Volume 5 Issue 2 (2025) Pages 851 - 872
Amkop Management Accounting Review (AMAR)
ISSN : 2828-2248 (Online)

Point of Sales (PoS) Application Improvement Strategy: An attribute-based approach

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Abstract

The rapid development of Point of Sales (PoS) applications has significantly impacted competition between Point of Sales (PoS) companies such as Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar, making it increasingly competitive. Therefore, a positioning strategy is needed for point of sale (PoS) providers to gain a position in the minds of their users. This research was conducted to determine the attributes of Point of Sales (PoS). The study used a quantitative method with a sample of 132 respondents. The study used multidimensional scaling analysis with SPSS Version 27. The results of this study indicate that implementing a positioning strategy can help a product form a clear image in the public's minds. The results of the MDS analysis show that each Point of Sales (PoS) has its advantages. In addition, Dimension 1 (d1) is trust, and Dimension 2 (d2) is Effort Expectancy. Moka POS is known to have the best performance expectancy, Majoo is known to have the best task fit, and Pawoon is known to have superior performance expectancy, among other attributes. In Olsera, it is known that this application has superior trust, and Kasir Pintar is known to have superior trust, among other attributes.

Keywords: Point of Sales (PoS); Strategy; Positioning; Multidimensional Scaling.

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INTRODUCTION

The digital transformation already present in society will be key to accelerating national economic growth, including increasing the growth and development of the Micro, Small, and Medium Enterprises (MSMEs) sector. Sanjaya & Nuratama (2021) define Micro, Small, and Medium Enterprises (MSMEs) as stated in Law Number 20 of 2008: A company classified as an MSME is a small company owned and managed by an individual or a small group of individuals with a certain amount of wealth and income.

The Ministry of Cooperatives and Small and Medium Enterprises (Kemenkop) explains that the majority, or 99% of businesses in Indonesia, are at the MSME level. MSMEs contribute 61.9% to the total gross domestic product (GDP) and absorb approximately 97% of the local workforce. The distribution of contributions to GDP shows that micro-enterprises contributed significantly, namely 37.4% in 2019. This value even almost rivals the contribution of large-scale companies, which reached 39.5% in the same year. Meanwhile, small businesses contributed 9.5% and medium enterprises 13.6%. According to the Kemenkop research team,

DOI: 10.37531/amar.v5i2.3101

this will create a "hollow in the middle" phenomenon, where the contribution of small and medium enterprises (SMEs) is much smaller compared to micro-enterprises and large companies.

MSMEs face challenges related to productivity, competitiveness, or limited resource access. These challenges vary, ranging from limited innovation and market access to difficulties scaling operations. The government emphasizes initiatives to support MSMEs by providing resources and growth opportunities. MSMEs will be encouraged to utilize technology optimally in their daily operations. To support MSMEs in increasing customer base, reducing operational costs, and accelerating business reporting, various digital companies (startups) are creating Point of Sales (PoS) applications.

Point of Sales (PoS) is a payment application for customers who are making purchases. POS is a cash register, such as an EDC machine, tablet, smartphone, or other payment machine. It is used to complete purchase transactions, store money, and print receipts. Point of Sales (PoS) applications have features developed in accordance with technological changes. Point of Sales (PoS) can currently store customer data, calculate profit and loss, and summarize sales reports digitally and in detail (Vely, 2025).

According to Vely (2025), Point of Sales (PoS) applications currently used by MSMEs include: Jurnal Kasir, Kasir Pintar, Mesin Kasir, Kasir PoS, Olsera, Moka PoS, Pawoon, Aplikasi Qasir, Program Kasir Vend, True Pos, Connect PoS, Square Register, Octopus Online, Equip PoS, and Omega PoS. Based on the recommendations for Point of Sales (PoS) applications for MSMEs from Dimas (2022), there are five applications, namely Moka POS, Majoo, Pawoon, Olsera, and Smart Cashier, so this study also uses 5 points of sales, such as Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar.

The wide selection of Point of Sales (PoS) applications, such as Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar, has created intense competition in the market. However, the adoption rate of this technology among MSMEs remains relatively low. This phenomenon poses significant managerial challenges, with MSME owners finding it difficult to select the most suitable application due to a lack of information about the competitive advantages of each product. Meanwhile, PoS application providers also face challenges due to their lack of a deep understanding of the attributes most valued by users. This gap highlights the need for research to bridge technology adoption theory with marketing strategies to assist users and service providers in making more strategic decisions.

The rapid development of point of sale (PoS) applications has impacted the increasingly competitive Competition between point of sale (PoS) companies. This Competition will cause many companies to provide various services to attract users to adopt this technology. Therefore, a positioning strategy is needed for Point of Sales (PoS) providers to gain a position in the minds of their users. Kotler & Keller (2016) stated that positioning is designing a company's offerings and image to occupy a distinct place in the target market's minds. The goal is to locate the brand in the minds of consumers and maximize potential benefits for the company.

Therefore, in positioning, it is necessary to monitor and evaluate the point of sale (PoS) position and determine whether the position needs to be strengthened or changed. One way to do this is through perceptual mapping. Perceptual mapping is also known as positioning maps because it helps develop strategic market positioning for products and services. Nigam & Kaushik (2011) explain that perceptual mapping offers a unique ability to understand market structure, analyze complex relationships among market competitors, and the criteria buyers use in making purchasing decisions and recommendations.

One of the multivariate analyses used in determining perceptual mapping is Multidimensional Scaling (MDS). Hair et al. (2014) define Multidimensional Scaling (MDS), which is also known as perceptual mapping, as a method researchers use to map individual

DOI: 10.37531/amar.v5i2.3101

perceptions of several objects, be it products, companies, ideas, or other elements with a shared perception. This technique helps describe the relative position of these objects based on how respondents perceive them. Several attributes are related to consumer perceptions of Point of Sales (PoS): effort expectancy, performance expectancy, task fit, trust, and social influence.

Previous research conducted by Nurcholisha & Lucyanda (2022) explored the factors influencing the Moka POS application system adoption among micro, small, and medium enterprises (MSMEs) in Jakarta. This research refers to the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which emphasizes performance expectancy, effort expectancy, social influence, and facilitating conditions. The main focus of this research is to examine user intentions and behavior in adopting Point of Sale (POS) technology, specifically Moka POS. Previous positioning analysis research was also conducted by Waoma et al. (2024), who analyzed positioning on TikTok, Tokopedia, Shopee, and Lazada.

Meanwhile, Guerra et al., (2018) conducted a perception mapping study on oleotourism, sharing cultural aspects of the oil industry. Furthermore, research by Sondhi & Chawla (2021) examined the positioning of chocolate brands, including After Eight, Amul, Toblerone, Snickers, and others. No research has addressed perception mapping for point-of-sale (POS) systems.

Several researchers have also examined various factors influencing individual technology adoption. For example, Chotigo & Kadono (2021) examined attributes influencing the use of food delivery apps, such as Effort Expectancy, Performance Expectancy, and Social Influence. Muchtar et al., (2024) examined QRIS adoption using Effort Expectancy, Performance Expectancy, Social Influence, and Facilitating Conditions. Furthermore, Bedué & Fritzsche (2022) found that attributes influencing AI adoption include Trust, Perceived Benefits, and Perceived Risk. Rai & Selnes (2019) examined the adoption of digital textbook service technology, namely task fit, perceived ease of use, perceived usefulness, and social factors. No research has specifically analyzed the position of Point of Sale (PoS) applications in the retail industry.

This study will use the Unified Theory of Acceptance and Use of Technology (UTAUT). The Unified Theory of Acceptance and Use of Technology (UTAUT) is a comprehensive model for understanding user intentions in adopting technology. This theory was developed by Venkatesh et al., (2003) after reviewing and combining eight existing technology adoption models, such as the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), and Theory of Planned Behavior (TPB). The goal is to create a stronger and more integrated framework that can explain user behavior more accurately. UTAUT essentially states that behavioral intentions to use technology are directly influenced by four main constructs, namely Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, which are moderated by demographic factors such as age, gender, experience, and willingness to use (Attuquayefio & Addo, 2014; Williams et al., 2015).

Although UTAUT has become the dominant theoretical foundation in technology adoption studies, significant gaps remain that have not been fully explored. Most studies using UTAUT focus on behavioral intentions and usage behavior (Dwivedi et al., 2011; Williams et al., 2015), without deeply linking them to the strategic aspects of brand positioning in competitive markets. Research on technology adoption often assumes that technology is adopted independently, without considering how consumers compare and position a digital product or service relative to its competitors. This gap is the basis for this research. This is due to the increasing competition in the Point of Sales (PoS) application market, which makes it difficult for many MSMEs to decide which PoS application to use. This research explores in depth the following:

DOI: 10.37531/amar.v5i2.3101

Research Question (RQ):
How do attributes (Performance Expectancy, Effort Expectancy, Task Fit, Trust, and Social Influence) influence consumer perception maps of Point of Sales (PoS) applications?

This study aims to understand how consumer perceptions of attributes in Point of Sales (PoS) applications can influence their competitive position in the market. Theoretically, this study will fill a gap in the literature by integrating technology adoption models, specifically UTAUT, with marketing strategies that focus on positioning. This approach will enhance understanding of how factors such as Performance Expectancy, Effort Expectancy, Task Fit, Trust, and Social Influence can shape images in the minds of consumers. Practically, this study is expected to provide valuable managerial insights for PoS application providers to formulate more effective product improvement strategies and assist MSME owners in making more informed decisions.

This research is also highly urgent because Indonesia's Point of Sales (PoS) application market is at a crossroads between rapid growth and intense competition. Although PoS technology offers a vital solution for MSMEs, low adoption rates indicate significant barriers that are not yet fully understood. This problem puts MSMEs at risk of digital lag and creates strategic challenges for PoS application providers who struggle to differentiate themselves from competitors. Therefore, this research is also expected to provide a clearer picture of the competitive advantages of each PoS application. Based on this description, the research will be conducted as follows: "Point of Sales (PoS) Application Improvement Strategy: An attribute-based approach."

LITERATURE REVIEW

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a comprehensive model for understanding user intentions to adopt technology. This theory was developed by Venkatesh et al. (2003) after reviewing and combining eight existing technology adoption models, such as the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), and the Theory of Planned Behavior (TPB). The goal is to create a more robust and integrated framework that can more accurately explain user behavior. UTAUT essentially states that behavioral intentions to use technology are directly influenced by four main constructs, namely Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, which are moderated by demographic factors such as age, gender, experience, and willingness to use (Attuquayefio & Addo, 2014; Williams et al., 2015).

After its introduction, the UTAUT theory proved successful in various contexts, from using information systems in the workplace to e-government services and e-learning (Dwivedi et al., 2011). However, with the rapid evolution of technology, such as the emergence of the metaverse, researchers have begun to question whether UTAUT is still relevant or needs adjustment. Lee & Kim (2022) applied UTAUT to understand the acceptance of metaverse platforms and found that this theory can explain why users adopt new technologies.

Although UTAUT has become the dominant theoretical foundation in technology adoption studies, significant gaps remain that have not been fully explored. Most studies using UTAUT focus on behavioral intentions and usage behavior (Dwivedi et al., 2011; Williams et al., 2015), without deeply linking them to the strategic aspects of brand positioning in competitive markets. Research on technology adoption often assumes that technology is adopted independently, without considering how consumers compare and position a digital product or service relative to its competitors.

Micro, Small, and Medium Enterprises (MSMEs)

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Micro, Small, and Medium Enterprises (2021) are defined by Micro, Small, and Medium Enterprises (MSMEs) as stated in Law Number 20 of 2008: A company classified as an MSME is owned and managed by an individual or a small group. Based on Law Number 20 of 2008, MSMEs or Small and Medium Enterprises are divided into Micro, Small, and Medium groups. Medium Enterprises (MSMEs)

1. Micro Enterprises
   Micro Enterprises are businesses owned by individuals or privately owned business entities. They have a maximum asset value of IDR 50 million (excluding land and buildings) and a maximum annual turnover of IDR 300 million.
2. Small Enterprises
   Small Enterprises are independent businesses, not subsidiaries or branches of medium-sized or large businesses. Small Enterprises have assets valued at IDR 50 million to IDR 500 million, excluding land and buildings. Sales revenue reaches IDR 300 million to IDR 2.5 billion per year.
3. Medium Enterprises
   Medium-sized businesses are also owned by individuals or privately owned business entities. These businesses are not branches or subsidiaries of other companies. The total assets of Medium Enterprises are valued at IDR 500 million to IDR 10 billion. Their annual turnover or sales are between IDR 2.5 billion and IDR 50 billion per person.

SMEs play a crucial role as drivers of economic growth, contributing to Gross Domestic Product (GDP). MSMEs must be encouraged to utilize technology optimally in their daily operations. Many startups are introducing Point of Sales (PoS) applications for MSMEs to support them in increasing their customer base and managing operations digitally.

Point of Sales (PoS)

Point-of-sale (POS) applications are cashier systems commonly found in retail businesses and restaurants. Their effectiveness and efficiency make these applications widely used to support business operations, particularly in businesses that produce products rather than services. POS programs are a highly beneficial investment for retail entrepreneurs. By using specialized retail applications, entrepreneurs can improve operational efficiency, manage inventory more effectively, make data-driven business decisions, and enhance customer satisfaction (Vely, 2025). According to (Vely, 2025) the current Point of Sales (PoS) application used by MSMEs such as Jurnal Touch, Kasir Pintar, Cash Register for Business Stores, Kasir PoS, Olsera, Moka PoS, Pawoon, Qasir Application, Vend Cashier Program, True Pos, Connect PoS, Square Register, Octopus Online, Equip PoS, Omega. According to Dimas (2022), there are five applications: Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar. Based on the description, this study uses the 5 Points of Sales (PoS): Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar.

Segmentation, Targeting, and Positioning (STP)

Kotler & Keller (2016) explain one of the core marketing concepts: Segmentation, Targeting, and Positioning. Marketers identify different buyer segments by identifying their demographic, psychographic, and behavioral differences. Kotler & Amstrong (2018) define positioning as an action that organizes a product distinctively and desirable and can be compared with other competing products to occupy a place in the minds of target consumers. Through a positioning strategy, marketers can utilize differentiation and specific products to meet the needs of the company's target customers and strengthen brand or product positioning by analyzing them using a perceptual positioning map.

Perceptual Mapping

DOI: 10.37531/amar.v5i2.3101

Gigauri (2019) defines perceptual mapping as simply depicting complex relationships. This depiction can make it easier for managers to assess distances on the map. Thus, this perceptual mapping technique can help display data based on surveys on consumer preferences. Hair et al., (2014) stated that one of the multivariate analyses used in determining perceptual mapping is Multidimensional Scaling (MDS).

Multidimensional Scaling (MDS)

Hair et al., (2014) define Multidimensional Scaling (MDS), which is also known as perceptual mapping, as a method researchers use to map individual perceptions of several objects, be it products, companies, ideas, or other elements with a shared perception. This technique helps describe the relative position of these objects based on how respondents perceive them. The following analysis model that will be the conceptual framework in this study is as follows,

Sumber: Data diolah

Gambar 1. Research Model

RESEARCH METHOD

Research Design

Bungin (2011) states that quantitative research explains a research concept. This research concept includes a framework for designing research instruments. This study employed a quantitative approach, collecting perceptual data from a representative sample of respondents. The goal was to describe and summarize how consumers perceive these attributes concerning various PoS applications. The primary data collection method was an online survey using a structured questionnaire. The questionnaire contained questions measuring respondents' perceptions of each attribute (Performance Expectancy, Effort Expectancy, Task Fit, Trust, and Social Influence) for each PoS application studied (Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar**).**

Variable Definition

Effort expectancy

Venkatesh et al. (2003) define effort expectancy as the level of ease associated with using a system. This concept focuses on how easily users can learn and master new technology without requiring significant physical or mental effort. According to Brown et al. (2016), performance expectancy is the extent to which technology benefits consumers and leads to improved performance. Chong (2013) demonstrated that performance expectancy is the strongest determinant of behavioral intention to use a mobile application. This effort expectancy factor is important because if someone perceives a technology as complicated or difficult to use, they will likely be reluctant to adopt it, even if they recognize its benefits. Therefore, effort expectancy has become a key variable in many studies examining technology acceptance across various fields. The lower the effort required, the higher the likelihood that the technology will be widely accepted and used.

DOI: 10.37531/amar.v5i2.3101

Performance Expectancy

According to Venkatesh et al. (2012), performance expectancy is defined as the extent to which the use of technology will benefit consumers in carrying out certain activities. Performance expectancy is an important variable in determining intention. Moreover, performance expectancy is an important predictor of user behavioral intentions in technology adoption (Wong et al., 2015). According to Ghalandari (2012), performance expectancy is the extent to which a person believes that using a system can help him or her improve job performance. Based on the fact that this model is a combination of previous models, five factors from previous models form the performance expectancy variable. These factors include perceived usefulness (from the technology acceptance model), external motivation (from the motivation model), job fit (from the PC utilization model), relative advantage (from the diffusion of innovation theory), and outcome expectations (from the social cognition theory).

Task Fit

Task fit is a concept that measures how well a technology matches the tasks users need to complete. This concept involves a group's perception of the appropriateness of the task and the technology used (Sarker & Valacich, 2010). Furthermore, task fit also refers to how information provided by a system, such as a website, effectively meets user needs (Liu & Goodhue, 2012). When technology is rated as having high task fit, users perceive the tool as helping them complete their work better, more efficiently, or more accurately. This theory proposes that task and technology characteristics are two inseparable domains that work together to create a fit that results in better performance (Tam & Oliveira, 2016). Task characteristics refer to the complexity and requirements individuals require in managing their tasks (Wang et al., 2020), while technology characteristics relate to the device's interface and functionality (Wang et al., 2020). If there is a better fit between the tasks an individual performs and the technology used, the individual's perception of the usefulness of the technology to complete the task will be more positive (Tam & Oliveira, 2016).

Trust

According to Abroud et al. (2015), trust is defined as the willingness of one party to trust the actions or suggestions of another party and to be vulnerable to potential risks based on the expectation that the other party influences those actions. Siagian (2022) defines trust as the expectation that a company can be trusted to fulfill its commitments. The following traits influence trust: competence, integrity, honesty, and kindness (Siagian, 2022). According to Taheri (2025), trust is a crucial element for business because it directly affects customer relationships and loyalty. To build and maintain trust, a company must communicate consistently, resolve problems quickly, and provide high-quality products and services. This trust forms a strong foundation for loyalty, as customers are more likely to stay with companies they believe are reliable. Furthermore, trust in interpersonal relationships is characterized by the belief that others will behave according to one's expectations (Taheri, 2025).

Social Influence

According to Venkatesh et al. (2012), social influence is the degree to which users perceive that important others believe they should use a particular technology. Furthermore, according to Chua et al. (2018), social influence refers to the extent to which a person perceives that important people, such as family, friends, or colleagues, believe they should use the technology. They tend to influence a person's behavior to adopt or use a new system. Individuals seeking social acceptance tend to conform to the expectations of others, which can drive their intention to use the system. Meanwhile, San Martín & Herrero (2012) define

DOI: 10.37531/amar.v5i2.3101

social influence as the extent to which individuals perceive that important people, such as family and friends, believe they should use a technology.

Population and Sample

Bungin (2011) defines a population as a group or groups of objects targeted by research. The population used in this study was users of Point of Sales (PoS) applications. Bungin (2011) defines a sample as a small population subset. This study's sample, or participants, were selected using a purposive sampling method. Furthermore, the sample size was determined using the sampling measurement theory described by Hair et al. (2010): number of indicators + number of latent variables x (5 to 10 times). Based on these guidelines, the sample size for this study was: Sample = (15 + 5) x 5 = 100 respondents. Based on this formula, the minimum sample size for this study was 100 respondents. This study sample was drawn from individuals who used one of the Point of Sales (PoS) applications and were familiar with all the Point of Sales (PoS) applications. There were 132 respondents in this study. The data collection method used was an online survey with a self-completed questionnaire.

DATA ANALYSIS DAN RESULTS

Data Analysis Techniques

The data analysis technique used in this study was Correspondence Analysis. The data was previously tested through validity and reliability tests, as follows:

a. Validity Test

Zikmund et al. (2013) stated that validity is the accuracy of a measurement or the extent to which a score truly represents a concept. The validity test in this study used construct validity, which was conducted using a correlation technique between the item scores in an observed variable and its total score, using the product-moment correlation formula with a significance level of 5% of the critical value. If the correlation result is greater than the table r, it is considered valid; otherwise, it is invalid (Arikunto, 2012).

b. Reliability Test

Zikmund et al. (2013:301) state that reliability is an indicator of a measurement's internal consistency. This test examines Cronbach's alpha calculation for each variable instrument as a measure of reliability. This coefficient varies from 0 to 1, and a value of 0.6 ($\alpha > 0.6$) generally indicates reliability (Malhotra, 2020). After validity and reliability testing, the Multidimensional Scaling (MDS) technique was used with SPSS version 27 software.

Respondent Analysis

The data in Table 1 shows the characteristics of respondents who have filled out the survey in this study. The majority of respondents in this study were male, totaling 72 people or around 54.5%. For the age range of respondents, the majority of respondents in this study were aged 18-27 years. Then, most of the respondents' education was relatively high, namely at the Bachelor's (S1) / Diploma IV level of education, with as many as 87 respondents or around 65.9%. The majority of business fields pursued by the respondents in this study were Food / Beverage / Restaurant etc, with as many as 67 respondents or 50.8% of all respondents. Then, for the income or income of respondents per month, from the results of this study, as many as 68 people, or 51.5% of respondents, had an income> Rp 7,000,001, -. The application's use length in this study was 7 to 12 Months, totaling 50 people or around 37.9%. The city of domicile of most respondents was Jakarta, with as many as 33 people or 25.0%.

DOI: 10.37531/amar.v5i2.3101

Table 1. Respondent Characteristics

Descriptions		Respondent	Percentage
Gender	Male	72	54.5%
	Female	60	45.5%
Age	18 - 27 years old	50	37.9%
	28 - 37 years old	45	34.1%
	38 - 46 years old	22	16.7%
	> 47 years old	15	11.4%
Educations	High School Equivalent	9	6.8%
	Diploma I - Diploma III	19	14.4%
	Bachelor's Degree (S1)/Diploma IV	87	65.9%
	Master's Degree (S2) or Doctorate (S3)	17	12.9%
Business fields	Food/Beverage/Restaurant/Cafe/Warkop etc. Business	67	50.8%
	Retail Stores (Minimarkets, Groceries, Clothing, Shoes etc.)	19	14.4%
	Electronics/Mobile Phone/Gadget/Accessories etc. Stores	17	12.9%
	Descriptions	**Respondent**	**Percentage**
	Health Services/Dental Clinics etc.	15	11.4%
	Second-hand Goods	1	0.8%
	Vapestores	1	0.8%
	Others	12	9.1%
Income	Rp 1.000.000,- to Rp 3.000.000,-	9	6.8%
	Rp 3.000.001,- to Rp 5.000.000,-	24	18.2%
	Rp 5.000.001,- to Rp 7.000.000,-	31	23.5%
	>Rp 7.000.001,-	68	51.5%
Duration of Use	1 Month - 6 Months	24	18.2%
	7 Months - 12 Months	50	37.9%
	13 Months - 23 Months	33	25.0%
	> 2 years	25	18.9%
City of Domicile	Jakarta	33	25.0%
	Surabaya	18	13.6%
	Bandung	15	11.4%
	Tangerang	15	11.4%
	Bekasi	15	11.4%
	Bogor	14	10.6%
	Others	22	16.7%

Source: Data Processed by Researchers (2025)

Validity Test Results

The validity test in this study used construct validity, conducted using a correlation technique between question scores, using the product-moment correlation formula with a significance level of 5% of the critical value. If the correlation result is greater than the table's r value, it is considered valid; otherwise, it is invalid (Arikunto, 2012). The validity test results showed that all items in EE1 to EE3 relate to the Effort Expectancy attribute, PE1 to PE3 to the Performance Expectancy attribute, TF1 to TF3 to the Task Fit attribute, T1 to T3 to the Trust

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attribute, and SI1 to SI3 to the Social Influence attribute. The calculated r value, based on the Corrected Item-Total Correlation, is the item validity value.

It can be considered valid if it has a calculated r value greater than the r table; in this case, the r table value is DF = N-2 => DF = 132– 2 = 130, r table at DF 130, probability of 0.05 is 0.171. So that all of these statement items are valid and can be used for further analysis. The Validity test results will be given a code in the table below, starting from Effort Expectancy (EE), there are 3, namely EE1, EE2, and EE3. There are three codes on the Performance attribute (P), namely P1. P2, P3. In addition, the Task Fit (TF) attribute is given three codes, namely TF1. TF2, TF3. Furthermore, the Trust (T) attribute will be given three codes, namely T1. T2, T3. In addition to the Social Influence (SI) attribute, three codes will be given, namely SI1. SI2, SI3.

Table 2. Validity and Reliability Test Results

Variabel Indicator	r tabel	r hitung	Cronbach Alpha
Learning this guide to using Point of Sales (PoS) was easy for me (EE1)	0,171	0,976	
My interaction with this Point of Sales (PoS) was very clear and understandable. (EE2)	0,171	0,990	0,93
I found this Point of Sales (PoS) application easy to find and install. (EE3)	0,171	0,979	
Using this Point of Sales (PoS) allows me to complete tasks faster (P1)	0,171	0,963	
Using this Point of Sales (PoS) can increase my productivity. (P2)	0,171	0,970	0,89
If I use this Point of Sales (PoS), I will get more customers and profits. (P3)	0,171	0,975	
All the features in this Point of Sales (PoS) can be used to facilitate my business transactions (TF1)	0,171	0,977	
This Point of Sales (PoS) provides a sense of comfort for users in its function as a means of supporting customer payment machines(TF2)	0,171	0,982	0,91
This Point of Sales (PoS) is able to provide detailed and detailed recording data (TF3)	0,171	0,986	
Variabel Indicator	**r tabel**	**r hitung**	**Cronbach Alpha**
I believe that confidential information when using this POS is delivered safely (T1)	0,171	0,982	
I believe that the risk of transaction failure with this application is low (T2)	0,171	0,983	0,86
I believe that using the POS application will not get transaction fraud. (T3)	0,171	0,970	
I get support from my family to use this Point of Sales (PoS) (SI1)	0,171	0,979	
My friends think that I should continue using this Point of Sales (PoS) because it is useful for business (SI2)	0,171	0,986	0,83

DOI: 10.37531/amar.v5i2.3101

People I know as Influencers on social media suggest using this Point of Sales (PoS) application (SI3)	0,171	0,970

Source: Data Processed by Researchers (2025)

Reliability Test

Reliability testing is an indicator of the internal consistency of a measurement. This test looks at the Cronbach's alpha calculation for each variable instrument as a reliability test. This coefficient varies from 0 to 1, and a value of 0.6 (α > 0.6) generally indicates reliability (Malhotra, 2020). The results of the reliability test show that Effort Expectancy, Performance Expectancy (PE), Task Fit (TF), Trust (T), and Social Influence (SI) have a Cronbach alpha value of 0.9. Therefore, it can be said that the five research attributes are reliable. An analytical tool or instrument can be reliable if the Cronbach coefficient value or α is > 0.6.

Multidimensional Scaling (MDS) Analysis

A perceptual mapping analysis was carried out to determine the competitive position of the Point of Sale (PoS) apps. Meanwhile, Mojoodi et al., (2025) stated that perceptual maps are visual tools that help display and evaluate how customers perceive different attributes of a product or service in relation to its competitors. Using multidimensional scaling (MDS) analysis as an analysis tool from the existing respondent perception data, the distance between the observed Point of Sales (PoS) can also be determined, for example, at Moka Pos with its competitor's Point of Sales (PoS), so that the distance between the points of sales can be known from each other.

Stress and RSQ Value Results

The stress value indicates whether the output is close to the actual state. The closer it is to zero, the more the output resembles the actual state. The test results showed a stress value of 0.20177, indicating a pretty good condition based on the stress value guidelines from Waoma et al. (2024). Meanwhile, the RSQ or R-squared requirement is a standard RSQ value of 0.6. If RSQ <0.6, H0 is rejected. The SPSS analysis showed that the RSQ value was >0.6, or 0.71891. This RSQ value indicates that respondents' perceptions of the research object are in a fairly good position. Based on the cumulative ranking, a multidimensional scale was used in the data analysis of Waoma et al. (2024).

Perceptual Maps Coordinates

Table 3. Coordinate Perceptual Maps

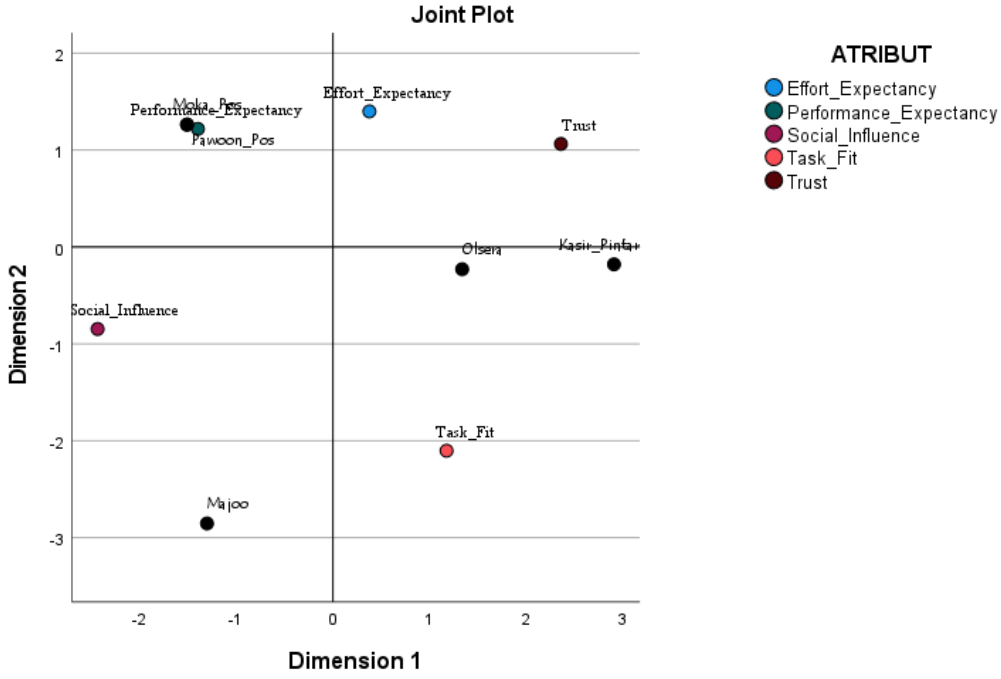
Point of Sales	Dimension		Attribute	Dimension	
	1	2		1	2
Moka Pos	-1.508	1.263	Effort Expectancy	0.377	1.400
Majoo	-1.302	-2.863	Performance Expectancy	-1.396	1.219
Pawoon	-1.508	1.263	Task Fit	1.174	-2.102
Olsera	1.335	-0.229	Trust	2.356	1.064
Kasir Pintar	2.905	-0.179	Social Influence	-2.433	-0.846

Source: Data Processed with SPSS (2025)

The Perceptual Map coordinates above produce output as the basis for depicting a perceptual map or perceptual mapping. This perceptual mapping will be in several dimensions. The dimensions formed will be at least two, filling the space that can be used as

DOI: 10.37531/amar.v5i2.3101

analysis material. Analyze each dimension by looking at the distance of the object's proximity, which indicates its similarity. From the proximity between objects, it can be determined whether they compete with each other or not. The following are the results of perceptual mapping conducted using multidimensional scaling analysis.



Source: Data Processed with SPSS (2025)

Figure 2. Multidimensional Scaling (MDS) Analysis of Each Point of Sales (PoS)

According to Hair et al., (2014) multidimensional scaling analysis is used to achieve two objectives: explorative and comparative. Exploratory techniques are used to identify unrecognized dimensions that can influence behavior. Comparative is a means to obtain an evaluation of an object when a specific comparison basis is not available, unknown, or undefined. The final results obtained from the multidimensional scaling analysis show that this study forms a position map in which there are five Point of Sales (PoS) applications, namely Moka POS, Majoo, Pawoon, Olsera, and Kasir Pintar, which can be seen in Figure 2 above.

Figure 2 also explains the details of the location of the Point of Sales (PoS) map (perceptual mapping); some are located quite close, and some are far apart. The position of the Point of Sales (PoS) close to others means many similarities in the perception of the attributes. Meanwhile, the point of sales (PoS) is located far from others, which means there are differences in perception of these attributes compared to its competitors. Interpretation in multidimensional scaling analysis includes several research elements or respondents. MDS output that can be used for comparison only involves the relative position of objects. (Hair, 2014).

Based on the results of Figure 2, we also obtained the Labeling Dimension. Dimension labeling is done by looking at the best points for each attribute in Dimension 1 (d1), trust, and Dimension 2 (d2), effort expectancy. In Figure 2, Dimension 1 shows that the further to the right, the higher the number for Dimension 1. Olsera and Kasir Pintar are also closest to the highest number for Dimension 1 (at the right end of the horizontal line). This means that points of sale like Olsera and Kasir Pintar have factors in Dimension 1 that are most differentiating compared to other sales points. In Dimension 2, the figure shows that the

DOI: 10.37531/amar.v5i2.3101

further up, the higher the number for Dimension 2 (d2). This shows that points of sale like Moka Pos and Pawoon are closest to the highest number for Dimension 2 (at the top of the vertical line). This means that Moka Pos and Pawoon have factors in Dimension 2 that are most differentiating compared to other sales points.

Analysis of the influence of attributes (Performance Expectation, Effort Expectation, Task Fit, Trust, and Social Influence) can influence the consumer perception map on the Point of Sale (PoS) application.

Based on the Joint Plot, we can see that attributes have different influences on the position of each Point of Sales (PoS) application in consumers' minds. Each attribute occupies a unique position, indicating how consumers perceive the competitive advantages of each application. This analysis will break down the influence of each attribute to provide a more detailed picture of the consumer perception landscape.

1. Analysis Based on the Effort Expectancy Attribute

The Effort Expectancy attribute is located in the upper positive quadrant of the perception map, indicating that this attribute is very important in shaping perceptions. The applications that most closely align with this attribute are Pawoon and Moka POS. This indicates that consumers perceive both applications as easy to use and in line with their expectations. These advantages make Pawoon and Moka POS applications perceived as easy to learn and operate, a crucial factor for MSMEs that require efficient solutions without technical complexity.

2. Analysis Based on the Performance Expectancy Attribute

The Performance Expectancy attribute is located in the upper-positive quadrant and close to Pawoon and Moka POS. This closeness confirms that both applications are not only easy to use but also perceived as highly effective in helping users improve their business performance. This includes completing tasks faster, increasing productivity, and acquiring more customers and profits. This strong perception makes Pawoon and Moka POS leaders regarding the functional value they offer users.

3. Analysis Based on Task Fit Attributes

The Task Fit attribute is in the lower-negative quadrant and is closest to the Majoo application. This closeness indicates that Majoo is perceived as having an advantage in terms of technological compatibility with business operational needs. Consumers feel that Majoo's features are highly suitable for simplifying their business transactions, providing convenience, and providing detailed and comprehensive data recording. Thus, Majoo has successfully positioned itself as a highly suitable solution for completing specific tasks in MSME operations.

4. Analysis Based on the Trust Attribute

The Trust attribute is located in the upper-positive quadrant and close to Olsera and Kasir Pintar. This perception indicates that consumers have a high level of trust in these two applications, particularly regarding transaction security, protection of confidential information, and minimal risk of failure or fraud. By highlighting these attributes, Olsera and Kasir Pintar have successfully distinguished themselves as safe and reliable options, an important factor for MSME owners when managing their business finances.

5. Analysis Based on Social Influence Attributes

The Social Influence attribute is in the upper-negative quadrant and appears close to Moka POS and Pawoon. This closeness indicates that Moka POS and Pawoon use is heavily

DOI: 10.37531/amar.v5i2.3101

influenced by the support and opinions of those closest to the user, such as family and friends. This perception suggests that reputation and social recommendations play a significant role in adoption decisions, making Moka POS and Pawoon popular and socially recognized choices among the MSME community.

The attribute descriptions in the perceptual map above show that each PoS application has a unique positioning based on different attributes. Moka POS and Pawoon compete closely in terms of ease and performance, Majoo leads in terms of task suitability, while Olsera and Kasir Pintar stand out in terms of trustworthiness. This differentiation provides strategic insights for each service provider to formulate more effective marketing and product development strategies.

Analysis based on each Point of Sales (PoS) application

Moka POS is known to have the best performance expectancy compared to other attributes. This indicates that consumers view this application as having high performance expectations. Research conducted by Ilma & Muid (2023) also revealed that Moka POS application users, especially MSMEs, believe that using this system provides real benefits, from recording transactions to managing financial data effectively and efficiently. This has resulted in increased interest in using the Moka POS application. Once this interest is aroused, users are more motivated to continue utilizing this technology to improve their performance. This advantage makes Moka POS superior to other applications such as Majoo, Pawoon, Olsera, and Kasir Pintar.

Furthermore, the application boasts various superior features that benefit businesses, particularly in the retail and F&B sectors. This application allows centralized management of multiple outlets, allowing businesses to easily monitor sales, inventory, and outlet performance in real-time. The inventory management feature also simplifies inventory monitoring with automatic updates after each transaction. Furthermore, Moka POS offers a customer loyalty program that strengthens customer relationships by awarding points or discounts. For the F&B industry, the table management feature also helps organize orders and customer placement more efficiently. With all its integrated features, Moka POS can improve operational efficiency, but it is important to ensure the application aligns with business needs before adopting it (Ananda, 2025).

Majoo was found to have the best task fit among other attributes. These results demonstrate that, in the eyes of consumers, this Point of Sales (PoS) application offers various superior features that enhance the application's suitability to business operational needs (task fit). One of its advantages is its ability to increase transaction efficiency; the payment process becomes faster and more accurate, thereby reducing customer waiting time and minimizing the possibility of input errors by cashiers. Furthermore, Majoo provides an inventory management feature that enables real-time stock monitoring, helping business owners identify the best-selling products and the right time to reorder, thus avoiding stockouts or overstocking. Another prominent feature is the ability to generate comprehensive sales reports; users can analyze daily, weekly, or monthly sales, supporting more informed business decision-making (Majoo, 2023).

Majoo POS also features customer management features that allow customer data storage, purchase history tracking, and personalized promotional delivery, boosting customer satisfaction and loyalty. Considering all these features, Majoo POS has proven effective in improving operational efficiency, making it a suitable choice for various types of businesses (Majoo, 2023). This is Majoo's advantage over Moka Pos, Pawoon, Olsera, and Kasir Pintar. Therefore, these advantages can be used to attract public interest in using the application.

In addition, Majoo must create the right strategy to respond to competition with other Point of Sales (PoS) applications. One strategy implemented by Majoo is by creating an

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innovation called Majoo Supplies, which aims to simplify the process of shopping for product stock for MSMEs. This digital service is designed to change how MSMEs shop, making it more efficient and practical with a single integrated dashboard. The founding of Majoo was sparked by the awareness of the founder, Adi Wahyu Rahadi, about the need for MSMEs for efficient and affordable solutions, after seeing expensive solutions from large companies. Together with his colleagues, Audia Rizal Harahap and Bayu Indriarko, who have more than 20 years of experience in the MSME business, they created Majoo as an easy-to-implement platform, providing a complete solution for sales recording, employee management, financial reports, inventory, and business analysis. By focusing on feature development and innovation, Majoo continues to provide solutions that support the growth and sustainability of MSMEs in Indonesia at an affordable price (Saputra, 2024).

Pawoon is known for its superior performance expectations among other attributes. Pawoon is a cloud-based cashier application that allows users to monitor and manage sales in real time from anywhere, which is very useful for MSMEs. Developed by Ahmad Gadi, who has experience in the international food industry, Pawoon is designed to provide affordable technology solutions, especially for small to medium-sized businesses. One of its advantages is the 14-day free trial feature, which allows users to try all features at no cost. After the trial period, users can continue using the application at the free level to accept transactions. The application is also equipped with advanced features, such as sales reports that can be accessed anytime via laptop or mobile phone, integration with various digital payment methods such as OVO, GoPay, Dana, and LinkAja, and the ability to sell phone credit and data packages. Pawoon is designed for various businesses, including restaurants, cafes, retail stores, and many others, making it a flexible cashier solution. Furthermore, Pawoon provides a customer support team ready to help via chat or email and access to tutorials and videos to maximize the application's use. With various superior features and strong support, Pawoon continues to support the progress and sustainability of MSME businesses in Indonesia (Rapihin.id. 2025).

This is Pawoon's advantage compared to Moka Pos, Majoo, Olsera, and Kasir Pintar. Therefore, Pawoon's advantages can be used to attract people who want to invest in the application. On the other hand, Pawoon must create the right strategy to respond to competition with other Point of Sales (PoS) applications. One strategy Pawoon implements is focusing on increasing performance expectations by developing features that increase the efficiency and productivity of its users' businesses. One key innovation is an inventory management system that allows real-time stock monitoring so businesses can ensure the availability of the right products for customers. In addition, Pawoon provides integration with various leading digital payment methods, such as OVO, GoPay, Dana, and LinkAja, facilitating transactions and expanding customer payment options. A comprehensive sales reporting feature is also provided, allowing business owners to analyze sales data and make more informed decisions (Pawoon, 2025).

Pawoon also continues to innovate to meet the needs of modern businesses. One of the latest innovations is an employee attendance feature that utilizes facial recognition technology through photos, improving security and accuracy in attendance management (Pawoon, 2025). Furthermore, Pawoon has been implemented at the Jakarta Premium Outlet (JPO), helping merchants in the F&B and retail sectors with a practical and efficient cashier system. Pawoon also adopts innovations such as integration with e-commerce platforms, using artificial intelligence (AI) and mobile payment support, and providing advanced data analytics features to improve the efficiency and effectiveness of its users' businesses. Through these various innovations, Pawoon is committed to continuously supporting business development in Indonesia (Unisbank, 2024).

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Olsera is known for its superior trustworthiness among other attributes. Olsera is a cloud-based cashier application trusted by over 85,000 entrepreneurs in over 500 cities and regencies in Indonesia. This application offers superior features, such as inventory management, online and offline transaction processing, and integration with various digital payment methods, including QRIS and e-wallets. With a user-friendly interface and 24/7 customer service, Olsera is committed to supporting the advancement of MSME businesses in Indonesia (Olsera, 2025). This is Olsera's advantage compared to Moka Pos, Majoo, Pawoon, and Kasir Pintar. Therefore, these advantages can be used to attract public interest in using the application.

In addition, Olsera must develop the right strategy to respond to competition from other Point of Sales (PoS) applications. One strategy Olsera has implemented is to increase user trust. One significant step is the provision of easy-to-understand transaction reports that can be accessed anytime, providing valuable insights for users' business strategies. Furthermore, Olsera offers a multi-branch management feature that allows centralized monitoring of outlet operations through a single application, allowing users to oversee their business more efficiently without visiting each branch in person (Olsera, 2024).

Research conducted by Rosulliya et al. (2023) also states that using Olsera in cafe management operations is very important. Olsera can be operated via computer, laptop, and even mobile phone, making it easier for cafe owners to control transactions in their cafe. Implementing Olsera can improve control of cashier transaction access, thereby reducing the risk of inaccurate financial records. By providing a transparent and easily accessible system, Olsera has built user trust, making it the primary choice for many business owners in managing their operations.

Kasir Pintar is known for its superior trustworthiness among other attributes. Kasir Pintar is a cloud-based cashier application used by over 1.5 million MSMEs in Indonesia, offering a complete solution for sales transactions and reporting. The application is designed for various businesses, including F&B, services, online stores, retail, and more. With its user-friendly interface, Kasir Pintar facilitates the management of sales transactions, inventory management, and the preparation of accurate financial reports (Skrol.id, 2021). One of Kasir Pintar's superior features is its ability to record financial transactions, including purchases and sales, and prepare profit and loss reports. This allows business owners to monitor financial performance in real time and make more informed decisions.

In addition, Kasir Pintar provides inventory management features that allow users to manage stock efficiently, reducing the risk of stockouts or overstocking (Post, 2020). To increase customer loyalty, Kasir Pintar offers a loyalty points program that can be used to provide discounts or rewards to loyal customers. This feature helps businesses retain customers and encourage repeat purchases. Furthermore, this application supports digital payment transactions by integrating various payment methods, including OVO, GoPay, Dana, LinkAja, and QRIS, making it easier for customers to make payments (Kasir Pintar, 2025). Kasir Pintar also provides a PPOB (Payment Point Online Bank) feature that allows businesses to pay various bills, such as mobile phone credit, electricity, BPJS, and PDAM, directly through the application. This feature not only increases business revenue sources but also increases customer convenience. With various comprehensive features and affordable prices, Kasir Pintar continues to strive to support the growth and sustainability of MSMEs in Indonesia (Kasir Pintar, 2025).

Kasir Pintar must develop appropriate strategies to respond to competition from other Point of Sales (PoS) applications. Kasir Pintar has adopted various strategies to increase user trust. One key approach is providing high-quality service, ensuring that the products and services offered meet or exceed customer expectations. Furthermore, transparency in business is also implemented, where Kasir Pintar is open about operational processes, costs, and

DOI: 10.37531/amar.v5i2.3101

company policies, so that customers feel more confident and comfortable using their services (Kasir Pintar, 2023b). Kasir Pintar maintains consistency in brand messaging and communications, ensuring that information conveyed through various marketing channels is aligned and clear. This helps build a strong and trustworthy brand image in customers' eyes. Furthermore, the company actively builds good relationships with customers through various initiatives, such as training and collaborative events, which provide added value for users and demonstrate Kasir Pintar's commitment to supporting their business development (PT Kasir Pintar Internasional, 2025).

To further enhance customer trust, Kasir Pintar also utilizes trust badges on its platform. These badges include security certificates, awards from trusted institutions, guaranteed delivery reliability, and positive reviews from previous customers. The appearance of these trust badges on the Kasir Pintar website and app provides concrete evidence of the company's credibility and service quality, increasing customer trust and encouraging sales conversions (Kasir Pintar, 2023a). By implementing these strategies, Kasir Pintar has successfully built and maintained a high level of user trust, making it the preferred choice for many businesses to manage their operations.

Findings

The findings of this study provide an in-depth overview of MSMEs' perceptions of Point of Sales (PoS) applications. Based on Multidimensional Scaling (MDS) analysis, the perception map shows clear differentiation in consumers' minds, reflecting each application's unique positioning strategies. This analysis identifies the Trust attribute as the main differentiating factor in Dimension 1 and Effort Expectancy in Dimension 2. This confirms that MSMEs' adoption decisions are not based solely on a single factor, but on a combination of ease of use and system reliability.

Specifically, the Moka POS and Pawoon apps are in close clusters, indicating tight competition in terms of perception. Both are perceived strongly on the Effort Expectancy and Performance Expectancy attributes, meaning consumers perceive these apps as easy to use and effective in improving their business performance. This is supported by research showing that Moka POS users, particularly MSMEs, experience tangible benefits in transaction recording and financial management. For MSMEs, these findings suggest that Moka POS and Pawoon are ideal for businesses prioritizing operational efficiency and increased productivity.

Meanwhile, Majoo has uniquely positioned itself with its strong Task Fit attribute. This application is perceived as highly suited to specific business operational needs, making it an effective solution for completing daily tasks for MSMEs. Meanwhile, Olsera and Kasir Pintar stand out in terms of Trust. Consumers have a high level of Trust in these two applications, especially regarding transaction security and data protection, for MSMEs that prioritize Trust and security, Olsera and Kasir Pintar are the top choices.

CONCLUSIONS

Based on Multidimensional Scaling (MDS) analysis, this study successfully answered the research question (RQ) by showing that each PoS application positions itself uniquely in the minds of consumers based on different attributes. Key findings also show that Moka POS and Pawoon are strongly perceived for their effort and performance expectancy attributes, placing them as leaders in ease of use and effectiveness in improving business performance. Meanwhile, Majoo stands out with its superiority on the Task Fit attribute, indicating that consumers perceive this application as highly suited to their business operational needs. On the other hand, Olsera and Kasir Pintar successfully position themselves as the most trustworthy and reliable options based on the Trust attribute.

DOI: 10.37531/amar.v5i2.3101

The significance of these findings is significant for stakeholders. For PoS application providers, these findings serve as a strategic roadmap for formulating more effective marketing and product development strategies, focusing on their target market's most valued attributes. On the other hand, for MSME owners, these research results provide clear guidance for selecting PoS applications that best align with their business priorities, whether efficiency, functional suitability, or security. Thus, this research not only enriches our understanding of market dynamics but also makes a significant practical contribution to the digital business ecosystem in Indonesia.

Theoretical Implication

The findings of this study significantly contribute to the theoretical understanding of consumer behavior in the context of technology adoption. Specifically, this study tests and extends the application of the Unified Theory of Acceptance and Use of Technology (UTAUT) by integrating a marketing perspective, namely positioning. By mapping consumer perceptions, this study shows that technology adoption attributes derived from UTAUT, such as Performance Expectancy, Effort Expectancy, and Trust, not only predict usage intentions but also fundamentally shape a brand's competitive position in the minds of consumers. This approach enriches existing theory by bridging adoption studies focusing on internal user aspects with broader market competitive dynamics.

Furthermore, this study provides theoretical insights into the weight and relevance of these attributes in specific industry contexts. This study demonstrates the importance of Trust and Effort Expectancy attributes in PoS system adoption, particularly in the F&B sector. These findings suggest that the universal validity of UTAUT needs to be interpreted by considering the unique characteristics of each industry and target market. This confirms that the UTAUT model may need to be modified or enriched with relevant contextual variables for future research to provide greater predictive power and a more accurate understanding of consumer behavior.

Managerial Implication

The findings of this study provide valuable managerial implications for MSME owners and Point of Sales (PoS) application providers, particularly in the F&B sector. For MSMEs, understanding this perception map is key to strategically selecting the tools that best suit their business needs. If operational efficiency and increased productivity are top priorities, applications like Moka POS and Pawoon are recommended due to strong consumer perceptions of the performance expectancy attribute. Both applications are considered capable of helping MSMEs manage their businesses more effectively and efficiently, from recording transactions to financial reporting.

Conversely, for MSME owners who focus on matching app functionality to specific business tasks, Majoo is a more appropriate choice. Consumer perceptions indicate that this app excels in task fit, meaning its features are considered highly suitable for simplifying daily operations such as inventory management and sales reporting. This implication helps MSME managers consider popularity and functional fit as key considerations.

Furthermore, the findings recommend Olsera and Kasir Pintar for businesses that prioritize security and reliability. Both applications are perceived as strong in the trust attribute, which is crucial for managing sensitive transaction data. Managers' investment decisions in PoS applications should be based on aligning these attributes with the company's core values and operational needs to ensure efficient and reliable service.

Limitation and Future Research

This study has several important limitations to consider. First, the study focuses on the food and beverage (F&B) sector and evaluates specific attributes of PoS systems. This limits

DOI: 10.37531/amar.v5i2.3101

the generalizability of the findings to other industries, such as retail, service, or e-commerce, which may prioritize different attributes when selecting a PoS application. Second, the study did not include other factors that are also significant in technology adoption decisions, such as cost, user training, customer support, and system integration. The absence of these factors in the analysis could hinder a more holistic understanding of consumer behavior.

Based on these limitations, there are several possible future research directions. Future research could explore other industry sectors to validate whether the attributes deemed important in this study (such as Trust and Effort Expectancy) are also universally relevant across industries. Furthermore, future studies could incorporate cost, user training, and customer support effectiveness to provide a more comprehensive picture of the factors influencing PoS system adoption. In-depth investigations into the role of system integration and interoperability between PoS applications and other platforms could also be promising areas to enrich our understanding of the complex technology adoption landscape.

Acknowledgment

The authors would like to express their gratitude to the study participants and the anonymous reviewers for their valuable feedback, which greatly enhanced the quality of this research.

Author Contribution

Author 1: conceptualization, writing original draft, data curation, formal analysis, investigation, methodology.
Author 2: review and supervision

Financial Disclosure

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declare that there are no conflicts of interest concerning this study.

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