, modified or influenced by illegitimate parties in between the process [1, 9]. When engaged in online activities and e- payments, customers are particularly concerned about security [11, 16].

The sense of security strengthens the positive intention and increases the inclination of a customer to rely on their trusted party, as it makes them feel more at ease [11]. The researchers also consider security as a major predecessor of initial trust and a crucial factor for the long-standing success and future of m-commerce. Overall, developing trust in m-commerce is challenging because of security issues [6, 15].

M-commerce is more vulnerable than e-commerce to the possibility of insecurity. This is because of the weak relations between the involved parties in the m-payment process which makes prying on financial data in the m-commerce setting easy for invaders [1].

M-payments entail exchanging customer accounts and financial information with a mobile service provider, ensuring that customers who believe their financial assets are secured against transaction loss would have strong confidence in m-commerce transactions [12, 14].

A review of studies on m-commerce shows that consumers share great concerns in m-payments regarding privacy. Consumers may be worried about potential opportunistic behaviours of mobile payment service providers, which could lead to the loss of confidential information [14].

In mobile banking transactions, [5] argued that not only the security of these payments that is important, the safety of individual and transactional privacy should also be attained to acquire consumer trust. Studies have indicated that perceived privacy risks are directly related to consumer trust in m-commerce and m-payments [2, 3, 8, 12, 13].

III. RESEARCH GAP

To have a successful implementation of a mobile payment service, it is crucial to address security and privacy concerns of consumers. However, the study of existing literature indicates that there are still not significant studies primarily analyzing impact of demographic variables on security and privacy concerns of consumers with respect to mobile payments.

Therefore, to address some of these gaps in literature, this study aims to find relationship of demographic variables with security and privacy concerns in m- payments.

IV.RESEARCH OBJECTIVE

To study relationship of demographic factors with security and privacy concerns of consumers with respect to mobile payments.

V. RESEARCH METHODOLOGY

The study is based on descriptive research design. The data was collected via personal interview method from the respondents. The target population in the study were individuals having age 18 or above with some knowledge of mobile payments. The data was collected from 1087 respondents from four major cities of Gujarat – Ahmedabad, Surat, Vadodara and Rajkot during February to March, 2019. Non probability convenience sampling was used.

The questionnaire is based on 7-point likert scale (1 = strongly disagree to 7 = strongly agree). The demographic variables comprise of categorical data which include gender, age, education, occupation and income.

The collected data has been analysed with the help of descriptive statistics, Mann-Whitney test and Kruskal-Wallis test performed in the Statistical Package of Social Science (SPSS) version 21.

VI.RESULTS AND DISCUSSION

A. Descriptive Statistics:

Descriptive statistics provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of quantitative analysis of data.

Table II: Demographic profile of respondents

Demographic Variables	Categories	Frequency	Percentage
Gender	Male	579	53.3
	Female	508	46.7
	Total	1087	100
Age	18-29	255	23.5
	30-45	333	30.6
	46-60	313	28.8
	>60	186	17.1
	Total	1087	100
Education	Undergraduate	252	23.2
	Diploma	392	36.1
	Graduate	382	35.1
	Post graduate	61	5.6
	Total	1087	100
Occupation	Salaried	429	39.5
	Business	217	20
	Professional	116	10.7
	Retired	59	5.4
	Housewife	261	24
	Agriculturist	5	0.5
	Total	1087	100
Annual Income	Up to Rs.3 Lacs	585	53.8
	3,00,001 – 5,00,000	352	32.4
	5,00,001 – 7,00,000	111	10.2
	More than 7,00,000	39	3.6
	Total	1087	100

(Source: Primary data)

Inference:

- Out of 1087 respondents, 579 (53.3%) respondents are male and 508 (46.7%) respondents are female. 30.6% respondents are in the age group of 30-35 years. Nearly, 28.8% of the respondents are in the age group of 46-60 years followed by 23.5% of the respondents in 18-29 age groups.
- With respect to education, 36% of the respondents are diploma, 35% of the respondents are graduates followed by 23% respondents who are undergraduate and 6% of them are post graduate. With respect to occupation, 39.5% of the respondents are salaried while 24% of the respondents are housewife followed by 20% of the respondents having business.
- 53.8% of the respondents are having annual income up to Rs. 3 Lacs while 32.4% of the respondents are having annual income between Rs. 3,00,001 – 5,00,000 Lacs followed by 10.2% of the respondents having annual income between Rs. 5,00,001 – 7,00,000 Lacs.
- 24.9% of respondents belonged to Ahmedabad city, 23.1% of respondents from Rajkot, 23.2% of respondents from Vadodara and 28.8% of respondents belonged to Surat city.

B. Mann Whitney U test *(Gender -> security & privacy concerns)*

Hypothesis:

H_{01}: There is no significant difference about security concerns between males and females

H_{02}: There is no significant difference about privacy concerns between males and females.

Table III : Gender and security concerns

Gender	Security Concerns
Mann-Whitney U	138333.000
Wilcoxon W	306243.000
Z	-1.728
Asymp. Sig. (2-tailed)	.084

Table IV : Gender and privacy concerns

Gender	Privacy Concerns
Mann-Whitney U	141553.500
Wilcoxon W	309463.500
Z	-1.093
Asymp. Sig. (2-tailed)	.274

A Mann-Whitney U test showed that there is no significant difference between males and females about security concerns (U = 146623.5, p = 0.084) and privacy concerns (U = 141553.5, p=0.274) for mobile payments as p value is greater than 0.05 in both the cases. Hence, H_{01} and H_{02} are accepted.

C. Kruskal Wallis test *(security concerns-> demographic variables)*

Hypothesis:

H_{03}: There is no significant difference about security concerns among demographic variables

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H_{04}: There is no significant difference about privacy concerns among demographic variables

Table V: Security concerns & demographic variables

	Demographic Variable	Chi square value	Asymp. Sig. (p value)	Result
Security Concerns	Age	21.237	0	Significant
	Education	5.146	0.161	Not significant
	Occupation	30.328	0	Significant
	Annual Income	12.301	0.006	Significant
	City	354.630	0	Significant

The above output of kruskal wallis test reveals that there is significant difference among age groups, occupation, annual income and city with respect to security concerns in mobile payments as p values of these variables are less than 0.05. So null hypothesis (H_{03}) is rejected for these variables. In case of education categories, no significant difference was found regarding security concerns. Hence, null hypothesis (H_{03}) is accepted in case of education categories.

Table VI: Privacy concerns & demographic variables

	Demographic Variable	Chi square value	Asymp. Sig (p value)	Result
Privacy Concerns	Age	18.192	0.000	Significant
	Education	4.335	0.227	Not significant
	Occupation	30.347	0.000	Significant
	Annual Income	13.751	0.003	Significant
	City	365.153	0.000	Significant

The output of kruskal wallis test reveals that there is significant difference among age groups, occupation, annual income and city with respect to privacy concerns in mobile payments as p values of these variables are less than 0.05. So null hypothesis (H_{04}) is rejected for these variables. In case of education categories, no significant difference was found regarding privacy concerns. Hence, null hypothesis (H_{04}) is accepted in case of education categories.

There are few empirical studies that have examined relationship of demographic factors with security and privacy concerns in m-payment. This study has made a valuable contribution to the body of knowledge by providing insight in to how demographic characteristics shape m-payment consumers' security and privacy concerns.

The findings have important implications for related entities like mobile service providers, system developers and m-payment vendors as they can formulate strategies to mitigate security and privacy issues for different target groups based on their demographic characteristics. This will in turn promote adoption of m-payment systems.

VII. CONCLUSION

This study examined the relationship of demographic variables with security and privacy concerns with respect to mobile payments. Age, occupation, annual income and city of respondents had significant influence on security and privacy concerns. Gender and education were found to have no significant influence with respect to security and privacy concerns. This study is limited to four major cities of Gujarat state of India and can be conducted on a larger geographical area so that the results can be applied to a larger population. The study can further be extended to include additional demographic variables such as marital status, religion, average family size along with cultural values. The findings of this study have important implications for practitioners, as by understanding the influence of demographic factors, organizations can adapt their mobile payment systems to cover a large number of consumers.

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