

Can Sales Revenue Mediate the Relationship Between Market Share and Food Waste Management Practices at Restaurants in Banyumas?

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ABSTRACT:

Indonesia, with its substantial population, faces a critical issue with food waste. The country's high food waste generation is concerning and necessitates action for sustainable development. Banyumas, a region experiencing a rise in restaurants and significant food expenditure, is particularly affected. In 2022, the restaurant sector in Banyumas emerged as the second-largest business sector, underscoring its significance and the need for focused attention. To effectively address food waste, it is crucial for restaurants to understand the interplay between sales revenue, market share, and waste management practices. This research explores the relationship between these factors within Banyumas' restaurant industry. Utilizing a quantitative approach, the study surveyed 102 restaurants in Banyumas Regency and employed SEM-PLS for model testing. Findings indicate that higher sales revenue positively influences food waste management practices, suggesting that increased income enables restaurants to better implement waste management strategies. This insight highlights the need for government efforts to enhance knowledge and coordination regarding restaurant food waste management.

Keywords:

Banyumas, Market Share, Sales Revenue, Food Waste, Restaurant

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1. INTRODUCTION

With its large population, Indonesia faces a significant food waste problem that demands urgent attention for sustainability. Food waste in this context refers to the food that consumers discard, either as leftovers or because it is no longer edible. In Indonesia, food waste accounts for approximately four to ten percent of food purchased from restaurants, a statistic that has notable implications for the food supply chain at the retail level (Saputro & Santoso, 2021). Creedon (2010) emphasizes that minimizing food waste in restaurants should be integral to waste reduction strategies within the food service industry. Variations in outlet size and characteristics can highlight opportunities for reducing waste. Generally, as the sales area, volume of purchases, and annual sales of an outlet increase, food waste tends to decrease. Higher sales are associated with less food waste, as outlets aim to reduce waste to enhance profitability. Shahijan et al. (2014) identified that barriers within the supply chain, such as retail performance issues, impact the management of food waste. Despite ongoing concerns about food waste across the global food sector (Huang & Tseng, 2020), Coşkun and Özbük (2020) noted that strong social pressure can help reduce food waste from the consumer side. Restaurants, as key players in the food supply chain, are significant contributors to food waste.

Goodman-Smith et al. (2020) highlight the need for restaurants to foster motivation and enhance understanding regarding the significance of waste reduction. This perspective underscores the potential impact of restaurants' attitudes and awareness towards food waste. Boschini et al. (2020) suggest that adjusting portion sizes is an effective preventive measure against food waste. Similarly, Dagiliūtė and Musteikytė (2019), emphasize that the quantity of food served to consumers directly influences the amount of food waste generated. The diverse array of restaurant types inevitably contributes to the generation of food waste, which can be categorized as solid, liquid, raw, or cooked, and is produced through various processes before reaching consumers (Blum, 2020). Many restaurants focus on selling their entire menu without adequately considering the waste generated by consumers (Fajri & Shauki, 2023). Restaurants often prioritize strategies that maximize profit, potentially overlooking waste reduction efforts. Challenges to minimizing waste include insufficient employee training and a lack of motivation to engage in environmentally responsible practices.

Banyumas is experiencing a significant rise in the number of restaurants and is noted for its high food consumption expenditure. Food waste constitutes approximately 36% of the total 636.28 m³ of waste in the region. Handayani (2023) reports that food consumption accounts for 24.65% of the total expenditure in Banyumas, ranking as the second-largest expense category. With restaurants becoming the second-largest business sector in Banyumas in 2022, the importance of this industry is evident. Understanding market share is crucial for restaurants as it informs strategic planning based on consumer needs. Market share reflects the proportion of business within a specific region or category and serves as an indicator of marketing performance, which can significantly enhance revenue (Suryadi et al., 2020).

This research seeks to investigate the relationship between market share, sales revenue, and food waste management practices among restaurants in the Banyumas region. Given the growing concern over food waste and its impact on the global food supply chain, this study aims to assess how performance metrics influence waste management practices and to enhance the restaurant industry's understanding and awareness of food waste issues. Additionally, the findings are intended to provide valuable insights for both restaurants and

policymakers, aiding in the development of regulatory frameworks to reduce food waste effectively.

2. LITERATURE REVIEW

2.1 Food Waste Management

Food waste includes various types of vegetables and fruits (Hartikainen et al., 2018). The primary contributors to food waste are consumer behaviors and the retail service process, as consumers play a crucial role (Huang & Tseng, 2020). Food waste presents a significant global economic, social, and environmental crisis, with the potential to exacerbate chronic hunger if not addressed. Addressing this issue is crucial for the global food chain (Giroto et al., 2018). The growing global concern over food waste will increasingly impact the food supply chain, particularly within the restaurant sector (Saputro & Santoso, 2021).

Food waste management involves strategies aimed at reducing food waste, such as donating excess food to food banks or similar organizations to aid those in need (Horoš & Ruppenthal, 2021). Effective food waste management is crucial due to the influence of consumer behavior in restaurants, which is shaped by cultural factors and the presentation or portion size of the food served (Hidayat et al., 2020). Cultural differences can lead to varying levels of food waste among residents and tourists (Filimonau et al., 2020). Therefore, it is essential for consumers to actively manage their behavior to minimize food waste. Additionally, social pressure and consumer awareness play significant roles in encouraging behaviors that reduce food waste (Coşkun & Özbük, 2020).

2.2 The Relationship Between Market Share and Food Waste Management

To enhance market position and penetrate new markets, increasing market share is essential. However, a growing market share does not necessarily correlate with increased profits (Suryadi et al., 2020). Market share influences a restaurant's performance and reputation, affecting its ability to attract new customers and retain existing ones (Su et al., 2019). Strategies to boost market share include leveraging consumer feedback through online reviews and implementing effective food waste management practices (Fernandes et al., 2021).

Aghion et al. (2017) note that market share may decline if competitors are well-received, which can impact growth in the hotel, restaurant, and retail sectors. Within the supply chain, factors such as retail performance significantly affect food waste management in restaurants. According to Shahijan et al. (2014), enhancing retail performance is crucial for understanding its impact on food waste management practices. Analyzing the relationship between market share, sales revenue, and retail performance in restaurants can provide new insights. Therefore, the following hypothesis is proposed:

H₁: Market share has a positive effect on food waste management practices.

2.3 The Relationship Between Market Share and Sales Revenue

Retail performance encompasses customer satisfaction, sales revenue, and market share, which can impact the supply chain process (Shahijan et al., 2014). Retail performance is critical because retailers directly interact with the supply chain. For instance, supermarkets address food waste through marketing strategies such as "buy one, get one" offers, which can boost sales volume, enhance consumer trust, and improve satisfaction. These practices help reduce

waste and highlight the importance of retail's role in food waste management (Pimentel et al., 2022).

Market share reflects an industry's reach and competitive strength. A large market share can attract new consumers and enhance a restaurant's performance, especially when partnered with third parties. Such alliances can provide additional support for refining marketing strategies. However, a high market share does not necessarily equate to higher profits, as consumer preferences and price fluctuations can affect profitability (Xie et al., 2022). Other profit-influencing factors include market share, restaurant size, advertising efforts, and the duration of operation (Bhattacharya et al., 2022). Therefore, the following hypothesis is proposed:

H₂: Market share has a positive effect on sales revenue.

2.4 The Relationship Between Sales Revenue and Food Waste Management

Sales revenue is the total sales income from a retail or business place. The existence of high income will generate high profits for the sustainability of a business. However, total income can affect workers' performance. It is known that the income generated has a relationship with the occurrence of food waste (Penpece & Elma, 2014). Fernandes et al. (2021) stated that maximum income is influenced by performance and decision-makers. In the process, restaurants that apply the luxury concept have high incomes in line with what is presented in the form of premium services and products (Yang & Mattila, 2016). Other things, such as product characteristics, can maximize sales by paying attention to presentation, nutrition, and portions served (Cohen & Babey, 2012). Revenue management in restaurants is carried out to increase profits, not only to increase revenue because high income does not always have high profits. The restaurant performance evaluation process is carried out with the aim of optimal revenue management (Heo, 2017). Shahijan et al. (2014) added sales revenue was mutually influenced by service quality indicators, restaurants' products or facilities, and market share.

Economic benefits can be channeled toward waste treatment. This is supported by Warshawsky (2016) who states that 40% of waste is generated due to the inefficiency of a process. The existence of an exemplary method can be utilized to improve operational efficiency through the reduction of food waste generated. Clowes et al. (2017) conveyed the financial factor in food waste reduction efforts. If the restaurant industry has high finances, it has the potential to reduce the waste that can be generated. According to Mulyani et al. (2020), restaurant growth and income can increase in line with the quality of service provided. Consumers who receive high-quality services will feel they get better value. Therefore, the following hypothesis is proposed:

H₃: Sales revenue has a positive effect on food waste management practices.

2.5 Market Share as a Mediator of the Relationship Between Sales Revenue and Food Waste Management

According to (1968), market share and price have a positive relationship that can increase the economic potential of an industry. There is a high income because the need to innovate in a restaurant can be implemented. This can identify new consumers and evaluate restaurant performance through market share. Halik et al. (2020) stated that revenue can be determined through the performance of a restaurant. Mun and Jang (2018) also said that the different characteristics of each restaurant are a task in itself to see its potential. Characteristics can be the type of service and size of the restaurant that can affect reputation, expected service, and

food quality. The existence of market share can be known from the number of visitors and revenue of a restaurant in a period.

Few restaurants compete to increase market share to get good sales revenue (Immanuel et al., 2013). Generally, a restaurant with a long operating time and a large size will also have a high market reach. In addition, restaurants that have good management will increase revenue significantly. This is supported by Kim et al. (2018) which states that high income due to market share will provide sufficient resources for food waste prevention. Dhir et al. (2020) stated that the actions of the restaurant and visitors impact the generation and reduction carried out. However, some restaurants are more aware of the impact of monetary losses and show that reducing waste to improve customer satisfaction is a top priority, not waste mitigation (Hennchen, 2019). Therefore, the following hypothesis is proposed:

H₄: Sales revenue mediates the relationship between market share and food waste management practices.

2.6 Model Framework

The conceptual model can be seen in Figure 1.

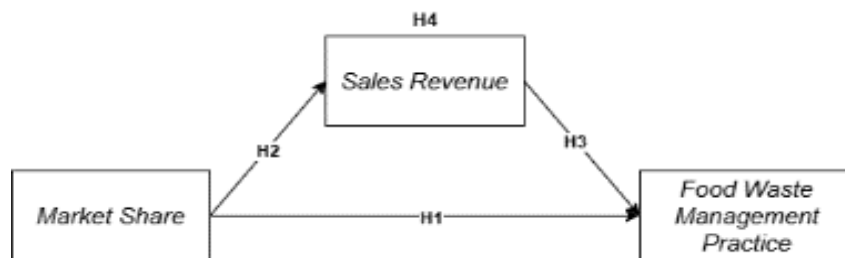


Figure 1. Conceptual Model

3. METHODS

This study employed a quantitative research method and was conducted in Banyumas Regency. There are 116 restaurants in the region (Statistics Indonesia, 2022). Using the Slovin formula, the sample size was determined to be 90, but responses were collected from 102 restaurants. Data was gathered through surveys and questionnaires, which were divided into two sections: demographic information and food waste management preferences. The demographic section collected data on gender, restaurant operational experience, owner age, address, restaurant size, type of restaurant, owner’s highest level of education, daily turnover, and operating hours. The food waste management preferences section focused on sales revenue, market share, and food waste management practices (see Table 1). The surveys were conducted face-to-face or via Google Forms. The questionnaire utilized a Likert scale ranging from one (strongly disagree) to five (strongly agree) to assess respondents’ views.

Table 1. Construct Variable

Construct	Code	Indicator
Market Share (Boschini et al., 2020; Halik et al., 2020; Hua & Templeton, 2010; Ozdemir & Caliskan, 2014)	MS1	The restaurant monitors/evaluates competitors' performance to retain customers.
	MS2	Having partnerships with other parties can attract customers.
	MS3	The existence of a unique/special menu from the restaurant can retain old customers and attract new customers.
	MS4	Having partnerships with other parties can attract customers.
	MS5	Good communication can increase customer interest.
	MS6	I am proactive and take the initiative in marketing to increase buyer interest.
Sales Revenue (Cohen & Bobey, 2012); Yang & Mattila, 2016)	SR1	The food served by the restaurant pays attention to aesthetic value, which can increase revenue.
	SR2	The restaurant serves consumers optimally regarding physical facilities and reliability, responsiveness, responsibility, and empathy.
	SR2	Higher prices than competitors can reduce customer interest.
	SR3	Setting the right price and promotion to increase sales
	SR4	The utilization of technology as a payment medium increases revenue.
Food Waste Management Practice (Chen & Jai, 2018; Sakaguchi et al., 2018; Stangherlin & de Barcellos, 2018)	FWM1	Food not consumed is given to employees or donated as animal feed.
	FWM2	Chefs have good cooking skills and less food waste.
	FWM3	The restaurant has adequate storage facilities (refrigerators).

The interviewed data was analyzed using descriptive statistics and the model analysis used SEM-PLS (Hamzah & Tanwir, 2021). SEM-PLS analyzed multivariate data based on the constructed relationship of one or more indicator variables, each measured. The SEM-PLS could maximize variance through latent variables by estimating the relationship between models. This method used a better formative parsing model even when it had a small sample size and secondary data. In addition, SEM-PLS could estimate models from average and non-normally distributed data with strong models (Hair et al., 2021). The SEM-PLS assessment is divided into model evaluation and structural model analysis.

3.1 Model Evaluation

The SEM-PLS (Structural Equation Modelling - Partial Least Square) was an approach that tests the results based on statistical values' validity and reliability test results. This approach used the results of Convergent Validity, AVE (Average Variance Extracted), and discriminant validity in the validity test and assessed the feasibility of the model with bootstrapping. SEM-PLS has two indicators, namely reflective and formative indicators. The difference between these two indicators can be seen from the direction of the causality relationship (Musyaffi et al., 2022). In the calculation of the weight of the minimum AVE is 0.5, the loading factor value, which is represented as convergent validity, is said to be of high value if the value is 0.7. Some previous studies used a minimum value of 0.5 to 0.6, which is considered sufficient. In

addition, the AVE value represents the level of consistency. If this value is valid, the construct can be regarded as reliable (Triwidyati & Tentama, 2020).

3.2 Structural Model Analysis

The structural model analysis is used to see the relationship or correlation formed and the significance value of the model that has been built. In this process, the R² adj value determined the model's accuracy between the independent and dependent variables to generate a model hypothesis. The R² Adj value was considered better because the value of the error has been corrected—this bootstrapping procedure aimed to reduce the abnormalities of the structural model created.

4. RESULTS AND DISCUSSION

4.1 Demographic of Respondents

This research examines the restaurant industry in the Banyumas area, highlighting the diverse characteristics of different restaurant types. Surveys and interviews with 102 restaurants revealed various distinctions among them. A key finding is the segmentation of restaurant locations, with 54% situated along highways, a strategic choice due to high consumer traffic. Only a few restaurants operated for less than a full day, while those open 24 hours were typically Padang stalls and similar food vendors. The study also found that 73% of respondents were aware of waste management practices, although many had not fully implemented these practices. Furthermore, the majority of restaurants had been in operation for 1-5 years, accounting for 64% of the sample, indicating significant growth in newer establishments within Banyumas. Detailed variables are presented in Table 2.

Table 2. Respondent Demography

Variable	Characteristics	N	Variable	Characteristics	N
Age	< 25 yo	17	Types	Rent	1
	26 - 35 yo	29		Food court	30
	36 - 40 yo	10		Food stall	63
	41 - 55 yo	31		Restaurant or cafe	2
	> 55 yo	13		Street food	5
Education	Elementary school	14	Year	< 1 years	5
	Junior High School	19		1-5 years	64
	Senior High School	53		6-10 years	11
	Diploma 3	3		11-15 years	14
	Diploma 4	1		> 15 years	7
	Bachelor’s degree	11		11-15 years	14
Gender	Male	42	Location	Nearby Highway	54
	Female	58		Public Facilities	29
FWM knowledge	Yes	11		School/Campus	14
	No	14		Tourist Attractions	3
	Yes	7	Turnover	<IDR 1,000,000 -	69

Variable	Characteristics	N	Variable	Characteristics	N
Delivery order	No	37		IDR 1,000,000 - 2,500,000	25
Operating hours	Half day	7		IDR 2,500,000 - 5,000,000	7
	24 hours	14			

The growth of the restaurant sector in Banyumas is also reflected in the high percentage of establishments operating for less than one year. The survey revealed that 58% of restaurant employees or owners are female, compared to 42% male, suggesting a potential area for further investigation into how gender may influence food waste management practices at the restaurant level.

Additionally, the survey aimed to assess the restaurants' knowledge, understanding, and needs regarding waste management. Qualitative responses indicated that responsibility for food waste was attributed to various stakeholders, including owners, employees, garbage collectors, customers, and even government authorities. This highlights the complexity of food waste management and the multiple perspectives on accountability within the restaurant industry.

4.2 SEM-PLS Result

SEM PLS model is used to visualize the correlation of each criterion that has been constructed; in this study, the criteria used are market share, sales revenue, and food waste management practice, which need to test convergent validity, discriminant validity, and composite reliability. The purpose of the PLS-SEM method is to maximize the latent variables of each variance through the relationship between models. The model can be run through SEM when the data is usually distributed and not strongly denormal (Hair et al., 2021).

Figure 2 shows the initial model construct. The initial construct assessment included 15 construct variables in the model. In SEM PLS, a loading factor or convergent validity value of greater than 0.5 is considered acceptable in the model (Hair et al., 2021). Two iterations of testing were conducted, eliminating construct variables with negative values to achieve a better loading factor model. Models with an outer loading value of less than 0.5 are considered less than optimal and must be evaluated or eliminated. The deleted indicators are MS1, MS2, SR2, SR5, FWM2, and FWM3. The final construct model is presented in Figure 3.

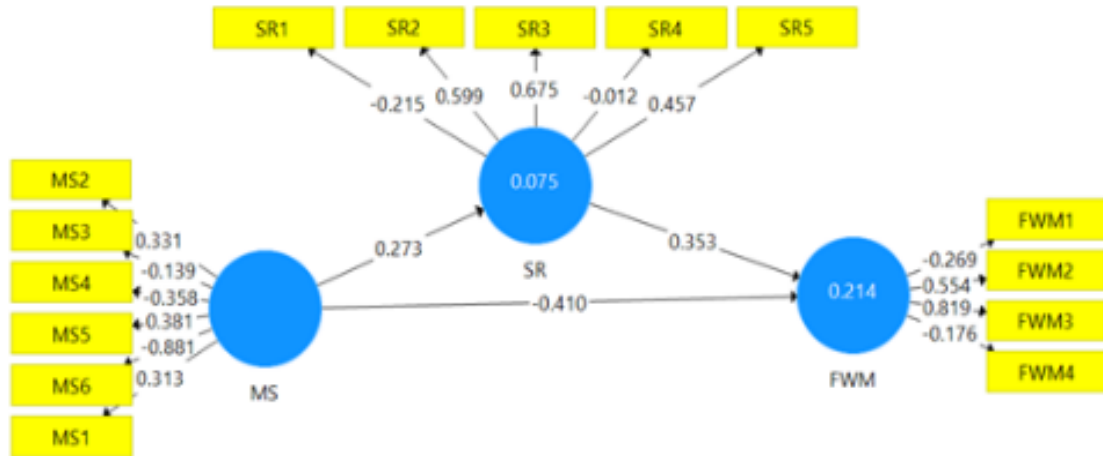


Figure 2. Initial Model

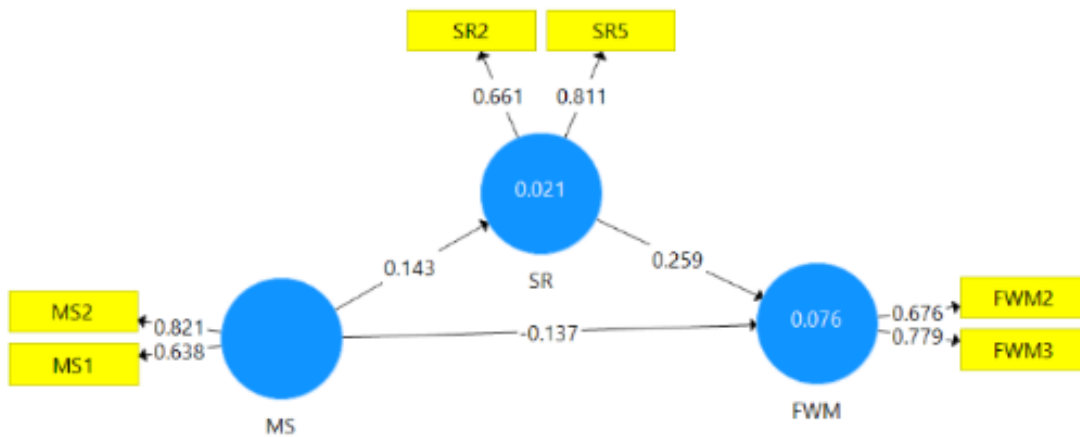


Figure 3. Final Model

Composite reliability was measured with Cronbach alpha and AVE (Average Variance Extracted). The constructed construct model's minimum consistency value is at the AVE value higher than 0.5. Discriminant validity is the test result that ensures that latent variables differ from others in its construct model. The study used the Fornell-Larcker Criterion to measure discriminant validity. In this measurement, the root value of AVE is compared, and each construct must be higher than its correlation with other latent variables. If the value of this construct is more significant than its correlation with other constructs, then the discriminant validity is accepted (Abdou et al., 2023). The result can be seen in Table 4.

Table 3. Composite Reliability, Discriminant Validity, dan AVE

	Cronbach's Alpha	Composite Reliability	AVE	Discriminant validity			R ²
				FWM	MS	SR	
FWM	0.121	0.693	0.532	0.729			0.057
MS	0.155	0.699	0.541	-0.100	0.735		
SR	0.177	0.705	0.547	0.240	0.143	0.740	0.011

The R^2 value aims to measure the strength or weakness of the prediction of the constructed construct model. The R^2 values showed the strength of the exogenous and endogenous variables. The Food waste management practice variable has an R^2 Adj value of 0.057 or 5%, which means it is weak (Legate et al., 2023). The weak R^2 value can be a new review in the future for other opportunities that can still be compared with the variables constructed in this study. Meanwhile, sales revenue with a value of 0.011 or 1% is also weak and can still be developed further with other influences or factors. The result can be seen in Table 3.

Table 4 shows the coefficient path of the model that has been constructed. The bootstrapping results produced four hypotheses. The hypothesis is acceptable if the p-value is less than 0.05 (Hair et al., 2021). The result shows that only hypothesis 3 is accepted. This means that sales revenue affects food waste management practices. If a restaurant's income is high, it will maximize the implementation of waste management practices in the restaurant.

Table 3. Coefficient path structured model

Hypothesis	Path	T-stats	P-values	Decision
H1	Market Share -> Food Waste Management Practice	0.900	0.369	Not supported
H2	Market Share -> Sales Revenue	1.049	0.295	Not supported
H3	Sales Revenue -> Food Waste Management Practice	2.429	0.016	Supported
H4	Market Share -> Sales Revenue -> Food Waste Management Practice	0.832	0.406	Not supported

Moreover, there is no relationship between market share and food waste management practice; market share with sales revenue and sales revenue can not mediate the effect between market share and food waste management practice. Budijati et al. (2021) mentioned that food waste management strategies cannot consistently be implemented in every restaurant because each restaurant's practices are tailored to the characteristics of waste generation in each restaurant. Jang et al. (2017) also stated the need for strategy development on environmental practices by a restaurant that can encourage sustainable restaurant behavior and increase the implementation of practices when the financial results are higher.

5. DISCUSSION

This research focuses on the relationship between sales revenue, market share, and food waste management practices at the restaurant in Banyumas. The result shows a significant positive relationship between sales revenue and food waste management practices. This means that the high and low income of restaurants can affect the food waste management practices implemented by restaurants (Mulyani et al., 2020). The existence of high-income restaurants implement waste management practices correctly. Conversely, if the income is low, it will hinder the implementation of waste management practices. Xie et al. (2022) show that sales have a significant positive relationship with environmental practices, especially in lower-middle-income countries. Clowes et al. (2017) also conveyed the high potential of

waste management practices carried out by a restaurant if it has high finances. In the construct model indicators built, respondents agreed with using technology as a payment medium. Therefore, the restaurant industry will be able to communicate increased awareness more efficiently to consumers to reduce waste generated from the consumer side.

The results of this study also support Clowes et al. (2017) regarding the existence of economic factors in waste reduction efforts. Although the results of this study are different from previous research on the relationship between sales revenue and market share, this is mainly due to differences in the characteristics of restaurants. The respondent restaurant is a new type of restaurant that is still developing, judging from the year of operation. In addition, sales revenue also did not mediate the relationship between market share and food waste management practice. This finding is a new review of the importance of conducting research based on the characteristics and variations of the grouped restaurants to see the details of the relationship among the variables.

There is no relationship between market share and food waste management. It aligns with Budijati et al. (2021) which stated that not all restaurants can fully apply food waste management strategies. This is because the strategy carried out by restaurants is based on the characteristics of the waste generation that occurs. In the context of restaurants in Banyumas, there are no government regulations or policies to prevent food waste. Many restaurants only focus on the level of profit generated (Fajri & Shauki, 2023). However, many restaurants will be indifferent because they think it is not easy. In addition, even though a restaurant has a high market share, if consumers have different views, it will affect the environmental practices carried out.

There is no relationship between market share and sales revenue. It occurs due to variations in the restaurant industry where market share is not positively related to restaurant profitability (Xie et al., 2022). The existence of a high market share cannot guarantee a high-profit value. This is influenced by the ability of restaurants to adapt, and the tight market competition accompanied by changes in consumer preferences so that price changes are related. In addition, restaurants in the Banyumas area are classified as small food stall categories, and the market share is also limited.

Sales revenue cannot mediate the relationship between market share and food waste management. This means that there are more extensive or older food industries with high sales revenue because they have strong management experience (Xie et al., 2022). Jang et al. (2017) mentioned that the environmental practices from restaurants can encourage sustainable restaurant behavior and increase the implementation of practices when the financial results are higher. This is due to the impact of stakeholder involvement in the restaurant's commitment to implementing waste management practices. Furthermore, Budijati et al. (2021) stated that food waste management strategies cannot consistently be implemented in every restaurant because each restaurant carries out practices that are adjusted to the characteristics of waste generation in each restaurant.

The theoretical implication shows that the research findings give new insight into the relationship among sales revenue, market shares, and food waste management. The finding shows that sales revenue has a relationship with food waste management. The higher the sales revenue of a restaurant, the better the food waste management should be. Therefore, the restaurant must provide some programs to attract customers to finish their food and minimize waste during the cooking and post-cooking process. The approaches that

restaurants can consider to reduce food waste include prevention, reduction, and reuse or redistribution of food waste (Principato et al., 2021).

The practical implications provide an overview of the current condition of restaurants and restaurants' knowledge about food waste generation in the Banyumas area. Many restaurants deny responsibility for food waste generation if they still profit on that day (Fajri & Shauki, 2023). Restaurants only focus on profit and loss, which means food waste management practices cannot be optimized optimally. Few restaurants regretted the government's role as a forum for reducing food waste at the restaurant level. Therefore, it needs to be a new view for the government to harmonize knowledge and understanding about restaurant food waste management. The government can boost food waste management programs by providing tax reductions, incentives, and constructive authority for the restaurant industry that has implemented practices for a certain period (Ibodov, 2021).

6. CONCLUSION

Restaurants, as significant generators of food waste, often lack awareness and motivation to prioritize waste reduction. While high revenue can lead to satisfaction, a deeper analysis reveals that restaurant revenue can influence food waste generation. Effective utilization of revenue can support the implementation of practices that reduce food waste. The SEM-PLS model used in this study demonstrates a relationship between sales revenue and food waste management practices in restaurants in Banyumas.

This research has limitations, particularly regarding its focus on high-revenue or well-established restaurants, which may offer more insights into food waste management. Future research could address these limitations by incorporating additional variables, such as customer preferences and menu choices. Expanding the study to include food waste management programs in hotels and public service restaurants could also provide a broader understanding of effective waste reduction strategies.

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