

The Relationship Between Self-Checkout Quality and Customer Satisfaction at AEON Malaysia

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DOI: <https://doi.org/10.30880/rmtb.2025.06.01.012>

Article Info

Received: 31 March 2025

Accepted: 30 April 2025

Available online: 30 June 2025

Keywords

Self-checkout quality, customer satisfaction, retail

Abstract

The emergence of self-service technologies (SSTs), especially self-checkout systems, has caused a major shift in the retail sector. These technologies are increasingly essential for improving consumer experiences and operational effectiveness. This study aims to examine the relationship between consumer satisfaction and the quality of the self-checkout systems at Aeon Seremban 2, Negeri Sembilan, Malaysia. Understanding the variables that affect customers' satisfaction with self-checkout systems is essential given the variety of customers the store services. Using a simple random sampling method, 384 respondents were selected from approximately in Seremban, Negeri Sembilan. This study takes a quantitative approach, collecting primary data using questionnaires that are analysed with SPSS software. The findings reveal a positive relationship between ease of use, convenience, and reliability with customer satisfaction among customers at Aeon Seremban 2. These results underscore the importance of user-friendly and efficient self-checkout systems in enhancing customer experiences. Grounded in the Technology Acceptance Model (TAM), the study highlights how user-friendly and efficient self-checkout systems enhance satisfaction levels, offering actionable insights for retailers. Although limited to a single location, this research provides valuable implications for optimizing self-checkout technologies to improve customer satisfaction and loyalty.

1. Introduction

The emergence of self-service technologies (SSTs), especially self-checkout systems, has caused a major shift in the retail sector. These technologies are increasingly essential for improving consumer experiences and operational effectiveness. This study aims to study the relationship between consumer satisfaction and the quality of the self-checkout systems at Aeon Seremban 2, Negeri Sembilan, Malaysia. Understanding the variables that affect customers' satisfaction with self-checkout systems is essential given the variety of customers the store services. Using a simple random sampling method, 384 respondents were selected from approximately in Seremban, Negeri Sembilan. This study takes a quantitative approach, collecting primary data using questionnaires that are analysed with SPSS software. The findings reveal a positive relationship between ease of use, convenience, and reliability with customer satisfaction among customers at Aeon Seremban 2. These results underscore the importance of user-friendly and efficient self-checkout systems in enhancing customer experiences. Grounded in the Technology Acceptance Model (TAM), the study highlights how user-friendly and efficient self-checkout systems enhance satisfaction levels, offering actionable insights for retailers. Although

limited to a single location, this research provides valuable implications for optimising self-checkout technologies to improve customer satisfaction and loyalty.

Retailing, distinct from wholesaling, focuses on selling goods and services directly to consumers, often at higher prices and in smaller quantities. Retail acts as a bridge between producers and customers, fostering convenience and competition. It is the largest private employer, offering numerous opportunities for professional advancement and high pay for skilled managers (Mahmoud, 2019). Retail significantly contributes to GDP in many countries, promoting continuous economic growth (Bhasin, 2023). Customer satisfaction, a critical measure of how well products and services meet customer expectations, influences repeat purchases and loyalty, crucial for business growth and revenue (Chew, 2023; Szyndlar, 2024). Memorable customer experiences enhance loyalty and satisfaction, essential for long-term business success (Al-Mair, 2023; Liow *et al.*, 2019).

Self-checkout systems have significantly transformed retail by simplifying the checkout process, attracting more customers, and improving operational efficiency (Jacobsen, 2021; Service, 2024). Advanced technologies like touch-screen interfaces, barcode scanning, and mobile payments have enhanced these systems, reshaping customer behaviour and business operations (Katz *et al.*, 2024). However, the relationship between self-checkout quality and customer satisfaction remains debated, with key factors like ease of use and system reliability being critical (Group, 2023; Siah *et al.*, 2018). A 2023 survey found that 62% of participants had a positive shopping experience with self-checkout (Magestore, 2023), though most research focuses on Western contexts. AEON CO. (M) Bhd., Malaysia's largest retailer, operates supermarkets and department stores, emphasizing customer value (BHD., 2023; Mui Hung Kee *et al.*, 2020). In Seremban, where diverse socio-economic backgrounds and cultural traditions intersect, understanding self-checkout's impact on customer satisfaction is vital. Embracing cultural diversity helps businesses tailor their offerings to meet distinct customer needs, enhancing satisfaction and market reach (Ganesh, 2023). This study aims to contribute to the growing body of literature on retail innovation and consumer behaviour, while providing valuable insights for retailers seeking to optimize their self-checkout systems and improve overall customer satisfaction levels.

The increasing use of self-checkout systems in stores reflects a trend toward more automated and convenient shopping experiences (In *et al.*, 2023). However, in places like Seremban 2, Malaysia, many customers are still not familiar with self-checkout technology, as it is currently only offered by Aeon. Self-checkout often remains unknown to customers because of cultural preferences for face-to-face connection, lack of knowledge, and unease with technology (Dabholkar *et al.*, 2003). This lack of familiarity has led to challenges, including increased merchandise loss due to customer errors and intentional shoplifting (Meyersohn, 2024). A survey conducted in 2022 found that 67% of customers experienced difficulties with self-checkout, highlighting the need to understand what factors influence customer satisfaction and the adoption of self-checkout systems (Markets & Joe, 2023). Despite the growing use of self-checkout systems, there is a lack of research on how these systems impact customer satisfaction in Malaysian retail settings. Existing studies have pointed out potential issues such as customer errors and technical failures that could hinder the widespread adoption of self-checkout systems (In *et al.*, 2023). Additionally, the lack of empirical data specific to Seremban 2 underscores the importance of investigating the relationship between self-checkout quality and customer satisfaction among adults in this area (Rashid *et al.*, 2024). Understanding this relationship is crucial for retailers like Aeon to improve the effectiveness of their self-checkout systems and enhance customer satisfaction levels. Most studies on self-checkout focus on its advantages; the potential disadvantages of using self-checkout services in comparison to traditional checkout ones are not as well studied (Nusrat & Huang, 2024). In a case study examining the challenges associated with self-checkout systems, operational difficulties were encountered with the technology approximately four years ago in Napanee, Ontario. The self-checkout machine erroneously required the scanning of a second item despite there being only a single item for purchase. Store staff intervened to resolve the issue, but the malfunction persisted, leading to the user's decision to cease using the company's services. This incident highlights potential user interface and functionality issues inherent in self-checkout technologies and underscores the need for improved system reliability and customer support mechanisms (Harris, 2019). According to a recent survey, which was funded by the weighing technology company Shekel Brainweigh, most customers had trouble with self-checkout, with over 80% requiring assistance at least once. Furthermore, almost 30% of respondents said that they had been asked to confirm their purchases by store employees. Additionally, according to the poll, 60% of customers said they would be more likely to utilise self-checkout if technological advancements like automated procedures, simplified systems, and increased accuracy were put into place (Ryan, 2020).

This study aims to bridge this gap in empirical research by examining the relationship between self-checkout quality and customer satisfaction among adults at Aeon Seremban 2, Negeri Sembilan. By identifying the factors that influence customer satisfaction with self-checkout systems, this research seeks to provide valuable insights for retailers and policymakers to enhance the adoption and effectiveness of self-checkout technology in Malaysia.

2. Literature Review

2.1 Customer Satisfaction

Customer satisfaction is defined as the level of satisfaction a customer has when comparing a product's performance to their expectations (Armstrong & Kotler, 2018; Bitner, 1997). It is crucial for business success and development, as it indicates how well a product or service meets customer needs and expectations (Indajang *et al.*, 2023; Kristiawan *et al.*, 2021; Nisa & Siregar, 2022). High customer satisfaction drives loyalty and repeat business (Rahmah & Silitonga, 2023), influenced by factors such as customer service, brand image, pricing, and product quality (Ghimire & Dhakal, 2023). Research shows that cost, security, responsiveness, and convenience are significant factors across various industries (Sukmawati *et al.*, 2023). In supermarkets, satisfaction is also impacted by additional services, service quality, and product variety (Khanal & Suresh Sapkota, 2022). Models like SERVQUAL, NPS, and CSI are used to measure and improve satisfaction levels (Bhadauriya, 2022; Solosichenko *et al.*, 2021; Umami *et al.*, 2021). Effective strategies to enhance satisfaction include understanding and meeting customer expectations, delivering excellent service, and efficiently handling complaints.

2.2 Self-Checkout System

Meuter *et al.*, (2000) introduced the term "self-service technology" (SST) as technology that allows customers to use a service independently, without staff assistance. The use of SSTs, including self-checkout systems (SCOs), is increasing in retail environments (Duarte *et al.*, 2022; Rinta-Kahila *et al.*, 2018; Šupić & Bowles, 2020). These systems simplify the payment process, allowing customers to scan and pay for items themselves, reducing checkout time and increasing store productivity (Šupić & Bowles, 2020).

Innovative approaches to SCOs include using Convolutional Neural Networks (CNN) for product detection (ANHAR & PUTRA, 2023), Radio Frequency Identification (RFID) (Zaveri *et al.*, 2022), and Speeded Up Robust Features (SURF) for image processing and payment optimization (Rajan *et al.*, 2022). Customers can select quantities, create bills via mobile apps or PC portals, and scan products with cameras or image scanners (Xia *et al.*, 2021). Additionally, some systems use load cell sensors for automated self-checkout, especially for accurately weighing fruits (Gao *et al.*, 2019). These technologies enhance transaction accuracy and efficiency by integrating product detection, identification, and online settlement.

2.3 Self-Checkout Quality

In modern retail, the quality of self-checkout systems is crucial for enhancing customer satisfaction and operational efficiency. Studies highlight that self-checkout technologies, such as mobile apps for Easy Mart and intelligent systems using image and RFID scanning, expedite transactions, reduce lines, and boost customer satisfaction (Zaveri *et al.*, 2022). During events like the Covid-19 pandemic, factors such as hygiene, reliability, problem-solving, and customer relationships significantly impact consumer satisfaction, loyalty, and trust (Gao *et al.*, 2019). Adopting self-service technologies like self-checkout terminals can lower costs, save time, and improve customer experiences, benefiting both retailers and consumers (Duarte *et al.*, 2022).

The quality of self-checkout systems is influenced by factors such as speed, ease of use, reliability, enjoyment, and control (Siah & Fam, 2018). Cost-effectiveness, ease of use, and simple design are essential in shaping consumer perceptions and behavioural intentions towards self-service devices (De Leon *et al.*, 2020; Duarte *et al.*, 2022). The adoption of these technologies depends on user acceptance, which is influenced by specific factors necessary for adoption (Su, 2021). Additionally, innovative technologies like RFID and automatic self-checkout systems can significantly enhance service quality and the overall checkout process (Calocha & Herwiyanti, 2020).

2.3.1 Ease of use

Ease of use significantly impacts consumer behaviour, system usage, and healthcare procedures. Research shows that simplicity in various contexts enhances satisfaction, repurchase intention, and perceived benefits (Elisa *et al.*, 2023; Petros *et al.*, 2023). For instance, in retail, the acceptance and adoption of self-checkout systems are heavily influenced by their ease of use (Yang *et al.*, 2022; Zaveri *et al.*, 2022). Similarly, user-friendly transportation interfaces in transportation apps and healthcare systems improve engagement and repeat usage (Kurnia *et al.*, 2023; Murphy & Carter-Templeton, 2023).

2.3.2 Convenience

Convenience in self-checkout systems refers to the comfort and efficiency customers experience while shopping. These systems enhance convenience by reducing shopping time, providing product information, simplifying payment methods, and creating a seamless shopping experience. For example, barcode technology and real-time databases enable speedy scanning and fast processing (Chaudhari *et al.*, 2023). Additionally, technologies like Easy Mart's mobile app allow consumers to scan items, specify quantities, and generate invoices on their mobile devices, addressing issues like long lines (Hauser *et al.*, 2019). Self-checkout systems benefit both customers and

businesses by saving time, reducing operating costs, and offering a more convenient shopping experience (Zaveri *et al.*, 2022).

2.3.3 Reliability

Reliability, defined as the ability to consistently produce desired results, is critical for efficient system performance and credible measurement (Bonzio *et al.*, 2021; Mokkink *et al.*, 2023; Sha, 2019). For example, Gaol *et al.* proposed an automated self-checkout system utilizing RFID technology and speed-up robust features (SURFs) that significantly improved payment process time and detection rates (Waghmare *et al.*, 2020). Similarly, Bukhari *et al.* introduced the ARC system, which utilizes computer vision and convolutional neural networks to accelerate and enhance the autonomy of the retail checkout process (Gao *et al.*, 2020).

2.4 Theoretical Framework

2.4.1 Technology Acceptance Model (TAM)

Fred D. Davis developed the Technology Acceptance Model (TAM) in his 1986 Ph.D. thesis, which comprises attitude toward using the system, perceived utility, and perceived ease of use, explaining how people adopt new technology (Davis, 1989). TAM, a renowned model for understanding and predicting technology adoption, focuses on factors like perceived ease of use, perceived usefulness, trust, satisfaction, and attitude toward use (Chan *et al.*, 2022). TAM has been widely applied to evaluate technology adoption across various domains, including healthcare, education, and finance (Ala & Ramayah, 2023; Lin *et al.*, 2023). Research indicates that individuals' perceptions and motivations to use technology are greatly influenced by perceived ease of use and perceived usefulness (Frieyadi & Muharam, 2023). TAM proves effective in promoting technology acceptance and usage across diverse scenarios by combining factors from multiple theoretical frameworks (Huang *et al.*, 2023).

In numerous contexts, perceived ease of use significantly impacts customer satisfaction. Studies reveal its substantial effect on customer satisfaction, such as in Grabfood consumers in Bandung City and taxable businesses utilizing e-Nofa for VAT purposes (Rachmi *et al.*, 2023; Rusnendar *et al.*, 2023). Perceived ease of use also plays a vital role in increasing satisfaction across various platforms and services, including Indonesian e-wallet users and online education (Nugroho *et al.*, 2023; Nuryakin *et al.*, 2023). Perceived usefulness is another critical factor affecting user satisfaction and attitude toward technology adoption. It positively influences learner satisfaction in online learning and consumer purchase intentions in the smartphone market (Nuryakin *et al.*, 2023; Wang, 2023). Factors like compatibility and self-efficacy significantly impact perceived usefulness, emphasizing their importance in technological adaptation and usability (Alamsyah *et al.*, 2022). These findings underscore the consistent, positive relationship between consumer satisfaction and perceived usefulness across various sectors and technological platforms.

2.4.2 SERVQUAL Model

The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry in 1988, evaluates service quality by measuring the disparity between customer expectations and perceptions (Jonkisz *et al.*, 2022; MANUNGGAL & AFRIADI, 2023). Comprising reliability, tangibility, empathy, responsiveness, and assurance, it assesses service quality across industries like food services, healthcare, and education (Augustyn *et al.*, 2022; Tudevtagva *et al.*, 2021). By highlighting differences between actual service delivery and customer expectations, the SERVQUAL model encourages improvements in service provision. Customer satisfaction, crucial in determining service quality, is a key consideration in SERVQUAL analysis (Zulganef & Hodijah, 2023). It reflects how well a company meets or surpasses customer expectations, influencing satisfaction and repeat business (Marpaung & Kusumah, 2022). Customer satisfaction moderates the relationship between customer value and service quality, underlining its importance for enhancing overall service quality (Pascasarjana Universitas Ibn Khaldun Bogor *et al.*, 2023).

Self-checkout systems in stores can benefit from the SERVQUAL model's focus on service quality (Nath, 2022). Technological advancements like Deep Learning and Computer Vision enable the development of automatic retail checkout systems, enhancing service quality and efficiency (Thomas-Francois & Somogyi, 2023). Customer willingness to embrace smart grocery shopping technologies suggests a favorable attitude toward self-checkout systems, with convenience playing a significant role in shaping consumer behavior and adoption (Safitri *et al.*, 2021). Reliability is a crucial independent variable chosen by researchers, directly impacting user experience (G. G. Alves *et al.*, 2023). A reliable self-checkout machine enhances convenience and customer satisfaction, whereas frequent malfunctions lead to frustration and dissatisfaction. The reliability of government portals influences consumer trust in the government, highlighting its significance in improving the user experience (G. G. Alves *et al.*, 2023). Similarly, reliability significantly influences customer opinions in operating systems, particularly in complex and non-routine operations (Yabe *et al.*, 2018). In the field of information technology, user experience positively affects IT dependability, emphasizing the interplay between user experience and reliability (Katarzyna Tworek, 2019).

2.5 Research Framework

The research framework is presented in Fig. 1. Based on the framework, the following hypotheses are proposed.

- H₁: There is a positive relationship between ease of use and customer satisfaction.
- H₂: There is a positive relationship between convenience and customer satisfaction.
- H₃: There is a positive relationship between reliability and customer satisfaction.

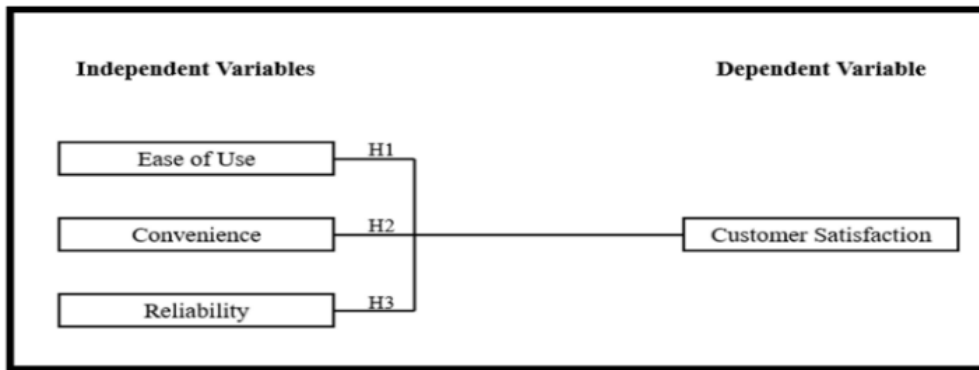


Fig. 1 Research framework

3. Research Methodology

Based on Fig. 2, the research process begins by determining the research title, which sets the foundation and scope of the study. Next, the researcher identifies the problem statement to highlight the issue or gap that needs to be addressed. Once the problem is clearly defined, the study proceeds to define the research objectives, which guide the direction of the investigation. Following this, a literature review is conducted to explore previous studies and theoretical frameworks relevant to the topic. This review informs the development of a suitable research methodology, outlining the approach and tools to be used in the study. Subsequently, data is collected through a survey, allowing the researcher to gather primary information from respondents. After data collection, the next step is data analysis, where the findings are processed and interpreted. Finally, the research concludes with the presentation of results and conclusion, summarising the key outcomes and implications of the study.

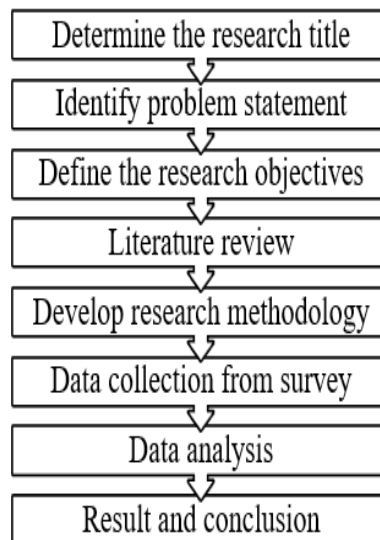


Fig. 2 Research Flow Chart

3.1 Population and Sample Size

The target population in this study focuses on residents of Seremban, Negeri Sembilan. According to the Department of Statistics Malaysia (2023), Seremban has a total population of 692,283 citizens. The researcher utilized the Krejcie and Morgan (1970) method to determine an efficient sample size. This technique is widely used in research to estimate sample sizes, especially when the entire population is inaccessible. Based on the Krejcie and Morgan (1970) table, the researcher selected 384 individuals from the 692,283 residents to participate in the study and complete the questionnaires.

3.2 Sampling Design

Probability sampling methods, such as simple random sampling (SRS), ensure representativeness by giving every member of the population an equal chance of being chosen. This method is particularly effective with homogeneous populations as it selects each unit individually, ensuring an impartial and fair sampling process (Das *et al.*, 2023; Latpate *et al.*, 2021; Singh, 2003; Tasic, 2022). In this study, the researchers opted for SRS to select respondents. SRS is chosen because it ensures that everyone in the population has an equal and independent chance of being selected, thereby minimizing biases (McLeod, 2014). The sample is drawn randomly from the residents of Seremban, ensuring a fair representation of the entire population for the study.

3.3 Research Instrument

Table 1 shows the research instruments. Sections A, B, and C are the three main sections of the questionnaire that focus on the relationship between self-checkout quality and customer satisfaction at Aeon Seremban 2, Negeri Sembilan. Section A gathers the demographic profile of the respondents. It includes questions on gender, age group, educational qualifications, occupation, and frequency of self-checkout usage. Section B focuses on independent variables related to the quality of self-checkouts. These variables include ease of use, convenience, and reliability. Section C assesses the dependent variable, which is customer satisfaction.

Table 1 Research instruments

Section	Categories	Number of items	Sources
A	Demographic profile	5	(Duarte <i>et al.</i> , 2022), (F. F. Alves <i>et al.</i> , 2023)
	Ease of use	5	(Duarte <i>et al.</i> , 2022), (F. F. Alves <i>et al.</i> , 2023)
B	Convenience	5	(Ghosh, 2021), (Thomas-Francois & Somogyi, 2023)
	Reliability	5	(Duarte <i>et al.</i> , 2022)
C	Customer Satisfaction	5	(Demirci Orel & Kara, 2014),(Sun & Pan, 2023)

3.4 Data Collection

Original information gathered directly from the source by researchers for a particular topic is referred to as primary data. Primary data may be gathered using a variety of techniques, including qualitative techniques like observations and interviews and quantitative techniques like surveys (Kara, 2023a). Researchers have a variety of opportunities to investigate when it comes to creative data gathering techniques, such online surveys, diaries, and visual data (Kara, 2023b). As stated in (Kaufmann, 2020), primary data collection in pragmatic trials is frequently included into standard care procedures to guarantee research validity while maintaining a practical approach.

3.5 Pilot Study

A pilot study, essential for laying the groundwork for larger trials, involves pre-testing research instruments and assessing feasibility factors like treatment safety and recruitment possibilities. While not guaranteeing success, it significantly enhances the chances by providing insightful information for the main trial's design, typically involving descriptive analysis without hypothesis testing. The researcher intentionally distributed questionnaires to the customers of Aeon Seremban 2, Negeri Sembilan to perform the pilot study. The researcher reached the target of 30 respondents to evaluate the feasibility and usefulness of the main study.

3.6 Data Analysis

In this study, expected correlations between independent and dependent variables were validated using quantitative analysis. Using SPSS software, descriptive statistics, normality testing, and correlation analysis were carried out to guarantee accuracy and reliability. A vital component of research is data analysis, which makes it easier to extract insightful information and make wise decisions. It helps researchers to convey results in a

statistically relevant way, improve transparency, and evaluate findings effectively. Descriptive analysis summarizes data features through statistical measures like frequency distributions, variability, and central tendency. It aids decision-making by providing insights into sample characteristics and connections between variables. Essential for research, it elucidates data patterns in various domains, guiding clinical decisions and research investigations (Varsha & Karan, 2023). Normality tests, such as the Shapiro-Wilk and Kolmogorov-Smirnov tests, assess if data follows a normal distribution, crucial for ensuring the validity of statistical analyses and methods. Correlation analysis examines relationships between variables to identify trends and validate mathematical models, using coefficients like Pearson's and Spearman's to measure association strength, crucial for understanding system performance and forecasting outcomes.

4. Results and Discussion

Table 2 presents the response rate of the distributed questionnaires. Out of 384 sets distributed, a total of 312 questionnaires were completed and returned, resulting in a response rate of 81.25%. Meanwhile, 72 sets were not returned, accounting for 18.75% of the total.

Table 2 Response rate of questionnaires

Questionnaires	Frequency (f)	Percentage (%)
Number of sets distributed	384	100
Number of sets returned	312	81.25
Number of sets not returned	72	18.75
Total	383	100

4.1 Reliability Analysis

Based on Table 3, a total of 30 participants from Aeon Seremban 2 took part in the pilot study, which aimed to assess the reliability of the survey instrument. Cronbach's Alpha values were calculated for each variable to determine internal consistency. The results showed that ease of use (0.715), convenience (0.759), and reliability (0.754) achieved acceptable reliability levels, indicating good internal consistency. Meanwhile, customer satisfaction, the dependent variable, recorded a Cronbach's Alpha value of 0.818, which reflects a very good level of reliability. These findings confirm that all constructs used in the questionnaire are reliable and suitable for further data collection in the main study.

Table 3 Results of the reliability test for pilot study

Variables	Cronbach's Alpha	N of Items	Interpretation
Independent variable			
1. Ease of use	0.715	5	Good
2. Convenience	0.759	5	Good
3. Reliability	0.754	5	Good
Dependent variable			
1. Customer Satisfaction	0.818	5	Very Good

Based on Table 4, data were collected from 312 customers of Aeon Seremban 2, Negeri Sembilan, to conduct a comprehensive reliability analysis. The reliability of four variables: ease of use, convenience, reliability, and customer satisfaction, was assessed using Cronbach's Alpha. The results indicated that all variables demonstrated good internal consistency. Specifically, ease of use, reliability, and convenience recorded Cronbach's Alpha values of 0.716, 0.720, and 0.730, respectively, which fall within the "good" reliability range. The customer satisfaction variable achieved the highest reliability score, with a Cronbach's Alpha of 0.785, indicating a very good level of consistency. In conclusion, while each variable showed slightly different degrees of reliability, all met the acceptable threshold, with customer satisfaction displaying the highest internal consistency among the four.

Table 4 Results of the reliability test for the actual study

Variables	Cronbach's Alpha	N of Items	Interpretation
Independent variable			
1. Ease of use	0.716	5	Good
2. Convenience	0.730	5	Good
3. Reliability	0.720	5	Good
Dependent variable			
1. Customer Satisfaction	0.785	5	Good

4.2 Demographic Analysis

This research involved 312 respondents who were categorized based on various demographic characteristics, gender, age groups, educational level, occupation, and the frequency of self-checkout usage. A detailed presentation of these findings is provided in Table 5.

Table 5 Results for demographic profile

	Items	Frequency (f)	Percentage (%)
Gender	Male	132	42.3
	Female	180	57.7
Age	15-18 years	5	1.6
	19-30 years	229	73.4
	31-40 years	47	15.1
	41-50 years	26	8.3
	51-60 years	3	1.0
	Above 60 years	2	0.6
Educational level	SPM	16	5.1
	STPM/Diploma	17	5.4
	Degree	237	76.0
	Masters	37	11.9
	PhD	4	1.3
	Others	1	0.3
Occupation	Student	93	29.8
	Employee	160	51.3
	Self-employed	50	16.0
	Unemployed	6	1.9
	Retired	3	1.0
	Other	0	0.0
Frequency of using self-checkout	Always	78	25.0
	Often	145	46.5
	Sometimes	72	23.1
	Student	93	29.8
	Employee	160	51.3

4.3 Descriptive Analysis

Table 6 shows the overall analysis of mean and standard deviation for factors. The relationship between customer satisfaction, convenience, reliability, and ease of use with self-checkout systems at Aeon Seremban 2 was evaluated using descriptive analysis. Overall, every factor had high mean ratings, suggesting that respondents had very positive perceptions of them. Convenience contributed significantly to customer satisfaction, as shown by its highest mean score of 4.472 with a standard deviation of 0.7296. With a mean score of 4.436 and a standard deviation of 0.6348, ease of use also received a high rating, highlighting the significance of user-friendly interfaces. With a mean of 4.226 and a standard deviation of 0.8198, reliability showed that it plays a part of developing system confidence. Finally, a mean of 4.370 with a standard deviation of 0.7476 for customer satisfaction demonstrated the overall beneficial effects of these factors.

Table 6 Overall analysis of mean and standard deviation for factors

Items	Mean (μ)	Std. Deviation (σ)	Level
Ease of Use	4.436	.6348	High
Convenience	4.472	.7296	High
Reliability	4.226	.8198	High
Customer Satisfaction	4.370	.7476	High

4.4 Normality Test

The dependent variable, customer satisfaction, was tested for normality using the Kolmogorov-Smirnov test, as shown in Table 7. With 312 degrees of freedom and a statistically significant p-value of 0.000, the test produced a statistic of 0.249. The data is categorized as non-normal as the p-value is less than 0.05, indicating that it does not follow a normal distribution. This suggests strong evidence that the data does not follow a normal distribution, which is the null hypothesis. It is important to keep in mind that the huge sample size might affect the normality test's sensitivity, making even minor deviations statistically significant.

Table 7 Results of test of normality for customer satisfaction

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Overall Mean Customer Satisfaction	.249	312	<.001	.821	312	<.001

a. Lilliefors Significance Correction

4.5 Spearman's Correlation Analysis

Table 8 shows the correlation between self-checkout quality and customer satisfaction. Customer satisfaction and ease of use have a strong positive relationship, as indicated by the correlation value of 0.676. The p-value was less than 0.001 at the 0.01 significance level, indicating that the relationship was statistically significant. Similarly, convenience and customer satisfaction showed a strong positive relationship, with a correlation coefficient of 0.606 and a p-value of less than 0.001. Additionally, reliability and customer satisfaction showed a positive relationship, as shown by a p-value of less than 0.001 and a correlation coefficient of 0.530. These results provide truth to the theories that customer satisfaction with self-checkout systems is positively correlated with ease of use, convenience, and reliability.

Table 8 Correlation between self-checkout quality and customer satisfaction

Spearman's Rho		
Customer Satisfaction Variables	Correlation Coefficient	Sig (2-tailed)
Ease of use	.676**	<.001
Convenience	.606**	<.001
Reliability	.530**	<.001

** Correlation is significant at the 0.01 level (2-tailed).

4.6 To examine the level of self-checkout quality at Aeon Seremban 2, Negeri Sembilan.

Reliability, convenience, and ease of use were the independent variables that were assessed using descriptive analysis. The findings showed that respondents had a high level of agreement about the quality of self-checkout systems. Most respondents said the systems were easy to use, with user-friendly interfaces and clear instructions making for satisfying user experiences. These results are consistent with other studies that highlight how crucial intuitive designs are to improving usability (Harahap *et al.*, 2024).

Respondents emphasized the time-saving advantages and thoughtful positioning of self-checkout kiosks throughout the mall as a further significant factor. This supports the findings of Wong (2021), who showed that customer satisfaction is greatly increased by efficient shopping processes. Because respondents valued the systems' accuracy and low mistake rates, reliability also garnered high scores. According to Barua *et al.* (2018), consumers' trust and satisfaction were increased by the self-checkout systems' reliable operation. Overall, the results show that AEON Seremban 2's self-checkout systems are excellent and successfully satisfy customer requirements.

4.7 To examine the level of customer satisfaction at Aeon Seremban 2, Negeri Sembilan.

High mean scores from the customer satisfaction research showed that respondents had a strong positive perception of self-checkout systems. Respondents highlighted the significance of simple designs in enabling smooth transactions, and ease of use emerged as a major driver of satisfaction. Jovie Micayas Gallera (2023), who pointed out that user-friendly solutions greatly improve customer experiences, agrees with this.

Respondents valued the flexibility and time-saving features of self-checkout systems, and convenience was also shown to be a significant factor in satisfaction. Bagdare (2014) highlighted the importance of operational efficiency in enhancing the retail customer experience, and these results are in line with his findings. Because respondents believed the accuracy and strength of the systems, reliability further supported satisfaction levels. The high scores for each of these factors highlight how crucial AEON Seremban 2's self-checkout quality is in determining customer satisfaction.

4.8 To investigate the relationship between self-checkout quality and customer satisfaction among adults at Aeon Seremban 2, Negeri Sembilan.

Strong positive correlations between the independent variables (reliability, convenience, and simplicity of use) and the dependent variable (consumer satisfaction) were found using Spearman's correlation analysis. The strongest relationship was found for ease of use, highlighting how important it is in raising customer satisfaction. This is consistent with the findings of Murad *et al.* (2024), who highlighted the significance of self-service technologies' user-friendly interfaces. As a result, hypothesis 1 (H_1) is being accepted as there is a positive relationship between ease of use and customer satisfaction.

Customer satisfaction and convenience had a moderate positive relationship, showing how much customers appreciate flexible and time-saving shopping experiences. This result supports the findings of Wong (2021), who highlighted the importance of convenience in retail environments. Hypothesis 2 (H_2) has been accepted as convenience and customer satisfaction are positively correlated. Additionally, reliability showed a moderate positive relationship with satisfaction, highlighting how crucial accurate and reliable system performance is to building confidence. These findings support the theories that reliability, convenience, and ease of use have a beneficial impact on customer satisfaction and offer useful information for enhancing AEON Seremban 2's self-checkout systems. As a result, reliability is having a positive impact on customer satisfaction as hypothesis 3 (H_3) is being accepted in this research.

5. Conclusion

In summary, this study provides important light on the relationship between adult customers' satisfaction with the self-checkout system and AEON Seremban 2, Negeri Sembilan. The research's objectives of assessing customer satisfaction, determining the level of self-checkout quality, and determining how these factors relate to one another were all achieved.

According to the results, most respondents thought self-checkout was of good quality, especially in terms of reliability, convenience, and ease of use. Positive feedback complimenting the self-checkout systems' steady functioning, time-saving capabilities, and user-friendly design supported this. Customer satisfaction was also found to be high, and respondents acknowledged that self-checkout systems had a major positive influence on their shopping experience. Additionally, the study found a strong positive relationship between customer satisfaction, ease of use, convenience, and reliability, highlighting the important role of these elements in influencing consumer opinions. Despite its advantages, the study's scope was limited to a particular region and retail environment, which would have limited the way its conclusions could be applied.

Acknowledgement

The authors would like to thank the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Lau Yong He and Hafizah Binti Zulkipli; **data collection:** Lau Yong He and Hafizah Binti Zulkipli; **analysis and interpretation of results:** Lau Yong He and Hafizah Binti Zulkipli; **draft manuscript preparation:** Lau Yong He and Hafizah Binti Zulkipli. All authors reviewed the results and approved the final version of the manuscript.

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