أمن المعلومات في التجارة الإلكترونية في السعودية

Information security within electronic trading in Saudi Arabia

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مستخلص:

على الرغم من أن قضايا أمن المعلومات معروفة بأنها تؤثر على قرارات الشراء الإلكتروني للعملاء في جميع أنحاء العالم، إلا أن الدراسات التي تركز على هذا الموضوع نادرة في المملكة العربية السعودية. لذلك، تم إجراء بحث استكشافي لدراسة كيفية تأثير أمن المعلومات على تصورات العملاء لمنصات التجارة الإلكترونية. أُجري استطلاع عبر الإنترنت مبني على إطار عمل Eid (2011) الذي تم نشره من خلال نماذج جوجل، وقد تم الحصول على 286 إجابة صالحة للتحليل. كشف تحليل البيانات عن بعض النتائج من أهمها: إن القلق من المخاطر في المعاملات المالية أو المعلومات الشخصية يمكن أن يؤثر سلبًا على اعتماد العملاء لمنصات التداول الإلكترونية في المجتمع السعودي، ولم يسمع العملاء عن الآخرين الذين عانوا من مشاكل في أمن المعلومات. كما لم تؤثر عليهم أي حواجز من أي نوع أدى صغر السن وانخفاض مستوى التعليم إلى زيادة هذا التخوف من أمن المعلومات بشكل كبير. وتدعم هذه النتائج بشكل عام نتائج الأعمال السابقة للعديد من الباحثين الآخرين.

الكلمات المفتاحية: أمن المعلومات، التجارة الإلكترونية، السعودية

Abstract

Although information security issues are known to affect the e-purchase decisions of customers worldwide, studies focusing on this topic are rare in Saudi Arabia. Therefore, exploratory research was done to study how information security impacts customer perceptions of e-trading platforms. An online survey adapting the framework of Eid (2011) through Google Forms yielded 286 valid responses. Analysis of the response data revealed some interesting results. Even if all other factors of e-trading platforms are positive, the single concern of risks in financial transactions or personal information can negatively impact customer adoption of e-trading platforms in the Saudi context.

Customers had not experienced or heard of others experiencing information security problems. No barriers of any type.

No barriers of any type also did not affect them. Younger age and lower level of education increased this apprehension of information security significantly. These findings generally support the findings of earlier works by many other researchers.

Keywords: Information Security, Electronic Trading, Saudi Arabia

Introduction

According to an IBIS report (IBIS, 2010), electronic trading platforms started in the 1970's. Since then, a large portion of transactions have been converted into electronic trading platforms. Electronic communication networks, commercial trading platforms, transactions of financial institutions, government e-services, etc. fall into this category. At first, stock exchanges were converted to electronic trading. This allowed brokers to access remote private dedicated networks and dumb terminals. In the early systems live streaming of prices was not possible; brokers or clients placed orders to be confirmed sometime later. These were termed 'request for quote' based systems. When live streaming prices and almost instant execution of orders using the internet started, the location became almost irrelevant. Some electronic trading platforms have Built-in scripting tools and APIs in some platforms allow traders to develop automatic or algorithmic trading systems and robots. Orders can be placed using client's graphical user interface in the electronic trading platforms. During the period from 2001 to 2005, dedicated online trading portals were set up. These systems facilitated the choice of many electronic trading platforms in place of one platform of the organization.

However, with an increasing number of customers preferring online shopping, the safety and security of the enormous personal data of these customers and their online financial transactions through open websites is a matter of great concern. Marketing agencies access these data without the knowledge of the customers for scoping studies of new products and services of large companies. While this is not an entirely negative point, hackers employ numerous methods to access these data for their ulterior motives, which is a negative point affecting the customers adversely. So, it is imperative that online traders should employ methods to ensure

the information security of their customers. On the other side, customers need to be aware of these aspects. Here, the customer perceptions of the security of their personal data and transactions influence their satisfaction and loyalty reflected by repeat purchase intentions and actual purchases. These two sides are examined in two sections below to justify this research.

Information security provided by electronic traders

Regulatory provisions for the enforcement of information security disclosures by corporates exist as a customer protection strategy. Favourable impact in this direction due to the Sarbanes-Oxley Act (SOX) of 2002 was reported by Gordon, Loeb, Lucyshyn, and Sohail (2006). According to Miyazaki and Fernandez (2000), the Consumer Internet Privacy Protection Act of 1999 (H.R. 313), the Online Privacy Protection Act of 1999 (S. 809), and the Inbox Privacy Act of 1999 (S. 759), E-Privacy Act (S. 2067) and the Secure Public Networks Act (S. 909) and Children's Online Privacy Protection Act of 1998 (16 C.F.R. Part 312) for children below 13 years in USA are some regulatory side efforts to enforce information security of online customers from the traders side. Online retailers are made responsible for the disclosure of consumer information acquisition, usage, and protection practices. However, very few online traders declare their information security practices. In their research, the authors established a positive relationship between the percentage of privacy- and security-related statements on websites with consumers' online purchase likelihood. The positive effect of the declared privacy policy on the adoption of online banking in China was reported by Hua (2008). The need for online financial dealers and stockbrokers to improve and disclose the security of the online system for e-investors to form positive perceptions about its security was stressed by Carlos Roca, García, and José de la Vega (2009).

Information on perceived risk and information security was one of the factors affecting consumer purchase outcomes, in the survey results of Kim and Lennon (2010).

Clearly, in spite of regulations, many online traders do not disclose their privacy and security policies and what they have on websites to protect consumers. When there is sufficient visibility of the online trader ensuring the security and privacy of customer details and transactions, the customers do respond positively.

Customer perceptions of information security

Privacy, security and subjective norms were the three factors affecting the decision to use online shopping by 375 university students surveyed by Zendehdel and Paim (2012). The authors focused on only three aspects. The justification for using students as participants was that they are potential future online customers. A moderating effect of the cultural dimension, collectivism/individualism, on the relationship between attitude and these three factors in a similar student sample was noted later by Zendehdel, Paim, and Delafrooz (2016). Security of financial transactions and individual privacy were matters of serious concerns for 195 online university student shoppers in a Turkish survey study by Huseynov and Yıldırım (2016). Security of the online payment system was the main concern of 160 online customers of Dhaka (Bangladesh) city in the survey findings obtained by Rahman, et al. (2018). Based on the results of a South Korean survey of 222 customers using various internet platforms for various purposes, a modified Technology Acceptance Model (TAM) was proposed by Kim (2018) with security risks as a factor affecting perceived usefulness leading to intention to use. However, the author did not explain these security risks, which may include the security of customer privacy and online transactions. In the case of apparel

retailing, the results of a survey of 298 US university students by Ha and Stoel (2012) showed a significant impact of privacy/security and customer service on e-shopping intention. Such an impact was not obtained for e-shopping satisfaction. Perception of e-security was one of the factors affecting the online purchase decisions of Malaysian customers, as was revealed by the results of a survey of 230 customers in the studies of Raman and Annamalai (2011). Using a review, Morad and Raman (2015) opined that consumers hesitate to shop online due to the fact that they are scared of product scams, financial scams, and information data being stolen. All these are parts of information security risks. Significant relationships between the security/privacy of online portals and the satisfaction of Chinese customers were obtained by Liu, He, Gao, and Xie (2008) from a survey of 1001 online customers. From their review studies using Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Sun and Lin (2009) found security and trust to be the most important factors determining the competitiveness of shopping websites. Huseynov and Yıldırım (2019) categorized 1027 online university student customers into shopping lovers, direct purchasers, suspicious browsers and incompetent customers based on psychographic characteristics. Privacy and security fear were maximum for suspicious and incompetent customers and it was minimum for shopping lovers.

The nature of the threat to information safety in online retailing was discussed by Marriott, Williams, and Dwivedi (2017) in a review paper. The collection and storage of a large number of customer data increases the risk of attacks by hackers. The hackers use the customer information for fraudulent purposes. Unlike traditional buying, there is no direct contact or visibility of the sales personnel. This increases the anxiety of customers and if there is any delay, they worry about

information privacy threats. If such privacy concerns exist, customers hesitate to adopt or continue online buying. Among the types of customer-perceived risks, privacy and security of information risks have been researched the least. Trust is another related risk and this affects consumer acceptance. Unauthorized access, fear of misuse of personal data, and modification of personal data by unknown parties are threats related to security and privacy. The geolocation capability of mobile phones adds the additional threat of location of customers when mobile phones are used for online shopping. However, there is a poor correlation between intention to disclosure and actual disclosure. Many consumers may be willing to disclose personal information on the computer but may not do so on mobile phones. Thus, application-related factors become important in the perception of information security. Security concerns often override the benefits of online buying. The anxiety of customers about information security increases when many instances of security breaches are reported. Customers may provide insufficient, incomplete, or inaccurate information when security fear is perceived. Although many reputed organizations now assure security protection, when instances of security breaches of the same organizations are reported. The customer confidence declines. There is often a similarity between privacy and security concerns. Many authors differentiate them. Security concerns are related to freedom from threats of fraud. Privacy concerns are related to situations of customers' inability to control the exploitation and sharing of their information by the company itself for their benefit or by other unknown people or organizations. (Marriott, Williams, & Dwivedi, 2017)

There have been many works on information privacy issues in Saudi Arabia. A study by Abu-Musa (2010) showed that most Saudi organizations did not have clear security strategies or policies. There were no disaster recovery plans either. There were severe deficiencies in the alignment of business goals with information security governance and its processes and there was no system to measure its performance. There was a high level of inadequacies about clearly defined information security roles and responsibilities or risk assessment and management. Security concerns about the delivery system, website and safe payment had lower importance than organizational and demographic factors of participants in determining positive attitudes about online shopping in Saudi Arabia, as was found in the survey of Bahaddad, Houghton, and Drew (2013). The research was focused on giving small-to-medium enterprises (SMEs) a competitive advantage through online selling. The authors noted generally all companies in Saudi Arabia were interested only in displaying their products with information on their websites and no attempt was being made for online selling.

Saudi electronic payment system (SADAD) was initiated by the Saudi Arabian Monetary Agency (SAMA) as its national Electronic Bill Presentment and Payment (EBPP) service provider on October 3, 2004. However, the e-payment system was already in use in some organizations before it was formalized through SADAD. SADAD facilitated bill payment transactions for end consumers through all channels of all banks in KSA. Security was highlighted as one of the advantages of SADAD through a survey of customers by Al-Adwan, Al-Zyood, and Ishfaq (2013).

The results of a survey by Eid (2011) revealed that perceived security risk and perceived privacy were strongly associated with customer trust, but weakly associated with customer satisfaction. Since trust was correlated with customer

satisfaction, there is an indirect relationship between perceived security and privacy risks with satisfaction. However, in the findings of Sait, Al-Tawil, and Hussain (2004) Saudi customers were doubtful about the ability of the Internet to provide adequate security and privacy to their e-commerce activities and hence, were hesitant to adopt e-commerce. In spite of the introduction of the SADAD payment system for customers and e-Mall by Saudi Post for companies as selling platforms, lack of awareness about trust and privacy among customers continue to be the main obstacles to rapid e-commerce adoption by customers in Saudi Arabia, noted Aljarboa (2016). In spite of increasing levels of adoption of e-commerce by customers, security and privacy issues continue to be the main challenges in 2018 Bahaddad, Drew, Houghtoni, and Alfarraj (2018) and even in 2019 (Alsenaidy & Lilac, 2019) in spite of a lot of innovative technologies used in e-commerce.

Excepting the paper by Abu-Musa (2010), none of the papers fully focused on information security. Even the paper by Abu-Musa (2010) deals with only the governance issue of information security. Fully focused studies on customer-side perspectives of information security have not been reported in Saudi Arabia. This research attempts to fill the gap to some extent. Therefore, the aim of this study was to measure customer perceptions of information security in commercial websites offering electronic trading platforms. Apart from the general perceptions the effect of some demographic factors on security preferences in electronic trading were also evaluated.

A mention must be made here of the increased need for information security on commercial websites offering electronic trading platforms in the context of Covid 19. The World Trade Organisation (WTO, 2020) found that there has been a marked increase in the number of transactions on such platforms with the

imposition of lockdowns across the world. There has been an unprecedented increase in demand for goods and services online. This increase in demand has led to a corresponding increase in the number of phishing and malware attacks on unsuspecting customers. Personal details and financial information are the chief targets of these attacks (Ozili & Arun, 2020).

The need to improve the security of consumers has raised certain challenges, such as the need for greater consumer protection, compliance with regulations and development of appropriate and robust electronic trading platforms. This is because, the influx of consumers onto such portals has also highlighted the digital divide that exists between and within countries (Ozili & Arun, 2020).

Aim and Objectives

The aim of this study is to measure customer perceptions of information security in commercial websites offering electronic trading platforms. The specific objectives are:

- To provide a demographic and trading profile of the sample.
- To provide insights about the current status of information security within electronic trading in Saudi Arabia
- To establish if the perceptions about security and privacy in electronic trading differ by the demographics of the participants.

Method

The survey framework of Eid (2011) was adapted for this research with some modifications for the research context. The population consisted of all online trading customers. There are no accurate statistics available about the number of people who engage in online trading, so the population size is unknown. The modified survey instrument was served to online customers without piloting. It

was distributed through Google Forms online between November and December of 2019. The instrument was accessed and responded by 286 adult customers, all of which were usable. Hence the response rate was 100%. All normal ethical procedures were followed.

The aims of the data analysis are:

1. To provide a demographic and trading profile of the sample.
2. To provide insights about the current status of information security within electronic trading in Saudi Arabia
3. To establish if the perceptions about security and privacy in electronic trading differ by the demographics of the participants.

Quantitative analysis was conducted using SPSS statistical software version 25. The SPSS software has proven to be consistently reliable in a variety of statistical analysis projects.

The frequency distributions (counts and percentages) were tabulated for all questions with a categorical response (nominal or ordinal). The trends were summarized, based upon whether the majority (more than 50% of the participants) of the responses were located. The skewness of the distributions (e.g., whether the highest frequencies were located) was recorded where applicable. Summary statistics (e.g., Means or Standard Deviations (SD) or Medians and Inter Quartile Ranges (IQR)) have been reported depending on whether a variable is normally distributed for questions with continuous response.

The security and privacy in electronic trading scores were computed from the scale used in the survey as the average of the individual items. The conceptual operational definition of the score is provided in the statistical analysis results section.

Prior to conducting statistical analyses, the assumptions of parametric statistics were inspected for continuous variables. The Shapiro-Wilk test was used to check the statistical significance of the normal distribution of the continuous variables at alpha = .001. Depending on the outcome of the test, parametric or non-parametric statistics and techniques have been utilized.

The main multivariate analysis technique used for addressing the objectives of this research include the Mann-Whitney test and the Kruskal-Wallis test. A Mann-Whitney test is a suitable test to compare the median scores of two independent groups, and a Kruskal-Wallis test is a suitable test to compare the median scores of more than two independent groups (Katz, 2011; Tabachnick & Fidell, 2007). These tests have been used to compare the perceptions about security and privacy in electronic trading by the demographics of the participants.

A .05 level of significance was used as the criteria for statistical significance for all multivariate analysis. The results obtained from the analyses of data are described in the subsequent sections.

Results

The results obtained after the analysis of data are presented in the following tables and described.

Demographic and trading profile

The demographic and trading profile is given in Table 1.

Table 1. Demographic and trading profile of survey participants.

		Frequency	Percent
Do you prefer using the electronic trading?	No	82	28.7
	Yes	204	71.3
	Total	286	100.0
Gender	Female	95	33.2
	Male	191	66.8
	Total	286	100.0
Age	Less than 25 years	24	8.4
	Between 25 - 40 years	161	56.3
	More than 40 years	101	35.3
	Total	286	100.0
Education	High School	75	26.2
	Graduate	118	41.3
	Post-graduate	93	32.5
	Total	286	100.0
Monthly income	Less than 10000 SAR	82	28.7
	Between 10000 - 20000 SAR	131	45.8
	More than 20000 SAR	73	25.5
	Total	286	100.0

As said above, there were 286 respondents. The analysis of their profile revealed that a large majority of them preferred using electronic trading (n=204, 71.3%). There were 191 (66.8%) males in the sample. The participants largely belonged to two major age groups of 25-40 years (n=161, 56.3%) and those over 40 years (n=101, 35.3%). Most of them were at least graduates (n=211, 73.8%) and earned at least 10,000 SAR per month (n=204, 71.3%). Thus, the Saudi customers were largely male, young and well-educated with affordable income.

The results of a detailed Shapiro-Wilk test (Table 2) did not indicate that the data to be normally distributed for all scales and items. Hence, only non-parametric methods could only be used.

Table 2. Test of Normality.

	Shapiro-Wilk		
	Statistic	df	Sig.
The Web site has mechanism to ensure the safe transmission of its users' information.	.655	286	<.001
The Web site has sufficient technical capacity to ensure that the data I send cannot be modified by hackers.	.576	286	<.001
The Web site abides by personal data protection laws.	.459	286	<.001
The Web site does not provide my personal information to others without your consent.	.446	286	<.001
The Web site shows concern for the privacy of its users.	.623	286	<.001
Purchasing on the Web site will cause financial risk.	.825	286	<.001
The electronic payment on the Web site is safe.	.834	286	<.001
The Web site only collects user's personal data that are necessary for its activity.	.864	286	<.001
I feel safe when sending my personal information to the Web site.	.898	286	<.001
I have experienced or come across anyone else having experienced any security breach problem at any time within Electronic Trading.	.891	286	<.001
I have faced or come across anyone else having faced any problem of a security breach in their electronic transactions.	.897	286	<.001
To what extent do you feel that (the Technological Barriers) prevent you from online purchases?	.899	286	<.001
To what extent do you feel that (the Psychological Barriers) prevent you from online purchases?	.900	286	<.001
To what extent do you feel that (Language Barriers) prevent you from online purchases?	.892	286	<.001
Security and Privacy Issue Score	**.975**	**286**	**<.001**

A summary statistic was prepared for the response data as presented in Table 3.

Table 3. Summary statistics.

Item/Score	Mean	Median	SD	IQR	Min.	Max.
The Web site has a mechanism to ensure the safe transmission of its users' information.	4.53	5.00	0.74	1.00	2.00	5.00
The Web site has sufficient technical capacity to ensure that the data I send cannot be modified by hackers.	4.72	5.00	0.49	1.00	3.00	5.00
The Web site abides by personal data protection laws.	4.80	5.00	0.48	0.00	2.00	5.00
The Web site does not provide my personal information to others without your consent.	4.84	5.00	0.37	0.00	4.00	5.00
The Web site shows concern for the privacy of its users.	4.66	5.00	0.51	1.00	3.00	5.00
Purchasing on the Web site will cause financial risk.	2.87	3.00	0.77	1.00	1.00	5.00
The electronic payment on the Web site is safe.	3.40	4.00	0.89	1.00	1.00	5.00
The Web site only collects user's personal data that are necessary for its activity.	3.68	4.00	0.83	1.00	1.00	5.00
I feel safe when sending my personal information to the Web site.	2.87	3.00	1.08	2.00	1.00	5.00
I have experienced or come across anyone else having experienced any security breach problem at any time within Electronic Trading.	2.56	3.00	1.06	1.00	1.00	5.00
I have faced or come across anyone else having faced any problem of a security breach in their electronic transactions.	2.57	3.00	1.04	1.00	1.00	5.00
To what extent do you feel that (the Technological Barriers) prevent you from online purchases?	2.65	3.00	0.97	1.00	1.00	5.00

Item/Score	Mean	Median	SD	IQR	Min.	Max.
To what extent do you feel that (the Psychological Barriers) prevent you from online purchases?	2.62	3.00	1.18	1.00	1.00	5.00
To what extent do you feel that (Language Barriers) prevent you from online purchases?	2.70	3.00	1.32	3.00	1.00	5.00
Security and Privacy Issue Score	**3.53**	**3.57**	**0.28**	**0.43**	**2.93**	**4.43**

The mean values of the first five items were between 4 and 5, indicative of strong agreement. These questions reflected confidence in the website in ensuring adequate information security and privacy, but not financial transactions. Enormous anxiety about the financial risks of using websites for purchase was expressed giving a low mean value of only 2.87, which is closer to disagreement. The same concern was shared with respect to sending personal information to the website. In spite of these concerns, the mean responses on personal experiences to the next two questions about own or other people's experiences were low. Since these are positive statements in which a negative response is a more desirable answer, the low means indicate that there were no such experiences to report. On average, online customers have not felt any serious technological, psychological or language barriers as their means were very low.

Thus, the level of security and privacy assurances by their trading websites were very good. Neither they nor anyone known to them experienced any problems of this type. They have not faced any barriers to their electronic purchase activities. Overall, the security and privacy mean was at a satisfactory level of acceptance (3.53). In spite of all these positive factors, their perceptions of the safety of sending personal data to the website was towards negative.

Multivariate analysis

Depending on the nature of the data and the aim, different types of multivariate analysis were done. The results are presented and described below.

A Mann-Whitney test was conducted to test whether the median security and privacy in electronic trading score was significantly different by the preference for using electronic trading. The test found that the median security and privacy in the electronic trading score is significantly higher for people who do not prefer using electronic trading, U (286) =6653.5, p=.007. This result presented in Table 4 is counter-intuitive.

Table 4. Median security and privacy in electronic trading score by the preference for using electronic trading.

Do you prefer using the electronic trading?	No	Median	3.71
		IQR	0.43
	Yes	Median	3.57
		IQR	0.29

Another Mann-Whitney test was done to test whether the median security and privacy in electronic trading score was significantly different by the gender of the respondent. There was no gender difference for the median security and privacy in the electronic trading score, U (286) =8146.5, p=.158 (Table 5).

Table 5. Median security and privacy in electronic trading score by gender.

Gender	Female	Median	3.57
		IQR	0.64
	Male	Median	3.57
		IQR	0.36

A Kruskal-Wallis test was performed to test whether the median security and privacy in electronic trading score differed significantly by the age of the respondent. The test found significant differences in the median security and privacy in electronic trading score by age, $\chi 2(2, 286) = 10.594$, $p = .005$ (Table 6). The median security and privacy in electronic trading score was significantly higher for the 25-40 year-old vs. less than 25 year-old and >40 year-old vs. less than 25 year-old. Thus, younger generations had lower perceptions of security and privacy for online shopping.

Table 6. Median security and privacy in electronic trading score by age

Age	Less than 25 years	Median	3.36
		IQR	0.50
	Between 25 - 40 years	Median	3.57
		IQR	0.43
	More than 40 years	Median	3.57
		IQR	0.50

A Kruskal-Wallis test was performed to test whether the median security and privacy in electronic trading score was significantly different by the education of the respondent. The test found significant differences in the median security and privacy in electronic trading score by education, $\chi 2(2, 286) = 9.623$, $p = .008$. As shown in Table 7, the median security and privacy in electronic trading score was significantly higher for people with a relatively lower level of education (i.e., High School vs. Graduate; High School vs. Post-graduate). Thus, people with lower educational levels will have perceptions of a higher threat to security and privacy.

Table 7. Median security and privacy in electronic trading score by education.

Education	High School	Median	3.71
		IQR	0.57
	Graduate	Median	3.50
		IQR	0.36
	Post-graduate	Median	3.57
		IQR	0.43

A Kruskal-Wallis test was performed to test if the median security and privacy in electronic trading score was significantly different by the income of the respondent. The test did not find any significant differences in the median security and privacy in electronic trading score by income, $\chi 2(2, 286) = 2.594$, $p = .273$ (Table 8). Once online trading is being done, income levels do not matter.

Table 8. Median security and privacy in electronic trading score by income.

Income	Less than 10000 SAR	Median	3.57
		IQR	0.43
	Between 10000-20000 SAR	Median	3.50
		IQR	0.43
	More than 20000 SAR	Median	3.57
		IQR	0.54

Discussions

Overall, the findings showed that male, educated youth preferred online trading. There were no issues with assurances of security and privacy by websites. There was no personal self or others experiencing any problems in online trading. No barriers of any type were of serious concern. Only purchasing from the website was a serious problem. Logically, when all the other factors were positive for information safety in online trading, purchase also should have received more positive perceptions. However, the perceptions of customers on information security issues (financial transactions and personal information) were negative.

Looking more deeply, the median value of security and privacy was higher for those who did not prefer using electronic trading. The explanation may be the other way around. Due to their high concern for security and privacy, some customers did not want to use online trading at all. There were no gender or income differences, but those aged above 25 and lower level of education perceived higher levels of security and privacy in electronic trading.

Within the range of response ratings of 1 to 5, means closer above 4 (first four items) reflect stronger agreement with the given statement. For example, in the case of item 1, the website has a mechanism to ensure the safe transmission of its user's information, the mean response was 4.53. This is between agree and strongly agree in the five-point Likert rating. So, the majority of participants agree that the website has a mechanism to ensure safe transmission of information and hence information security is not at risk.

On the other hand, for the item, purchasing on the website will cause financial risk. Has a mean value of 2.87. In the 5-point scoring system, this value tends to be

toward disagreeing. So, the majority of participants do not agree that purchasing on the website will cause financial risks Then the alternative statement, purchasing on the website will not cause financial risk, should be valid. Extending the same arguments for other items of low responses, the alternate statement may be:

- I do not feel safe when sending my personal information to the Web site.
- I have not experienced or come across anyone else having experienced any security breach problem at any time within Electronic Trading.
- I have not faced or come across anyone else having faced any problem of a security breach in their electronic transactions.
- No technological barriers prevent me from online purchases.
- No psychological barriers prevent me from online purchases.
- No language barriers prevent me from online purchases.
- Thus, none of the commonly reported barriers exist for online shopping in Saudi Arabia.

A higher mean was seen in the case of those who do not prefer using online shopping. The demographic data showed that out of 286 participants, only 82 were not using online shopping and 204 were using online shopping. The higher mean of 3.71 for those who do not do online shopping can be assumed to reflect the same 82 participants. Within educated people, the gender differences may be very narrow and may not be significant. Although participants of less than 25 years of age had higher response means, they were only less than 10% of the sample and hence the impact of this finding on the overall trend is not great. For this, as well as for education levels, even the significantly least means were above 3 and below 4. This means a tendency to agree. The tendency might have not become equal to the others due to their low sample size compared to the others of these groups. Income

levels do not matter for largely educated youths, who love online shopping, as long as they earn enough for a decent living.

We have already seen that many earlier findings reported information security as the major problem in e-trading in many countries (Zendehdel & Paim, 2012) These authors also (Zendehdel, Paim, & Delafrooz, 2016) showed an effect of cultural dimensions in determining these factors. Although this possibility is strong in Islamic Saudi Arabia, it was not included in our research. This may be an interesting future topic of research. However, using students in such surveys may not give a correct picture of what an average e-trading customer would have perceived. This is because the level of education and income may have an influence on e-purchase decisions.

The safety of financial transactions is one of the major worries of e-trading customers as was stressed by Huseynov and Yıldırım (2016) in Turkey and by Rahman, et al. (2018) in Bangladesh. In our study also, one of the response means was given for the statement related to the risk involved in purchases through websites. Security risks of different types have been given as the reason for hesitation to adopt e-purchase by customers in South Korea by Kim (2018). In our research, sending personal information to the website received low support indicating this as an information security issue.

Differentiating the effect of information security on customer trust and on satisfaction and customer loyalty is very important, as was rightly pointed out by Eid (2011) in a Saudi study and in a Chinese study by Liu, He, Gao, and Xie (2008). Youngsters are often bold and ready adopters of e-commerce and they do not worry about information security. However, even among them, there may be cautious purchasers. Although not exactly university students, those participants

aged less than 25 years were more prone to worries on security issues in our study also, as lower mean response indicated in their case. Broadly, it can be said that security concerns often override the intention to buy online whether using a computer or mobile phone, as was pointed out by Marriott, Williams, and Dwivedi (2017). By and large, this type of behaviour was indicated in this study also. Even if all other factors are positive, a strong negative perception on financial risk (low response mean) can drive away customers from e-trading platforms. SADAD (AL-Adwan, AL-Zyood, & Ishfaq, 1013) and e-Mall (Alsenaidy & Lilac, 2019) facilities are not able to remove this insecurity perception easily. This may be due to the very traditional views of certain types of purchasers about online arrangements.

Conclusions

This exploratory study showed problems of information security impacting the customers' perceptions of otherwise perfect e-trading platforms. The study was done using a questionnaire survey of online trading customer, from which 286 usable responses were obtained for analysis.

The profile of Saudi online customers is that they are mostly males, 25 to 40 years old, of any educational level beyond high school and belonging to all income groups. Generally, a high level of concern was expressed by participants about the safety of online transactions and the risks involved in sharing personal information on the site.

As can be logically stated, higher concerns for security and privacy were noted in the case of people who did not prefer to trade online, which may be the reason for their not preferring to trade online. Irrespective of gender and income levels, younger people had lower perceptions of security and privacy. Higher concern for security and privacy concerns were also noted in the case of those with lower

educational levels. Evidently, younger people with higher levels of education will be more familiar with the internet and security aspects and they are more adventurous which makes them ideal online customers. The observed findings have been discussed using supportive evidence from the literature.

These findings demonstrate the need for enhanced security and privacy in online trading websites and transactions in Saudi Arabia. While the traders themselves need to adopt the required steps for this purpose, the Saudi government also needs to enact laws and regulations to protect online customers from fraudulent transactions and threats to the privacy and security of online customers.

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