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ANALYSIS THE RISK OF SNAKE FRUIT PRODUCTION USING THE HOUSE OF RISK MODEL IN SALACCA TRADING BUSINESS

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Abstract

The snake fruit processing company UD Salacca faces several challenges in its snake fruit processing activities, including people, machines, methods and the environment. The aim of this research is to identify the challenges faced by UD Salacca in snake fruit production. The risk management method used in this research follows the ISO 31000:2008 guidelines using the House of Risk (HOR) Model, which includes steps for risk identification, risk analysis, risk evaluation, and risk management. 22 risk events (risk factors) have been identified from 9 process activities and 17 risk agents (risk causing factors), of which there are 5 high priority risk causes. The causes of this risk include the mixing process taking less than three hours, weather and pest factors, not being careful when loading, and not being careful in the sorting process using traditional grinding equipment. From the research results, 18 proposed mitigation strategies were found from 9 process activities. Some of the strategies proposed include the use of machines in the ripening process, the use of tools to peel snake fruit, the use of personal protective equipment when working, supervision and implementation of work operational standards during harvest, and the use of assessment checklists when sorting snake fruit. Early handling strategies are needed by salacca businesses to anticipate major risks. These results can be used to increase the company's effectiveness in handling risk management.

Keywords: Risk Management, Snake Fruit Processing, Risk Analysis, House of Risk, Risk Mitigation, Risk Prioritization.

INTRODUCTION

Risk management is an important aspect of decision making in a dynamic business environment, where companies can incorporate sustainability into their strategy through risk management. Risk assessment can be done by creating a large and complex portfolio,

but with the help of risk management, risk assessment can be more effective [1]. Risk is the possibility of loss. The possibility of loss usually means a situation where there is an openness (exposure) to loss or the possibility of loss [2].

Risk is everywhere, can come at any time and is difficult to avoid [3]. If this risk is faced by the company, the company could experience quite large losses. In certain cases, these risks can cause losses to the organization. Risk management is necessary for this reason. Risk management is a risk management activity through identification, analysis, evaluation, minimization and elimination of unwanted risks. Risk management aims to mitigate these risks so that we can achieve optimal results [4].

UD Salacca is in Aek Nabara Parsalakan Village, Angkola District, South Tapanuli Regency, North Sumatra, and focuses on processing snake fruit. This company is one of the trading companies that is developing in North Sumatra. Also known as a snake fruit producing area in North Sumatra, Parsalakan Village is one of the areas that produces a lot of snake fruit compared to other areas in South Tapanuli. This is because the area of snake fruit plants in Parsalakan Village is very large [5].

Parsalakan Village is a sub-district included in West Angkola District which produces snake fruit of 298,775.25 tons per year with a harvest area of 14,951.32 Ha in 2022 [6]. UD Salacca produces and sells various kinds of snake preparations such as snake dodol, snake dates, snake softdrinks, snake chips, snake syrup, snake coffee, snake honey, snake soy sauce, snake jelly, and candied. From the preliminary study that has been carried out, the Salacca Company still often experiences delays in receiving snake fruit, so that the production process of the processed snake fruit they process is hampered. In fact, processed snake products in the production section are very much in demand by consumers. Requests often come from various shops, supermarkets, both inside and

[1] Laura M. Castro and others, 'Managing the Risks of Risk Management', *Journal of Decision Systems*, 17.4 (2008), 501–21 <https://doi.org/10.3166/jds.17.501-521>; Qihu Qian and Peng Lin, 'Safety Risk Management of Underground Engineering in China: Progress, Challenges and Strategies', *Journal of Rock Mechanics and Geotechnical Engineering*, 8.4 (2016), 423–42 <https://doi.org/10.1016/j.jrmge.2016.04.001>.

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[6] (Sitompul et al., 2023)

outside the city, as well as from various campuses for events. This request can be in the form of consumers coming directly to the company or online requests [7].

From the research study carried out at the Salacca Company, the focus of the research was aimed at the existing production activities at the Salacca Company starting from the snake fruit harvesting activity. The stages in a trading business consist of several sub-processes where each sub-process that is passed is a part that must be passed in several product items. The initial identification results regarding the low productivity of the Salacca Company were caused by several things.

The first problem is related to humans or labor. The average employee who works at the Salacca Company is a young person who lacks the level of experience and skills. This will also affect the value of productivity and quality and this is also a risk. In terms of technological factors and the production machines used by the Salacca Company, they are simple, where most of every process still prioritizes human technology. The Salacca Company also does not have a maintenance schedule for its existing production machines. This can be seen from the survey carried out which found that the frying machine in the frying process was in an inoperable condition and had not been repaired.

There is also a machine at the Salacca Company that is damaged in the snake chips oil drying section, which could result in the risk of the chips being drained manually so they will take longer to package. Apart from that, peeling snake fruit is done manually using a knife, which can pose a risk of hand injury to workers. Another form of problem in terms of product quality is that the products produced do not match the desired quality values, such as the quality of snake dodol in terms of taste and texture which is not good due to lack of supervision in certain processes and also the use of decreased raw materials, snake chips. The product produced has a bitter texture, color and taste, the snake fruit jelly produced is sometimes too hard and soft, the syrup product produced has an inconsistent taste, the snake fruit coffee has a less refined aroma and taste.

In terms of methods, workers do not wear Personal Protective Equipment (PPE) when working. Workers do not use gloves when opening bark, which can cause the thorns to enter their hands. Workers also transport snake fruit in the Salacca Company's garden using bicycles. This can cause the snakehead to fall if when transporting the snakehead the bicycle is positioned on an unstable road and workers can also be injured if they are not careful when transporting the snakehead on the bicycle.

Problems that occur in a company can cause losses and a decrease in profits. Risks that occur in business process activities can be handled with risk management which aims to minimize the occurrence of risks using the House of Risk (HOR) model [8]. House of

[7] Batubara, Zakiah, and Zulkarnain.

[8] Doddy Arief Wibowo and Ervina Ahyudanari, 'Application of House of Risk (Hor) Models for Risk Mitigation of Procurement in The Balikpapan Samarinda Toll Road Project', *IPTEK Journal of Proceedings Series*, 0.1 (2021), 172 <https://doi.org/10.12962/j23546026.y2020i1.8481>; Pinnarat Nuchpho, Santirat Nansaarng, and Adisak AUD Pongpullponsak, 'Risk Assessment in the Organization by Using FMEA Innovation: A Literature Review', *International Conference on Educational Reform*, 8.July (2014), 781–89 <https://www.researchgate.net/publication/264116818>.

Risk (HOR) is a method for handling risk which consists of 2 phases. House of Risk (HOR) phase 1 is used to determine the priority of risk agents who should be provided with risk mitigation strategies. House of Risk (HOR) phase 2 is a priority sequence in taking actions that are considered most effective for dealing with risks that have the potential to occur in business process activities [9].

From the description above, it shows that there are quite a lot of risks faced by the Salacca Company related to risk management actions in production activities in running its business, so it is necessary to carry out a risk analysis of snake production at the Salacca Company.

RESEARCH METHODS

Data

The research is descriptive quantitative and qualitative through exploration of data and facts in the field. This research data includes two primary and secondary data. Due to the large number of individuals in the population and the difficulty of reaching all of them, the convenience sampling method was used for research purposes. Primary data is data that refers to information obtained from the first party by researchers related to research variables. Secondary data is data obtained from indirect sources such as previous research data and documentation sourced from books and journals [10]. This research examines the activities of the snake fruit processing industry in an effort to identify various risk factors and carry out mitigation efforts limited to within the scope of the Salacca Company.

Method

At this stage, after conducting interviews and distributing questionnaires, processing steps adopted from ISO 31000:2008 are carried out. The questionnaire was created based on the activity mapping of the Salacca Trading Business Company, see (table 2). Risk assessment is carried out using the steps of risk identification, risk analysis and determining priority risks which will be further evaluated by calculating the value using House of Risk phase 1. In determining what priority mitigation strategies are appropriate and must be implemented first, namely by calculating value using House of Risk phase 2. Each question reference uses several previous research references [11].

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Table 1. List of Risk Events

Sub Process	Code	Risk Events
Harvest Snake Fruit	E1	Snake fruit peels off (wounds) during the harvest process
	E2	Damage to snake fruit during loading
	E3	Harvest production decreases
Sort Snake Fruit	E4	There is a mismatch between the size of the snake fruit and the desired weight
	E5	Work accidents occur, injuries to the hands
	E6	Snake fruit is damaged due to wounds, bruises, broken skin
Peeling Snake Fruit	E7	Wounds on hands when stripping
	E8	Processing time is still slow

Table 2. List of Risk Events (Continued)

Sub Process	Code	Risk Events
Snake Fruit Milling	E9	The processing time is too long
	E10	Non-compliance with quality
Cooking	E11	Shrinkage occurs in the snake fruit dough
	E12	The product is not durable
	E13	The color texture is not good
	E14	The dough is not thick enough
	E15	Processing time is not optimal
	E16	Taste and aroma are lost
Snake Fruit Frying	E17	Risk of overcooking chips
	E18	Taste quality is reduced
	E19	The color quality of the chips produced is not good
Cooling Process	E20	Risk of rancid odor
	E21	Risk of chips going stale
Packaging Process	E22	Packaging is not neat

Table 3. List of Risk Causes

Sub Process	Code	Risk Events
Harvest Snake Fruit	A1	Lack of caution when carrying out harvest activities
	A2	Lack of caution when strengthening
	A3	Weather and pest factors
Sort Snake Fruit	A4	Lack of accuracy in the sorting process
	A5	Do'nt use safety gloves
Peeling Snake Fruit	A6	Not using safety gloves (traditional)
	A7	Work that is still traditional (manual)
Snake Fruit Milling	A8	The workmanship is still traditional
Cooking	A9	There are traces of product mixture still attached to machines and equipment
	A10	The dodol mixing process takes less than six hours

'Analisis Risiko Petani Salak Pondoh (Salacca Zalacca Gaertner Voss) Kabupaten Lumajang', *Repositoriy Unej*, 2020.

	A11	The workmanship is still traditional
	A12	The temperature during the cooking process is not stable or maintained
Snake Fruit Frying	A13	Oil temperature is overheated
	A14	Supervision during the frying process
	A15	Good quality cooking oil
Cooling Process	A16	The cooling process is too fast
Packaging Process	A17	Lack of accuracy in carrying out packaging activities

RESULT AND DISCUSSION

Risk Identification

At the risk event identification stage, risk determination was carried out by distributing questionnaires that had been validated by several experts in the fields of snake fruit processing and horticulture, which were then distributed to respondents. The next step is to analyze the risks that have been identified, including assessing the severity, the probability of the risk occurring, and the impact on the operations of the Salacca Company. In this research, the identification of risk events is based on the overall activities that occur in the snake fruit processing process at the Salacca Company. There are 8 activities at the Salacca Company in processing, namely: harvesting, sorting, peeling, milling, cooking, frying, cooling and packaging.

Risk Agent Analysis

Based on the results of interviews conducted in all processing activities, there are 22 risk events, which means there are 22 risk factors. From several identification steps, the causes of risk are caused by various things in accordance with the existing sub-processes at the Salacca Company, such as sorting activities where there is a lack of accuracy in the sorting process (A4) which causes a mismatch between the size of the snake fruit and the desired weight (E4) and damaged snake fruit, bruises, and broken skin (E5). Another factor in the case may be related to lack of training or inadequate equipment in the sorting process. Snake fruit is damaged due to the water content in snake fruit which is quite high at 78%, which can shorten the shelf life and cause snake fruit to be easily damaged. However, if the snake is dried, the water content of the snake drops to 24.86%. The process starting from planting, growing and harvesting snake fruit depends on the climate and season so snake fruit is difficult to handle [12].

Milling activities (A8) work at the Salacca Company is still manual or traditional, resulting in too long processing times (E9) and non-compliance with quality (E10). The reason is due to the lack of more modern equipment and technology in the grinding process. Cooking activity (A10) where the stirring process of snake dodol takes less than 3 hours, resulting in the product not being durable (E12), poor texture and color (E13), and a dough that is not thick enough (E14). The cause may be related to a lack of understanding of the proper cooking process or inefficient time management. Cooling Activity (A16) Cooling process that is too fast. This can cause the risk of a rancid odor

[12] Amanatur dan Santoso (2017)

(E20) and the risk of the chips going soggy (E21). The cause may be related to the lack of proper temperature monitoring or regulation in the cooling process.

Analysis of Phase 1 House of Risk (HOR) Results

Phase 1 House of Risk (HOR) analysis determines a dominant risk agent by taking priority measures. In HOR phase 1, the Aggregate Risk Potential (ARP) calculation was used to assess the influence of risk agents on snake fruit processing activities at the Salacca Company.

Table 4. Risk Classification Based on Priority Value (ARP)

Aggregate Risk Potential (ARP) Assessment				
Code	**Causes of Risk**	**ARP**	**ARP (%)**	**Cumulative ARP**
A9	Lack of employee accuracy when grinding	1032,8	23%	1033
A3	Weather and pest factors	414,0	9%	1447
A2	Lack of care when loading	348,0	8%	1795
A10	The mixing process (dodol) takes less than three hours	305,3	7%	2100
A8	The grinding process still uses traditional tools (not using a grinding machine)	288,8	6%	2389
A6	Not using safety gloves (traditional)	263,3	6%	2652
A15	The quality of the cooking oil is not good	231,3	5%	2883
A1	Lack of caution when carrying out harvest activities	231,0	5%	3114
A13	The temperature during the cooking process is not stable or maintained	223,1	5%	3337
A12	Work that still uses traditional equipment (not using a mixing machine)	217,5	5%	3555
A4	Lack of accuracy in the sorting process	203,5	4%	3758
A14	Supervision during the frying process	191,6	4%	3950
A5	Don’t use safety gloves	154,7	3%	4105
A16	The cooling process is too fast	135,0	3%	4240
A17	Lack of accuracy in carrying out packaging activities	126,0	3%	4366
A11	There are traces of product mixture still attached to machines and equipment	114,0	3%	4480
A7	The workmanship is still traditional	78,0	2%	4558
	Total	**4557,6**	**100%**	**4558**

Analysis of House of Risk (HOR) Phase 2 Results

Risk Mitigation Analysis

At the mitigation stage, the step in determining the mitigation plan is the risk priority that requires treatment which has been determined in the first phase HOR, then loaded into a questionnaire. After the questionnaire has been compiled, interviews and literature

studies are carried out to strengthen data in planning. From the results of interviews and studies conducted, 18 mitigation plans were obtained as an effort to handle risks.

Mitigation Plan Assessment Analysis

After carrying out a comprehensive analysis related to the risk mitigation plan at the Salacca Company, there is an assessment scale for the level of difficulty of the effectiveness value for each mitigation strategy (ETDk). Measuring the effectiveness value is aimed at seeing the priority level at which the Company carries out mitigation actions sequentially. From the results of measuring the effectiveness value, the following mitigation strategy action priorities were obtained:

1. Replace the cooking process from a traditional stove to a machine. This mitigation strategy is a top priority because it can mitigate 3 possible causes of risks arising. This strategy is very helpful in increasing the efficiency of processing time so that it has an impact on production and product quality. increase time efficiency and effectiveness by 20-30%.
2. Increase supervisory activities in the cooking process, by increasing these supervisory activities it will maximize results in the cooking process with many risks that arise in the cooking process, in the supervision process it allows workers to supervise activities by using checklists for each process being supervised such as items related to product quality in the cooking process.
3. Equipping personal protective equipment (hand slippers) is an important action to maintain the safety and health of workers during the snake processing process.
4. Using a milling machine, where using a milling machine can speed up the grinding process and can help improve product quality.
5. Using bamboo baskets and wooden crates lined with leaves during loading and transportation can help and protect the snake fruit from damage during the transportation process.
6. Use a filter for the oil, this is done to maintain the quality of the oil so that it can be used repeatedly.
7. Adjust the temperature and cooking time, this priority is done to overcome the high temperature of the oil in frying activities
8. The use of a thermometer, this mitigation step is attempted to overcome the risk of temperature instability or overheating.
9. Supervise and implement work operational standards during the harvest process by maintaining strict work operational standards at each stage of harvest to ensure product quality and consistency.
10. Using standard equipment in the sorting process that complies with standards and sorting processes that will help increase accuracy and efficiency,
11. Carrying out an assessment checklist in the sorting process, this means determining quality standards for the grinding process which helps maintain uniform product quality. This step also aims to ensure that no steps are missed in the sorting process.
12. Carrying out periodic land cleaning and maintenance activities during harvest activities, this aims to maintain the stability of the supply of raw materials to the Salacca Company.

13. Using a timer or timer in the cooling process. Using a timer will further increase the effectiveness of the cooling process.
14. Establish quality standards in the milling process. This strategy aims to maintain product quality stability. Determination of quality standards is carried out by carrying out standard product tests from food lab results.
15. Using standard work equipment in the sorting process, this step will help workers to increase work effectiveness by minimizing the risk of injury to hands and also increasing efficiency because it is faster
16. Using a stripping machine will speed up the stripping process and help increase efficiency.

Development of Mitigation Measures

The development of this mitigation step is a follow-up action to the strategy that has been planned. At this development stage, several analyzes related to the mitigation tools and actions that will be implemented at the Salacca Company are added.

CONCLUSION

From the results of the research carried out, it can be concluded that in the Salacca Company's snake fruit production process there were 22 risk events with 18 risk causes. The causal factors that occur are due to labor, machines and also environmental factors. During the cooking process, efforts are made to replace the furnace using a stirring machine. Increase monitoring activities in the cooking process to ensure each stage of the process and product quality is maintained. During the stripping process, workers wear personal protective equipment. The grinding process is carried out using a milling machine to increase work efficiency and productivity. In the frying process, a filter tool is used to ensure that the oil is always clean, avoiding any remaining frying residue. Set temperature standards in the cooking process to stabilize the heat of the oil so that overcooked and damaged products do not occur. The use of temperature measuring instruments to assist the process of monitoring the level of oil heat stability in the frying process. Increase supervision activities in the packaging process so that packaged products have passed the inspection process.

Apart from that, increasing the monitoring process for harvest activities to ensure the work process runs well in order to maintain the quality and availability of snake fruit. In the process of sorting snake fruit, workers are given a list form which contains information on the condition of the fruit, the quality and quantity of the snake fruit. Use bamboo baskets lined with leaves to help with the loading process of snake fruit. Carrying out regular cleaning and maintenance activities. Use a stopwatch to help monitor the cooling process so that the product goes through the cooling process according to the rules. Determination of product quality standards in milling activities so that quality uniformity is maintained. Use of stripping machines to increase stripping time efficiency.

The benefit of the research that the author conducted is to provide results and evaluate the possible risks that occur in the production of processed snake, then for the Salacca Trading Business company, these results can be used to increase the company's effectiveness in handling risk management based on ISO 31000:2008 based on the House model. of Risk, and for academics, this research can be used as a reference for students conducting studies on risk management based on ISO 31000:2008. Further research can

develop more specific mitigation strategies for each risk that has been identified, including the selection of tools and technology in worker training, and changes in the production process.

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