

Analysis Of Risk Mitigation Strategy For Tofu Production In Padang City

Fitriyeni Saputri*, Gunarif Taib, Nofialdi

Postgraduate Program, Faculty of Agricultural Technology
Andalas University



Abstract – Risk management is an attempt to identify, analyze and control risks in an activity with the aim of obtaining higher effectiveness and efficiency. The research was conducted on the tofu industry in Padang City from March to May 2021. The method used in this analysis is the method Z score and analyze the impact of risk using the VaR (Value atRisk) method. The results of the study show that there are 12 risk indicators that commonly occur in the tofu industry; the biggest cause of risk in the production of tofu in the city of Padang occurs in the limited number of workers; based on the results of risk mapping, risk sources in quadrant I are carried out in a preventive way, namely by preventing the occurrence of risk sources. Meanwhile, the risk sources in quadrant III are carried out by means of mitigation, which is done to reduce the impact caused by the risk sources.

Keywords – *Mitigation, Risk, Tofu Industry.*

I. INTRODUCTION

The tofu industry contributes significantly to the supply of food processing products because it has bright development prospects. This is because tofu is a popular food for the people with an economical price and high nutritional value. In addition, tofu is also very easy to find in the market. In Padang City, the tofu industry that is developing in the community is the Small and Home Industry. Seeing the large role of tofu as a healthy food among the community, it is necessary to develop the tofu industry. This business is not only profitable for producers, but also provides benefits for consumers both in terms of nutritional content as well as in terms of product quality.

According to Mahesa (2017), his research reveals that there are 17 (seventeen) sources of risk in each tofu business production process, starting from the raw material procurement process to the packaging process. The highest level of risk is the destruction of the tofu during packaging and the lowest level of risk is the unavailability of water during soaking and damage to operational machines.

To minimize the impact caused by the existence of risk, a strategy in risk management is needed. Risk management has a goal to manage risk so that we can obtain optimal results. Risk management is needed in the decision-making process in production activities so as to reduce the level of risk and loss. Based on the conditions described above, the authors are interested in conducting a study entitled "Analysis of Risk Mitigation Strategies for Tofu Production in the City of Padang"

II. METHODOLOGY

The research was conducted on the tofu industry in the city of Padang. The research was conducted from March to May 2021. In Padang City, there are 10 tofu industries registered with the Padang City Manpower and Industry Office. The samples in this study were 6 tofu industries. According to Aulia (2012), if the population is homogeneous enough for the population below 100, the sample can be used 50%, and if it is above 1,000, the sample can be used 15%. So, the sample size used is 50% of the 10 population, namely 6 tofu industries in the city of Padang.

Sampling is done by area sampling. This technique is carried out to take sample members because it considers the representation of each existing geographic area.

The data collected in this study consisted of primary data and secondary data. Primary data was obtained directly through interviews with respondents using a list of questions that was made in advance. In addition, this data was also obtained through direct observation of the object of research. Secondary data were obtained from the Padang City Manpower and Industry Office, websites and literature relevant to the research.

2.1 Descriptive Analysis

Descriptive analysis was conducted to analyze the factors that are a source of risk in the tofu industry in the city of Padang.

2.2 Risk Analysis

The method used to determine the possibility of risk is the Z score method.

2.3 Risk Impact Analysis

The method used in analyzing the impact of risk is the VaR (Value at Risk) method.

2.4 Risk Mapping

Risk mapping is done by classifying risks into two dimensions, namely the probability dimension and the impact dimension.

2.5 Risk Management

The risk level map divides the severity of the impact and the risk mitigation measures into 4 quadrants. Quadrant I is a risk that has an impact that can threaten the achievement of company goals with mitigation measures in the form of avoid, which means avoiding or eliminating activities that have the risk. Quadrant II is a dangerous risk group that rarely occurs with mitigation measures in the form of sharing or sharing the risk with other parties so as to reduce the risk. Quadrant III is for risk groups that occur regularly with mitigation measures in the form of reducing or reducing risk by means of routine monitoring management so that risk can be reduced. The last quadrant is quadrant IV for the risk group that is not dangerous so that the mitigation step is to accept or accept the risk.

III. FINDINGS AND DISCUSSION

3.1 Identification of Risk Sources in the Tofu Industry in Padang City

Risk identification is carried out at the raw material, production and marketing processes. Based on the results of research through observations and interviews with tofu industry business owners in the city of Padang, it is known that there are 12 risk indicators that commonly occur in the tofu industry. These indicators can be seen in Table 1 below.

Source of Risk	Type of Risk
Raw Material Risk	Soybean raw material prices fluctuate
	Insufficient supply of soybean raw materials
	Low quality of soybean raw materials
Production Risk	Lack of clean water
	Lack of cleanliness during the production process
	Damage to equipment in the production process
	The tofu product was destroyed during packaging
	Limited number of workers
Marketing Risk	Tofu products are not sold out
	Product competitors know
	Product delivery delays
	<u>Damaged tofu products arrive in the hands of consumers</u>

3.2 Probability Analysis of Risk Sources in the Tofu Industry in Padang City

Probability analysis is carried out to find out how big the probability or possibility of the occurrence of risk from each risk source. The calculation of the probability analysis of the occurrence of risk from each risk source in the tofu industry in Padang City is processed using the standard value method or Z-score can be seen in Table 2 as follows.

No	Source of Risk	Probability (%)
1	Soybean raw material prices fluctuate	0.494
2	Insufficient supply of soybean raw materials	0.317
3	Low quality of soybean raw materials	0.317
4	Lack of clean water	70.54
5	Lack of cleanliness during the production process	65.542
6	Damage to equipment in the production process	0.494
7	The tofu product was destroyed during packaging	18.141
8	Limited number of workers	73.891
9	Tofu products are not sold out	34.46
10	Product competitors know	18.14
11	Product delivery delays	26.11
12	Damaged tofu products arrive in the hands of consumers	18.14

Based on Table 2, it is known that the probability value of each source of risk from the largest to the smallest is the limited number of workers at 73.891% and the availability of supply of soybean raw materials is less and the quality of soybean raw materials is low at 0.317%. Z value obtained for the source of the risk of limited number of workers is -0.40824829. The negative sign of the Z value is ignored because it indicates that the value is to the left of the mean value on the normal Z distribution curve.

This value, if mapped on the Z distribution table, will show a value of 0.73891. This value means that the probability of limited number of workers is 73.891%.

3.3 Impact Analysis of Risk Sources on Tofu Industry in Padang City

This analysis aims to determine the impact of losses caused by each source of risk. In calculating the impact of risk is done by determining the level of confidence used is 95% and the remaining error is 5%. The value of the calculation of the risk impact can be seen in Table 3 below.

No	Source of Risk	Impact
1	Soybean raw material prices fluctuate	4.681478558
2	Insufficient supply of soybean raw materials	4.869263773
3	Low quality of soybean raw materials	4.869263773
4	Lack of clean water	3.869263773
5	Lack of cleanliness during the production process	3.1085663
6	Damage to equipment in the production process	4.681478558
7	The tofu product was destroyed during packaging	3.869263773
8	Limited number of workers	3.014811891
9	Tofu products are not sold out	3.441899633
10	Product competitors know	3.869263773
11	Product delivery delays	3.681478558
12	Damaged tofu products arrive in the hands of consumers	3.869263773

Based on Table 3 above, it is known that the impact caused by each source of risk on the tofu industry from the largest to the smallest is the availability of supply of raw soybeans that are less and the quality of soybean raw materials is low with a value of 4.869263773 and the limited number of workers with a value of 4.869263773. 3.014811891 at the 95% confidence level. This means that the maximum loss suffered due to the lack of supply of soybean raw materials and low quality of soybean raw material is 4.869263773, but the possibility of the above loss is 5%.

3.4 Risk Mapping

The risk mapping on the risk map is based on an estimate of where the position is from the calculation of probability and impact. To find out the actual position, calculations are carried out for the risk status. The risk status is obtained based on the results of the multiplication between probability and impact. Risk status describes the order of risk from the most at risk to the least risky. The value of the risk status can be seen in Table 4 below.

No	Source of Risk	Risk Status
1	Soybean raw material prices fluctuate	2.312650408
2	Insufficient supply of soybean raw materials	1.543556616
3	Low quality of soybean raw materials	1.543556616
4	Lack of clean water	272.9378665
5	Lack of cleanliness during the production process	203.7416524
6	Damage to equipment in the production process	2.312650408
7	The tofu product was destroyed during packaging	70.19231411
8	Limited number of workers	222.7674654
9	Tofu products are not sold out	118.6078614
10	Product competitors know	70.18844484
11	Product delivery delays	96.12340515
12	Damaged tofu products arrive in the hands of consumers	70.18844484

Based on Table 4 above, it can be seen that the biggest risk status is the lack of clean water availability and the smallest is the lack of supply of soybean raw materials and the low quality of soybean raw materials. The risk status describes the order of priority on the sources of risk. After obtaining the results of the probability and impact of risk, the next step is risk mapping. Risk mapping is a description of the risk position on a map on two axes, namely the vertical axis which describes the probability and the horizontal axis which describes the impact. Placement of risk positions based on the results of the calculation of the probability and impact of risks that have been carried out previously. On the probability of the possibility of risk is divided into two, namely a large probability and a small probability. The impact of the risk is also divided into two, namely the major impact and the minor impact. The limit between the large probability and the small probability is determined by the business owner, which is 30%. The limit is determined based on long experience in business and the percentage of occurrence of events that are a source of risk. The limits for large and small impacts are also determined by the business owner, namely 3. The results of the analysis of the probability and impact of risk from each risk source can be seen in Figure 1 below.

Probability (%)

big 30% small		4, 5, 8, 9	
		1, 2, 3, 6, 7, 10, 11, 12	
	small	3	besar
			big

Based on the results of risk mapping, the risk sources in quadrant I are carried out in a preventive way, namely by preventing the occurrence of risk sources. Meanwhile, the risk sources in quadrant III are carried out by means of mitigation, which is done to reduce the impact caused by the risk sources.

The preventive strategy taken to deal with the risk of lack of availability of clean water and lack of cleanliness during the production process is to perform personal hygiene and environmental sanitation. Personal hygiene can be done by washing hands, using special clothes in the production process and carrying out the production process according to good procedures. In the production section, hand washing is very important for craftsmen. This is done because you remember every time your hands are exposed to acidic tofu waste. The use of soap in washing hands can remove residual acid that sticks to the skin and can also kill microorganisms. The same thing was also expressed by Sudaryantining Sih (2020), hand contact with tofu-making liquid waste will cause Irritant Contact Dermatitis. In the tofu industry environment, environmental sanitation is a matter that must be prioritized, because tofu products are products with high water content and protein content, so that they become a good medium for spoilage microorganisms to grow. Always checking the stock of water availability is a step that can be taken to reduce the risk that occurs. Good and sufficient lighting is also needed to avoid the production room from high humidity.

The preventive strategy taken to deal with the risk of limited number of workers is to maximize the use of labor in accordance with their respective abilities and fields. The number of workers is influenced and associated with the quality of labor, gender, age and wages of workers. According to Azizah (2019), the number of workers must be sufficient not only from its availability, but also from its quality. Workers with male sex and productive age are needed in the production process. Technology is also a driving factor in the production process. The use of increasingly modern technology in the production process will produce goods and services that are more effective and efficient. The preventive strategy taken to deal with the source of the risk of tofu products not being sold out is to carry out a production system according to customer orders.

The mitigation strategy taken to deal with the source of the risk of fluctuating raw material prices, insufficient supply of soybean raw materials and low quality of raw materials is to implement a warehousing system. With the warehousing system, in addition to maintaining the stability of the price of basic materials in production, it can also ensure the use of raw materials of the same quality in every production process. The mitigation strategy taken to deal with the source of the risk of equipment damage in the production process is to check and maintain production tools and machines regularly. The mitigation strategy taken to deal with the source of the risk of tofu products being destroyed during packaging, tofu product competitors, delays in delivery of tofu products and damaged tofu products to consumers is to maintain the quality and quality of tofu by paying attention to each stage of production, increasing the number of workers so that the process packaging is more effective and efficient because it does not only depend on one person who might result in less focus when working due to fatigue, using better tools so that the work becomes more effective and the tofu products that are cut are more uniform in size, implement the made by system orders, cooperate with other partners and expand market share.

IV. CONCLUSIONS

Based on the results of research that has been carried out on the tofu industry in the city of Padang, it can be concluded that:

1. It is known that there are 12 risk indicators that commonly occur in the tofu industry;
2. The biggest cause of risk in the production of tofu in the city of Padang occurs in the limited number of workers;
3. Based on the results of risk mapping, the risk sources in quadrant I are carried out in a preventive way, namely by preventing the occurrence of risk sources. Meanwhile, the risk sources in quadrant III are carried out by means of mitigation, which is done to reduce the impact caused by the risk sources.

REFERENCES

- [1] Adinasa, MN dan Fitri Awaliyah. 2021. Analisis Permintaan Kedelai sebagai Bahan Baku Agroindustri Tahu di Kabupaten Garut. *Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*. 7(1): 377-385
- [2] Anindita, Ratya dan Nur Baladina. 2017. *Pemasaran Produk Pertanian*. Yogyakarta : Andi.
- Arifin. 2016. *Pengantar Agroindustri*. Bandung : CV. Mujahid Press.

- [3] Aulia, Giska Rizky. 2012. Skripsi. *Analisis Nilai Tambah dan Strategi Pemasaran Usaha Industri Tahu di Kota Medan*. Medan : Fakultas Pertanian Universitas Sumatera Utara.
- [4] Awantara, I Gusti Putu Diva. 2014. *Sistem Manajemen Lingkungan : Perspektif Agrokompleks*. Yogyakarta : DeePublish.
- [5] Cannon, Perreault dan Mc Carthy. 2008. *Pemasaran Dasar Edisi 16 : Pendekatan Manajerial Global Terjemahan*.
- [6] Jakarta : Salemba Empat.
- [7] Dahlia, Mutiara M. Kesdan, Rusilanti. 2007. *Peluang Usaha : Membuat Tahudan Tempe*. Jakarta Selatan : RedaksAgromedia.
- [8] Darmawi, Herman. 2017. *Manajemen Risiko Edisi 2*. Jakarta Timur : Bumi Aksara.
- [9] Fattah, Muhammad dan Pudji Purwanti. 2017. *Manajemen Industri Perikanan*. Malang : Universitas Brawijaya Press.
- [10] Faqih, Achmad. 2010. *Manajemen Agribisnis*. Yogyakarta : Dee Publish.
- [11] Herjanto, Eddy. 2009. *Sains Manajemen : Analisis Kuantitatif Untuk Pengambilan Keputusan*. Jakarta : Grasindo. Irawan, JP, Imam S dan Siti AM. 2017. Model Analisis dan Strategi Mitigasi Risiko Produksi Keripik Tempe. *Jurnal*
- [12] *Teknologi dan Manajemen Agroindustri Vol 6 No 2* 88-96.
- [13] Kumalaningsih, Sri. 2014. *Pohon Industri Potensial pada Sistem Agroindustri*. Malang : Universitas Brawijaya Press.
- [14] Kustiyaningsih, Febri. 2011. Skripsi. *Penentuan Prioritas Penanganan Kecelakaan Kerja di PT GE Lighting Indonesia dengan Metode Failure Mode and Effect Analysis (FMEA)*. Surakarta : Fakultas Teknik Universitas Sebelas Maret.
- [15] Mahesa, Tedy Imam. 2017. Skripsi. *Kajian Manajemen Risiko Produksi pada Usaha Tahu Super Indra Di Kampung Koto Kelurahan Gurun Laweh Kecamatan Nanggalo Padang*. Padang : Fakultas Pertanian Universitas Andalas.
- [16] Maulidah, Silvana. 2012. *Pengantar Manajemen Agribisnis*. Malang : Universitas Brawijaya Press.
- [17] Midayanto, Dedy Nur dan Sudarminto SY. 2014. Penentuan Atribut Mutu Tekstur Tahu Untuk Direkomendasikan Sebagai Syarat Tambahan Dalam Standar Nasional Indonesia. *Jurnal Pangan dan Agroindustri Vol 2 No 4* : 259-267.
- [18]
- [19] Minartin. 2016. Skripsi. *Analisis Persediaan Kedelai Sebagai Bahan Baku Pembuatan Tahu (Studi Kasus pada Industri Tahu Mekar di Kelurahan Liabuku Kecamatan Bungi Kota Bau-Bau)*. Kendari : Fakultas Pertanian Universitas Halu Oleo.
- [20] Narmindan Made Antara. 2016. Analisis Pendapatan dan Pemasaran Tahu Pada Industri “Afifah” di Kota Palu Sulawesi Tengah. *Jurnal Agrotekbis 4 (4)* : 468 - 479.
- [21] Pasaribu. Ali Musa. 2012. *Perencanaan dan Evaluasi Proyek Agribisnis*. Yogyakarta : Andi.
- [22] Permatasari, Pradipta Eka. 2015. Skripsi. *Analisis Pengaruh Modal, Bahan Baku, Bahan Bakar dan Tenaga Kerja Terhadap Produksi pada Usaha Tahu di Kota Semarang Tahun 2015*. Semarang : Fakultas Ekonomika dan Bisnis Universitas Diponegoro.
- [23] Pratomo, Rahardian Dwi. 2005. Skripsi. *Analisis Efisiensi, Nilai Tambah, Saluran Pemasaran, Serta Strategi Pengembangan pada Agroindustri Tahu Takwa di Kota Kediri*. Jember : Fakultas Pertanian Universitas Jember.
- [24] Puspitasari, Nia Budi dan Arif Martanto. 2014. Penggunaan FMEA dalam Mengidentifikasi Resiko Kegagalan Proses Produksi Sarung ATM (Alat Tenun Mesin) (Studi Kasus PT. Asaputex Jaya Tegal). *Jurnal TI Undip Vol IX No 2*. 93-98.
- [25] Safitra, Muhammad Nasrun. 2013. Skripsi. *Analisis Faktor-faktor yang Mempengaruhi Produksi Industri Tahudan Tempe di Kota Makassar*. Makassar : Fakultas Ekonomi dan Bisnis Universitas Hasanuddin.
- [26] Salikin, Karwan A. 2003. *Sistem Pertanian Berkelanjutan*. Yogyakarta : Kanisius.
- [27] Siahaan, Hinsa. 2007. *Manajemen Risiko : Konsep, Kasus dan Implementasi*. Jakarta : PT Elex Media Komputindo. Soekartawi. 2000. *Pengantar Agroindustri*. Jakarta : Rajawali Pers.

- [28] Soemohadiwidjojo, Arini T. 2018. *Six Sigma :Metode Pengukuran Kinerja Perusahaan Berbasis Statistik*. Jakarta Pusat : Raih Asa Sukses.
- [29] Sudaryantiningsih, C. dan Yonathan Suryo Pambudi. 2021. Kondisi Personal Hygiene dan Sanitasi Pabrik Tahu di Sentra Industri Tahu Kampung Krajan Mojosongo Surakarta dan Pengaruhnya terhadap Hygienitas Tahu yang Diproduksi. *Jurnal Ekonomi, Sosial & Humaniora*. Vol.2 No. 11.
- [30] Sulu, Theo Manto dan Padang Yohanis. 2015. Analisis Persediaan Bahan Baku Kedelai pada Industri Tahu Mitra Cemangi di Kecamatan Tatanga Kota Palu. *Jurnal Agrotekbis* 3 (2) :261-270.
- [31] Suprapti, M. Lies. 2005. *Pembuatan Tahu*. Yogyakarta : Kanisius.
- [32] Suwandi, Ni Wayan Praptika, Made AM dan Lulup ET. 2014. Sistem Pengendalian Persediaan Bahan Baku pada Perusahaan Tempe Tahu Cap Malang Desa Petiga Tahun 2011-2012. *Jurnal Pendidikan Ekonomi Undiksha* Vol 4(1).
- [33] Wishnu, AP. 2008. *Smart Business Series :Pabrik Kecil Jadi Industri Modern? Ini Dia Konsepnya!*. Jakarta : PT Elex Media Komputindo.
- [34] Yap, Pardjo. 2017. *Manajemen Risiko Perusahaan*. Jakarta Utara : Growing Publishing.