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# Factors Driving Sustainability of Food and Beverage Industries

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ABSTRACT

This study has two objectives, namely compiling and analyzing vulnerability indexes of business unit, and analyzing key success variables for food and beverage industries after the COVID-19 pandemic. The analysis tool used in this study is business vulnerability analysis. The vulnerability analysis is derived from the vulnerability index to the COVID-19 threat, which is collected from all aspect indicator values of MSMEs' vulnerability to the COVID-19 theeat. These values consist of exposure, sensitivity, and adaptive capacity. The results of the study explain that food and beverage MSMEs are categorized into medium vulnerability to the threat of COVID-19, where sensitivity is the highest influence aspect as a determinant of the vulnerability level. Due in part to the high number of MSMEs that are sensitive to the threat of COVID-19 and lack the ability to adjust, there may have been a fall in sales and bankruptcy of food and beverage MSMEs during the COVID-19 pandemic.

## 1. Introduction

In many developing nations, the development of the national economy depends critically on the creative economy. (Purnomo et. Al., 2021; Goel, 2022; Yue, 2022) in the era of business environmental uncertainties. Generally, a food and beverage industries are Micro Small and Medium Enterprises (MSMEs) for the creative sub-economy with low resilience (high level of vulnerability) to the threat of external environmental uncertainty (Isa et. al 2021; Pramudyastuti, et al, 2023). The food and beverage industries play a major role in strengthening food security (Hadi, 2020), economic growth (Goel, 2022), and employment (Purnomo et al., 2021). The industries include restaurants, cafeterias, cafés, fast-food outlets, delis, food manufacturing facilities, catering companies, and other businesses that handle everything from food preparation and delivery to service and packaging. Ninety percent of national food products are provided by MSMEs (Hadi, 2020). Micro Small and medium enterprises (MSMEs) are firms with less than 100 workers (Tambunan, 2009). In Indonesia, moreover, 99,9% of the industry market was dominated by MSMEs which employed 97% of national employment and contributed to 60% of natural Gross Domestic Product (GDP) (Statistics Indonesia, 2022)

One of Indonesia's most popular tourist destinations for food and drink is Surakarta (Rahadhini et.al. 2021). The ability of MSMEs to perform as a function of different combinations of inputs is considered the industry's resilience to the COVID-19 threat in the food and beverage sector (Gaffar et. Al. 2022), in both internal and external business unit (Isa and Mangifera, 2019). The study highlights the lack of information regarding the performance of MSMEs in the food and beverage sectors with regard to non-financial factors like business efficiency, degree of vulnerability to changes in the external environment, and uncertain significant impact on business performance. This issue is fascinating for research in an effort to increase productivity and ensure the sustainability of the food and beverage industries.

MSMEs in the food and beverage industries poses a formidable challenge e.g., rapid changes of business environment which are full of uncertainties (Gaffar et. Al 2022; Otengei and Ahebwa, 2021). Consequently, they are required to have the ability to survive and increase their competitiveness (Tatiana and Ritala, 2016; Amalia and Melati. (2021).) so that they must constantly assess their internal capabilities and react on a regular basis to changes in the external environment (Schreyögg and Martina, 2017; Otengei and Ahebwa, 2021). COVID-19 threats have a high risk for MSMEs (Otengei and Ahebwa, 2021), that is, 3.33% of MSMEs closed their businesses, 11.67% experienced a decrease in turnover of less than 50%, and 75% experienced a decrease in assets of more than 50% (Kuncoro, 2023). Business actor must take notice of business environment uncertainties in the planning, implementation, and evaluation of business strategies (Hamze Moussavi et al., 2020). Certain business units cannot thrive in an unpredictable business climate (Day and Schoemaker, 2016).

The primary success determinants for MSMEs shift when the business environment shifts, and these shifts lead to adjustments in business strategy. Core strategies of MSMEs are based on core resources and core competences. Business environment changes prompt the change in resources and capabilities. MSMEs need to posses' dynamic capability which not only makes the organization adapt but also integrates and reconfigures organization skills, resources, and competences (Teece, et. Al. 1997; Purwati et. al. 2021). Organizations with dynamic capacities are more proactive in addressing environmental issues, utilizing data for internal development, and seizing new possibilities (Wang and Shi, 2011; Otengei and Ahebwa, 2021) thus impacting the sustainability and performance of the organization.

Food and beverage MSMEs' strategies are subject to change based on the decisions made by their leaders, who take into account various factors and respond to information

management requests (Ambrosini and Bowman. 2009; Brown, et al. 2022). Strengthening organizational quality emphasizes the importance of both the leader's role as the initiator and person in charge of implementing business unit improvements. This indicates the importance of businessman's dynamic role in improving business unit performance (Otengei and Ahebwa, 2021). Leadership plays a role in directing employees to participate in and be committed to improving business unit performance. MSMEs performance entirely depends on the leader's ability to adopt and to adapt improvement program of business unit. Business owners and/or actors play a crucial role in supporting the performance and sustainability of MSMEs in the post-pandemic era. This study has two objectives, namely compiling and analyzing vulnerability indexes of business unit, analyzing key success variables for food and beverage SMEs after the COVID-19 pandemic.

## 2. Literature Review

### Risk and Vulnerability

The degree of susceptibility of the business unit affects the magnitude of the COVID-19 pandemic risk to the food and beverage industry (Kamalipoor et al. (2022). The hazard of a disaster or disruption increases with the business unit's degree of vulnerability (Isa, et al. 2021). Vulnerability is defined by ISA (2022) as a business unit's inability to handle uncertainty. According to Kamalipoor (2022), vulnerability is a business unit's propensity to be impacted by a risk or opportunity for change. Vulnerability is described as a three-dimensional system by Aleksic et al. (2014), Lo et al. (2019), Isa et al. (2018), and Kamalipoor (2022). Exposure, or how much a system is exposed to risks, sensitivity, or how much a system is impacted, and adaptive capability, or how well a system can adjust to change, are the three dimensions.

### MSMEs competitive advantage and Dinamic Capability

Dynamic capability is the latest approach in building MSMEs competitive advantage (Yuniarty et al. 2021; Otengei and Ahebwa, 2021; Purwati et. al. 2021). Three dynamic characteristics are required of business units: the capacity to be adaptable, absorbent, and innovative (Wang and Shi, 2011; Otengei and Ahebwa, 2021). The capacity of MSMEs to recognize and seize market opportunities is known as adaptive capability. The capacity to react to opportunities, keep an eye on markets, clients, and rivals, and allocate resources for marketing initiatives are the key indicators of adaptive aptitude. The capacity of MSMEs to assess and use knowledge from outside the company is known as absorptive competence. The level of research and development activity is used to measure it. MSMEs with innovative capability are able to create new goods and markets. Innovation processes, the quantity of new product and service innovations, and problem-solving techniques are indicators of an organization's innovative capacity.

There are two dynamic capabilities (Tatiana and Ritala, 2016; Portillo-Tarragona et. Al 2018): specific domain capability (attached to special organizational ability and becoming short-term superior sources) and generic capability (not attached to certain functions in organization and becoming long-term superior competitive sources). The rationale is that high-level dynamic capabilities not only focus on responsible learning and creativity but also influence low-level dynamic capabilities for the implementation of more flexible specific tasks. Generic dynamic capabilities are possesed by all organizations and expressed as organizational change capabilities that are deemed capable of expressing organizational change better than dynamic capabilities with a broader perspective (Tatiana and Ritala, 2016; Otengei and Ahebwa, 2021).

## 3. Research Method

In 2023, the study was carried out in Surakarta City, Central Java, Indonesia. One of Indonesia's top culinary attractions is Surakarta City. This city has many different types of food and beverage businesses. Surakarta City has 608 unit of food and beverage industries and 1,729 types of food and beverage businesses (BPS, 2023). The population consists of 608 business units, chosen by purposeful random sampling on the grounds that they are not hawkers, have at least two years of business experience, and have dealt with disasters, namely COVID-19. Focus Group Discussions (FGD) with stakeholders and structured interviews supplemented by questionnaires were used to collect data from 250 respondents (Creswell and Creswell, 2018). In this study, there was one analytical tool used was vulnerability index.

Table 1. Vulnerability Variables and Indicators

| Variables | Indicators | Definition |
|---|---|---|
| Exposure | Number infected to COVID-19 | Number of workers infected to COVID-19 |
| | COVID-19 Depth | Length of time business not operating due to COVID-19 pandemic |
| | COVID-19 duration | Total time workers infected with Covid-19 are unable to work |
| | Comorbid Employees | Percentage of workers with comorbid (%) |
| Sensitivity | Treatment frequency | Number of workers exposed to Covid 19 taking treatment (total) |
| | Availability of raw material | Availability of raw material during COVID-19 (%) |
| | Price of raw material | Increase in raw materials during COVID-19 (%) |
| | Sale | Decline in sales during COVID-19 (%) |
| | Turn Over | Workers who resigned and changed jobs (%) |
| Adaptive Capacity | Education | Percentage of workers' tertiary education (%) |
| | Map of COVID Spread | Map of COVID spread cases (total) |
| | Information access | MSME owner access to COVID-19 information (likert) |
| | Distance to health services | Distance to nearest hospital (m) |
| | COVID-19 awareness | Percentage of workers with health insurance |
| | COVID-19 prevention and socialization training | Number of training and COVID-19 risk socialization attended by MSME owners (total) |

Source: Weis et al. (2016), Kamalipoor et al. (2022), Isa and Mardalis (2022)

After selecting appropriate indicators to serve as a guide for the researcher to gather data from respondents' responses, the data must be normalized to bring the indicator values within a comparable range (Isa et al 2018). For each indicator, normalization is accomplished by deducting the mean from the observed value and dividing the result by the standard deviation. These indications should then be given weights.

The following formula is then used to multiply the normalized variables by the provided weights in order to produce the indices (for exposure, sensitivity, and adaptive capacity separately).

$$I_j = \sum_{i=1}^{k} b_i \left[\frac{a_{ji} - x_i}{s_i}\right] \quad \text{.....(1)}$$

where "I" is the matching index value, "a" is the indicator value, "x" is the mean indicator value, and "s" is the standard deviation of the indicators. The pertinent indicators are weighted using the loadings from the principal component analysis (PCA) first component.

The process of creating a vulnerability index includes consideration of exposure, sensitivity, and adaptive capacity. Following this, the evaluation findings are compiled. A higher score denotes a decreasing degree of susceptibility. The data compilation findings examine all facets of vulnerability before being normalized to get a score between 0 and 1 (Luni et al. 2012; Isa et al. 2021). In order to display the degree of vulnerability, the vulnerability index score—which is calculated as 1 minus the data normalization result—is processed during the preparatory phase. The degree of susceptibility increased with increasing number (closer to 1), according to the results.

The weighing aspect vulnerability is what needs to be done next. Each variable's weighting was determined by taking into account how each component contributes to the formation of the vulnerability aspect. A factor's weight increases with the degree of influence. Through focus group discussions (FGD) with the study's stakeholders, the weighting was established. The weights of exposure, sensitivity, and adaptive capability are multiplied by the total score of all indicators to obtain the vulnerability index (Weis et al. 2016). The formula (Isa et al., 2021) presents the MSME vulnerability index as follows:

$$Vurnerability = \sum_{i=1}^{3}(W_1 \times X_1) + (W_2 \times X_2) + (W_3 \times X_3) \quad (2)$$

Where “vulnerability” is COVID-19 vulnerability index, “W1” is exposure weighting, “X1” is exposure score, “W2” is sensitivity Weight, “X2” is sensitivity score, “W3” is adaptive capacity weight, “X4” is adaptive capacity score.

## 4. Results and Discussion

### Food and Beverage Industries in Surakarta

Due to several measures taken by nations to lower the COVID-19 pandemic number, including lockdown procedures and extensive social restrictions, the COVID-19 pandemic has caused a recession in the worldwide economy. The Food and Beverage Industry is an industry that has the most negative impact of this policy. The food and beverage sector includes restaurants, cafeterias, cafés, fast-food restaurants, delis, food manufacturing facilities, catering services, and food transportation businesses. This industry employs people to produce, package, prepare, transport, and serve food and beverages. The number of food and beverage industries are very dominant in Surakarta City, which is as much as 43.03% of the total IKM (1,413). Most of the food and beverage industries were in Jebres sub-district (30.76%), followed by Banjarsari sub-district (26.48%), Laweyan sub-district (19.57%), Pasar Kliwon sub-district (17.11%) and the least in Serengan sub-district (6.09%).

Table 2. Number and Distribution of Food and Beverage Industries in Surakarta City

| Sub-District | Number | Persentase |
|---|---|---|
| Banjarsari | 161 | 0,26 |
| Jebres | 187 | 0,31 |
| Laweyan | 119 | 0,20 |
| Pasar Kliwon | 104 | 0,17 |
| Serengan | 37 | 0,06 |
| Total | 608 | 100 |

Source: Cooperative, Small and Medium Enterprise and Industri Office of Surakarta City, 2023

Food and beverage industries are regional flagship businesses that experienced the worst negative impact during the COVID-19 pandemic that is, 3.33% of MSMEs closed their businesses, 11.67% experienced a decrease in turnover of less than 50%, and 75% experienced a decrease in assets of more than 50% (Kuncoro, 2023). The degree of company vulnerability to the COVID-19 threat affected the performance and sustainability of MSMEs.

**SMEs Vulnerability**

There were 250 participants in this study. Of the 250 respondents, 52.40% were men, and 47.60% were women. Moreover, 86,80% respondent were micro enterprises, and 12,80% were small enterprises. Subsequently, 50,01% held senior high school degrees, 18,01% held junior high school degrees, 12,00% held undergraduated/graduated degrees, 10,00% held diploma degrees, and 10,00% held primary degrees. The resilience of MSMEs is impacted by their degree of susceptibility to the COVID-19 threat (Kamalipoor et al. 2022). This resilinece has an impact on the turnover of business actors, which ultimately has an impact on regional economic growth (Isa et al. 2015; Tanaka, 2021). The low resilience of MSMEs, which can be seen from the number of MSMEs that have experienced a decline in turnover and went bankrupt, indicates an unresolved economic problem (Planinc, et al. 2022). The capacity of business units to present the COVID-19 hazard is referred to as resilience.

Table 3. Sensitivity Index

| Number | Indicators | Vulnerability Value |
|---|---|---|
| 1 | Treatment frequency | 0.52 |
| 2 | Availability of raw material | 0.69 |
| 3 | Price of raw material | 0.50 |
| 4 | Sale | 0.73 |
| 5 | Turn Over | 0.29 |

Sensitivity is a component of vulnerability that reflects MSME owners' readiness to pose a COVID-19 danger (Kamalipoor et al. 2022). Table 3 above shows the sensitivity index composed of 5 (five) indicators: frequency of treatment, availability of raw materials, prices of raw materials, sales, and turnover. The indicators of the number of sales, and the availability of raw materials are in a high vulnerability classification. The index values for the frequency of employees seeking treatment due to COVID-19 and the price of raw materials are categorized into the moderate vulnerability. The employee turnover is an indicator in the low vulnerability category. These findings indicate that the most sensitive variable for MSMEs to the danger and risk of COVID-19 is sensitivity to the supply chain characteristics of sales and raw material availability.

According to Table 5, capacity adaptation is the second most susceptible variable to COVID-19 threats. Adaptive capability was proposed by Isa et al. (2015) as a vulnerability factor that explains MSMEs' potential to lower risks in the face of the COVID-19 threat (Chasanah and Hiroyuki, 2021). Table 4 shows all aspects of the adaptive capacity of MSMEs, namely education, maps of the spread of COVID, access to information, distance to health services, awareness of COVID-19, as well as training and socialization of prevention of COVID-19 are in the moderate vulnerability category.

Table 4: Adaptive Capacity Index

| Number | Indicators | Vulnerability Value |
|---|---|---|
| 1 | Education | 0.46 |
| 2 | Map of COVID Spread | 0.37 |
| 3 | Information access | 0.54 |
| 4 | Distance to health services | 0.58 |
| 5 | COVID-19 awareness | 0.63 |
| 6 | COVID-19 prevention and socialization training | 0.38 |

According to Table 5, exposure is the least important element in evaluating an MSME's susceptibility to the COVID-19 hazard. Weis et al. (2016) emphasized that exposure is an aspect of vulnerability explaining the extent to which the threat of COVID-19 affects the risk of MSMEs related to the amount of exposure, depth, duration and number of comorbid co-workers. Based on Table 5 below, it is explained that the indicators for the amount of exposure, depth, duration of COVID-19 are in the moderate vulnerability category. The quantity of Cormobid employees is not very vulnerable at this time. This feature calls for particular consideration of a number of criteria, including the length, depth, and amount of COVID-19 exposure.

Table 5. Exposure Index

| Number | Indicator | Vulnerability Value |
|---|---|---|
| 1 | Number exposed to COVID-19 | 0.37 |
| 2 | COVID-19 Depth | 0.62 |
| 3 | COVID-19 duration | 0.46 |
| 4 | Comorbid Employees | 0.29 |

The MSME vulnerability index to the threat of COVID-19 was obtained by multiplying the indicator score by the weight of exposure, sensitivity, and adaptive capacity. Vulnerability Index of MSMEs is 0,499. This index shows that MSMEs are in the moderate level category.

Table 6. Vulnerability Index of MSMEs on COVID-19

| Description | Exposure | | Sensitivity | | Adaptive Ability | | Vulnerability Index |
|---|---|---|---|---|---|---|---|
| | Score | Weight | Score | Weight | Score | Weight | |
| Vulnerability Index | 0.43 | 0.25 | 0.55 | 0.4 | 0.49 | 0.35 | 0.499 |
| | 0.107 | | 0.220 | | 0.171 | | |

The value between 0.34-0.66 indicates that MSMEs in Surakarta City are somewhat vulnerable to COVID-19. According to Table 6, exposure and adaptive ability have the greatest effects on the degree of MSME vulnerability, followed by sensitivity. The findings of this investigation support those of Isa and Mardalis's (2022) study on SMEs' susceptibility to floods in the Klaten Regency. Consequently, this result differs from other research in coastal regions, which concluded that exposure is the most vulnerable factor (Isa et al., 2019). The higher the level of business vulnerability index, the lower the level of resilient (Prastian et al., 2022). The low level of resiliency will affect the low level of business sustainability as well.

Government policies in limiting the spread of COVID-19 threats during Pandemi caused disturbance in the purchase and distribution of raw materials, as well as disturbances in the sale and distribution of products that cause large losses to SMEs. SMEs must build an effective business strategy to be able to adapt in an uncertain business environment. In an effort to reduce the level of vulnerability, SMEs do not only rely on one supplier and also the target market in selling their products, suppliers need to diversify and expand the customer base.

Pandemi Covid 19, which is a non-natural disaster, has caused many SMEs to experience difficulties in the supply of raw materials and product sales. Therefore, to reduce business vulnerability, it is necessary to identify some potential suppliers for primary raw materials, to reduce dependence on only one supplier, and increase the capacity of adaptation by conducting post-disaster evaluations and renewing disaster responses and recovery plans, based on lessons.

## 5. Conclusion

Food and beverage industries are potentially developed. Many of them suffered significant losses and even filed for bankruptcy during the COVID-19 pandemic. These

MSMEs are categorized into moderate vulnerability (0.499) to the threat of COVID-19, and the factor that most affects MSMEs' vulnerabuility level is sensitivity, which is followed by exposure and adaptability. Due in part to the high number of MSMEs that are sensitive to the threat of COVID-19 and lack the ability to adjust, there may have been a fall in sales and bankruptcy of food and beverage MSMEs during the COVID-19 pandemic. Food and beverage MSMEs can be used to reduce exposure, lessen sensitivity, and boost adaptive capacity.

The implication of the research is that the resilience of MSMEs to the threat of COVID-19 must be considered to maintain the sustainability of business units. MSME actors who have main business variables will find new ways to combine existing resources and at the same time seek innovation in their business models to survive the uncertainty of the external environment. The government must support the sustainability of MSMEs through regulations and policies that support a conducive business system.

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