International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Risk Mitigation in Tofu Production at PT. Tahu Jeletot Taisi, Depok, West Java

Isnaini Setia Hanif[1], Eny Dwiningsih[2]*, Rizki Adi Puspita Sari[3], Mudatsir Najamuddin[4], Mukhlis[5]

[1,2,3,4] Department of Agribusiness, Faculty of Science and Technology, Universitas Islam Negeri Syarif Hidayatullah Jakarta, Jakarta, Indonesia
[5] Agribusiness Study Program, Department of Agriculture Business, Politeknik Pertanian Negeri Payakumbuh, Lima Puluh Kota, Indonesia

*Corresponding author: eny.dwiningsih@gmail.com

Abstract

This research aims to (1) Identify risk events and risk causes, (2) Know the level of risk, (3) Map risks, and (4) Formulate risk mitigation that can be applied in the production process of stuffed tofu at PT Tahu Jeletot Taisi. The data used are primary data and secondary data collected through observation, interviews, questionnaires, and literature studies. The analytical tools used are fishbone diagrams, House Of Risk (HOR), and pareto diagrams. Based on the research that has been done, 25 risk events and 28 risk causes are obtained in the entire series of tofu production processes at PT Tahu Jeletot Taisi. The results of measuring the risk of the highest ARP value in making tofu, namely the quality of soybeans is not good (A1), in frying tofu, namely turning the tofu too hastily (A16), and in making stuffed tofu, namely employees are less careful when splitting and filling the tofu (A26). The mapping results obtained 14 priority risk causes. 8 priority risk causes in tofu making, 3 priority risk causes in tofu frying, and 3 priority risk causes in stuffed tofu making. Then there are 20 risk mitigations recommended to PT Tahu Jeletot Taisi, namely 10 risk mitigations in making tofu, 4 risk mitigations in frying tofu, and 6 risk mitigations in making stuffed tofu.

Keywords: Stuffed Tofu, Risk Mitigation, Fishbone Diagram, House of Risk.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

INTRODUCTION

Every activity in a business organization is aimed at generating added value in order to make a profit. Generally, these profits are obtained by companies or business organizations through production activities. Production activities in a business are not immune to the possibility of risk. Risks in production activities are potential deviations in production handling or from the stages of raw material production to finished materials that are ready for consumption. Deviations in the production process at the factory arise due to the passage of raw materials that do not meet specifications and finished goods that do not meet company standards, the production stages not complying with standard production procedures, and the presence of damaged machines or tools at the factory (Wastra & Mahbubi, 2014; Simaremare et al., 202; Sulistyowati, 2024).

The supply chain has always been affected by crises, mostly because of the growing number of players and their intricate relationships. Crisis events are occurring more frequently and with more impact than in past years as supply chains become more complicated (James et al., 2011; Honkanen, 2013; Kamperos et al., 2024).

PT Tahu Jeletot Taisi is a company that has long been engaged in the production of stuffed tofu. PT Tahu Jeletot Taisi currently has around 600 *outlets* spread across Jakarta, Bogor, Depok, Tangerang, Bekasi, Cirebon, Bandung, Surabaya, Semarang, and Malang. PT Tahu Jeletot Taisi is not immune to potential risks in the production of stuffed tofu. PT Tahu Jeletot Taisi faces risks during tofu production, such as poor soybean quality and dirty or damaged production equipment, such as dirty buckets. Dirty buckets can cause stains on the tofu, making it less appealing. These risks can result in defective products. Defective products have fluctuated several times and exceeded the limit set by PT Tahu Jeletot Taisi, which is 2% of the total products produced.

Table 1. Data on Damage to Stuffed Tofu Products from October 2022 to September 2023

Month	Production	Defective Products	Percentage
October 2022	100,339	3,836	3.82%
November 2022	99,654	3,190	3.20%
December 2022	126,234	2,543	2.01%
January 2023	111,352	2,016	1.81%
February 2023	113,556	2,136	1.88%
March 2023	149,435	2,842	1.90%
April 2023	131,408	7,607	5.79%

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

May 2023	143,158	7,425	5.19%
June 2023	67,236	2,674	3.98%
July 2023	95,794	1,233	1.29%

Source: PT. Tahu Jeletot Taisi (2023)

Based on the data presented in Table 1, it can be seen that the percentage of defective products in one year fluctuated with a total of 2.87% defective products. In October 2022-December 2022, defective products reached 3%, then decreased in January 2023-March 2023 to 1%, then rose again in April 2023-June 2023 to 5%. Defective products at PT Tahu Jeletot include burnt, torn, and punctured products, as well as products with stains and sizes that do not meet company standards. These defective stuffed tofu products cannot be marketed or sold, which can result in losses for the company. In addition, if these defective products reach consumers, it will damage the company's image.

PT Tahu Jeletot Taisi has not implemented a structured risk management process. Therefore, it is necessary to identify risks to determine the risk events and causes that may occur in each tofu production activity at PT Tahu Jeletot Taisi. These risk events and causes are then measured and mapped to determine the appropriate measures to minimize the risks that pose obstacles to the company.

METHOD

This study discusses the risks of tofu production at PT Tahu Jeletot Taisi. In the initial stage, an analysis of risk events and causes of risks that occur throughout the tofu production process was carried out using a fishbone diagram. The fishbone diagram is useful for identifying variables that can pose risks in the tofu production process. Then, measurements were taken using a 1-10 Likert scale. The values obtained were then calculated using the HOR phase 1 formula to obtain the ARPj value. After obtaining the ARPj value, mapping was carried out to determine the priority risk causes using a Pareto diagram. Mitigation measures were then developed and prioritized to address the risk causes that occurred in the tofu production process at PT Tahu Jeletot Taisi using HOR phase 2.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

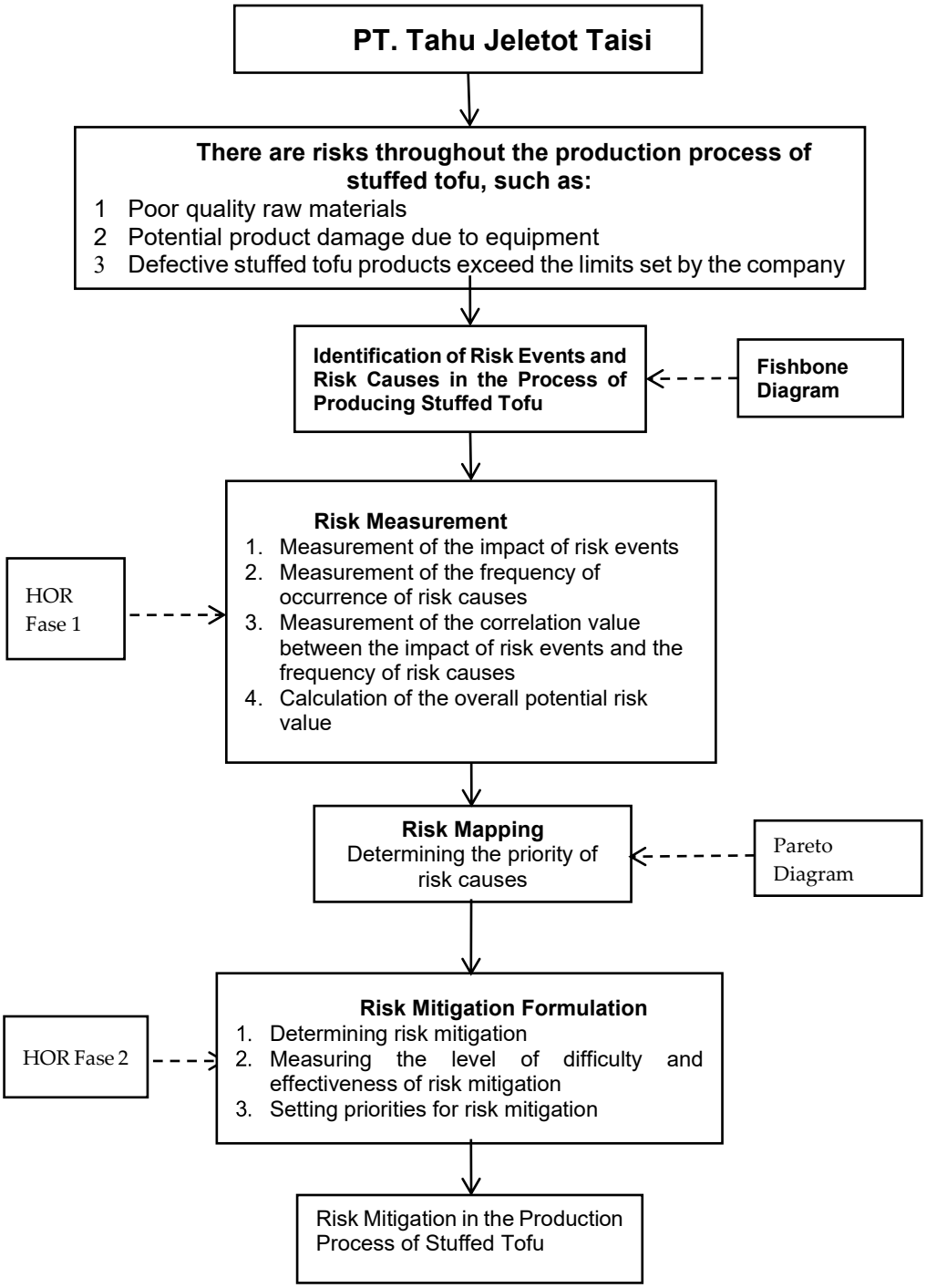


Figure 1. Conceptual Framework

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Research Location and Time

This research was conducted at PT Tahu Jeletot Taisi, located at Jl. Raya Sawangan No.8, RT.04/RW.04, Rangkapan Jaya, Pancoran Mas, Depok, West Java, which was determined purposively (Mukhlis et al., 2024; Asgaf et al., 2025). The research was conducted from November 2023 to November 2024.

Type and Source of Data

This research used qualitative and quantitative data sourced from primary and secondary data (Sugiyono, 2021; Mukhlis et al., 2023). Primary data was obtained through observation, questionnaires, and interviews with relevant parties regarding the tofu production process. Secondary data was obtained through written documents regarding the production volume and defective products of PT Tahu Jeletot Taisi from October 2022 to September 2023, previous studies, and literature used as research references.

Data Collection Methods

Data collection in this study was carried out using direct observation (observation), interviews, questionnaires (Rianse & Abdi, 2013; Mukhlis et al., 2019). Data collection was filled out by operational managers and employees from the production division (2 people from the tofu making section, 2 people from the tofu frying section, and 2 people from the stuffed tofu making section (process)), and literature study.

Data Analysis

Data analysis in this study was carried out in several stages, starting from the identification of causes and risk events, measurement of causes and risk events, risk mapping, to the formulation of risk mitigation.

Fishbone Diagram

According to , there are four steps in creating a fishbone diagram, namely agreeing on the problem statement, identifying categories, finding potential causes, and reviewing and agreeing on the most likely causes. The fishbone diagram used in this study is a production process classification fishbone diagram.

House of Risk (HOR)

According to Pujawan & Geraldin (2009), there are two HOR distribution models based on modifications of *the House of Quality* (HOQ). HOR phase 1 is used to determine

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

which risk causes should be prioritized for preventive action, and HOR phase 2 is used to prioritize actions that are considered effective but with reasonable commitment and resources.

Referring to Pujawan & Geraldin (2009), the steps in HOR phase 1 are as follows:

1. Identify *risk events* that could occur in each tofu production process. In the HOR Phase 1 model, risk events are placed in the left column and presented as *Ei*.
2. Assessing the impact (severity) of these risk events (if they occur). The impact of each risk event is placed in the right column and indicated as *Si*. The assessment of the impact level of risk events uses a 1-10 Likert scale, where 1 indicates no effect and 10 indicates dangerous.
3. Identify *the risk agents* and assess the likelihood of each risk agent occurring. Risk agents (*Aj*) are placed in the top row and the frequency of occurrence of risk agents (*Oj*) in the bottom row. The assessment of the frequency of occurrence of risk agents uses a Likert scale of 1-10, where 1 indicates almost certain and 10 indicates almost certain.
4. Develop a relationship matrix, namely the relationship/correlation between each risk cause and each risk event (*Rij*). The assessment of the correlation between risk causes and risk events uses a Likert scale of 0 for no correlation, 1 for low correlation, 3 for moderate correlation, and 9 for high correlation.
5. Calculate *the aggregate risk potential* (*ARPj*) of cause *j*, which is defined as the product of the probability of risk cause *j* occurring and the impact resulting from the risk event. *The aggregate risk potential* (*ARPj*) is calculated using the following formula:

   $$\boldsymbol{ARPj = Oj\Sigma Si Rij}$$

6. Ranking risk causes according to their aggregate risk potential in descending order (from high to low values).

Referring to the Risk Management Framework () by -958) , the steps in HOR phase 2 are as follows:

1. Select high-priority risk causes obtained using the Pareto diagram from *ARPj*. The selected causes are then placed on the left side of HOR phase 2 and the corresponding *ARPj* values are placed in the right column.
2. Identify actions that are considered appropriate to prevent risk causes. One risk cause can be addressed with more than one action, and one action can jointly reduce the possibility of more than one risk cause.
3. Determine the relationship between each mitigation action and each risk cause indicated by *Ejk*. This relationship (*Ejk*) can be considered as the level of effectiveness

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

of action *k* in reducing the possibility of risk cause *j*. Assessment of the correlation between risk causes and risk mitigation uses a Likert scale of 0 for no correlation, 1 for low correlation, 3 for moderate correlation, and 9 for high correlation.

4. Calculate the total effectiveness of each action using the formula:

$$\boldsymbol{TEk = \Sigma ARPjEjk}$$

5. Assess the level of difficulty in performing each action (*Dk*), then place these values in a row below the total effectiveness. The assessment of the level of difficulty of risk mitigation in this study uses a Likert scale of 3 for easy, 4 for moderate, and 5 for difficult.
6. Calculate the total ratio of effectiveness to difficulty level using the formula:

$$\boldsymbol{ETDk = \frac{TEk}{Dk}}$$

7. Set priorities for each action (*Rk*) where actions with the highest ETDk are given a rank of 1.

Pareto Diagram

The Pareto diagram is used for risk mapping after obtaining the Aggregate Risk Potential (*ARPj*) from each risk cause. The Pareto diagram is used to determine the risk causes that have the greatest to smallest impact on the company so that the priority risk causes can be obtained. Each *ARPj* value will be calculated cumulatively or as a percentage of the impact of the risk cause. Based on Pujawan & Geraldin (2009), risk causes with a cumulative percentage of less than or equal to 75% will become priority risk causes. The cumulative frequency or percentage is calculated using the formula:

$$\boldsymbol{\%Aj = \frac{ARPj}{\Sigma ARPj} \times 100\%}$$

RESULTS AND DISCUSSION

Identification of Risk Events and Causes

Identifying risk events and causes is the first step in risk management, aimed at determining what risk events may occur in each tofu production process and the causes of such risks. Risk identification in this study was obtained from observations and interviews with sources, namely the operations manager and employees from the production division, consisting of 2 people from the tofu making section, 2 people from the tofu frying section, and 2 people from the tofu filling (processing) section at PT.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Tahu Jeletot Taisi. Risk identification was carried out using a fishbone diagram of the production process classification.

The results of risk identification from the fishbone diagram were then described in a risk identification table containing risk events and risk causes at each stage of the stuffed tofu production process at PT Tahu Jeletot Taisi, which can be seen in Table 2.

Table 2. Identification of Risk Events and Risk Causes in the Stuffed Tofu Production Process at PT Tahu Jeletot Taisi

Variable	Sub-Variable	Risk Event	Code	Risk Causes	Code
Tofu production	Soybean selection	The texture of the tofu becomes denser and harder	E1	Poor soybean quality	A1
		The color of the tofu becomes speckled/uneven	E2		
	Soybean soaking	Soybeans are too soft	E3	Soaking time exceeds 5 Hours	A2
		Soybeans are still hard/not soft	E4	Soaking time less than 2 Hours	A3
	Washing and draining of soybeans	Soybeans are wasted	E5	Employees are not careful when draining soybeans after washing	A4
	Soybean grinding	Soybean paste texture is not smooth enough	E6	Grinding machine is Broken	A5
		Soybean paste spillage	E7	Employee was late in replacing the soybean paste container with a new one	A6
	Boiling	There was foam spillage	E8	Delayed pouring water on the foam on the surface of the soybean paste	A7
				No stirring was done	A8
		The soybean paste has an unpleasant odor.	E9	Thick smoke from burning wet palm kernel Shells	A9
		Employee exposed to hot water	E10	Employees not wearing complete PPE (Personal Protective Equipment)	A10
	Soybean milk Filtration	Soybean pulp not filtered properly	E11	The filtering equipment is Damaged	A11

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

	Curdling	Insufficient tofu coagulation power	E12	Poor quality of starter culture/seedling ratio	A12
	Molding	Inconsistency in the size and shape of tofu	E13	The weighting device is notsuitable for the desired hardness and size	A13
				Pressing for too long	A14
				Risk Causes	Code
				The mold used is dirty	A15
				Tofu flipped too quickly	A16
				Freshly made tofu is not left to rest first/is fried Immediately	A17
				The temperature during the first stage of frying tofu is below 120°C	A18
				The temperature during the first stage of frying tofu is above 120°C	A19
				The temperature during the second stage of frying tofu is below 180°C	A20
				The temperature during the second stage of frying tofu is above 180°C	A21
				Too much tofu in one frying session	A22
				Lack of employee Accuracy	A23
				Vegetable chopper machine is broken	A24
				No regular stirring	A25
				Employees are not careful when cutting and filling the tofu	A26
				The container for holding the filling material is not Covered	A27
				Damaged packaging	A28

Risk Measurement

The ARP value calculation aims to determine the order/ranking of risk causes that must be prioritized for risk mitigation actions. The ARP value is obtained from the

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

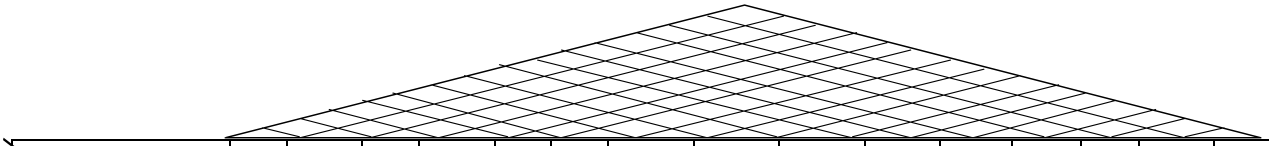
International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

multiplication of the *occurrence* value with the total multiplication value *of severity* and the correlation value between the risk cause and the risk occurrence.

Tofu production explanation :

\+ = Positive

++ = Strong Positive



Risk Agent (Aj) / Risk Event (Ei)	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	Severity of Risk Event (Si)
E1	9	3	3	0	0	0	0	0	0	0	0	3	3	3	0	5.00
E2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3.67
E3	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	2.00
E4	3	0	9	0	0	0	0	0	0	0	0	0	0	0	0	1.67
E5	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	4.67
E6	1	0	9	0	9	0	0	0	0	0	0	0	0	0	0	2.33
E7	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	4.00
E8	0	0	0	0	0	0	9	9	0	0	0	0	0	0	0	5.33
E9	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	3.33
E10	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	5.00
E11	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	2.00
E12	3	1	1	0	0	0	0	0	0	0	0	9	0	0	0	2.33
E13	0	0	0	0	0	0	0	0	0	0	0	0	9	9	0	4.67
E14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3.67
Occurrence of Agent j	6.67	4	1.67	4.33	5	5.33	5.33	4	6.63	6	4.67	4.67	6.33	6	5.67	
Aggregate Risk Potential j	656.08	141.33	64.02	181.99	105	191.88	255.68	191.88	198.70	270	84.06	168.12	361	342.18	249.54	
Priority Rank of Agent j	1	12	15	10	13	8	5	9	7	4	14	11	2	3	6	

Figure 2. HOR Phase 1 in Tofu Production

Based on the ARP calculation in tofu Production, it was found that the cause of risk with the highest ARP was poor soybean quality (A1). This is because soybean quality greatly affects the final result of tofu; if the soybean quality is poor, the texture of the tofu will not be as desired and the color of the tofu will be uneven/spotty. The risk factor with the lowest ARP is soybean soaking time of less than 2 hours (A3). This is because if the soaking time is insufficient and the soybeans are still hard, employees will increase the soaking time until the soybeans are soft. In tofu production, there are risk factors that have a positive (+) correlation, namely poor soybean quality (A1) with soybean soaking time

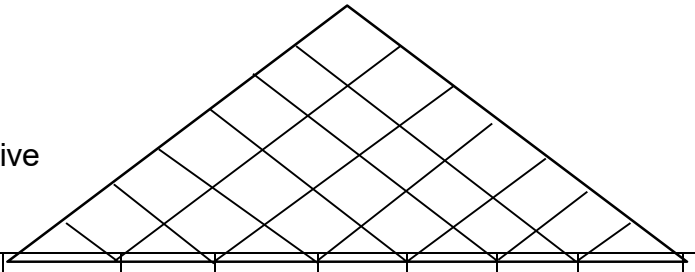
Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

exceeding 5 hours (A2) and poor soybean quality (A1) with soybean soaking time of less than 2 hours (A3), which means that these risk factors are positively correlated, but the effect is not very strong.

Tofu frying

Description:
+ = Positive
++= Strong Positive



Risk Factors / Risk Agent (Aj) — Risk Event / Risk Event (Ei)	A16	A17	A18	A19	A20	A21	A22	Severity of Risk Event (Si)
E15	9	3	0	0	0	0	0	7.00
E16	0	9	9	0	0	1	0	4.33
E17	0	0	0	9	0	0	0	3.33
E18	0	0	0	0	9	0	0	1.67
E19	0	0	0	1	0	9	9	6.0
Occurrence of Agent j (Oj)	6.33	4	2.67	3	2.33	4	6.33	
Aggregate Risk Potential j (ARPj)	398.79	240	104.05	108	34.95	233	341.82	
Priority Rank of Agent j	1	3	6	5	7	4	2	

Figure 3. HOR Phase 1 in Tofu Frying

Based on the ARP calculation for tofu frying, it was found that the cause of risk with the highest ARP was flipping the tofu too quickly (A16). Employees were not careful when flipping the tofu, especially if the tofu was still fresh, causing it to tear easily and become unusable because it could not be filled. The risk factor with the lowest ARP is a temperature below 180°C (A20) during the second stage of tofu frying. This is because PT Tahu Jeletot Taisi already uses a thermometer to measure the temperature, and employees always check the temperature during frying. In tofu frying, there are risk factors with a positive (+) correlation, namely a temperature below 120°C during the first stage of tofu frying (A18) (A18) with the temperature during the second stage of tofu frying below

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

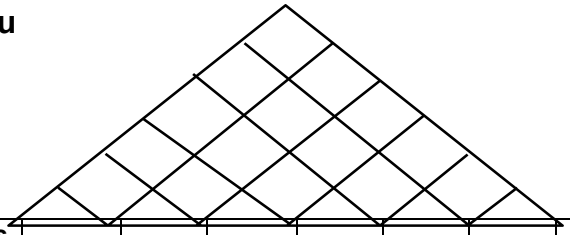
International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

180°C (A20) and the temperature during the second stage of tofu frying below 120°C (A19) with the temperature during the second stage of tofu frying above 180°C (A21), which means that these risk factors are positively correlated, but the effect is less strong.

Production of stuffed tofu

Description:

\+ = Positive
++ = Strong Positive



Risk Factors / Risk Agent (Aj) / Risk Event / Risk Event (Ei)	A23	A24	A25	A26	A27	A28	Severity of Risk Event (Si)
E20	9	0	0	0	0	0	3.00
E21	0	9	0	0	0	0	2.00
E22	0	1	9	0	0	0	1.33
E23	3	0	0	9	0	0	3.33
E24	0	0	0	0	9	0	2.00
E25	0	0	0	0	0	9	1.33
Occurrence of Agent j (Oj)	3.3	2.67	2.67	4	2.33	2.67	
Aggregate Risk Potential j (ARPj)	123.21	51.97	32.04	120	41.94	32.04	
Priority Rank of Agent j	1	3	5	2	4	6	

Figure 4. HOR Phase 1 in Stuffed Tofu Production

Based on the ARP calculation in the production of stuffed tofu, it was found that the cause of risk with the highest ARP was the lack of employee accuracy (A23). This is because employees who are not accurate will cause defective products to pass the sorting process, resulting in a waste of time to separate them again, thereby hampering productivity. The causes of risk with the lowest ARP are not stirring regularly (A25) and damaged packaging (A28). This is because employees always stir the filling ingredients being cooked in the pan regularly and there is rarely damaged packaging. In the production of stuffed tofu, there are risk factors that have a positive (+) relationship, namely, lack of employee diligence (A23) with not stirring regularly (A25), and lack of employee diligence (A23) with containers for holding the filling not being closed (A27), which means that these risk factors are positively correlated, but the effect is not very strong. There are also risk factors that have a strong positive (+++) relationship, namely the lack of employee diligence (A23) with employees being careless when cutting and

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

filling tofu (A26), which means that these two risk factors are positively correlated and have a strong effect on related risk factors.

Risk Mapping

Risk mapping aims to identify risk causes that should be prioritized for risk mitigation actions. Risk mapping is carried out using a Pareto chart by sorting the ARP values from largest to smallest, then calculating the cumulative percentage. Risk causes that need to be prioritized are those with a percentage below 75%, while those above 75% can be ignored.

Tofu Production

Based on the ARP value ranking, the results of risk mapping in tofu production presented in Figure 6 show that out of 15 risk causes, there are 8 risk causes with a cumulative percentage below 75%. The risk factors below the cumulative percentage are poor soybean quality (A1) with a cumulative percentage of 19%, weights that do not match the desired hardness and size (A13) with a cumulative percentage of 29%, excessive pressing time (A14) with a cumulative percentage of 39%, employees not wearing complete PPE (Personal Protective Equipment) (A10) with a cumulative percentage of 47%, late sprinkling of water on the foam on the surface of the soybean pulp (A7) with a cumulative percentage of 54%, and dirty containers (A15) with a cumulative percentage of 62%, thick smoke from burning wet palm kernel shells (A9) with a cumulative percentage of 67%, and employees were late in replacing the soybean pulp container with a new one (A6) with a cumulative percentage of 73%.

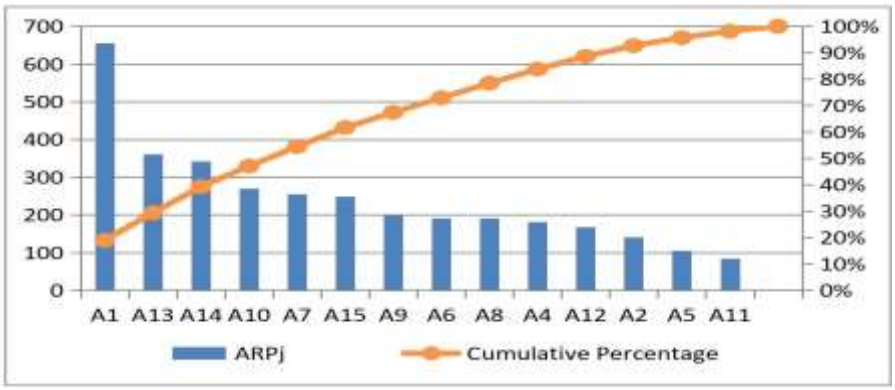


Figure 5. Risk Mapping in Tofu Production

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Tofu frying

Based on the ARP value ranking, the results of risk mapping in tofu frying presented in Figure 7 show that out of 7 risk causes, there are 3 risk causes with a cumulative percentage below 75%. The risk factors with cumulative percentages below 75% are: flipping the tofu too quickly (A16) with a cumulative percentage of 28%, frying too much tofu at once (A22) with a cumulative percentage of 51%, and freshly made tofu not being left to rest first/being fried immediately (A17) with a cumulative percentage of 68%.

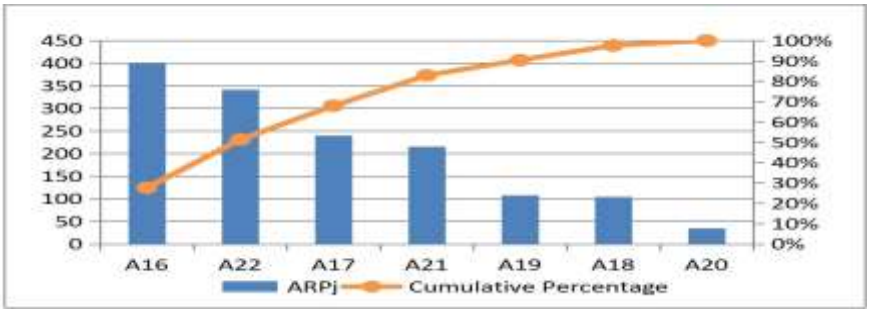


Figure 6. Risk Mapping in Tofu Frying

Production of stuffed tofu

Based on the ARP value ranking, the risk mapping results for stuffed tofu production presented in Figure 8 show that out of 6 risk causes, 3 risk causes have a cumulative percentage below 75%. The risk causes with cumulative percentages below 75% are employee carelessness (A23) with a cumulative percentage of 31%, employees being careless when cutting and filling the tofu (A26) with a cumulative percentage of 61%, and a broken vegetable chopper (A24) with a cumulative percentage of 74%.

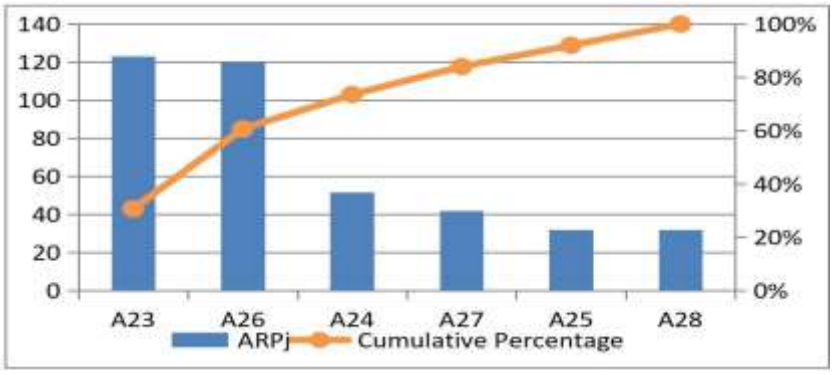


Figure 7. Risk Mapping in Stuffed Tofu Production

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Risk Mitigation

The risk mitigation measures are presented in Table 3.

Table 3. Risk Mitigation Identification

Variable	Sub-Variable	Risk Cause	Code	Risk Mitigation	Code
Tofu production	Soybean selection	Poor soybean quality	A1	Selecting a reliable soybean supplier	PA1
	Soybean grinding	Employees are late in replacing the soybean pulp container with a new one	A6	Conducting regular monitoring during soybean milling	PA10
	Boiling	Delayed pouring water on the foam on the surface of the soybean pulp.	A7	Conducting strict supervision by the section head periodically during boiling ( )	PA5
				Adding employees tothe tofu production Department	PA6
		Thick smoke from	A9	Drying palm kernel	PA8
		burning wet palm kernel shells as fuel.		shells before using them as fuel	
				Storing palm kernel shells in a dry place	PA9
		Employees not wearing complete PPE (Personal Protective Equipment)	A10	Issuing a warning or reprimand to employees who do not wear complete PPE(Personal Protective Equipment)	PA4
	Printing	The weighting device does not match the desired hardness and Size	A13	Replacing the weighting tool with a modern/automatic pressing tool	PA2
		Pressing takes too long	A14	Using *a timer* in accordance with the standard operating procedure (SOP) for pressing time	PA3
		However, the one used is dirty.	A15	Clean the press before use	PA7
Tofu frying pan	Frying tofu	Turning the tofu too quickly	A16	Provide training and education on how to flip tofu to employees responsible for frying tofu.	PA11
				Replace with a spatula that has soft, wide edges	PA12

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

		Freshly made tofu is not left to rest first/is fried Immediately	A17	Create a schedule for resting the tofu before frying	PA14
		Too much tofu in one frying session	A22	Determining the appropriate amount of tofu for one frying Session	PA13
Making stuffed tofu	Sorting	Lack of employee precision	A23	Conducting strict supervision by the department head on a regular basis during tofu sorting	PA15
				Installing visual reminders /posters	PA16
	Production of filling materials	Vegetable chopper machine is broken	A24	Inspecting the vegetablechopper	PA19
				before use	
				Performing regular maintenance on the vegetable chopper machine	PA20
	Cutting and filling tofu	Employees are not careful when splitting and filling tofu	A26	Issuing warnings or reprimands to employees who are not careful enough	PA17
				Conducting periodic employee performance appraisals and evaluations	PA18

Risk Mitigation Priorities

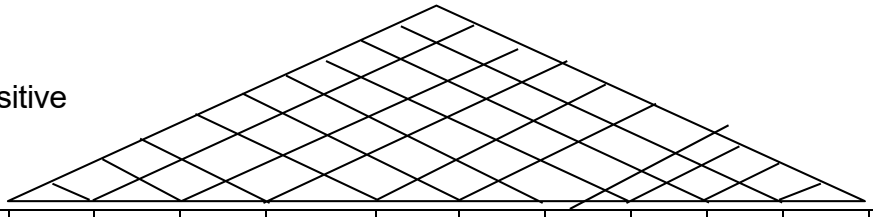
The identified risk mitigations are then prioritized and recommended to PT Tahu Jeletot Taisi. The prioritized risk mitigations are obtained using HOR Phase 2.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Tofu production

Description:
+ = Positive
++ = Strong Positive



Preventive Action (PAk) / To be treated Risk Agent (Aj)	PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10	*ARPj*
A1	9	0	0	0	0	0	0	0	0	0	656.08
A13	0	9	0	0	0	0	0	0	0	0	361
A14	0	3	9	0	0	0	0	0	0	0	342.18
A10	0	0	0	9	0	0	0	0	0	0	270
A7	0	0	0	0	9	9	0	0	0	0	255.68
A15	0	0	0	0	0	0	9	0	0	0	249.54
A9	0	0	0	0	0	0	0	9	9	0	198.70
A6	0	0	0	0	0	9	0	0	0	9	191.88
Total Effectiveness of action k	5904.72	4275.54	3079.62	2430	2301.12	4028.04	2,245.86	1788.3	1788.3	1726.92	
Degree of Difficulty Performing Action k	4.00	4.33	3.0	3.0	3.0	3.67	3.00	3.00	3.00	3.00	
Effectiveness to Difficulty Ratio	1476.18	987.42	1026.54	810.00	767.04	1097.56	748.62	596.10	596.10	575.64	
Rank of Priority	1	4	3	5	6	2	7	8	9	10	

Figure 8. HOR Phase 2 in Tofu Production

The priority order for implementing risk mitigation in tofu production is as follows:

1. Selecting reliable soybean suppliers (PA1)
2. Increasing the number of employees for tofu production (PA6)
3. Using *a timer* in accordance with the standard operating procedure for pressing time (PA3)
4. Replacing the weighting device with a modern/automatic pressing device (PA2)
5. Issuing warnings or reprimands to employees who do not use complete PPE (Personal Protective Equipment) (PA4)
6. Conducting strict supervision by the department head on a regular basis during boiling (PA5)
7. Cleaning the equipment before use (PA7)
8. Drying palm oil fruit shells before use as fuel (PA8)
9. Storing palm fruit shells in a dry place (PA9)
10. Conducting regular monitoring during soybean grinding (PA10)

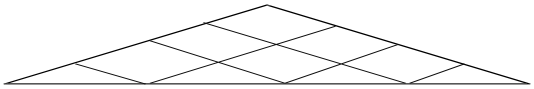
Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

In the production of stuffed tofu, there is a risk mitigation that has a positive (+) relationship between giving reprimands or warnings to employees who do not use complete PPE (Personal Protective Equipment) (PA4) and conducting regular strict supervision by the section head during boiling (PA5) and between drying palm fruit shells before use as fuel (PA8) and storing palm kernel shells in a dry place (PA9), which means that these mitigations can be carried out simultaneously or in combination.

Frying tofu Description:

Description:
+ = Positive
++ = Strong Positive



***Preventive Action* (PAk)** / ***To be treated Risk Agent* (Aj)**	PA11	PA12	PA13	PA14	**ARPj**
A16	9	3	0	0	398.79
A22	1	0	9	0	341.82
A17	0	0	0	9	240
Total Effectiveness of action k	3930.93	1196.37	3076.4	2160	
Degree of Difficulty Performing Action k	3.33	4.33	4.0	3.0	
Effectiveness to Difficulty Ratio	1180.46	276.30	769.1	720	
Rank of Priority	1	4	2	3	

Figure 9. HOR Phase 2 in Tofu Frying

The priority order for implementing risk mitigation in tofu production is as follows:

1. Provide training and education on how to flip tofu to employees in charge of frying tofu (PA11)
2. Determining the appropriate amount of tofu for each frying session (PA13)
3. Establishing a schedule for resting tofu before frying (PA14)
4. Replacing with a spatula that has soft and wide edges (PA12)

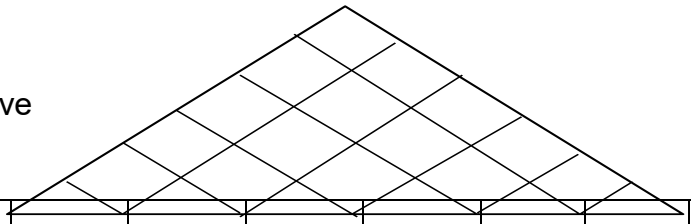
In tofu frying, there are risk mitigations that have a positive (+) relationship, namely providing training and education on how to flip tofu to employees in charge of frying tofu (PA11) and replacing spatulas with ones that have soft and wide edges (PA12), which means that both can be done simultaneously or combined to minimize the occurrence of risks.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Making stuffed tofu

Description:
+ = Positive
++ = Strong Positive



Preventive Action (PAk) / *To be treated Risk Agent* (Aj)	PA15	PA16	PA17	PA18	PA19	PA20	ARPj
A23	9	9	0	0	0	0	123.21
A26	9	9	9	9	0	0	120
A24	0	0	0	0	9	9	51.97
Total Effectiveness of action k	2188.89	2188.89	1108.89	1108.89	467.73	467.73	
Degree of Difficulty Performing Action k	3.00	3.67	3.0	4.63	3.0	3.00	
Effectiveness to Difficulty Ratio	729.63	596.43	369.63	239.501	155.91	155.91	
Rank of Priority	1	2	3	4	5	6	

Figure 10. HOR Phase 2 in the Production of Stuffed Tofu

The priority order for implementing risk mitigation in tofu production is as follows:

1. Conducting strict supervision by the department head on a regular basis during tofu sorting (PA15)
2. Installing visual reminders/posters (PA16)
3. Issuing warnings or reprimands to employees who are not careful enough (PA17)
4. Conducting regular employee performance assessments and evaluations (PA18)
5. Inspecting the vegetable chopper machine before use (PA19)
6. Performing regular maintenance on the vegetable chopper (PA20)

In the production of stuffed tofu, there are risk mitigations that have a positive (+) relationship, namely between conducting strict supervision by the section head on a regular basis during tofu sorting (PA15) and conducting regular employee performance assessments and evaluations (PA18), giving warnings or cautions to employees who are not careful enough (PA17) and conducting regular employee performance assessments and evaluations (PA18), and inspecting the vegetable chopper before use (PA19) with performing regular maintenance on the vegetable chopper (PA20), which means that these

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

mitigations can be carried out simultaneously or in combination. In the production of stuffed tofu, there is also a risk mitigation measure that has a strong positive correlation (++) between conducting strict supervision by the section head on a regular basis during tofu sorting (PA15) and issuing warnings or reprimands to careless employees (PA17). This means that PT Tahu Jeletot Taisi can choose one of these two mitigation measures.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the research conducted, the following conclusions can be drawn:

1. The results of the identification of risk events and risk causes carried out in the stuffed tofu production process at PT Tahu Jeletot Taisi are as follows:
   a. There are 25 risk events in the entire tofu production process at PT Tahu Jeletot Taisi, namely 14 risk events in tofu making, 5 risk events in tofu frying, and 6 risk events in tofu filling.
   b. There are 28 risk causes throughout the tofu production process at PT Tahu Jeletot Taisi, namely 15 risk causes in tofu making, 7 risk causes in tofu frying, and 6 risk causes in tofu filling production.
2. The results of risk measurement using HOR phase 1 in the tofu production process at PT Tahu Jeletot Taisi are shown by the ARP value. The cause of risk with the highest ARP value in tofu production is poor soybean quality (A1), the cause of risk with the highest ARP value in tofu frying is rushing the tofu flipping process (A16), and the cause of risk with the highest ARP value in stuffed tofu production is employees not being careful when cutting and filling the tofu (A26).
3. There are 14 priority risk causes from the risk mapping that occur in the production of stuffed tofu at PT Tahu Jeletot Taisi. There are 8 priority risk causes in tofu production, 3 priority risk causes in tofu frying, and 3 priority risk causes in stuffed tofu production.
4. There are 20 risk mitigations recommended to PT Tahu Jeletot Taisi, namely 10 risk mitigations in tofu production, 4 risk mitigations in tofu frying, and 6 risk mitigations in stuffed tofu production.

Recommendations

Based on the research findings, the following recommendations can be provided:

1. PT Tahu Jeletot Taisi needs to manage the causes of risk that arise throughout the production process, especially priority risk factors that have a major impact on the company.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

2. PT Tahu Jeletot Taisi can implement the risk mitigation measures recommended in this study and readjust them to the conditions in the company to minimize existing risks.
3. For future researchers, it is hoped that they can deepen this research by expanding the scope of the research, such as conducting risk analysis related to the supply chain.

REFERENCES

Asgaf, K., Hifizah, A., Astati, Ananda, S., Jamili, M. A., & Mukhlis. (2025). Application of Fermented Feed Technology to Improve Beef Cattle Business Efficiency and Student Agribusiness Learning. Jurnal Penelitian Pendidikan IPA, 11(5), 604–610. https://doi.org/10.29303/jppipa.v11i5.11135

Honkanen, U. (2013). Supply chain management.

James, E. H., Wooten, L. P., & Dushek, K. (2011). Crisis Management: Informing a New Leadership Research Agenda. Academy of Management Annals, 5(1), 455–493. https://doi.org/https://doi.org/10.5465/19416520.2011.589594

Kamperos, I. D. G., Giannakopoulos, N. T., Kanellos, N., & Sakas, D. P. (2024). Big data and supply chain crisis financial risk management : A bibliometric review. Journal of Infrastructure, Policy and Development, 8(9), 1–41. https://doi.org/https://doi.org/10.24294/jipd.v8i9.6592

Mukhlis, M., Ismawati, I., Sillia, N., Fitrianti, S., Ukrita, I., Wisra, R. F., Raflis, H., Hendriani, R., Hanum, L., Ibrahim, H., Nofianti, S., Marta, A., & Sari, N. (2024). Characteristics of Production Factors and Production of Zero Tillage System Rice Farming. Jurnal Penelitian Pendidikan IPA, 10(8), 6013–6019. https://doi.org/10.29303/jppipa.v10i8.8542

Mukhlis, Noer, M., Nofialdi, & Mahdi. (2019). Analysis of income and feasibility of rice-cattle integration system farming based on enterprises scale. Journal of Advanced Research in Dynamical and Control Systems, 11(7), 544–553. https://www.jardcs.org/abstract.php?id=2678

Mukhlis, Wisra, R. F., Hendriani, R., & Sari, N. (2023). Analisis Faktor-Faktor Yang Mempengaruhi Pendapatan Padi Organik Di Kecamatan Harau. Jurnal Ilmiah Agribios, 21(2), 183–190. https://doi.org/https://doi.org/10.36841/agribios.v21i2.3680 Abstrak

Pujawan, I. N., & Geraldin, L. H. (2009). House of risk : a model for proactive supply chain risk management. Business Process Management Journal, 15(6), 953–967. https://doi.org/10.1108/14637150911003801

Rianse, U., & Abdi. (2013). Metodologi Penelitian Sosial dan Ekonomi-Teori dan Aplikasi

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

(1st ed.). Alfabeta.

Simaremare, N. N., Pardian, P., & Trimo, L. (2020). MANAJEMEN RISIKO PRODUKSI SISTEM HIDROPONIK STUDI KASUS FRUITABLE FARM KABUPATEN BOGOR RISK. Jurnal Ekonomi Pertanian Dan Agribisnis (JEPA), 4(1), 1–12. https://doi.org/https://doi.org/10.21776/ub.jepa.2020.004.01.1

Sugiyono. (2021). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta.

Sulistyowati, Y. (2024). Mitigasi Risiko Produksi Bibit Anggur dengan Teknik Penyambungan (Grafting) di Arga Urban Farming Jakarta Selatan [Universitas Islam Negeri Syarif Hidayatullah]. https://repository.uinjkt.ac.id/dspace/bitstream/123456789/80471/1/YUNI SULISTYOWATI-FST.pdf

Wastra, A. R., & Mahbubi, A. (2014). Risiko Agribisnis. Gaung Persada Press Group.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.