

EXAMINING THE INFLUENCE OF PRODUCT QUALITY, SERVICE QUALITY, AND DELIVERY PERFORMANCE ON GENERATION Y'S ONLINE SHOPPING SATISFACTION: THE MEDIATING ROLE OF PERCEIVED SECURITY

Amalina Mursidi^{1*}, Wan A'tirah Mahyudin and Umi Hamidaton Mohd Soffian Lee¹

¹Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia, 71800 Bandar Baru Nilai, Negeri Sembilan, Malaysia

*Corresponding Author: amalina.mursidi@usim.edu.my

Abstract: *This study investigates the impact of various factors on customer satisfaction in online shopping among Generation Y, focusing on product quality, service quality, and shipping performance as independent variables. Additionally, it explores the mediating role of security in this relationship. The research aims to understand how these elements contribute to the overall satisfaction of Generation Y consumers in the digital marketplace. A comprehensive survey was conducted among Generation Y online shoppers, analyzing their perceptions and experiences. The findings indicate service quality significantly influence customer satisfaction. However, the perceived security of online transactions mediates these relationships, enhancing the overall satisfaction when consumers feel secure. The study highlights the critical role of security in online shopping, suggesting that e-commerce platforms must prioritize secure transactions to boost customer satisfaction among Generation Y. These insights offer valuable implications for online retailers seeking to enhance the shopping experience for this tech-savvy and influential demographic.*

Keywords: Customer satisfaction, Online Shopping, Gen Y, Perceived Security

1. Introduction

The rapid expansion of online shopping in recent years has had an undeniable impact on the retail sector. This growth has been driven by the convenience, accessibility, and diverse product range offered by online platforms, making e-commerce a preferred purchasing method for many consumers. A 2021 Statista report highlights the acceleration of e-commerce due to the COVID-19 pandemic, with global e-retail sales reaching approximately 49 trillion USD. This figure marks a significant increase from previous years, underscoring the growing importance of online commerce. The convenience of shopping from home, eliminating the need for physical travel and in-person interactions, is a key factor in the rise of online shopping. Additionally, as noted by Hussain et al. (2017), this convenience is further enhanced by multiple online payment options, secure transaction systems, and the ability to shop at any time.

In Malaysia, Generation Y (Gen Y), commonly known as Millennials, plays a major role in driving the growth of e-commerce. Defined as individuals born between the early 1980s and

mid-1990s (Ting et al., 2018), this generation is characterized by a high level of digital fluency, which has reshaped the retail landscape. Data from the Department of Statistics Malaysia (DOSM, 2021) indicates that the 25 to 42 age group, largely comprising Gen Y, represents over 20% of Malaysia's population. Their strong affinity for technology, social media, and online interactions has significantly influenced the country's e-commerce sector.

The trajectory of Malaysia's e-commerce industry has been remarkable. Statista (2021) reported that the industry was valued at approximately 3.9 billion USD in 2020, with expectations for continued growth. This expansion is largely attributable to Gen Y's preference for digital channels and online shopping platforms. A study by Rakuten (2020) found that 43% of Malaysian Millennials preferred online shopping, citing its convenience and accessibility as major factors.

Gen Y's impact on mobile shopping in Malaysia is also significant. The rise of mobile commerce (m-commerce) has been fuelled by the widespread use of smartphones. A report by Hootsuite and We Are Social (2021) revealed that Malaysia has a smartphone penetration rate of 66%, placing it among the leading nations in the Asia-Pacific region. This aligns with Gen Y's tendency to adopt mobile shopping apps and e-commerce sites optimized for mobile devices.

Online purchasing has seen substantial growth in recent years, with Gen Y emerging as a key consumer demographic. As digital natives, Gen Y exhibits a high proficiency in navigating e-commerce platforms, relying heavily on online shopping to meet their purchasing needs (Pew Research Center, 2020). However, there is a notable gap in scholarly research measuring customer satisfaction in relation to online shopping within this demographic (Tzeng et al., 2021). Identifying the key factors and challenges affecting online customer satisfaction among this group is essential for both academic inquiry and business strategy.

This study utilizes Expectation Disconfirmation Theory (EDT) as its theoretical framework. According to Guo et al. (2012), the European Public Administration Network (EUPAN) clarifies consumer satisfaction with a service is determined by the extent of disconfirmation, or the difference between expectations and actual experiences. Accordingly, this study aims to investigate customer satisfaction with online shopping among Gen Y in Malaysia, examining variables such as perceived security, product quality, service quality, shopping performance, and online shopping satisfaction.

2. Literature Review

2.1 Online Shopping

Online shopping refers to any transaction in which a buyer and seller use internet technology to exchange goods, services, or money (Unver & Alkan, 2022). The widespread popularity of online shopping has influenced consumer decision-making across the globe (Kau, Tang, & Ghose, 2003). With the increasing number of internet users, purchasing goods and services online has become more prevalent. Joines, Scherer, and Scheufele (2003) identified shopping as one of the primary reasons individuals use the internet. As a result, online shopping has emerged as a fast and convenient method for conducting transactions.

Typically, the term "online shopping" refers to the buying and selling of goods or services over the internet (Ramli, Rashid, Nasuredin, & Kepal, 2021). The internet, often described as the largest marketplace in the world, allows consumers to engage in commerce with just a few clicks, regardless of time or location (Kim, Lee, & Kim, 2004). As new technologies emerge, they are expected to replace traditional barriers to purchasing goods and

services (Paynter & Lim, 2001). Online shopping continues to grow, offering improvements in service quality, speed, security, and popularity compared to traditional retail methods (Laohapensang, 2009).

Consumers engaging in online shopping can be classified into two groups, according to Bobbitt and Dabholkar (2001), those who directly make purchases online and those who use the internet to research products before buying. Today, most consumers engage in some level of online research before completing a purchase. Therefore, this study defines online shopping as a process of purchasing goods or services through internet-based platforms, where buyers and sellers engage in transactions facilitated by digital technologies.

2.2 Generation Y

Generation Y, also known as Millennials, refers to individuals born between 1980 and 1999 (Gurau, 2012) and is recognized as the first high-tech generation (Norum, 2003). This cohort is characterized by a strong focus on consumption and shopping savviness (Jackson et al., 2011). Similar to other developing countries in Asia, Malaysia has a significant youth population within its 32.6 million citizens, with Gen Y (26%) being the largest generational cohorts (Tjiptono et al., 2020). Shaped by the forces of globalization and popular culture, Gen Y came of age during a time of economic growth, the rise of social media, reality television, and a decline in modernist values.

According to recent studies, Gen Y is distinguished by its ability to multitask, driven by its strong digital proficiency and engagement with technology (Gursoy et al., 2008). Kumar et al. (2024) further highlights that Gen Y's tech-savviness and environmental consciousness have increasingly influenced their purchasing behaviours. Meanwhile, Nguyen and Nguyen (2024) reveal that Gen Y's continued engagement with online services, such as food delivery, is motivated by the conveniences and gratifications offered through digital platforms, which align with their demand for efficiency and flexibility.

In addition, Srivastava et al. (2024) emphasize the critical role of FinTech services in shaping Gen Y's financial habits, noting that this generation is particularly open to adopting digital payment systems. Their technological fluency and comfort with online transactions have made them early adopters of various digital tools that streamline their daily activities, including financial management, shopping, and entertainment.

For Gen Y, technology is not just a tool but an integral part of their identity, influencing everything from civic engagement to personal hobbies, with digital platforms central to their experiences. Therefore, this study defines Gen Y as individuals born between 1980 and 1999, and characterized by its digital fluency, having grown up during the rise of the internet, social media, and advanced technology.

2.3 Product Quality

Product quality is a key determinant of customer satisfaction, particularly in the context of online shopping, as it directly influences perceptions of value and trust. Several studies have explored the role of product quality in shaping customer satisfaction across different markets. Momtaz et al. (2011) examined customer satisfaction in online shopping within the Malaysian context. Their study highlighted that product quality plays a central role in customer satisfaction, especially in the absence of physical inspection. In this setting, product quality is primarily judged based on online descriptions and customer reviews, which often serve as

proxies for actual product features. The study concluded that product quality, when consistent with customer expectations, contributes significantly to repeat purchases and brand loyalty.

In a more recent study, Tzeng et al. (2021) expanded on these findings by examining the factors affecting customer satisfaction during online holiday shopping. They found that product quality was a critical factor in driving customer satisfaction, especially in time-sensitive shopping events. The study emphasizes the importance of maintaining high product standards to meet customer expectations during peak shopping seasons when trust in the brand is paramount. Their findings suggest that customers place increased emphasis on product quality when shopping for gifts or items with emotional or social significance, underscoring the relevance of product quality in shaping overall satisfaction.

Similarly, Ekasari et al. (2019) investigated the effects of product quality, along with price and service quality, on customer satisfaction in the context of online product purchases. Their findings revealed that while price and service quality are important, product quality remains the most significant predictor of customer satisfaction. This study supports the argument that product quality is a non-negotiable factor in achieving customer satisfaction, as it directly impacts the perceived value of the purchase. Importantly, the study also emphasized that discrepancies between online descriptions and the actual product received can lead to dissatisfaction and negative word-of-mouth, which further underscores the importance of accuracy in product representation.

Al-Jahwari et al. (2018) explored customer satisfaction with online shopping from a youth perspective in Oman, focusing on Generation Y. Their findings aligned with previous studies, revealing that product quality is a decisive factor for this demographic. The study noted that Generation Y, often more tech-savvy and informed through social media, places higher importance on product quality compared to previous generations. This demographic is more likely to conduct extensive research before making online purchases, and any inconsistency in product quality can result in a sharp decline in satisfaction.

Finally, Momotaz and Hasan (2018) focused on the service quality factors affecting customer satisfaction in online shopping in Bangladesh but also considered the role of product quality. Their study highlighted that product quality interacts with other dimensions of the online shopping experience, such as service quality and perceived security, to influence overall satisfaction. While service quality factors such as timely delivery and customer support were important, product quality was found to be a foundational element without which satisfaction could not be sustained. The study further reinforced that the perception of product quality in an online context is closely tied to trust, particularly in developing markets where customers may be more hesitant to trust e-commerce platforms.

In conclusion, the central role of product quality in determining online shopping satisfaction, particularly for Generation Y. Across different regions and contexts, product quality emerges as a critical factor that directly influences customer satisfaction, brand loyalty, and repeat purchases. While price and service quality are important, product quality remains the most influential determinant. Moreover, accurate product representation and meeting customer expectations are essential to maintaining high levels of satisfaction in online shopping environments.

2.4 Service Quality

Service quality has long been recognized as a critical determinant of customer satisfaction in online shopping, particularly for Generation Y consumers who demand efficiency, reliability, and security. Al-Dweeri et al. (2017) explored the relationship between e-service quality and

e-loyalty, finding that higher service quality directly enhances customer satisfaction and trust, ultimately fostering e-loyalty. Their research emphasizes that in an online environment, where personal interaction is limited, elements such as website functionality, responsiveness, and customer support become vital in influencing the overall service experience. The study suggests that for Generation Y, seamless and reliable service is essential for maintaining satisfaction and long-term loyalty.

Momotaz and Hasan (2018) further underscore the importance of service quality by examining its impact on customer satisfaction in Bangladesh's e-commerce sector. They identify key service quality factors, such as prompt customer service, clear communication, and ease of transaction that contribute to positive shopping experiences. Their findings highlight that service quality is often intertwined with product quality in shaping customer satisfaction, as delays in service or unresponsive support can diminish the overall shopping experience, even when product quality meets expectations. The study emphasizes that continuous improvement in service processes is essential to maintaining customer satisfaction in a highly competitive market.

Biswas et al. (2019) extend the discussion by focusing on website service quality as a critical factor in online customer satisfaction. Their research highlights the role of expectation confirmation in mediating the relationship between service quality and satisfaction. They argue that when website performance aligns with or exceeds customer expectations, particularly in areas like ease of navigation, transaction security, and after-sales support, satisfaction levels rise. This study supports the idea that Generation Y shoppers, who tend to rely heavily on digital interfaces, are highly sensitive to the quality of online services, and ensuring a smooth, secure shopping experience is crucial for maintaining customer trust.

Lastly, Barusman (2019) takes a broader perspective by examining how service quality interacts with other factors like security and trustworthiness to influence customer loyalty in e-commerce. His findings suggest that while product quality is important, the overall service experience plays an equally vital role in shaping customer perceptions of an online retailer. High levels of service quality, particularly in areas such as customer support and information management, can mitigate the impact of minor product issues, leading to greater customer loyalty. For Generation Y shoppers, who prioritize convenience and responsiveness, ensuring a consistently high level of service quality is key to building long-term relationships with online retailers.

2.5 Shipping Performance

Shipping performance has emerged as a key factor in determining customer satisfaction in the e-commerce sector, particularly for Generation Y consumers who prioritize convenience and speed. Rashid and Rasheed (2024) emphasize the critical role of logistics service quality in shaping customer satisfaction with online shopping. Their study reveals that timely and reliable delivery significantly influences product satisfaction, as customers are more likely to be dissatisfied when their orders arrive late or are mishandled. The authors argue that efficient shipping not only enhances the overall shopping experience but also fosters trust in the e-commerce platform, making it a crucial element in retaining online shoppers.

Han et al. (2024) explore the impact of shipping policies, particularly free shipping, on cross-border e-commerce platforms. Their research suggests that the implementation of free shipping policies increases customer satisfaction, as it removes a significant barrier to online purchasing. They highlight that shipping performance, when coupled with cost-saving incentives, plays a pivotal role in customer decision-making, especially for Generation Y, who

are highly sensitive to both delivery speed and cost. The study underscores the importance of balancing logistics efficiency with promotional strategies to optimize customer satisfaction in cross-border e-commerce.

Loh et al. (2024) contribute to this discussion by examining the role of digital platforms in enhancing customer satisfaction with international shipping services. Their findings indicate that advancements in digital tracking, real-time updates, and seamless communication between customers and logistics providers improve perceptions of shipping performance. Generation Y, being more digitally oriented, values the transparency and control that these platforms offer. It concludes that shipping performance is not solely about speed but also about providing a reliable, transparent, and well-communicated delivery process that aligns with customers' expectations.

2.6 Customer Satisfaction

Customer satisfaction plays an important role in determining the success of online shopping platforms, particularly for Generation Y, who are more likely to engage in e-commerce. Kumari (2024) explores customer satisfaction in online shopping, highlighting the importance of convenience, ease of use, and trust in driving positive consumer experiences. The study suggests that the ability to navigate websites seamlessly, coupled with reliable product quality and timely delivery, is essential to maintaining satisfaction. Kumari argues that for Generation Y, digital fluency and high expectations for service quality demand that online retailers provide a consistently satisfying shopping experience to retain customers.

Kumar et al. (2023) extend the analysis by using text mining to explore customer reviews on grocery mobile apps, identifying key factors that influence satisfaction. Their research indicates that timely service, ease of payment, and the user interface of the apps are major determinants of customer satisfaction. For Generation Y, who increasingly rely on mobile technology for shopping, these factors are especially significant. The study underscores that satisfaction is multifaceted, driven not only by the quality of products and services but also by the digital experience provided by the platform. This aligns with broader trends in e-commerce, where user experience and interface design are as critical as product delivery.

Further supporting these findings, Tzeng et al. (2021) examined customer satisfaction during online shopping holidays, identifying key drivers such as promotional offers, product variety, and fast delivery. Their study emphasizes the importance of meeting customer expectations during high-demand periods, where Generation Y consumers prioritize efficiency and reliability. These studies collectively highlight that customer satisfaction is influenced by a combination of factors, including product quality, service efficiency, and digital platform performance, all of which are critical to fostering loyalty among online shoppers.

2.7 Expectation Disconfirmation Theory

Expectancy Disconfirmation Theory (EDT) is a widely employed framework in understanding customer satisfaction, particularly in e-commerce, as it effectively explains the psychological processes consumers undergo during online transactions. The theory posits that customer satisfaction is derived from the comparison between pre-purchase expectations and post-purchase experiences (Elkhani & Bakri, 2012). When the performance of a product or service exceeds expectations, positive disconfirmation occurs, leading to higher satisfaction. Conversely, negative disconfirmation arises when expectations are not met, resulting in dissatisfaction. This theory is particularly relevant in examining Generation Y's online

shopping behavior, as their satisfaction is strongly influenced by the interplay between expectations and the actual quality of products, services, and delivery performance.

Lankton et al. (2014) extend EDT by incorporating the element of trust-in-technology, emphasizing its significance in the online shopping context. They argue that in digital environments, where direct product experience is unavailable prior to purchase, trust in the technology platform becomes a critical component of the expectancy disconfirmation process. This trust influences both the formation of expectations and the interpretation of the shopping experience. For Generation Y, who are digital natives and rely heavily on e-commerce, trust in technology platforms, such as secure payment systems, accurate product descriptions, and efficient customer service—plays a mediating role in shaping their satisfaction levels.

Bollenbach et al. (2024) apply EDT in the context of fast-charging services for electric vehicles, yet their findings are transferable to online shopping experiences. Their study demonstrates that customers who receive a seamless, efficient service that aligns with or exceeds their expectations are more likely to report higher levels of satisfaction. In the online shopping environment, similar principles apply, when the quality of products, service performance, and delivery match or surpass consumer expectations, satisfaction is reinforced. Conversely, unmet expectations, particularly in delivery performance or service support, can lead to dissatisfaction, underscoring the relevance of EDT in online retail.

Employing EDT in this study is essential because it provides a structured understanding of how Generation Y's satisfaction is shaped by their expectations and perceptions of product quality, service quality, and delivery performance. By examining the gaps between expected and actual outcomes, EDT helps to identify the factors that most significantly influence satisfaction or dissatisfaction. This approach is crucial in e-commerce, where the absence of direct physical interaction with products elevates the importance of managing and meeting customer expectations effectively.

Therefore, here are seven hypotheses development, structured to introduce each hypothesis:

H1: Product quality positively affects perceived security.

H2: Service quality positively affects perceived security.

H3: Shipping performance positively affects perceived security.

H4: Perceived security positively affects perceived satisfaction.

H5a: Perceived security mediates between product quality and satisfaction.

H5b: Perceived security mediates between service quality and satisfaction.

H5c: Perceived security mediates between shipping performance and satisfaction.

2.8 Conceptual Framework

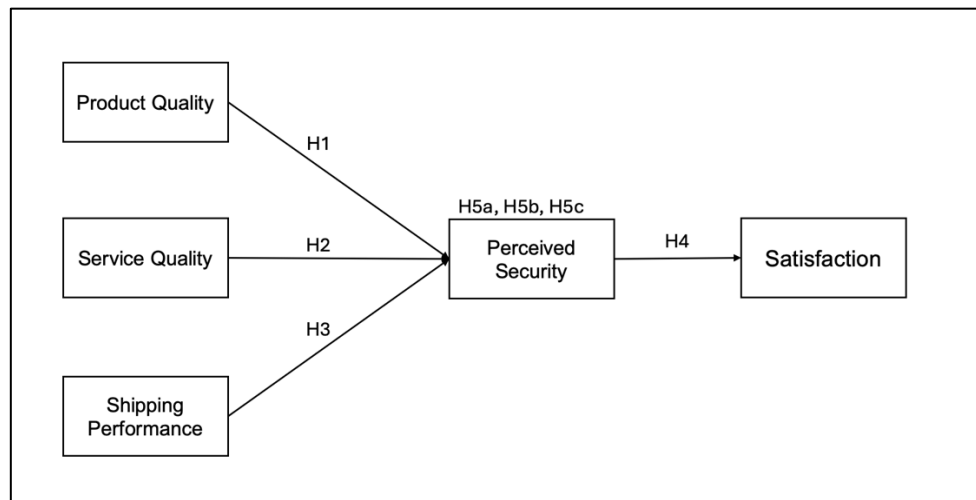


Figure 1: Conceptual Framework

3. Research Methodology

This study utilized an online survey to collect data, which was distributed by a designated enumerator via social media platforms, specifically WhatsApp and Facebook, using Microsoft Forms. The enumerator was thoroughly briefed on the study's objectives and the procedures for disseminating the survey. In terms of this study's sample, Hair et al. (2018) recommend a minimum sample size of 100 if the model contains five or fewer constructs, and 150 if the model has seven or fewer constructs. Hair et al. (2018) also suggest the use of G-power software to determine the required sample size considering effect size and predictive power analysis. In the case of this study, power analysis was conducted using G-power on six predictors: $\alpha = 0.05$, effect size $f^2 = 0.3$, and a power of 0.80 (Faul et al., 2007), resulting in the desired sample size of 82. By using non-probability sampling with convenience sampling techniques, 200 responses were generated in the data collection of this study and the recommended sample size was achieved. Descriptive data analysis was conducted using IBM SPSS (version 26), and structural equation modelling was performed with SmartPLS version 4.

4. Results

4.1 Demographic Profile of Respondents

The final sample consisted of 200 usable survey responses, representing a 100% response rate. The gender distribution was relatively balanced, with 60% male and 40% female respondents. In terms of age demographics, the majority of respondents were between 29 and 38 years old, with 40.5% aged 29 to 34 and 39.5% aged 35 to 38. The youngest group, aged 25 to 28, accounted for 20% of the sample. Regarding marital status, 80% of respondents were single, while 20% were married. Occupationally, the sample reflected a diverse workforce, 44% were employed in the public sector, 28.5% in the private sector, and 27.5% were self-employed.

Income distribution showed that 55% of respondents earned between RM2,560 and RM5,249, while 45% fell within the RM5,250 to RM11,819 range. Geographically, the respondents were fairly evenly distributed across Johor, Melaka, Kedah, and Selangor, with

each state representing approximately 20% of the sample, except for Wilayah Persekutuan, which accounted for 20.5%. Regarding online shopping behaviour, the majority (72.5%) reported making online purchases 0-1 times per month, while 27.5% did so 2-5 times per month. In terms of spending, 50% of respondents reported spending over RM150, 27.5% spent between RM101 and RM150, and 22.5% spent less than RM100 on online purchases.

4.2 Partial Least Squares (PLS) Path Modelling

In this study, PLS path modelling was employed using SmartPLS 4.1 software (Ringle et al., 2024) to assess both the measurement and structural models, as it does not assume data normality, a common issue in survey-based research (Chin et al., 2003). Following the guidelines of Anderson and Gerbing (1988), a two-step approach was adopted, requiring the validation of the measurement model before proceeding to the evaluation of the structural model.

4.2.1 Assessment of the Measurement Model

According to Hair et al. (2011, 2019), evaluating the measurement model involves confirming item reliability, internal consistency, content validity, convergent validity, and discriminant validity. The reliability and convergent validity of the entire PLS path model are presented in Table 1, where all indicators meet or exceed the recommended loading threshold of 0.70, with the exception of SQ4 (0.613), DP2 (0.196), PQ1 (0.560), PQ3 (0.676), and S2 (0.581), which have loading value less than 0.70 and was subsequently removed.

Fornell and Larcker (1981) highlight the importance of assessing convergent validity using the average variance extracted (AVE). Chin (2010) specifies that an AVE exceeding 0.50 is required to establish adequate convergent validity for a construct. As shown in Table 1, the AVE values for this study range from 0.687 to 0.822, demonstrating satisfactory convergent validity according to Chin's (2010) guidelines.

Cronbach's alpha, a commonly used metric for assessing reliability, is calculated based on the average intercorrelations among items that measure a particular construct (Sekaran & Bougie, 2016). Reliability scores below 0.60 are considered weak, scores between 0.70 and 0.80 are deemed acceptable, and scores above 0.80 are regarded as strong. Hair et al. (2018) recommends a reliability threshold of 0.70 or higher. As shown in Table 1, Cronbach's alpha values for this study range from 0.664 to 0.887, all of which exceed the recommended threshold. Additionally, composite reliability values surpass the acceptable benchmark of 0.80. Thus, the study exhibits robust internal reliability and convergent validity.

Table 1: Measurement Model

Constructs	Items	Loadings >0.70	AVE >0.50	Composite Reliability >0.80	Cronbach's Alpha >0.7
Product Quality			0.748	0.856	0.664
	PQ2	0.859			
	PQ4	0.871			
Service Quality			0.687	0.866	0.770
	SQ1	0.955			

	SQ2	0.819			
	SQ3	0.700			
Delivery Performance			0.710	0.880	0.795
	DP1	0.779			
	DP3	0.910			
	DP4	0.834			
Perceived Security			0.822	0.932	0.891
	S1	0.940			
	S3	0.846			
	S4	0.918			
Customer Satisfaction			0.754	0.924	0.887
	CS1	0.942			
	CS2	0.813			
	CS3	0.755			
	CS4	0.947			

The subsequent step involved evaluating the model's discriminant validity. The results of this evaluation, using the Heterotrait-Monotrait Ratio of Correlations (HTMT) method, are presented in Table 2. Notably, all HTMT values ranged from 0.843 to 0.907, which is well within the acceptable thresholds recommended by Hair et al. (2017) and Henseler et al. (2015).

Table 2: Assessment of Discriminant Validity

	1	2	3	4	5
1. Customer Satisfaction	0.868				
2. Delivery Performance	0.917	0.843			
3. Perceived Security	0.846	0.692	0.907		
4. Product Quality	0.740	0.757	0.651	0.865	
5. Service Quality	0.909	0.772	0.928	0.733	0.829

4.2.2 Assessment of the Structural Model

The path coefficient estimates, representing the hypothesized relationships between the constructs, were derived using the bootstrapping technique. This process involved generating a sample size of 5,000 from the original 200 observations, in line with the recommendation of Hair et al. (2017). Figure 2 presents a detailed visualization of the structural model estimates, while Table 3 summarizes the results, including the standard errors of the path coefficients and their associated t-statistics.

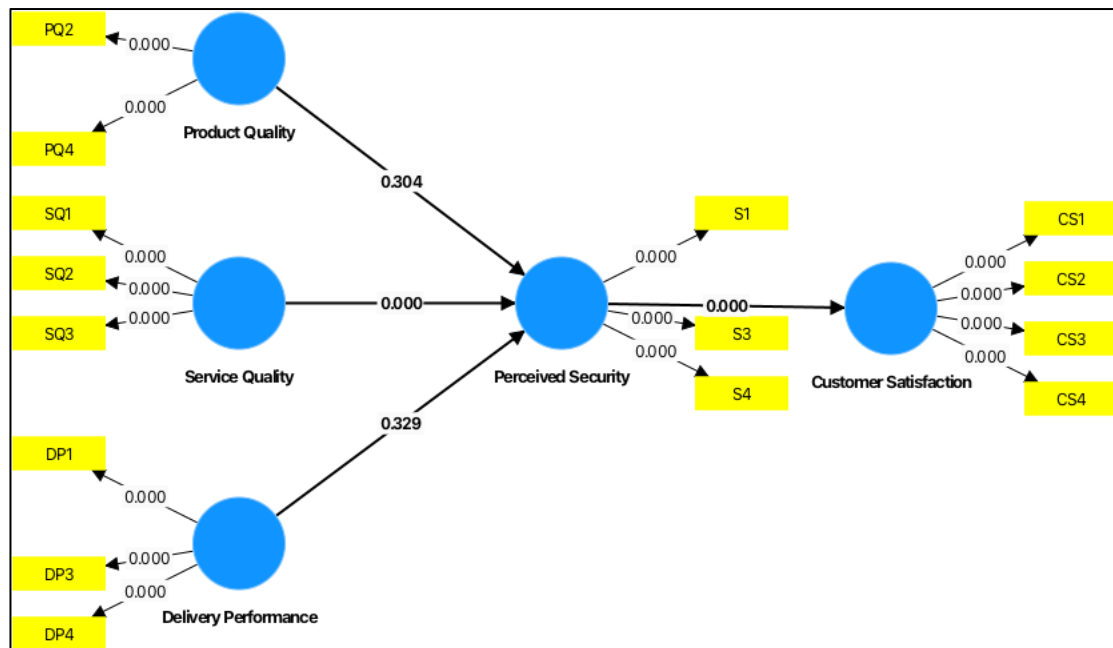


Figure 2: Results of Structural Model

The results summarized in Table 3 indicate that two hypotheses were supported, with t-values exceeding 1.645 and p-values below 0.05. Hypothesis 2 (H2) proposed a positive correlation between service quality and perceived security, and the data in Table 3 and Figure 2 confirm this with a significant positive relationship ($\beta = 0.994$, $t = 43.202$, $p = 0.000$). Furthermore, the analysis shows a strong positive link between perceived security and customer satisfaction ($\beta = 0.846$, $t = 32.440$, $p = 0.000$), supporting hypothesis 4 (H4). However, two hypotheses did not receive support, as product quality and delivery performance were not significantly related to perceived security, with low path coefficients.

Table 3: Direct Relationship for Hypothesis Testing

	Hypotheses	Std Beta	Std Error	t-values	p-values	5.0% (LLCI)	95.0% (ULCI)	Decision
H1	Product Quality → Perceived Security	-0.049	0.050	1.028	0.304	-0.126	0.032	Not Supported
H2	Service Quality → Perceived Security	0.994	0.992	43.202	0.000	0.961	1.039	Supported
H3	Delivery Performance → Perceived Security	-0.038	0.035	0.976	0.329	-0.108	0.021	Not Supported
H4	Perceived Security → Customer Satisfaction	0.846	0.844	32.440	0.000	0.795	0.880	Supported

4.2.3 Testing Mediator Effects

The findings in Table 4 involved testing three mediation hypotheses (H5a, H5b, H5c) to assess the mediating effect of perceived security between product quality, service quality, delivery performance, and customer satisfaction. To evaluate these hypotheses, the study applied the PLS algorithm and employed a bootstrapping procedure, analyzing a dataset of 200 cases with a sample size of 5000, following the approach of Hair et al. (2014). In line with Preacher and Hayes (2008), the indirect effect is deemed significant if the confidence interval does not encompass zero.

The bootstrapping results revealed that the mediation paths service quality → perceived security → customer satisfaction ($\beta = 0.841$, $p = 0.000$) was statistically significant. However, two mediation hypotheses (H5a and H5c) did not reach statistical significance.

Table 4: Mediation Testing Results

	Hypotheses	Std Beta	Std Error	t-values	p-values	5.0% (LLCI)	95.0% (ULCI)	Decision
H5a	Product Quality → Perceived Security → Customer Satisfaction	-0.042	0.042	1.039	0.299	-0.105	0.028	Not Supported
H5b	Service Quality → Perceived Security → Customer Satisfaction	0.841	0.837	24.305	0.000	0.782	0.893	Supported
H5c	Delivery Performance → Perceived Security → Customer Satisfaction	-0.032	0.030	0.972	0.331	-0.092	0.018	Not Supported

4.2.4 Coefficient of Determination

Calculating the R^2 value for a model can be complex due to the specific nature and complexity of the research domain. In general, a higher R^2 value indicates stronger predictive accuracy (Hair et al., 2017). As outlined by Sarstedt and Mooi (2019), R^2 values of 0.67, 0.33, and 0.19 suggest strong, moderate, and weak explanatory power, respectively.

Figure 3 displays the R^2 values for both perceived security and customer satisfaction, which are 0.862 and 0.715, respectively. These results reflect strong explanatory power (Sarstedt and Mooi, 2019). The analysis indicates that product quality, service quality, and delivery performance explain 86.2% of the variance in perceived security, while 71.5% of the variance in customer satisfaction is accounted for by product quality, service quality, delivery performance, and perceived security.

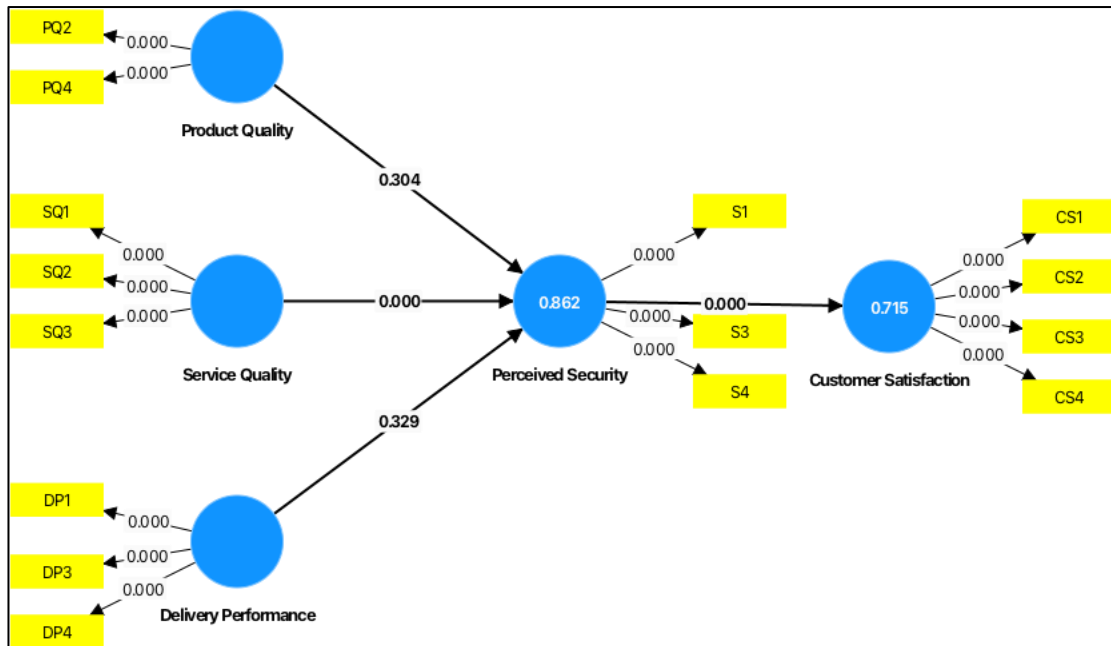


Figure 3: Coefficient of Determination

4.2.5 Effect Size

The magnitude of the impact of predictor construct can be assessed using Cohen’s f^2 , which measures the significance of changes in R^2 due to variations in an independent latent variable. This metric evaluates how much an endogenous construct contributes to explaining an exogenous construct (Ramayah et al., 2018).

Cohen (1988) classifies effect size values as large (0.35), medium (0.15), and small (0.02). The f^2 values in Table 5 demonstrate that the relationships vary in their contributions, ranging from small to large, in explaining product quality, service quality, delivery quality, perceived security, and customer satisfaction.

Table 5: Effect Size

Constructs	F square	Effect size rating
Product Quality -> Perceived Security	0.007	Small
Service Quality -> Perceived	2.558	Large
Delivery Performance -> Perceived Security	0.003	Small
Perceived Security -> Customer Satisfaction	2.526	Large

5. Discussion and Conclusion

This study extends the applicability of Expectation Disconfirmation Theory (EDT) to online shopping satisfaction – with particular reference to Generation Y. The current study provides relevant insights into how the perceived security, product quality, service quality, and delivery

performance affect the Generation Y's online shopping satisfaction. The research findings reveal a significant relationship between service quality and perceived security, suggesting that higher service quality contributes to greater confidence in the security of online shopping platforms. It is logical to state that when customers perceive that an online store is reliable and responsive, they are more likely to feel that their transactions are secure and their personal information is protected.

Moreover, perceived security is shown to have a significant influence on online shopping satisfaction, underlining its role as a key determinant of customer experience. The results are consistent with what was found in a study undertaken by Trang et al. (2024). Perceived security has also been employed as mediating role in this study to investigate the mediating effects of perceived security in the relationship between product quality, services quality, delivery performance and customer satisfaction. However, the findings reveal that perceives security only mediates the relationship between service quality and customer satisfaction.

The mediating role of perceived security implies that customer satisfaction in online shopping can be enhanced with greater security in the online shopping platform. In this case, it is viewed that customers not only assess the product itself but also use their perceptions of service quality as an indicator of the platform's overall reliability and safety. Therefore, improving service quality indirectly boosts satisfaction by reinforcing trust in the system's security. This interplay suggests that businesses should focus on both quality and perceived security to enhance customer satisfaction in online environments.

References

- Al-dweeri, R. M., Obeidat, Z. M., Al-dwiry, M. A., Alshurideh, M. T., & Alhorani, A. M. (2017). The impact of e-service quality and e-loyalty on online shopping: moderating effect of e-satisfaction and e-trust. *International journal of marketing studies*, 9(2), 92-103.
- Al-Jahwari, N. S., Khan, F. R., Al Kalbani, G. K., & Al Khansouri, S. (2018). Factors influencing customer satisfaction of online shopping in Oman: Youth perspective. *Humanities & Social Science Reviews*, eISSN, 2395-7654.
- Biswas, K. M., Nusari, M., & Ghosh, A. (2019). The influence of website service quality on customer satisfaction towards online shopping: The mediating role of confirmation of expectation. *International Journal of Management Science and Business Administration*, 5(6), 7-14.
- Barusman, A. R. P. (2019). The effect of security, service quality, operations and information management, reliability & trustworthiness on e-loyalty moderated by customer satisfaction on the online shopping website. *International Journal of Supply Chain Management*, 8(6), 586-594.
- Bollenbach, J., Halbrügge, S., Wederhake, L., Weibelzahl, M., & Wolf, L. (2024). Customer satisfaction at large charging parks: Expectation-disconfirmation theory for fast charging. *Applied Energy*, 365, 122735.
- Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of Partial Least Square: Concepts, Methods and Application* (pp. 655–690). Berlin: Springer.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Ekasari, R., Agustya, D., Yucha, N., Arif, D., Retnowati, D., Mandasari, A. A., ... & Lestari, L. P. (2019, March). Effect of price, product quality, and service quality on customer satisfaction on online product purchases. In *Journal of Physics: Conference Series* (Vol. 1175, No. 1, p. 012287). IOP Publishing.
- Elkhani, N., & Bakri, A. (2012). Review on “expectancy disconfirmation theory”(EDT) Model in B2C E-Commerce. *Journal of information systems research and innovation*, 2(12), 95-102.
- Fanani, Y. D. (2023). Shopee Pay Free Shipping Promotion Moderation On Customer Satisfaction. *Journal of Social Science and Business Studies*, 1(1), 27-41.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.20546/ijcrar.2016.409.006>
- Gursoy, D., Maier, T. A., & Chi, C. G. (2008). Generational differences: An examination of work values and generational gaps in the hospitality workforce. *International journal of hospitality management*, 27(3), 448-458.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate data analysis*. Cengage Learning, EMEA. <https://doi.org/10.1002/9781119409137.ch4>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications. <https://doi.org/10.1080/1743727x.2015.1005806>
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–151. <https://doi.org/10.2753/MTP1069-6679190202>

- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Han, S., Chen, S., Yang, K., Li, H., Yang, F., & Luo, Z. (2024). Free shipping policy for imported cross-border e-commerce platforms. *Annals of Operations Research*, 335(3), 1537-1566.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115–135. <https://doi.org/10.1007/s11747-014-0403-8>.
- Hien, N. N., Long, N. T., Liem, V. T., & Luu, D. X. (2024). Customer Responses to Airline Service Failure: Perspectives from Expectation Disconfirmation Theory. *SAGE Open*, 14(2), 21582440241248334.
- Jain, R., & Sharma, M. S. (2020). Determinants of customer satisfaction in online shopping. *Maharshi Dayanand University Research Journal ARTS*, 19(1), 51-66.
- Jayasubramanian, P., Sivasakthi, D., & Ananthi, P. K. (2015). A study on customer satisfaction towards online shopping. *International Journal of Applied Research*, 1(8), 489-495.
- Joines, J. L., Scherer, C. W., & Scheufele, D. A. (2003). Exploring motivations for consumer Web use and their implications for e-commerce. *Journal of consumer marketing*, 20(2), 90-108.
- Kumar, J., Rani, V., Rani, G., & Rani, M. (2024). Does individuals' age matter? A comparative study of generation X and generation Y on green housing purchase intention. *Property Management*.
- Kumari, A. (2024). The Study on Customer Satisfaction Towards Online Shopping. *International Journal for Multidisciplinary Research (IJFMR)*.
- Kumar, A., Chakraborty, S., & Bala, P. K. (2023). Text mining approach to explore determinants of grocery mobile app satisfaction using online customer reviews. *Journal of retailing and consumer services*, 73, 103363.
- Lankton, N., McKnight, D. H., & Thatcher, J. B. (2014). Incorporating trust-in-technology into expectation disconfirmation theory. *The Journal of Strategic Information Systems*, 23(2), 128-145.
- Loh, H. S., Lee, J. L., Gu, Y., Chen, H. S., & Tay, H. L. (2024). The effects of digital platforms on customers' satisfaction in international shipping business. *Review of International Business and Strategy*, 34(2), 231-244.
- Momtaz, H., Islam, M. A., Ariffin, K. H. K., & Karim, A. (2011). Customers satisfaction on online shopping in Malaysia. *International Journal of Business and Management*, 6(10), 162.
- Momotaz, S. N., & Hasan, M. S. (2018). Exploring the impact of service quality factors on customer satisfaction towards online shopping: Evidence from Bangladesh. *World Journal of Social Sciences*, 8(1), 102-123.
- Nguyen, T., & Nguyen, D. M. (2024). What will make Generation Y and Generation Z to continue to use online food delivery services: a uses and gratifications theory perspective. *Journal of Hospitality Marketing & Management*, 33(4), 415-442.
- Paynter, J., & Lim, J. (2001). Drivers and impediments to e-commerce in Malaysia. *Malaysian Journal of library and Information science*, 6(2), 1-19.
- Ramli, N., Rashid, U. K., Nasuredin, J., & Kepal, N. (2021). Factors Influencing Consumer Intention to Purchase Online: A Study Among Female Consumer in Johor, Malaysia. *Research in Management of Technology and Business*, 2(2), 935-951.

- Ringle, Christian M., Wende, Sven, & Becker, Jan-Michael. (2024). SmartPLS 4. Bönningstedt: SmartPLS. Retrieved from <https://www.smartpls.com>.
- Rashid, D. A., & Rasheed, D. R. (2024). Logistics service quality and product satisfaction in e-commerce. *SAGE Open*, 14(1), 21582440231224250.
- Rashid, D. A., & Rasheed, D. R. (2024). Logistics service quality and product satisfaction in e-commerce. *SAGE Open*, 14(1), 21582440231224250.
- Ramayah, T., Cheah, J., Chuah, F., & Memon, H. T. & M. A. (2018). Assessment of mediation analysis. In *Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 3.0* (2nd ed). Pearson Malaysia Sdn Bhd.
- Rigdon, E. E., Schumacker, R. E., & Wothke, W. (2017). A comparative review of interaction and nonlinear modeling. In *Interaction and Nonlinear Effects in Structural Equation Modeling* (pp. 1–16). Routledge.
- Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3, SmartPKS GmbH, Boenningstedt*.
- Srivastava, S., Mohta, A., & Shunmugasundaram, V. (2024). Adoption of digital payment FinTech service by Gen Y and Gen Z users: evidence from India. *Digital Policy, Regulation and Governance*, 26(1), 95-117.
- Sutriani, S., Muslim, M., & Ramli, A. H. (2024). The Influence Of Experience, Satisfaction And Service Quality On Word Of Mouth Intentions And Customer Loyalty. *Jurnal Ilmiah Manajemen Kesatuan*, 12(4), 1037-1052.
- Ta, Thi, Nguyet, Trang., Pham, Chien, Thang., Tran, Quang, Quy. (2024). Examining the Influence of Security Perception on Customer Satisfaction: A Quantitative Survey in Vietnam. *EAI endorsed transactions on internet of things*, 10 doi: 10.4108/eetiot.5210
- Tzeng, S. Y., Ertz, M., Jo, M. S., & Sarigöllü, E. (2021). Factors affecting customer satisfaction on online shopping holiday. *Marketing Intelligence & Planning*, 39(4), 516-532.
- Tandon, U., & Ertz, M. (2024). Modelling gamification, virtual-try-on technology, e-logistics service quality as predictors of online shopping: an empirical investigation. *Current Psychology*, 43(16), 14289-14303.
- Tzeng, S. Y., Ertz, M., Jo, M. S., & Sarigöllü, E. (2021). Factors affecting customer satisfaction on online shopping holiday. *Marketing Intelligence & Planning*, 39(4), 516-532.
- Ting, H., Lim, T. Y., de Run, E. C., Koh, H., & Sahdan, M. (2018). Are we Baby Boomers, Gen X and Gen Y? A qualitative inquiry into generation cohorts in Malaysia. *Kasetsart Journal of Social Sciences*, 39(1), 109-115.
- van Zoonen, W., van der Meer, T., & Sivunen, A. (2024). Expectation dissonance: the role of perceived negativity bias in enterprise social media in explaining accountability and support. *Information Technology & People*, 37(8), 196-215.