

**UNDERSTANDING THE RISK PERCEPTION OF SAUDI E-
CONSUMERS: A LENS OF EXTENDED TECHNOLOGY
ACCEPTANCE MODEL**

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I HOPE MY ATTITUDE IN THIS RESREACH ADDED SOME VALUE TO THOSE WHO IS LOOKING FOR INFORMATION REGARDING THE TOPIC.

IF I DID GOOD WORK THAT'S FROM ALLAH, THEN MY INSTRUCTORS, BUT IF NOT IT ALWAYS FROM MY SELF.

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CHAPTER 1: INTRODUCTION

Background

It is equally important for a risk management student to comprehend the complex interrelationships of risk management and risk perception, particularly in the area of e-commerce. Therefore, it is relevant to identify factors that influence consumer behavior toward buying from e-shopping sites like Amazon, eBay, Jarir, Noon, and others since the expansion of e-shopping sites for consumer goods has occurred quickly (Alshahrani, 2020). Most consumers tend to buy products online when they are shopping (Brosdahl & Almousa, 2013). This trend offers a promising avenue of study, particularly with regards to examining how different factors affect consumers' buying behavior during e-shopping, especially in markets that experience a constantly increasing connectivity to the Internet and digital media literacy, such as Saudi Arabia.

An important factor of this research is to determine the factors that influence consumers' behavioral intent to purchase or buy from online sites. Some of the factors that are the determinants of such a decision include: – necessities like the confidence or trust of the users on the website, secure payments, simplicity, convenience, availability of the product, and good customer service provision (Chishty & Sayari, 2024). Risk perception studies carried out by Brosdahl and Almousa (2013) suggest that consumers' risk perception when shopping online is not standard. Customers may experience risks associated with monetary loss, exposure of identity, and security of shared information. Hence, e-commerce firms need to reduce these perceived risks actively by improving the features of their site's security, coming up with better customer service, and making their working process clear.

On the regional level, Saudi Arabian e-commerce is also quite remarkable, owing to outstanding sales growth rates in the Middle East. According to Statista (2023), improvements in the Internet connection, together with more users subscribing to social media, have boosted the growth of online shopping in the country. In the last couple of years, the Kingdom has experienced a tremendous increase in internet connectivity. This has serious recognition for e-commerce since the population is gradually evolving to be more techno-savvy (Chishty & Sayari, 2024). The Saudi population section of the youth is actively participating in online buying, and it has been found that more mobile devices are used for buying products online.

Saudi E-commerce Market and Factors:

The statistics of the present e-commerce market of Saudi Arabia, reckoned to be almost USD 13.61 billion, are an example. Estimations also show that this market might reach an enormous figure of USD 27.37 billion by 2029, at a CAGR of 15.01 percent (Mordor Intelligence, 2024). Besides this, there are several other factors behind the swift growth of Saudi e-commerce. Firstly, there are current efforts by the Saudi Arabian government to popularize Vision 2030 as a strategic plan aimed at diversifying the economy away from oil dependence and improving digital infrastructure. Such endeavors include enhancing digital access, financing business ventures, and promoting innovation in general and e-commerce in particular (Khoirunnisa & Nurhaliza, 2024).

In addition, perceived cultural values as a determinant are also influential in Saudi Arabia when it comes to consumer buying behavior (Kononova et al., 2024). This activity is not new and has been focused on the physical or tangible aspect, mainly investigated in terms of sales from stores and markets. However, with time, the help of internet connection enhancement, and the change in social culture, this view has slowly started changing (Wijesekara et al., 2020). It is becoming more acceptable to order goods online, and customers are starting to value the opportunity to make purchases at online stores. Social media influencers and marketing campaigns associated with youths especially enhance this shift because people now believe that online shopping is more stylish and innovative than normal retailing (Wang & Zhai, 2022).

One more important factor considered to contribute to the e-commerce of Saudi Arabia is what is more known as mobile commerce (m-commerce). With new mobile device sales, more consumer defaults are using their phones and tablets to shop online (Wasiq et al., 2022). This shift looks to create ways for e-commerce businesses to continue interacting with consumers through interfaces that are mobile-friendly, targeted advertising, and through apps and other applications for shopping. Any social media platform that bothers to build the mobile experience and make it as smooth as possible shall capture the attention of consumers (Wang & Zhai, 2022).

Another factor linked to the economic growth of Saudi Arabia is the development of new trends in the sphere of e-commerce (Khoirunnisa & Nurhaliza, 2024). The growing middle-income class, as indicated by improved disposable incomes and increased product consumption, is behind this growth. Since consumers are now open to experimenting with

new brands and products, e-commerce companies have encountered several opportunities and challenges. Also, local business players are beginning to make an effort to go online and expand their customer base, increasing competition and fostering innovation in this sector.

Problem Statement

Nevertheless, the practice of e-commerce in Saudi Arabia has revealed several challenges that need to be solved. Challenges that are common with logistics and delivery structures, as well as rules and regulations, affect the general functioning of e-commerce businesses (Al-Tayyar et al., 2021). For example, the transportation of goods from factories or different cities to large urbanization and rural areas may not be an easy task, and this may result in transmittal delays and customer complaints. Hence, it is crucial to improve the variety of supply chains and overcome any specific organizational obstacles to the formation of an efficient e-commerce environment.

Furthermore, there is a set of issues connected with regulation, such as the problem of payments and services, consumer rights restriction, protection, data retention, and usage. In light of this progress, the legal system must match up with the rate of advancement in e-commerce so as to work for the benefit of the customers. Companies are required to follow national laws and regulations as well as practice good ethical standards and, of course, transparency to improve brand reputation.

Based on the above-mentioned notion, this study aims to investigate the impact of perceived risk, perceived usefulness, and perceived ease of use on the attitudes and intentions to buy from male and female Saudi consumers. The study will help us understand the role of gender in the intention to buy.

Study Purposes

This research highlights the value of comprehending risk management based on Saudi Arabian data in the e-commerce market. Given the continued forecasts of growth, and not least with the Vision 2030 initiative being instrumental in driving the digital economy forward (Chishty & Sayari, 2024; Mordor Intelligence, 2024; Statista, 2023), Saudi Arabia provides a specific case for analyzing how risk perception influences consumer conduct within the specific context of e-commerce. As consumers in Saudi Arabia are starting to come online and experience e-shopping, the following are the key factors that should be considered. This research will have theoretical implications that can be useful in defending

Saudi consumers against threats, as well as practical implications of value to businesses, policymakers, and other researchers. In so doing, it seeks to create a safer, secure, and satisfying electronic trading environment that is aligned with the nation's vision of economic progression and embracing information technology.

Study Importance

Risk management in the context of e-commerce will be of multiple importance for various reasons, especially when dealing with rapidly progressing active markets such as Saudi Arabia (Alshahrani, 2020). As the e-commerce industry extends into the worldwide market, it would be of paramount necessity to factor in both perceived risk and real risk in customers' transactions. The analyzed elements can be explained using Saudi Arabia's e-commerce market, which has recently emerged as one of the fastest-growing industries in the Kingdom (Mordor Intelligence, 2024); however, we need to consider certain specificities of Saudi Arabian socio-economy and culture (Kononova et al., 2024). In turn, the result achieved from the study of this market can help to develop not only accurate theoretic models but also may help firms from all around the world manage their processes similarly to firms from regions experiencing similar rates of growth.

The rapid growth of adoption of technology in Saudi Arabia is taking place in a context that includes trust in online transactions, acceptance of technology, and consumers' confidence, which are relatively novel (Chishty & Sayari, 2024). Still, Saudi buyers are quite young in the experience of digital shopping, and there are some fears that, for now, still remain quite important and should be considered more thoroughly when compared with those markets where advanced online shopping has been taking place for many years. This research seeks to understand from the list of factors that promote or discourage purchase behavior what could explain the buying behavior of Saudi consumers and general reasons that may make them avoid e-commerce. That way, the study will make a valuable contribution to consumer behavior research in general as well as to risk perception in e-markets, particularly in Middle Eastern markets, which are underrepresented in the global e-commerce context.

Consumer behavior is influenced by the risks related to the purchase of the service, especially the perception of risks (Alshahrani, 2020). From the Saudi Arabian consumers' perspective, risks may not necessarily be associated with product quality or delivery, or even the possibility of payment platforms, but data privacy and consumers' attitude to fraud, or cultural factors that are poles apart from those dictated by Western culture (Brosdahl &

Almoussa, 2013). Thus, investigating these aspects allows the researcher to contribute to an improved understanding of the effect of perceived risk on consumer interactions with e-commerce platforms.

In terms of business relevance, the present research is important as it provides recommendations to guide a targeted e-commerce business approach for the Saudi market. Companies on the international and local levels, like Amazon Noon and Jarir, can adopt this information to determine how the trust of Saudi consumers can be earned and reduce the perceived risks. For instance, cash on delivery (COD) and smart customer support could be more important to a company in Saudi Arabia than in other markets where digital methods of payments are recognized and embraced. Such insights are significant for e-business firms and can be used to tailor their offerings for the Saudi Arabian market and to achieve even greater levels of future growth (Al-Tayyar et al., 2021).

From a theoretical perspective, this research aims to enrich the presented models of risk perception with additional components relevant to emerging markets. It will expand on earlier research by Brosdahl and Almoussa (2013) that identified antecedents of e-commerce adoption in similar environments and Statista (2023) that showcased the future employment of Saudi Arabia's digital economy. Saudi Arabia provides a unique setting in which to develop and gradually modify such models. It might help develop more inclusive theories of risk perception and consumer behaviors when seeking products online that take into account the variety of e-commerce.

Study Questions

Given this backdrop, the current study utilizes the extended Technology Acceptance Model (E-TAM) proposed by Crespo et al. (2009) to investigate the risk perception behavior of Saudi e-consumers and compare the behavioral differences among genders. Below are the research questions this study proposes:

1. Do perceived risk (comprised of financial, performance, social, time, psychological, and privacy), perceived ease of use, and perceived usefulness impact Saudi consumers' attitudes toward buying from e-commerce websites?
2. Do perceived risk (comprised of financial, performance, social, time, psychological, and privacy), perceived ease of use, perceived usefulness, and attitudes impact Saudi consumers' buying behavior on e-commerce websites?

3. Does attitudes mediate the relationship of perceived risk (comprised of financial, performance, social, time, psychological, and privacy), perceived ease of use, and perceived usefulness with Saudi consumers' buying behavior on e-commerce websites?
4. Does sex (male vs female) moderate the impact of perceived risk (comprised of financial, performance, social, time, psychological, and privacy), perceived usefulness, and perceived ease of use on attitudes and buying intention of Saudi e-consumers?

Research Hypotheses

Based on the study questions, this study develops the following research hypothesis:

- H₁*: Perceived Risk (comprised of financial, performance, social, time, psychological, and privacy) has a significantly negative impact on Saudi consumers' attitudes toward buying from e-commerce websites.
- H₂*: Perceived ease of use has a significantly positive impact on Saudi consumers' attitudes toward buying from e-commerce websites.
- H₃*: Perceived usefulness has a significantly positive impact on Saudi consumers' attitudes toward buying from e-commerce websites.
- H₄*: Attitudes has a significantly positive impact on Saudi consumers' intention to buy from e-commerce websites.
- H₅*: Perceived Risk (comprised of financial, performance, social, time, psychological, and privacy) has a significantly negative impact on Saudi consumers' intention to buy from e-commerce websites.
- H₆*: Perceived ease of use has a significantly positive impact on Saudi consumers' intention to buy from e-commerce websites.
- H₇*: Perceived usefulness has a significantly positive impact on Saudi consumers' intention to buy from e-commerce websites.
- H₈*: Attitudes has a significantly positive mediation effect between the relationship of (i) Perceived Risk (comprised of financial, performance, social, time, psychological, and privacy), (ii) perceived ease of use, and (iii) perceived usefulness with Saudi consumers' intention to buy from e-commerce websites.

H₉: Sex (male vs. female) has a significantly positive mediation effect between the relationship of (i) Perceived Risk (comprised of financial, performance, social, time, psychological, and privacy), (ii) perceived ease of use, and (iii) perceived usefulness with Saudi consumers' intention to buy from e-commerce websites.

Theoretical Model

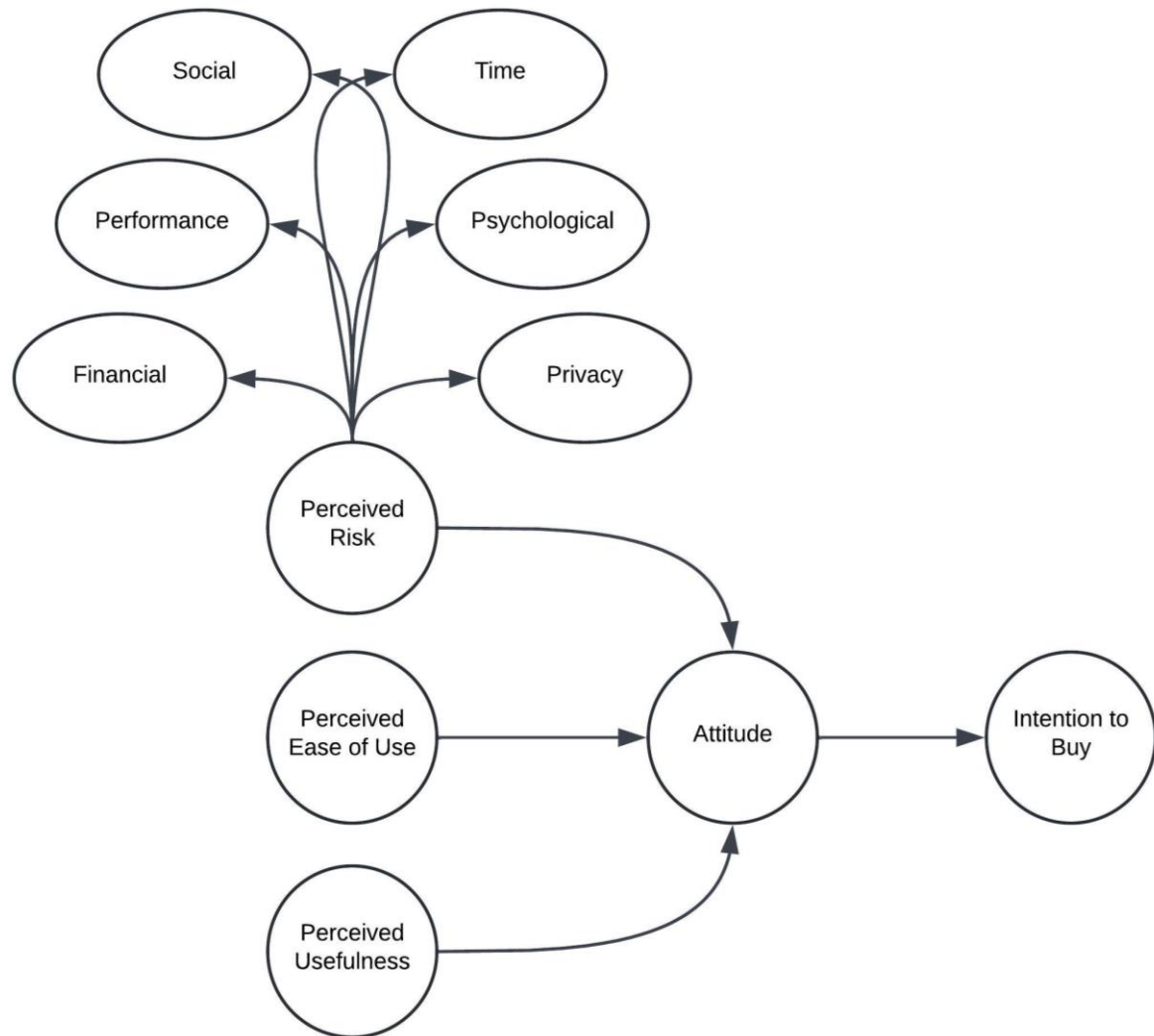


Figure 1: Theoretical Model

Research Limitations

The limitations of the research on the differences in Saudi e-consumers' intention to shop online are as follows: Based on the nature of the study and the methodology described, several potential limitations can be inferred:

- a. Generalizability: In the given circumstances, randomization is not possible as the sampling frame of the consumers is not available. Therefore, the best option is to use convenience sampling to find the relationships among different variables. As a result, it will be more challenging to generalize the findings of the specified genders and generations to other regions in Saudi Arabia.
- b. Sample Size: The study involves and expects a sample of 200 participants from Riyadh City. While this is a substantial number, it may not fully represent all consumers in Saudi Arabia.
- c. Self-Reported Data: The study relies on self-reported data through questionnaires, subject to biases such as social desirability bias, where respondents may underreport undesirable behaviors or overreport desirable ones. This lack of balance can introduce biases that affect the generalizability of findings.
- d. Limited Scope of Factors: While the study identifies several factors associated with perceived risk (i.e., financial, performance, social, time, psychological, and privacy), there may be other influencing factors that are not considered or measured in this research. The scope of the study is limited.

CHAPTER 2: LITERATURE REVIEW

Introduction

This section summarizes the previous literature investigating the extended technology acceptance model (E-TAM), mainly evaluating the impact of perceived ease of use, perceived usefulness, and attitudes on intention to shop online using e-commerce platforms.

Tong (2010) tested the applicability of an E-TAM for online shopping in the USA and China. The research established that consumers' perceived usefulness and perceived risk of shopping through the Internet on online purchase intentions are invariant, while perceived usage of the Internet for shopping is not. Perceived ease of use, like perceived usefulness, has an equally positive impact. Perceived risks are directly influenced by prior online shopping experience; similarly, perceived ease of use is also influenced by prior online shopping experience. Nonetheless, there is a quite contrasting impact of prior internet buying experience on perceived usefulness between the two countries.

Fayad and Paper (2015) found that e-commerce is another crucial medium for the performance of business transactions. Theoretical and practical experts in the field, especially market executives, are now heading towards understanding the different theories of consumer behavior within online markets. In their empirical study, Fayad and Paper (2015) recommend the use of E-TAM in contextual e-commerce. The original model of TAM was augmented by including four predictor variables. Outcome satisfaction, expectations, process satisfaction, and e-commerce use are the four predictor variables in this study. Moreover, the actual TAM was expanded by capturing actual behavior instead of capturing intentions as a proxy for behavior in prior TAM utility studies. They proposed specifying the actual use variable in terms of four criterion variables—purchase, access number, access total time, and access average time.

Ofori and Appiah-Nimo (2019) found that owing to the enhanced penetration rate of the Internet and technology in the world, e-commerce is boosting. This has been occasioned by rising innovations in the telecommunication and financial sectors to deepen financial liberalization. They investigated the factors that influence the behavior of students from tertiary institutions who engage in online shopping by using the lens of TAM. The survey covered a sample of 580 undergraduate students. It was found that the effect of ease of use on usefulness was very significant, as the TAM has postulated. Out of all the independent variables analyzed in the study, perceived cost emerged as having the highest impact on the

actual use of online shopping among students; nonetheless, the perceived cost had no impact on purchase intention. A significant relationship was observed between perceived risk and purchase intention (PI) but not between perceived risk and actual use.

Recently, Wibasuri et al. (2024) analyzed Indonesian consumers' behavior when they opted for online shopping. Self-organized specified factors influencing consumer attitudes: perceived usefulness positively influenced consumer attitudes; perceived ease of use positively influenced consumer attitudes; Self-organized specified factors influencing purchase intentions: perceived ease of use influenced purchase intentions; perceived ease of use fortified by perceived risk influenced purchase intentions; Consumer attitudes fortified by security influenced purchase intentions; consumer attitudes fortified by e-trust influenced purchase intentions.

Chishty and Sayari (2024) suggest that consumers' buying behavior is a complex phenomenon, and under such conditions, it becomes challenging to predict consumer activity, particularly in online markets, and the knowledge of this field is essential for the formation of strategies by newcomers on the market, such as online retailers. Currently, Saudi Arabia has a rapidly increasing number of online users. The outcomes of their research are as follows: perceived enjoyment, perceived ease of use, social norms, and perceived risk are the key factors that exert strong positive effects on the online shopping behavior of college students in Saudi Arabia.

Alateeg and Alhammadi (2023) examine the determinants that influence traditional retail firms' decisions to embrace e-commerce in the digital retail business in Saudi Arabia. The analysis shows that there is perceived usefulness among the greatest influencers, which has a positive correlation with the intention of choosing e-commerce. Furthermore, the results reveal that perceived usefulness and ease of use play major roles in attitude towards e-commerce, key insight, and conducive and user-friendly platforms. On the other hand, high perceived costs bear the potential of negativism about the potential relationship. Technological barriers are also useful as they serve analytical purposes and can help cultivate a positive attitude. Surprisingly, organizational and environmental factors had a modest effect on attitude, suggesting that internal and personal factors exert the most influence on the attitudes of traditional Saudi Arabian retailers. The knowledge produced by this study would be of great relevance to the conventional retail sector, government bodies, and all other stakeholders who are concerned with the transformation of KSA's established retail sector,

including e-commerce. This integration is critical to sustaining competitive advantage when placed in the environment of technology-infused retail. It is important to comprehend these factors as the retail environment transforms gradually, integrating both corporate and online segments of retail selling.

Perceived Risk:

Defined by Bauer in early 1960, perceived risk has been seen as a significant variable in consumer behavior and perhaps the most critical component of communicating browsers into buyers (Mitchell, 1992; Mitchell & Greatedorex, 1993; Dowling & Staelin, 1994). While the academic literature has yet to agree on an accepted definition of perceived risk, for the purpose of this study, then we shall define it as suggested by Stone and Gronhaug (1993) as when an individual feels that he/she is set for a loss (Herrero Crespo et al., 2009).

Through the years, most research has built toward the consensus that there are five different types of perceived risk: social, psychological, economic, performance, time, economic, and psychological. Social risk is the potential for embarrassment, disappointment, or status loss from family and friends due to a bad choice, while psychological risk is the threat to an individual's ego due to a bad choice (Herrero Crespo et al., 2009; Jacoby and Kaplan, 1972). Perceived economic risk is when an individual may feel that he is likely to be monetarily worst off at the point of purchase of a product or service along with its future costs that might be incurred in maintaining the product or being fraudulently cheated (Herrero Crespo et al., 2009).

According to Stone and Gronhaug (1993), performance risk may be described as the belief that there is a lack of adequate performance of a product or service and that it loses its positive values. The time risk perceived is felt by the consumer when confronted with the loss of time that could have been used when researching for or making a purchase. Besides the five other kinds of perceived risk, which have been isolated in many prior studies concerning Internet shopping adoption, there is another type of risk known as privacy risk (Herrero Crespo et al., 2009; Jarvenpaa & Todd, 1997; Featherman & Pavlou, 2003; Forsythe & Shi, 2003; Miyazaki & Fernandez, 2001). Privacy risk can be defined as the probability of a potential loss of control over information about a person, for example, if one's privacy has been infringed or retailers may sell information to other individuals (Miyazaki & Fernandez, 2006).

Consumer behavior related to Internet purchasing, including the perception of risk for purchasing products online, became an area of interest right from the beginning of the use of the Internet for residential purposes in the early 1990s. However, research has shown that consumers perceive the benefits of using the Internet (Salisbury et al., 2001; O'Cass & Fenech, 2003; Park et al., 2004). From the perception of risk, there are also negative consequences, including a negative effect on shoppers' attitude to online shopping, as highlighted by Shih (2004) and Heijen et al. (2003), and a negative impact on a person's attitude toward going online shopping as described by Korgaonkar and Wolin (1999). As indicated earlier, Jarvenpaa and Todd (1997) considered perceived risk from a multidimensional angle. As the findings of this study indicate, it is possible to identify the economic, social, performance, physical, and privacy risks that can affect the attitudes to online shopping the consumers experience increased risk while shopping online (Jarvenpaa & Todd, 1997; Featherman & Pavlou, 2003). Heijen et al. (2003) also weighed the antecedents of perceived risk in materializing e-commerce disadvantage.

While examining risk from each of the six perspectives and not from a multiple perspective, Jarvenpaa and Todd (1997) and Featherman and Pavlou (2003) discovered that consumer feels the risk of their privacy loss during an online shopping event when they have to enter personal and credit card numbers. Similarly, Forsythe and Shi (2003) have revealed that performance, time, and economic risks influence the purchase frequency of online shopping. Likewise, Herrero Crespo et al. (2009) stated that the protracted economic and performance risk factors motivate firms to embrace e-commerce more than social and time risk factors.

Theoretical Framework of the Study

Figure 1 shows variables in the model.

The model has six dimensions of perceived risk: financial, performance, social, time, psychological, and privacy. These have been obtained from the model of Crespo et al. (2009). Besides, the model has perceived ease of use and perceived usefulness, leading to attitudes and Saudi consumers' intention to shop online.

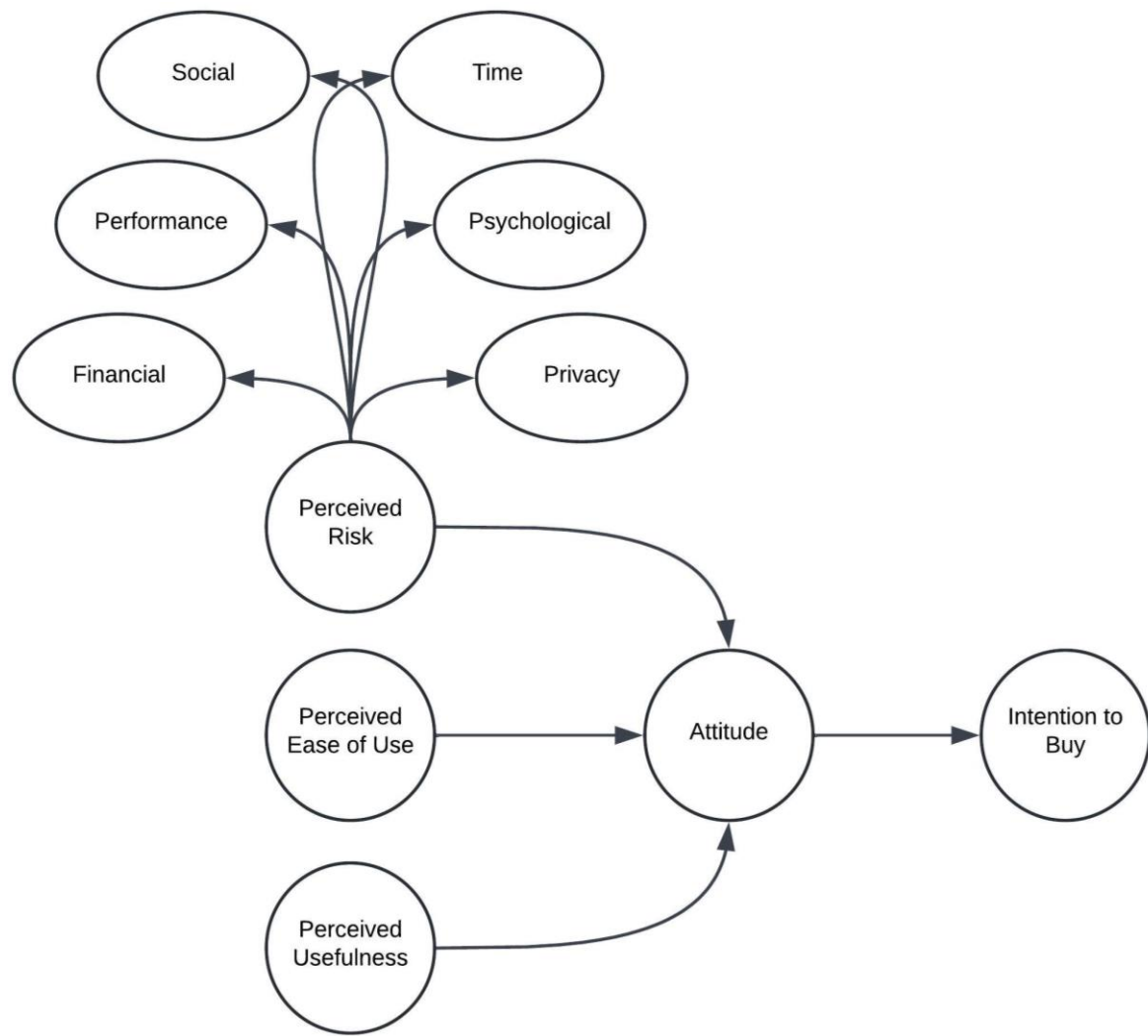


Figure 2: Study Model Adopted from Crespo et al. (2009)

CHAPTER 3: RESEARCH METHODOLOGY

Introduction

This research employs the Extended Technology Acceptance Model (TAM) to investigate how Saudi e-consumers perceive risks (comprised of financial, performance, social, time, psychological, and privacy) and how their perceptions, alongside perceived usefulness and ease of use, influence their adoption of e-commerce. The study adopts a quantitative, cross-sectional design, utilizing a structured survey questionnaire adapted from established scales. The analysis employs Structural Equation Modeling (SEM) via SmartPLS 4.0, with a focus on multi-group comparisons to discern gender (male/female) differences. By integrating perceived risk into the TAM framework, the study aims to enrich the theoretical discourse on e-commerce adoption while offering actionable insights for tailoring gender-specific strategies in Saudi Arabia's digital marketplace.

Research Design

The study adopts a hypothetico-deductive-based quantitative research design to test relationships within the Extended TAM framework. A cross-sectional survey strategy is employed, enabling the collection of data at a single point in time while focusing on variability across gender cohorts. The research design integrates perceived risk as an additional construct alongside traditional TAM variables (perceived usefulness and ease of use), hypothesizing that risk perception differentially impacts e-commerce adoption.

Population of the Study

The target population comprises Saudis (nationals and non-nationals) residing in Riyadh who have engaged in e-commerce activities within the past six months. As the capital and most populous city in Saudi Arabia, Riyadh's 7.0 million residents represent a diverse mix of demographics, with 15 municipal districts offering socioeconomic variability. The population is characterized by high digital literacy (99.38% literacy rate, 2021) and extensive internet penetration (97% as of 2022), making it an ideal locus for studying e-consumer behavior.

The selection of this population aligns with Saudi Vision 2030's emphasis on digital transformation, ensuring the study's relevance to national economic priorities. By focusing on active e-consumers, the research targets individuals with firsthand experience in online

transactions, thereby capturing meaningful insights into risk perception and technology acceptance.

Sample Characteristic

The sample consists of 203 Saudi e-consumers recruited via convenience sampling from seven randomly selected municipalities in Riyadh. Demographically, the sample aims for proportional gender representation (approximately 50% male, 50% female), reflecting Saudi Arabia's youthful population pyramid. Participants are required to have made at least one online purchase in the preceding six months, ensuring relevance to e-commerce behavior. Given Riyadh's high literacy rate, the sample was expected to exhibit higher educational attainment, with a majority likely holding secondary or tertiary qualifications. Convenience sampling may introduce self-selection bias, as participants with stronger opinions on e-commerce might be overrepresented. However, randomization at the municipal level (seven of 15 districts) offsets this by distributing recruitment across varied socioeconomic zones, enhancing external validity. Ethical considerations, including informed consent and anonymity, are focused throughout the sampling process.

Sample Size Determination

The sample size of 200 is justified through n:q guidelines for SEM, which recommend a minimum of 10 observations per indicator variable. With the proposed model containing 21 indicators (across perceived risk, usefulness, ease of use, and behavioral intention), 210 responses meet this threshold, ensuring statistical robustness.

Data Collections Procedures

Data collection involves administering a bilingual (Arabic/English) online survey distributed via social media, email, and through e-commerce platforms. A pilot test with 30 participants ensured clarity and cultural appropriateness, with refinements made to ambiguous items. The survey includes sections on demographics, perceived risk (5 items), perceived usefulness (3 items), perceived ease of use (3 items), attitudes (5 items), and behavioral intention (5 items), adapted from Davis (1989) and Featherman & Pavlou (2003). Participation in the survey was voluntary, with informed consent obtained electronically and anonymized data stored securely.

Study Determinants

The study's determinants include three independent constructs: perceived risk (comprised of financial, performance, social, time, psychological, and privacy), perceived usefulness, and perceived ease of use, with behavioral intention as the dependent variable, while attitudes served as the mediating variable. Gender (male/female) served as a moderating variables. Perceived risk is operationalized through a 6-item scale measuring concerns over transaction security and data misuse, while usefulness and ease of use are operationalized through 4-item scales validated in TAM literature. Behavioral intention is assessed via three items gauging the likelihood of future e-commerce use. Control variables include age, education, and frequency of online purchases. All constructs use 5-point Likert scales (1 = strongly disagree, 5 = strongly agree), ensuring compatibility with SEM requirements. The integration of perceived risk extends TAM's predictive capacity, while moderation tests explore demographic heterogeneity, addressing gaps in Middle Eastern e-commerce research.

The questionnaire, adapted from validated prior studies, ensures content validity and reliability, with Likert-scale items measuring each construct. By selecting Riyadh—a city with robust e-commerce infrastructure—the design captured insights from a tech-savvy population, enhancing ecological validity.

Method of Analysis

Data analysis proceeds in three stages using SmartPLS 4.0. First, descriptive statistics summarized demographics. Second, the measurement model is assessed for reliability (Cronbach's alpha > 0.7, composite reliability > 0.7) and validity (AVE > 0.5, HTMT ratios < 0.9). Third, the structural model evaluates path coefficients (bootstrapping with 5,000 resamples) to test hypotheses. PLS-SEM was chosen for its suitability in exploratory research, smaller samples, and non-normal data. Results are visualized via path diagrams.

The findings will add to our current understanding of Saudi e-commerce behavior from various applications. It will also provide specific evidence for gender.

CHAPTER 4: PRACTICAL STUDY

Data Analysis

This chapter presents the data analysis procedure and results. Data analysis proceeds in three stages using SmartPLS 4.0. First, descriptive statistics summarize demographics. Second, the measurement model is assessed for reliability (Cronbach's $\alpha > 0.7$, composite reliability > 0.7) and validity (AVE > 0.5 , HTMT ratios < 0.9). Third, the structural model evaluates path coefficients (bootstrapping with 5,000 resamples) to test hypotheses.

Research Findings

This section discusses the study findings., initially presenting the demographic statistics.

Table 1: Sex Distribution

Sex	Frequency	Percent	Valid Percent	Cumulative Percent
Female	63	31.0	31.0	31.0
Male	140	69.0	69.0	100.0
Total	203	100.0	100.0	

Following that, the first step is to perform model fit analysis to fit the data into the theoretical model in SmartPLS. Figure 3 below shows the developed model in SmartPLS 4.0, with three independent variables, one mediator, one moderator, and one dependent variable.

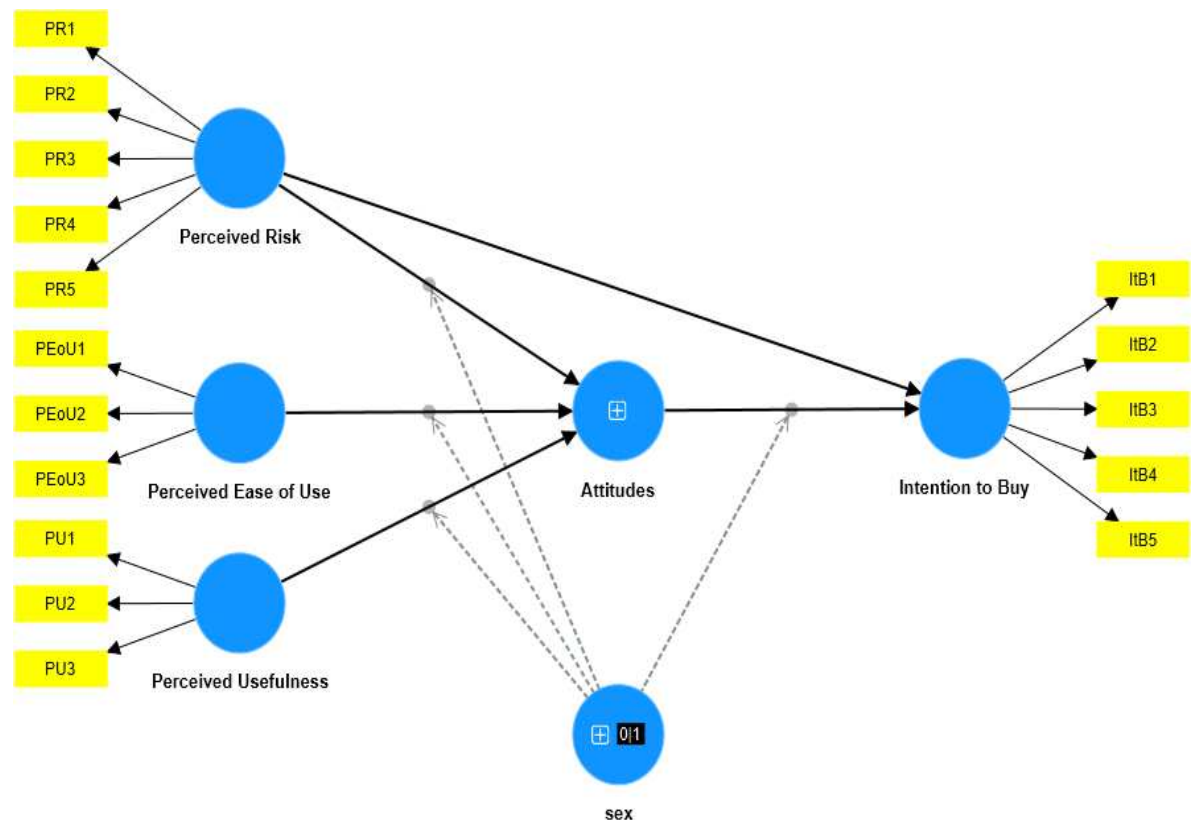


Figure 3: Research Model

Table 2: Factor Loadings, Internal Consistency, and Validity

Study Variables	Items	Factor Loadings	Cronbach's Alpha	Composite Reliability		Average Variance Extracted (AVE)
				rho_a	rho_c	
Attitudes	A1	0.793	0.741	0.775	0.829	0.505
	A2	0.621				
	A3	0.805				
	A4	0.838				
	A5	0.812				
Intention to Buy	ItB1	0.664	0.702	0.716	0.799	0.545
	ItB2	0.771				
	ItB3	0.671				
	ItB4	0.663				
	ItB5	0.651				
Perceived Ease of Use	PEoU1	0.977	0.961	0.961	0.974	0.927
	PEoU2	0.955				
	PEoU3	0.956				
Perceived Risk	PR1	0.871	0.880	0.909	0.909	0.669
	PR2	0.881				
	PR3	0.713				
	PR4	0.826				
	PR5	0.786				
Perceived Usefulness	PU1	0.918	0.883	0.884	0.928	0.812
	PU2	0.925				
	PU3	0.859				

All constructs demonstrated acceptable factor loadings (>0.60), meeting the requirement for structural equation Modeling. Internal consistency was validated through Cronbach's alpha (>0.70) and composite reliability (ρ_a and $\rho_c > 0.70$). Convergent validity was

confirmed via AVE (>0.50), showing that all study constructs have AVE of greater than 0.50, meeting the threshold level. Discriminant validity was calculated through two measures: the HTMT ratio and the Fornell-Larcker Criterion, further validating the model fit. Tables 3 and 4 report the results of the HTMT ratio and Fornell-Larcker criterion.

Table 3: Heterotrait-monotrait ratio (HTMT) - Matrix

Variables	Attitudes	Intention to Buy	Perceived Ease of Use	Perceived Risk	Perceived Usefulness
Attitudes	-				
Intention to Buy	0.288	-			
Perceived Ease of Use	0.765	0.140	-		
Perceived Risk	0.089	0.110	0.027	-	
Perceived Usefulness	0.036	0.235	0.141	0.081	-

Table 4: Fornell-Larcker Criterion

Variables	Attitudes	Intention to Buy	Perceived Ease of Use	Perceived Risk	Perceived Usefulness
Attitudes	0.710				
Intention to Buy	0.214	0.667			
Perceived Ease of Use	0.530	0.105	0.963		
Perceived Risk	0.012	-0.122	-0.014	0.818	
Perceived Usefulness	0.509	0.196	0.130	0.024	0.901

Following the results of the validated model, the next step is to perform the PLS Bootstrapping using 5000 sub-samples. Below given is the structural model in Figure 4

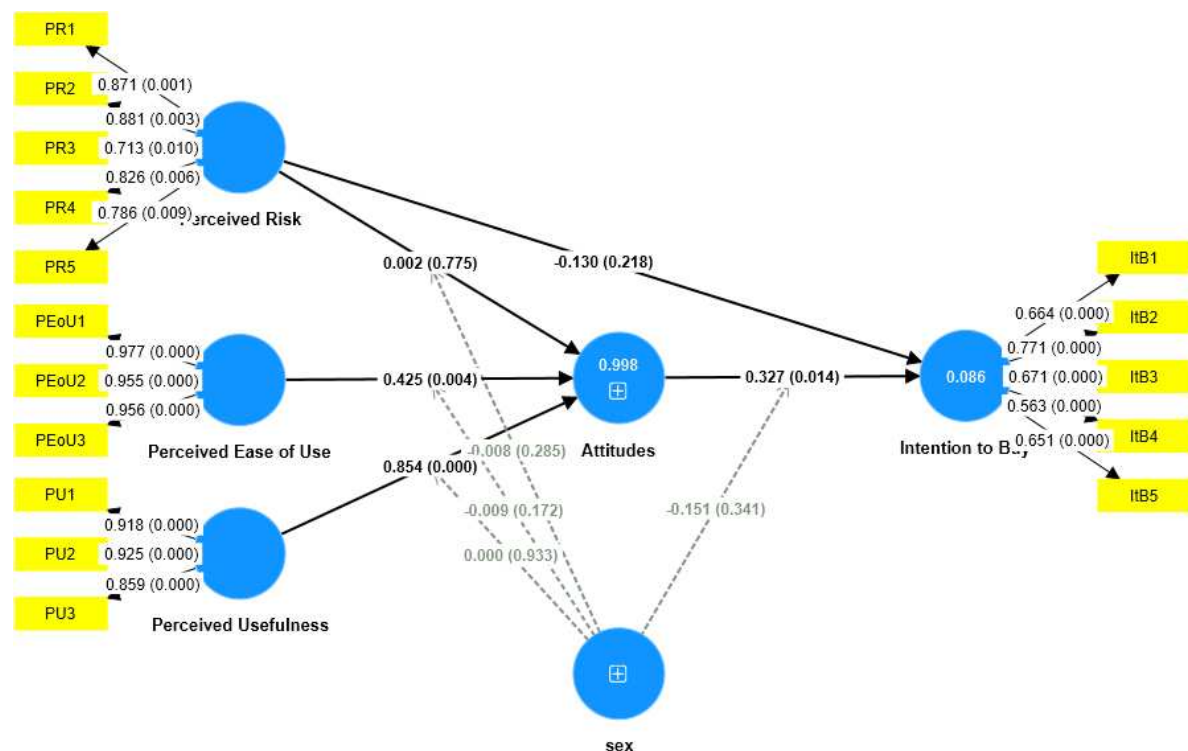


Figure 4: Structural Model

The structural model tested direct, mediation, and moderation effects (Table 5). Direct effects revealed that perceived ease of use ($\beta = 0.425$, p -value = 0.004) and perceived usefulness ($\beta = 0.854$, p -value < 0.001) significantly influenced Attitudes, which in turn affected Intention to Buy ($\beta = 0.327$, p -value = 0.014). Interestingly, perceived risk had no significant direct or mediated impact (p -value > 0.05), contradicting expectations. Mediation through attitudes was significant for perceived ease of use ($\beta = 0.139$, p -value = 0.039) and perceived usefulness ($\beta = 0.279$, p -value = 0.017), reinforcing their indirect roles. However, all moderation hypotheses by gender (sex) were rejected (p -value > 0.05), indicating no statistically meaningful differences between male and female consumers in how risk, ease, or usefulness shape attitudes or intentions.

Discussing these results separately, we find that the study reveals that perceived usefulness exerts a robust and statistically significant influence on consumer attitudes ($\beta = 0.854$, p -value < 0.001), aligning with the foundational principles of the Technology Acceptance Model. This finding underscores Saudi consumers' prioritization of functional benefits—such as time efficiency, access to diverse products, and informed decision-making—over potential risks associated with online transactions. The dominance of usefulness suggests that Saudi consumers are pragmatically driven, valuing platforms that enhance their shopping

efficiency and meet practical needs, even in the presence of perceived risks. This aligns with Saudi Arabia's rapid digital transformation under Vision 2030, where e-commerce is increasingly integrated into daily life as a tool for convenience and modernization.

Table 5: Results of Hypotheses Testing

Hypotheses	Coefficient	Std. Dev.	t-stat	p-value	Decision
Direct Effect					
Perceived Risk → Attitudes	0.002	0.006	0.285	0.775	Rejected
Perceived Ease of Use → Attitudes	0.425	0.148	2.875	0.004	Accepted
Perceived Usefulness → Attitudes	0.854	0.069	12.298	0.000	Accepted
Attitudes → Intention to Buy	0.327	0.132	2.468	0.014	Accepted
Perceived Risk → Intention to Buy	-0.129	0.105	1.227	0.220	Rejected
Perceived Ease of Use → Intention to Buy	0.139	0.067	2.065	0.039	Accepted
Perceived Usefulness → Intention to Buy	0.279	0.117	2.378	0.017	Accepted
Mediation Hypotheses					
Perceived Risk → Attitudes → Intention to Buy	0.002	0.002	0.265	0.791	Rejected
Perceived Ease of Use → Attitudes → Intention to Buy	0.139	0.067	2.065	0.039	Accepted
Perceived Usefulness → Attitudes → Intention to Buy	0.279	0.117	2.378	0.017	Accepted
Moderation Hypotheses					
sex × Perceived Risk → Attitudes → Intention to Buy	-0.003	0.003	1.003	0.316	Rejected

sex × Perceived Ease of Use → Attitudes → Intention to Buy	-0.003	0.003	1.201	0.230	Rejected
sex × Perceived Usefulness → Attitudes → Intention to Buy	0.000	0.002	0.070	0.945	Rejected
sex × Perceived Risk → Attitudes	-0.008	0.008	1.069	0.285	Rejected
sex × Perceived Ease of Use → Attitudes	-0.009	0.007	1.365	0.172	Rejected
sex × Perceived Usefulness → Attitudes	0.000	0.006	0.084	0.933	Rejected
sex × Attitudes → Intention to Buy	-0.151	0.159	0.951	0.341	Rejected
sex × Perceived Risk → Intention to Buy	-0.003	0.003	1.003	0.316	Rejected
sex × Perceived Ease of Use → Intention to Buy	-0.003	0.003	1.201	0.230	Rejected
sex × Perceived Usefulness → Intention to Buy	0.000	0.002	0.070	0.945	Rejected

Despite strong factor loadings (0.713–0.871) and high internal consistency (Cronbach's $\alpha = 0.880$) for the perceived risk construct, its impact on attitudes and intention to buy was statistically insignificant (p -value > 0.05). This challenges the Extended TAM's assumption that risk perception critically impacts technology adoption. The results suggest that Saudi consumers may normalize or discount risks—such as financial loss or data privacy concerns—in favor of the convenience and accessibility offered by e-commerce. Cultural factors, such as high trust in emerging digital infrastructures or generational tech-savviness, might explain this trend, indicating that risk constructs require contextual recalibration in Middle Eastern settings.

Other than the direct and mediating roles, all hypotheses testing gender moderation (e.g., sex $\times$ → attitudes → intention to buy) were rejected (p -value > 0.05), revealing no statistically significant differences between male and female consumers in how risk, ease of use, or usefulness shape attitudes or intentions. This contrasts with studies in other regions where

gender often moderates technology adoption, highlighting the cultural uniqueness of Saudi Arabia's e-commerce landscape. The finding implies that marketing strategies and platform designs need not be gender-specific in this context, allowing businesses to adopt unified approaches to engage Saudi consumers.

Research Recommendations and Implications

Theoretical Implications

The study reaffirms the core TAM framework's relevance in Saudi e-commerce but challenges the universal applicability of risk-based extensions. The non-significance of perceived risk calls for culturally nuanced theorizing, where risk perceptions are contextualized within regional trust dynamics and digital literacy levels. Similarly, the absence of gender moderation underscores the need to prioritize cultural specificity over-generalized assumptions in technology adoption models. Future research may investigate how sociocultural norms, such as collective trust in digital systems or generational tech exposure, reshape traditional TAM variables.

Practical Implications

For Saudi businesses and policymakers, the findings emphasize prioritizing platform enhancements that amplify perceived usefulness (e.g., AI-driven product recommendations, localized inventory) and perceived ease of use (e.g., streamlined checkout processes and multilingual interfaces). The negligible role of risk perception suggests that investments in risk-mitigation messaging (e.g., cybersecurity campaigns) may yield limited returns compared to usability improvements. Additionally, the gender-neutral findings advocate for inclusive, non-segmented marketing strategies that cater to broad consumer preferences, implying that males and females do not differ in terms of their perceived ease of use and perceived usefulness towards intention to buy from e-commerce websites, which is pretty understandable that the generation may play a role instead of gender/sex of the participants.

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APPENDIX

Study Questionnaire

Demographic Questions:

1. Gender

- a. Male
- b. Female
- c. Prefer not to say

2. How frequently do you shop online?

- a. Daily
- b. Weekly
- c. Monthly
- d. Rarely

Study Questions

Instructions: Rate your agreement with the following statements using the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Perceived Risk					
I worry about financial loss when making online payments (e.g., unauthorized transactions).	1	2	3	4	5
I fear my personal information (e.g., credit card details) could be misused during online purchases.	1	2	3	4	5
Online shopping platforms may fail to deliver products as described (e.g., wrong size, quality)	1	2	3	4	5
I feel uncertain about resolving disputes (e.g., returns, refunds)	1	2	3	4	5

Online transactions expose me to risks that outweigh the convenience of e-commerce.	1	2	3	4	5
Perceived Usefulness					
Using e-commerce platforms improves my shopping efficiency (e.g., saves time).	1	2	3	4	5
Online shopping helps me make better purchasing decisions (e.g., product reviews and comparisons).	1	2	3	4	5
E-commerce increases my productivity in managing daily needs (e.g., groceries, clothing).	1	2	3	4	5
Perceived Ease of Use					
Learning to navigate e-commerce platforms is easy for me.	1	2	3	4	5
The process of completing an online purchase is clear and intuitive.	1	2	3	4	5
I find it easy to recover from errors (e.g., incorrect payment details) during online transactions.	1	2	3	4	5
Attitudes					
I feel confident while buying from e-commerce websites.	1	2	3	4	5
The quality of products on e-commerce websites is better.	1	2	3	4	5
I prefer buying from e-commerce websites to buying physically.	1	2	3	4	5
Buying from e-commerce websites is convenient.	1	2	3	4	5
I have a positive attitudes towards buying from e-commerce websites.	1	2	3	4	5
Intention to Buy					
I intend to continue using e-commerce platforms for future purchases.	1	2	3	4	5

I will recommend online shopping to friends or family.	1	2	3	4	5
Despite the risks, I am likely to increase my use of e-commerce in the next year.	1	2	3	4	5
I prefer online shopping over physical stores for most product categories.	1	2	3	4	5
I trust the long-term benefits of e-commerce enough to overlook occasional issues.	1	2	3	4	5

Thank you for your time!