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Analysis of The Potential Packaging Solution for Madura Satay Based on Customer's Preferences

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Abstract - **Sales at micro, small, and medium-sized businesses (MSMEs) decreased during and after the COVID-19 pandemic. Madura satay, a street meal offered by MSMEs in Indonesia, has also experienced a drop in sales. This decline was caused by the packaging, which created concerns about the hygiene of Madura satay. One effort to aid MSMEs in selling satay is to create satay packaging that would continue to attract buyers. This study uses both qualitative and quantitative methods to design Madura satay packaging. The qualitative method was used to determine customers' needs, while the quantitative method was used to analyze customer interest and contentment with current packaging. Satay packaging is designed using the Quality Function Deployment methodology. The new packaging innovation consists of a box made of thin cardboard coated in thin food-grade plastic. The packaging is intended to be easy to open and close, suitable for direct eating, and capable of storing satay condiments. Sales are likely to rise with the introduction of this new package.**

Keywords – **Madura satay, MSME, product design, Quality Function Deployment**

I. INTRODUCTION

Micro, small, and medium-sized enterprises (MSMEs) are key contributors to the national economy. In developing nations, MSMEs generate 50% to 60% of state revenue [1]. In Indonesia, according to the Indonesian Ministry of Cooperatives and Small and Medium Enterprises, MSMEs contribute around 61% of GDP [2]. According to data from the Central Statistics Agency, the number of MSMEs in Indonesia reached 64 million in 2020, accounting for 99.9% of all enterprises and 96.9% of the workers. These conditions show that MSMEs are vital to Indonesia's economy and society.

Most Indonesian MSMEs have been severely affected by the COVID-19 pandemic, which began in March 2020. Some have reported revenue losses of up to 80% [3]. This is because people's movements are restricted, and they are also concerned about getting COVID-19.

Indonesian MSMEs have considerable growth potential because they use raw materials and sell primarily domestic products [4]. Given the importance of MSMEs, they must be assisted in increasing sales and empowered to survive and grow in the new normal era. Therefore, efforts to support the sustainability of Indonesian MSMEs would be effective.

The effect of the COVID-19 pandemic, people become afraid of contracting the virus if they eat at MSMEs' places because they doubt the hygiene of the place to eat. Thus, MSMEs and the community are trying to increase takeaway and delivery. The problem arises is that people are not very comfortable with the packaging provided by MSMEs.

In general, MSMEs are paying less attention to packaging regarding to cleanliness, temperature control, and food appearance. This study assists MSMEs selling Madura satay by designing packaging. Madura satay is a popular traditional cuisine in Indonesia. Madura satay is created by cutting cattle, goat, or chicken into small pieces and skewering them, with each skewer containing 4-5 pieces of meat. The meat is then marinated and grilled over a charcoal fire, as seen in Figures 1 and 2.

Madura satay was chosen for investigation because it is commonly marketed by MSMEs using carts, as seen in Figure 1. The shape of Madura satay is distinct since it has a meat part, skewers, spices, and various accompaniments such as pickles, onions, chili sauce, and so on. community, but the existing packaging does not meet buyer expectations. Figure 2 shows the present Madura satay packaging, which is comprised of rice paper and banana leaves. Satay seasoning is commonly supplied alongside cooked Madura satay, as shown in Figure 2.

Fig. 1. Cart selling Madura satay

Packaging has several functions, namely as a means of protecting food from contamination [5], as a means of communicating the product inside [5], as a means of brand communication [6], to convenience and maintain the durability of the product inside [5], and as innovation in food and beverage packaging [7]. Several studies have

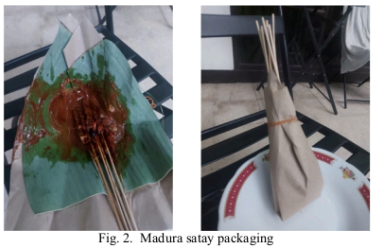

Fig. 2. Madura satay packaging

been conducted on packaging technology, such as the detection of hazardous foods and food quality [8]. Various uses of technology in food packaging have also been studied, such as food identification using sensors and radio frequency indicators [9], active packaging [10], [11], intelligent packaging [12], bio-based packaging [13], [14], and electrospinning active food packaging [15]. Based on previous studies, there is a close relationship between brand strategy and packaging design elements and there is also a high relationship between purchasing behaviour and visual elements of packaging [6], [16]. Thus, good design can increase sales which ultimately increases MSME income.

Much research has been carried out to design food packaging, such as Soto Mie packaging design [17], food packaging for delivery contexts [18], banana packaging [19], and rice bowl packaging [20]. However, no researcher has designed Madura satay packaging for MSMEs based on the needs of satay sellers and buyers.

The study's benefits include helping MSMEs enhance their income by raising public purchase interest. From an academic standpoint, this work develops a novel package design for MSMEs.

II. METHODOLOGY

As previously explained, this article discusses the design of Madura satay packaging for MSMEs. The research steps are shown in Figure 3.

This research uses a mixed-method type (qualitative and quantitative). This research begins by finding the needs of the community and Madura satay traders through qualitative methods, namely interviews and observations. Furthermore, the Quality Function Deployment (QFD) approach is utilized to transform needs into specifications, allowing the packaging to be built based on the needs of traders and customers. The QFD methodology employs a quantitative approach, specifically administering a questionnaire designed to assess customer interest (IC) and satisfaction (CoSP).

The QFD used is only QFD stage 1, because the purpose of this research is to compile specifications and QFD stage 1 has produced satay packaging specifications. In addition, because the product design is simple, then with QFD stage 1 can compile new design packaging specifications.

Fig. 3. Research methodology

The research began with a preliminary qualitative investigation, which involved monitoring the Madura satay sales process and identifying the causes of the reduction in Madura satay sales. In addition to observations, interviews were performed with five satay sellers and ten purchasers.

Figure 2 depicts the currently utilized satay packing. The wrap was created from rice paper, which is often coated in banana leaves. The wrapper is shaped into a cone and secured with a rubber band. Customers believe that this packaging is less hygienic, less practical, and less comfortable. Less hygienic because the package is not tightly sealed, and less practical because once opened, it requires a plate to hold the packaging, making it less comfortable. During the pandemic, packaging like this makes buyers less likely to buy.

The next phase is problem conceptualization. The issue to be addressed is the design of Madura satay packaging to meet the needs of vendors and purchasers. To determine the needs, a qualitative method was used, which involved in-depth interviews with 6 satay sellers and 11 purchasers at some place in Bandung City. The number of responders was determined according to the saturation [21]. Saturation occurs when additional respondents do not add new information [21] so that data collection can be stopped. The main questions explored during the interview were about the reasons for reducing purchases of Madura satay, the type of packaging currently used, the obstacles that occur with the packaging, and what is expected in the new packaging design. Data processing was done with descriptive statistics and comparisons between answers. To preserve validity, triangulation was used to compare data from many sources.

According to the interview results, nine customer needs were translated into consumer needs, which are listed in the leftmost column of the HOQ in Figure 4.

Furthermore, customer needs are used for quantitative ways to gather the data required in the process of building the House of Quality using the Quality Function Deployment (QFD) method. QFD incorporates customers

Customer Needs	Packaging materials retain heat	Tight packaging	Openable and resealable packaging	Foodgrade packaging material	Water-resistant packaging	Concave packaging	Separate packaging of supplementary ingredients (pickles, chili, onions, etc.)	Strong packaging material	Packaging does not cause easy puncture	Practical supplementary ingredient packaging design	Strong packaging design	IC	CoSP	Goal
Packaging keeps the satay warm	9	9	3									3.33	2.41	4.00
Packaging maintains the quality of the satay	3	9	3	3			3					3.56	2.65	4.00
The packaging can be used to store the remaining satay			9					1	3		1	2.92	2.24	3.00
The packaging keeps the satay hygienic		3	9	9	3				3			3.69	2.56	4.00
The packaging can be used to directly eat the satay (without any additional tools)					9	9		3			3	3.18	2.60	4.00
The packaging keeps the sauce from getting mixed up							9			3		2.88	2.31	3.00
Packaging protects the satay (e.g. not easy to spill, not easily pinched, not easily punctured)		3						9	9		3	3.52	2.68	4.00
Supplementary ingredient packaging is easy to open										9		3.31	2.63	4.00
Durable packaging								9	3		9	3.43	2.30	4.00
Score	48	96	87	48	48	36	39	87	69	45	63			
Priority	7	1	2.5	7	7	11	10	2.5	4	9	5			
Competitive benchmark	Rice paper lined with banana leaves	Closed with a hecker or rubber band	Can be closed again but not neat	Rice paper lined with banana leaves	Not water-resistant	Flat packaging (paper)	Supplementary ingredients are combined, or separate out of the pack	Rice paper lined with banana leaves	Thin packaging material, sticks directly to the satay	Supplementary ingredients are combined, or separate out of the pack	Packaging only paper lined with banana leaves			
Target specification	Cardboard with waterproof coating	Lid design can be closed tightly	Packaging can be opened and closed while still remaining tight	Carton material and foodgradle plastic coating	Water-resistant plastic coated cardboard	Box shape packaging	Complementary seasonings are wrapped separately, put into packs	Thin cardboard	Thick packaging material, packaging model according to the shape and size of the satay	Ziplock plastic	Box design with carton material, strong construction model			

Fig. 4. House of Quality Madura satay packaging

as early as possible in the product design process [18]. The quantitative method involves purchasers filling out a questionnaire about their level of importance (IC) and satisfaction (CoSP).

IC has four scales: extremely important, important, not important, and very not important. Meanwhile, user satisfaction with the existing package (CoSP) is rated on four scales: very good, good, bad, and very bad. These values are converted to 4, 3, 2, and 1 during data processing.

Sate Madura's packaging specifications were produced using the QFD approach. The QFD stage begins with assessing consumer needs based on interviews and observations, which are listed in the leftmost column of the HOQ. These customer requirements are then turned into technical responses, specifically answers to customer needs at the top of the HOQ.

Furthermore, in the middle of the HOQ, the relationship between each customer's requirements and each technological solution is identified. The values 9, 3, and 1 indicate strong, medium, and weak associations, respectively.

On the right side of the HOQ, the IC, CoSP, and objectives are listed. Goals are defined by calculating the highest value between IC and CoSP for each customer need and rounding up.

The score appears at the bottom of the HOQ. The score is derived by multiplying each relationship with the goal listed in the related column. The next row shows the rank, which is the order of scores from highest to lowest. This order is used to establish priorities, particularly when there is a disagreement amongst technical responses. As a reference, the next row below shows a competitive benchmark, which represents the packaging's current condition. The final row provides the target specification, which is the design specification that will be derived from each technical response. The next step is to design a Madura satay packaging that meets the needs of both vendors and purchasers.

III. RESULTS

Figure 4 depicts the designed high-order quantities. The leftmost column of the HOQ lists the customer needs, which total nine. Technical responses are at the top of the HOQ; there are 11. The technological response prioritizes the packing's ability to be tightly closed; thus, the packaging is built to be tightly closed. Figure 5 shows an image of the designed package. Priority 2.5 has two technical responses: the package can be opened and closed correctly, and it is strong. As a result, the

packaging is designed to be easily opened and closed, and it is constructed of thin cardboard coated with food-grade plastic in a box form to maintain strength. The design is created to accommodate all technical responses. Figure 5 shows the 3-dimensional design results, Figure 6 shows the Madura satay seasoning container, and Figure 7 depicts thin cardboard before it is constructed into a box.

Fig. 5. Madura satay box packaging

Fig. 6. Ziplock bag for peanut sauce

IV. DISCUSSION

We designed the Madura satay packaging as a box composed of thin cardboard coated with food-grade plastic on the inside. Figure 8 depicts how the cardboard is made for storage and transit. When it is ready to be utilized, the box is built and molded as shown in Figure 5. Figure 5 shows that the packaging box has a divider to keep the satay and complements separate. Peanut sauce, the key spice for Madura satay, is wrapped in a ziplock bag, as seen in Figure 7. This box is not only elegant and keeps its shape, but it also allows customers to eat directly without using plates.

This box shape allows for a tight closure, preserving the hygiene and warmth of Madura satay. Furthermore, if the satay is not completed right away, this box is simple to open and close. The box can also be used to hold satay. Furthermore, the package, made of thin cardboard, is robust enough to maintain its contents in their original condition. The box's design and substance also prevent satay skewers from injuring the packaging.

Furthermore, the packaging material can endure heat, ensuring that Madura satay does not become cold when transported; the material chosen is food-grade, making it suitable for food packaging; and it is water-resistant due to its plastic coating on the interior. Complementary materials are also easily accessible because their corresponding locations have been designated, and they are bundled in a ziplock bag, making it simple to open and close the complementary material spot.

Thus, the new packaging design accommodates all technical responses. It is envisaged that this packaging meets the needs of Madura satay buyers, hence increasing the income of MSMEs selling Madura satay.

The new Madura satay packaging design which accommodates customer needs has implications for increasing customer interest in buying Madura satay for takeaway or delivery. This will increase the income of Madura satay sellers.

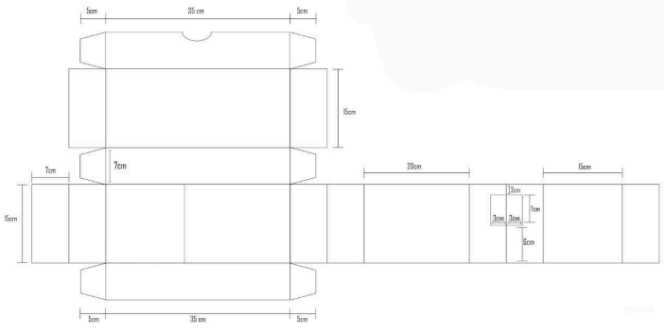

Fig. 7. Madura satay packaging before assembled

V. CONCLUSION

Madura satay packaging was created to assist MSME satay merchants by taking into account the demands of both customers and satay sellers. This design improves on the previous design, which was less capable of meeting the needs of customers and satay traders. With this new style, Madura satay dealers seek to enhance sales by making customers feel more at ease.

This study also demonstrates that qualitative and quantitative methodologies can be utilised concurrently and complementarily. Qualitative approaches are used to investigate customer needs. After compiling customer needs, quantitative approaches are utilised to determine IC and CoSP, which serve as the foundation for developing HOQ.

In this study, the design was created without taking into account costs or performing value engineering. Although not expensive, there are additional expenditures associated with realizing this packaging. As a result, value engineering is required to establish the most cost-effective packaging while also ensuring that the packaging is appropriate for MSME traders. Other studies can be continued by compiling numerous sorts of package designs and materials, resulting in several possibilities from which to choose.

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PAGE 1

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PAGE 4

PAGE 5