Revitalization Strategy for Traditional Markets Using Market Basket Analysis (AR-MBA) And Service Quality (SERVQUAL) Approaches

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ABSTRACT

The rise of modern markets in Purwokerto provides benefits such as diverse shopping options and increased competition in pricing and services. However, this trend negatively impacts traditional markets, which are experiencing a decline in customers. Understanding customer behaviour and needs is essential for enhancing the competitiveness of traditional markets. The AR-MBA method analyses shopping behaviour by identifying frequent item set combinations. The findings from the AR-MBA analysis can inform business strategies, including promotions, market re-layouts, and marketing campaigns aimed at boosting sales in traditional markets. To enhance competitiveness, traditional markets must be revitalised by improving service quality. A Servqual Model analysis will assess the gap between customer expectations and the current state of these markets. This study aims to restore the vital role of traditional markets by enhancing service quality to compete effectively with modern markets. This research is important for policymakers and market managers as it provides insights that can be used to formulate effective strategies to strengthen the competitiveness of traditional markets and ensure local economic sustainability. This strategy enhances customer convenience by positioning frequently purchased items close together based on the Association Rule analysis. It encourages impulse buying, as shoppers are likelier to notice complementary products. Additionally, a sales strategy focused on bundling products can increase perceived value and motivate customers to purchase more items together, ultimately leading to higher sales and a better shopping experience. By maintaining high-performing areas while addressing gaps in service quality, traditional markets can remain strong competitors against modern retail outlets.

Keywords: *Traditional market, revitalise, AR-MBA, shopping behavior, Market layout, Servqual Model,*

Introduction

Traditional markets are vital to Indonesia's economy and culture, supporting millions of small traders and providing affordable goods. [1]. They drive local economies by distributing agricultural and craft products and stabilising prices and supplies. Culturally, they embody Indonesia's bargaining traditions and social interactions, where direct connections foster relationships and community ties. Often hosting cultural events, these markets serve as social hubs. [2]. Revitalising them is crucial not only for economic reasons but also to preserve cultural heritage and social values.

Traditional markets in Indonesia are increasingly struggling against the fierce competition posed by rapidly expanding modern markets. A study by AC Nielsen stated that modern markets have grown by 31.4%. At the same time, the growth of traditional markets has declined by 8% per year. [3][4]. These modern markets offer innovative sales models, superior services, and amenities that attract growing consumers. As buyers gravitate towards the convenience and enhanced shopping experiences in modern markets, traditional markets risk losing their long-standing appeal. This shift is particularly concerning given that traditional markets have historically been vital for local economies, serving as essential hubs for purchasing daily necessities. If traditional markets do not adapt to these changing consumer preferences, they may face significant challenges in retaining their customer base and relevance in the marketplace. [5].

The growing number of modern markets offers customers a broader range of shopping options. Competition between traditional and modern markets has led to better pricing and services [6]. However, this trend has also posed challenges for traders in traditional markets, as they face fewer customers.

Traders at Proliman Market in Purwokerto have felt the impact of a recent drop in visitors, which has directly affected their income. Data from the Indonesian Market Traders Association (APPSI) indicates that the number of traditional market visitors has decreased by up to 80%. The Central Statistics Agency (BPS) also reported a decline in visitors to traditional markets of around 15% to 20% each year since 2020 [7].

This situation has worsened with modern shopping centres near the traditional market opening. It highlights a shift in consumer preference towards modern markets, creating even greater challenges for traditional markets to maintain their appeal and competitiveness. There are several modern market locations near Proliman Market, including Indogrosir (1.6 km away), Rita Supermall (2.1 km), Swalayan Aroma (1.3 km), and Berkah Jaya Swalayan (1.4 km). Like traditional markets, modern markets and supermarkets offer the same products found in traditional markets but with a more comprehensive selection of household goods and kitchen essentials (vegetables, meat, fish, spices, fruits, and more), along with improved facilities and services.

Traditional markets hold advantages, as they offer more affordable products and allow for price negotiation. However, they are often viewed negatively due to disorganised vendor arrangements, untidiness, poor product quality, unfriendly service, and safety issues such as pickpocketing and extortion. In contrast, modern markets excel in various aspects, such as offering a wider range of products, providing a more comfortable shopping environment, better product organisation, effective promotional strategies, and professional human resources. [8]Modern markets also better understand customer needs, enabling them to offer superior service and implement effective marketing strategies to attract customers.

If these issues are not addressed, traditional markets will continue to lag and risk losing their loyal customer base. Should traditional markets fail to adapt to the changing times and improve their competitiveness, there is a significant risk of losing the distinctive cultural identity and uniqueness that have long been their primary attraction. Traditional markets are places for commerce and are integral to cultural heritage, reflecting the local community's habits, values, and traditions. The inability to compete with modern markets may result in losing key elements, such as the close social interactions between vendors and buyers, the authentic market atmosphere, and the variety of unique local products.

Understanding customer behaviour and needs is essential for enhancing the competitiveness of traditional markets. [9]. This knowledge can be used to develop business strategies to increase sales for market vendors, including promotional strategies, market re-layouts, and marketing campaigns. The government's role in revitalising traditional markets to enhance their competitiveness is crucial, particularly by creating clean markets that avoid the impression of being run down. Proliman Market in Purwokerto has an advantage as it already possesses good infrastructure; however, the vendor arrangement is not well-organized, leading to a sense of disorder or being "messy."

Rearranging the market layout is important for improving sales effectiveness by making it easier for customers to find the products they need [10]. The layout design should consider customer shopping patterns to allow them to locate the items they are looking for quickly. [11]. A well-organized vendor arrangement also creates a positive impression, enhancing the shopping experience for customers in traditional markets.

Several researchers have previously applied the AR-MBA method. For example, Andung [12] used AR-MBA to determine the layout of vegetable stores, while Indah [13] AR-MBA was also utilised to optimise the arrangement of vegetable products. Kalijaga and Swardhana [14] Combined the Analytical Hierarchy Process, Clustering, and AR-MBA to develop supermarket marketing strategies. Wibowo et al. [15] Used AR-MBA to analyse supermarket purchasing decisions, as did Ibrahim et al. [16] Applied it to formulate marketing strategies for these stores. Mustofa [17] Employed AR-MBA to devise product bundling strategies in mini markets.

Based on the literature review, AR-MBA is widely used in minimarkets and retail stores to analyse product purchasing decisions, leading to the development of sales bundling strategies, promotions, and store layout designs. In this study, the researcher will apply AR-MBA to propose a layout for traditional markets, distinguishing it from previous research focusing on minimarkets and supermarkets. While earlier studies mainly offered recommendations on layout and sales strategies, they often neglected service quality improvements. Consequently, this research will also analyse customer needs using the ServQual method to identify enhancements that can increase public interest in shopping at traditional markets. [18]. This approach aims to provide new insights into improving the appeal of traditional markets compared to modern retail.

Research Methods

The research was conducted at Proliman Market in Purwokerto, Banyumas Regency. This study focuses on improving the market layout, developing effective promotional strategies, and enhancing service quality to align with customer purchasing behaviour and expectations for traditional markets. By analysing these aspects, the study aims to identify key areas for improvement that can increase customer satisfaction and attract more visitors to the market. Ultimately, the research seeks to provide actionable recommendations that will help traditional markets better meet the needs of their customers while remaining competitive in a changing retail landscape.

Data Collection Technique

This study uses the Incidental Sampling technique to select respondents for the Market Basket and ServQual questionnaires based on chance encounters. This method enables quick and cost-effective data collection, especially in situations where access to a predefined population is difficult, while also allowing for diverse perspectives from respondents who might be hard to reach through other methods. However, this technique may introduce biases. Relying on chance encounters can lead to overrepresenting certain groups and underrepresenting others, potentially skewing results. This bias can limit the generalizability of the findings, as the sample may not accurately reflect the overall population. [19].

Therefore, caution is necessary when interpreting the results, and future studies should consider more systematic sampling methods to enhance the robustness of their findings. The suitability criteria refer to individuals in the community who shop for products at Proliman Market in Purwokerto. The sample size for this study is determined using the following formula [20]:

$$n = \frac{N}{1 + N\,(d^2)} \tag{1}$$

This study requires transaction data from buyers (MBA) and assessments of customer expectations and perceptions regarding the Proliman Market based on quality dimensions (Servqual) of the market's services, including Reliability, Assurance, Tangible, Empathy, and Responsiveness. [21]. Under Reliability, vendors create a friendly atmosphere for customers (Item 1) and offer guarantees for defective products (Item 2), ensuring customer trust and satisfaction. For Assurance, vendors maintain product cleanliness (Item 3), engage with customers in a friendly manner (Item 4), and demonstrate knowledge about their products (Item 5), which helps in addressing inquiries and offering appropriate recommendations. Tangible aspects focus on physical elements such as convenient parking (Item 6), making the market easily accessible, and vendors presenting themselves professionally to create a positive first impression (Item 7). Regarding Empathy, the market's strategic location provides easy access (Item 8), while satisfactory service involves prompt responses and attentive assistance (Item 9). Lastly, Responsiveness is demonstrated through vendors informing customers about the condition of products (Item 10), offering suggestions based on their expertise (Item 11), and welcoming customers with an approachable demeanour (Item 12). These practices contribute to a positive shopping experience, meeting various customer expectations.

Data Analysis Technique

The research data will be analysed using AR-MBA and the ServQual Model. AR-MBA will analyse customer transaction data to enhance vendor layout and sales strategies. The ServQual Model will assess customer expectations and perceptions of the Proliman Market. The results of the analysis will help identify necessary improvements in market services.

1. AR-MBA Process

Data transaction analysis using the AR-MBA technique requires several processes, such as [22]:

a) Data Reduction

In this process, unnecessary or irrelevant data is filtered out, leaving only the essential information needed for analysis. This step helps to simplify the data set and improve the efficiency of the analysis.

b) Data Integration

This step combines data from different sources to create a unified data set. The integration ensures that all relevant data is consolidated, providing a comprehensive view for analysis.

c) Data Transformation

The final step involves converting the data into a suitable format for analysis. This may include normalising the data, encoding categorical variables, or creating new variables based on existing data to prepare it for the AR technique.

d) Assocotion Rule Analisys

The association rule model used in this study is the FP-Growth algorithm, which efficiently analyses large datasets by constructing a compact frequent pattern tree (FP-tree) instead of generating

candidate itemsets like the Apriori algorithm. This approach enables faster processing, making it ideal for market basket analysis with extensive transactions and complex patterns [23]. To understand the relationships within each transaction, it is crucial to determine the values of support and confidence. Support refers to the percentage of combinations of items, while confidence indicates the strength of the relationship between items in associative rules [24]. The calculations for support and confidence are as follows [24]:

$$Support\ (A, B) = \frac{Number\ of\ transactions\ containing\ items\ A\ and\ B}{Total\ Transaction} \tag{2}$$

$$Confidence = P\ (A \mid B) = \frac{Number\ of\ transactions\ containing\ items\ A\ and\ B}{Total\ Transactions\ containing\ item\ A} \tag{3}$$

An association rule is acceptable if the lift ratio exceeds 1. This ratio evaluates the strength of the rule by comparing the likelihood of the antecedent and consequence occurring to their supports. The Antecedent is the rule's premise, while the Consequent is the conclusion [20]. The following equation gives the lift calculation [25].

$$Lift\ Ratio = \frac{Confidence}{benchmark\ confidence} \tag{4}$$

e) Creating a layout proposal and sales strategy based on the results of the AR - MBA analysis

Rearranging the market layout is important for improving sales effectiveness by making it easier for customers to find the products they need, specifically by placing frequently purchased items close together based on the results of the Association Rule analysis [26].

2. ServQual Process

a) Questionnaire Validity and Reliability Tes

The questionnaire validity test aims to assess how well it measures what it intends to measure. Validity ensures that the questionnaire results are reliable for answering research questions or measuring the targeted variables [27]. The following equation gives the validity test:

$$r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{\left(N \sum X^2 - (\sum X)^2\right)\left(N \sum Y^2 - (\sum Y)^2\right)}} \tag{5}$$

Explanation:

r = the correlation coefficient between the item score and the total score

N = the number of respondents

X = the item score

Y = the total score

$\sum$ = summation symbol

A questionnaire item is considered valid in validity testing if the calculated R value (R Hitung) is greater than the critical R value from the table (R Tabel). This comparison ensures that the item accurately measures the intended construct and contributes meaningfully to the overall score [27].

Reliability testing is used to evaluate the consistency and dependability of a research instrument, such as a questionnaire, in measuring a variable. This process ensures that the instrument produces consistent results across different times and situations under the same conditions. [28]. The following equation gives the reliability test:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum \sigma_{item}^2}{\sigma_{Total}^2}\right) \tag{6}$$

Explanation:

α = Cronbach's Alpha value

k = number of items in the instrument

σ^2 item = variance for each item

σ^2 total = total variance of the entire instrument

The questionnaire results are reliable if the Cronbach's Alpha (α) value is greater than 0.7. This indicates a good internal consistency among the items in the questionnaire. If the α value is less than 0.7, the questionnaire needs to be revised to improve its reliability [28].

b) Calculation of Servqual Value

To calculate the ServQual value, customers' expectations and perception scores regarding the Proliman Market are first determined. These scores are obtained by calculating the average response for each item in the questionnaire. Next, the Gap value (ServQual Scores) is calculated using the formula. [29]:

$$SQi = P - E \tag{7}$$

Explanation:

SQi = Gap value for the question i

P = Perception score

E = Expectation score

c) Calculation of Service Quality
   The Besterfield formula is used to assess the quality of service provided by the company. If Q≥1, the service quality is considered good, while if Q≤1, the service quality is considered poor. The calculation formula is as follows [30]:

$$Q = \frac{P}{E} \qquad (8)$$

Explanation:
   Q   = Service Quality
   P   = Perception score
   E   = Expectation score

d) Importance-Performance Analysis (IPA)
   Importance-Performance Analysis (IPA) is a strategic management tool that assesses how effectively an organisation meets customer expectations. The IPA diagram visually illustrates the importance and performance of various attributes or services, facilitating the identification of areas that require improvement [31].

Results and Discussion

Determination of Sample Size for Market Basket and ServQual Research
   The average number of transactions at Pasar Proliman is 500 per day or 15,000 per month. The sample size is determined using the formula (1). With a margin of error of 10%, the minimum sample size calculated is 99.36, rounded up to 100. Therefore, the minimum required sample size is approximately 100 people. Based on this calculation, at least 100 shoppers at Pasar Proliman Purwokerto are needed for data collection, which will take place over one month, from July 29, 2024, to August 31, 2024. The questionnaire will be distributed only to visitors carrying shopping bags. Respondents will receive a souvenir as a token of appreciation to encourage participation. Data collection will occur from 7:00 AM to 9:00 AM, as the market becomes less crowded afterwards. 200 completed questionnaires were collected, exceeding the minimum required sample size.
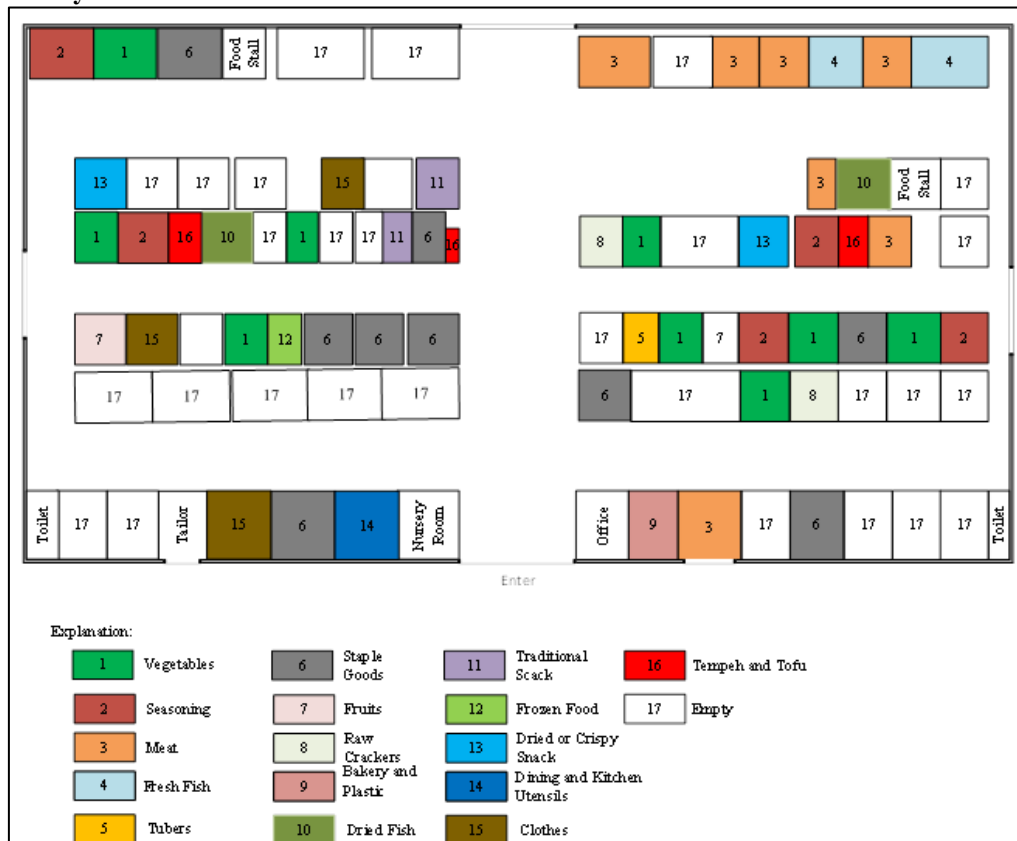
Initial Layout of Pasar Proliman

Figure 1. Initial Layout of Proliman Market

From the initial layout of Pasar Proliman in Figure 2, it can be seen that the arrangement of vendors is still not well-organized, and there are many empty stalls due to a low number of customers.

Market Basket Analysis Process
A. Data Reduction

Data reduction in market basket analysis involves simplifying and summarising data to make it more manageable and relevant for analysis. Table 2 illustrates data reduction.

Table 1. Data Reduction

No Respondent	Purchased Products
1	Cesim, cabbage, orange, papaya, tofu
2	Eggs, long beans, cassava, crackers, rice cakes.
…	…
200	Spinach, lemongrass, papaya, turmeric, ginger, tofu.

B. Data Integration

Data integration in market basket analysis involves combining data from various sources to create a unified dataset, providing a comprehensive view of consumer behaviour and purchasing patterns. The marketplace is divided into several departments offering a variety of products. Dept 1 provides fresh vegetables, while Dept 2 sells seasonings. Dept 3 offers meat and Dept 4 has fresh fish. Dept 5 features tubers and Dept 6 provides necessities. Dept 7 is dedicated to fruits, whereas Dept 8 sells raw crackers. Dept 9 offers bakery items and plastic products, and Dept 10 sells dried fish. Dept 11 features traditional snacks, while Dept 12 provides frozen food. Dept 13 offers dried or crispy snacks. Dept 14 supplies dining and kitchen utensils. Dept 15 sells clothing, and Dept 16 focuses on tempeh and tofu. This structure makes it easy for customers to find products that fit their needs. Data integration is illustrated in Table 2.

Table 2. Data Integration

No Resp	Item Set				
1	Dept 1	Dept 7	Dept 16		
2	Dept 1	Dept 5	Dept 6	Dept 8	Dept 11
…	…	…	…	…	…
200	Dept 2	Dept 3	Dept 7	Dept 16	

C. Data Transformation

Data transformation in market basket analysis involves converting data into a suitable format for analysis to enhance its usability and relevance. Table 3 illustrates data transformation.

Table 3. Data Transformation

No Resp	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16
1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
2	1	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
200	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1

D. Association Rule (AR) using RapidMiner Studio.

Association rule mining in Rapid Miner involves discovering interesting relationships or patterns within datasets, typically used in market basket analysis. According to Park [24]A higher confidence value indicates a stronger association rule, deemed valid when the lift ratio exceeds 1. In this study, the minimum confidence threshold set is 0.8, enhancing the robustness of the association rule. The data shows connections between different departments and purchases in Dept 1 (fresh vegetables). Dept 16 (tempeh and tofu) has the highest support (0.39) and good confidence (0.804), indicating frequent shopping overlap with Dept 1. Other departments, like Dept 13 (crispy snacks) and Dept 12 (frozen food), show similar patterns with confidence levels around 0.8. Combinations of departments, such as **Dept 16 and Dept 8** (raw crackers), also have high confidence (0.833). Stronger associations appear with **Dept 10** (dried fish) and **Dept 5** (tubers), showing confidence above 0.84. The strongest links are seen in combinations like **Dept 16 and Dept 10**, where confidence reaches 1.0, indicating a high likelihood of buying fresh vegetables along with these items. This suggests that customers in certain

departments are more likely to buy fresh vegetables. Based on this analysis, the proposed layout for Proliman Market is as follows:
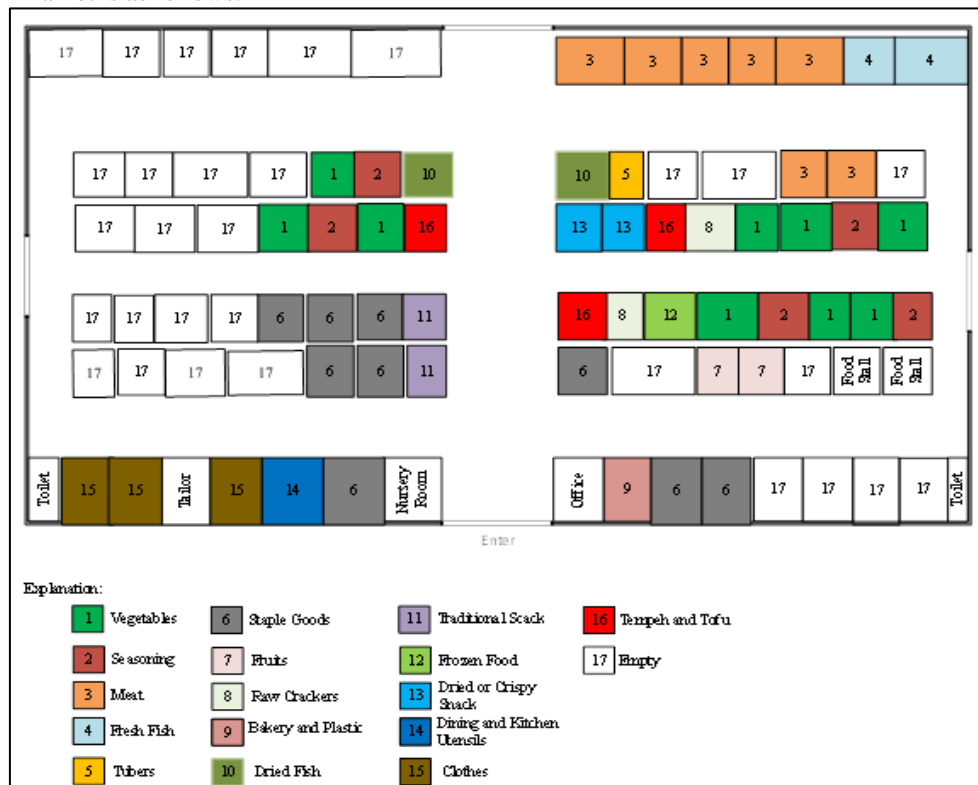

Figure 2. Proposed Layout for Proliman Market

Strategically positioning departments based on association rule results allows customers to find products more easily, leading to a smoother shopping experience. Research shows that increased accessibility is linked to higher customer satisfaction and sales. The "Retail Space Management" theory supports the idea that optimal product placement not only aids product discovery but also encourages impulse buying, boosting overall sales capacity. [32]. The study's findings highlight the benefits of combining related products consistent with consumer behaviour and retail strategy research. Product adjacency enhances convenience and encourages impulse buying, as customers are likelier to notice complementary items. [33]. This arrangement simplifies decision-making and creates opportunities for additional purchases. For example, when related products are placed nearby, customers may consider items they hadn't planned to buy, increasing their total spending. [34].

To capitalise on this, vendors can collaborate on sales bundles, such as pairing vegetables with tofu, spices, frozen food, or cooking oil. This reflects successful bundling practices seen in other retail environments. [35]. Association Rule Mining and Market Basket Analysis (AR-MBA) in this study confirms findings from previous research on the importance of product placement and bundling for sales growth. [36]. Our results, in line with other studies, demonstrate the broad applicability of AR-MBA in improving retail strategies. The findings emphasise that strategic product placement and bundling are key to enhancing customer experiences and boosting sales in traditional markets. By adopting these strategies, market vendors can stay competitive with modern retail outlets, ensuring growth and customer satisfaction.

Improving Service Quality in Traditional Markets Using the Servqual Approach

In addition to Market Basket data, this study analyses customer evaluations of service quality in traditional markets based on dimensions of customer quality (Table 1). A total of 200 completed questionnaires were collected, with validity and reliability test results using SPSS software; it was found that all calculated values (Calculated R) > table values (R table). Therefore, all questionnaire items are considered valid. The reliability test results show that Cronbach's Alpha value is greater than 0.7, indicating that the entire questionnaire is reliable.

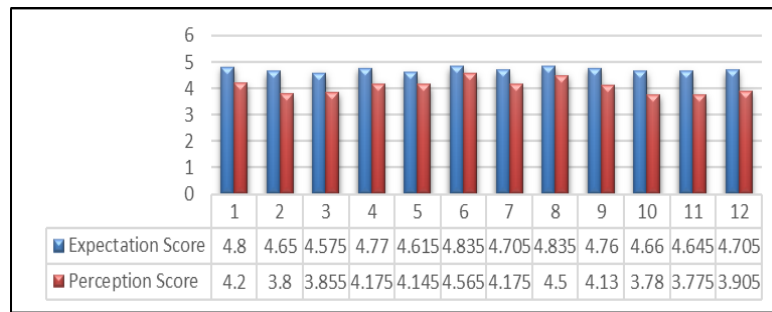**A. Calculation of Servqual Value**

Figure 3. Gaps in Service Quality

Based on the ServQual Score calculations, all items still have a negative gap, with the highest gap values found in item 10 (Vendors inform customers about the condition of the products for sale), item 11 (Vendors offer suggestions regarding products that customers are considering purchasing), item 2 (Vendors offer guarantees for defective products), and item 12 (Vendors do not appear busy when welcoming customers).
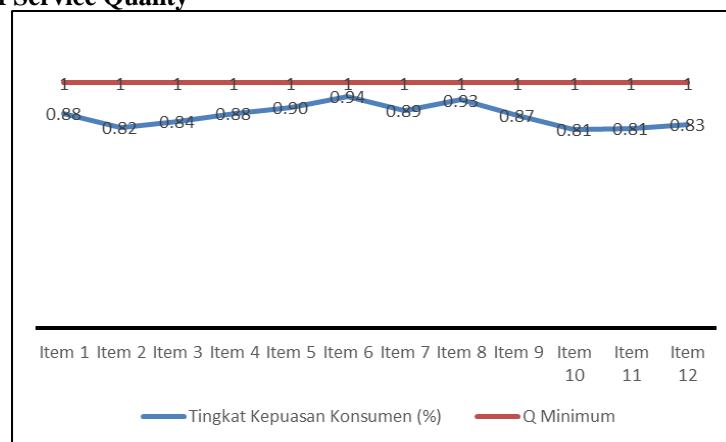
B. Calculation of Service Quality

Figure 4. Service Quality

If Q≤1, the service quality is considered poor. Since the Q values for all questions are less than 1, it can be concluded that the service quality at Proliman Market is still poor, indicating that improvements are needed.

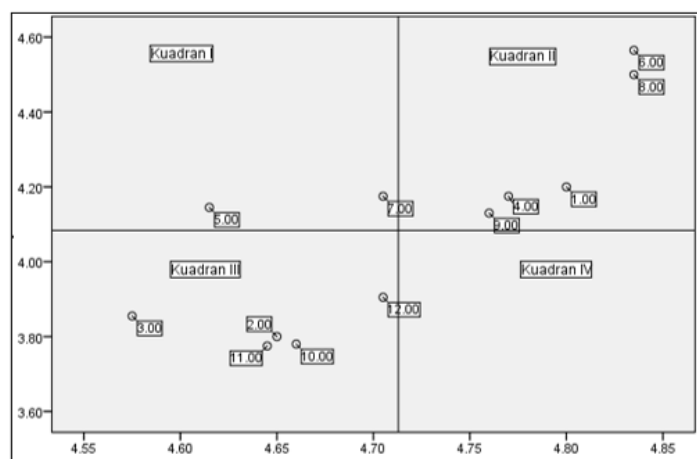## C. Importance Performance Analysis (IPA) Diagram

Figure 5. The IPA Diagram Analysis

The IPA diagram analysis identifies key factors influencing customer satisfaction across different quadrants. In Quadrant I, important attributes such as trader product knowledge (Item 5) and appearance (Item 7) are rated as unsatisfactory, indicating a need for improvement to boost customer trust and attract more visitors. Quadrant II, the maintenance performance area, includes attributes that meet expectations, such as trader friendliness and available parking, which should be preserved to sustain

high satisfaction levels. In Quadrant III, the low-priority area, factors like product guarantees and cleanliness are considered less critical but could still add value if addressed.

Key improvement areas include Trader Product Knowledge, Appearance, Friendliness, Product Guarantees, and Cleanliness. To improve Trader Product Knowledge, regular training on product features and usage and workshops can enhance traders' confidence and customer engagement. Trader's Appearance can be elevated by implementing dress codes and hygiene standards, creating a professional and welcoming atmosphere. Promoting Trader Friendliness through a customer-centric culture, with regular recognition of friendly service, helps maintain customer loyalty. Introducing clear Product Guarantee policies can assure customers of their purchases, even if not an urgent focus. Lastly, a consistent cleaning schedule and encouraging traders to tidy stalls will create a positive shopping experience, fostering repeat visits.

Conclusion

The combination of strategic market layout and focused service quality improvements offers a clear pathway to enhancing the traditional market's competitiveness. This strategy enhances customer convenience by positioning frequently purchased items close together based on the Association Rule analysis. It encourages impulse buying, as shoppers are likelier to notice complementary products. Additionally, a sales strategy focused on bundling products can increase perceived value and motivate customers to buy more items, ultimately leading to higher sales and a better shopping experience. Maintaining high-performing areas while addressing gaps in service quality will ensure the market remains a strong competitor against modern retail outlets.

Future research can greatly enhance the competitiveness of traditional markets like the Proliman Market. Key areas of focus include assessing the impact of strategic layout on sales performance by comparing sales data before and after rearranging frequently purchased items based on Association Rule analysis. Additionally, evaluating how improved service quality affects customer satisfaction through surveys will provide insights into trader knowledge and market cleanliness.

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