Jurnal Ilmu Pertanian Indonesia (JIPI), Januari 2025
(Indonesian Journal of Agricultural Sciences)
ISSN 0853-4217 EISSN 2443-3462

Vol. 30 (1): 64–73
http://journal.ipb.ac.id/index.php/JIPI
DOI: 10.18343/jipi.30.1.64

Vulnerability Level of Small-scale Fishery Enterprises in Central Tapanuli, North Sumatra

Nabila Khairiyah Sitompul, Eko Sri Wiyono*, Iin Solihin

(Received February 2024/Accepted December 2024)

ABSTRACT

Numerous operational variables constantly threaten small-scale fishery enterprises, increasing vulnerability and the possibility of economic stagnation. The goal of this study was to investigate the vulnerability of small-scale fishery enterprises in Central Tapanuli Regency. The study looked at six aspects of vulnerability: natural, human, physical, financial, social, and institutional. The methodology employed was participative, using interviews, observations, and Likert scale questionnaires. The study's findings revealed that seasonal and weather circumstances were the most significant weaknesses affecting fishery enterprises. Except for the marketing group, which showed a greater degree of vulnerability was visible in terms of institutional supporting and participation by fishermen's groups. Finally, fishery enterprises can improve their resilience by developing business groups and implementing treatments tailored to each group's individual needs. This study proposes technical methods to increase the resilience and sustainability of the region's fisheries enterprises.

Keywords: Central Tapanuli, fisheries business, resilience, vulnerability

INTRODUCTION

Small-scale enterprises, especially the fisheries business system, are widespread in Indonesia (Ambarini 2016). This business encompasses a wide range of marine economic operations, including pre-production, production, post-harvest processing, and marketing (Ambarini *et al*. 2018; Intyas and Abidin 2018; Ambarini 2019). The Fisheries Law No. 45 of 2009 article 1 paragraph (1) defines fisheries as all activities connected to the management and utilization of fish resources and their surroundings that take place within a fisheries business system.

Central Tapanuli Regency, located on Sumatra's west coast, is one of the locations with high fisheries potential. People in this region capitalize on the possibilities of fisheries by establishing fishery enterprises. Most of fishery enterprises here are small-scale, encompassing fishing, processing, and marketing (Muna *et al*., 2023; Situmeang and Koswara 2021). These enterprises frequently confront a variety of obstacles, including changes in fish capture, adverse weather conditions, limited market access, and other concerns that can lead to vulnerability and commercial stagnation. Although the local government of Central Tapanuli Regency is responsible for fostering the development of fishery enterprises, no effective strategy has been established to address this issue. As a result, information on the vulnerability of small-scale fishery enterprises in the region is critical for developing effective measures; yet this information is still unavailable.

The purpose of this study was to determine the vulnerability of small-scale fishery enterprises in the Central Tapanuli Regency. Vulnerability was assessed using six criteria that affect the sustainability of fisheries businesses: nature, human resources, physical, financial, social, and institutional. This evaluation included participatory approaches, such as interviews and observations based on a Likert scale questionnaire. Vulnerability is defined as the degree of risk elements' exposure to potential threats that can cause harm or disruption (Choirunisa and Giyarsih 2016). Resilience, on the other hand, is the opposite of vulnerability: the ability to withstand and adapt in the face of, overcoming, averting, and limiting risks, as well as recover from such strain (Koronis and Ponis 2018; Walker 2020).

Marine Fisheries Technology Study Program, Faculty of Fisheries and Marine Sciences, IPB University, IPB Campus Darmaga, Bogor 16680 Indonesia
* Corresponding Author:
Email: eko-psp@apps.ipb.ac.id

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

METHODS

The study was conducted in November and December 2023 in Central Tapanuli Regency, North Sumatra Province. The site selection was based on three sub-districts that are engaged in fisheries: Pandan, Sarudik, and Tapian Nauli. Researchers collected primary data using a variety of participatory methods, including surveys, interviews, and observations. The questionnaire utilized a series of questions aimed at assessing the level of vulnerability of small-scale enterprises in the fisheries sector at the site. These questions addressed six predetermined topics, following the format of the "the fisheries livelihoods resilience communities check (FLIRES check)" instrument (Stanford *et al*. 2017). The collected data was handled using Microsoft Excel. Secondary data were gathered from relevant literature, such as government publications, academic journals, and case studies on fisheries and their susceptibility in other regions experiencing similar conditions.

The purposive sample method was used to pick respondents based on criteria that were consistent with the type of small-scale processed fishery goods produced in the Central Tapanuli Regency, namely boiled fish and dried saltfish. Respondents were classified based on their maritime economic operations in the fishery enterprises, which included fishing, processing, and marketing (Ambarini 2019). The group was utilized to categorize respondents based on variances in fisheries households in Central Tapanuli, namely catchers, processors, marketers, catchers-processors, and catchers-producers. The number of samples was calculated with a 90% confidence interval and a 10% margin of error (Putri *et al*. 2021). The entire population was 149 units; thus, the sample size was 60 small-scale business actors in the fisheries sector, which represents a share of the current population.

Data was analyzed using vulnerability analysis. The level of vulnerability was determined using the Likert scale approach, which is commonly used to assess people's or groups' attitudes, opinions, and perceptions of social phenomena (Rasmikayati *et al*. 2017). During the interview, each respondent was asked to rate the attributes on the questionnaire (Table 1). Each response was scored on a scale of 1 to 4, where a score of 1 means vulnerable, a score of 2 is moderately vulnerable, a score of 3 is sufficiently resilient, and a score of 4 is resilient (Rizky 2020).

The data gathered from all respondents was then validated, coded, and collated in a Microsoft Excel file. The total and average scores were calculated by averaging the distribution of tabulated data in each field. The score was divided into four categories based on predetermined scoring intervals. A score of 1.00 ≤ an average score of ≤ 1.75 indicated vulnerable. A score of 1.76 ≤ an average score of ≤ 2.50 indicated moderate vulnerable. A score of 2.51 ≤ an average score of ≤ 3.25 indicated moderate resilience. A score of 3.26 ≤ an average score of ≤ 4.00 indicated resilience (Vatria 2019).

RESULTS AND DISCUSSION

The level of vulnerability of small-scale enterprises in the fisheries sector in the Central Tapanuli was estimated using vulnerability analysis based on questionnaire-guided interviews. The questionnaire had 30 questions organized into six categories: nature, human nature,

Table 1 Types of data on measuring vulnerability of fishery businesses

Aspect	Attribute	Aspect	Attribute
Natural	Fish availability	Social	Cooperative relationships with other businesses
	Types of fish available		Business guarantee
	Fish quality		Social structure (mutual help)
	Seasonal influences		Fairness
	Weather conditions		Social conflicts and tensions
	Knowledge and skills		Business ownership
Human	Market identification capabilities	Physical	Adequacy of business equipment
	Long-term planning capabilities		Availability of physical infrastructure
	Suitability of the number of employees		Storage capacity
	Fluctuations in fish prices		Existence of business groups
	Capital availability		Extension
Financial	Access to financing	Institutional	Training
	Selling price		Support/participation
	Profit		Empowerment
	Taxes and financial regulations		Long-term support

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

physical, finance, social, and institutional. Each answer was scored on a scale of 1 to 4, indicating the vulnerability of small-scale fisheries enterprises in Central Tapanuli. The score acquired from the questionnaire interview would represent the portrait of business vulnerability as perceived by small-scale operators in the Central Tapanuli's fisheries industry.

Vulnerability to Natural Resources

The vulnerability of small-scale enterprises in the fisheries industry in terms of natural resources was measured using five criteria: availability of fish resources, available fish species, fish quality, seasonal influence, and weather conditions (Figure 1). According to the respondents' perceptions, season was the most vulnerable aspect of the fisheries business's sustainability. This is due to seasonal changes in fish catches (Nurani *et al*. 2021). All business groups exhibited fragile situations, particularly during the western season. During the western season, fishing activities were hindered by high rainfall and huge sea waves, preventing many fishermen from going to sea, resulting in a low catch and low income (Delafrinda *et al*. 2021).

Fishermen's groups were perceived to be sensitive to adverse weather since they disrupt fishing activities, both in terms of equipment operations and fishing gear damage (Andemora *et al*. 2021; Riady *et al*. 2021). Fluctuations in fish catches had a direct impact on the volume of available catches, which in turn impacted the availability of raw materials for processing, and thus the manufacturing and sale of processed products. As a result, understanding and managing these changes is critical to the long-term viability of Central Tapanuli's small-scale fishing operations. Furthermore, meteorological circumstances increased susceptibility, particularly for organizations participating in fish processing operations, such as processing groups and

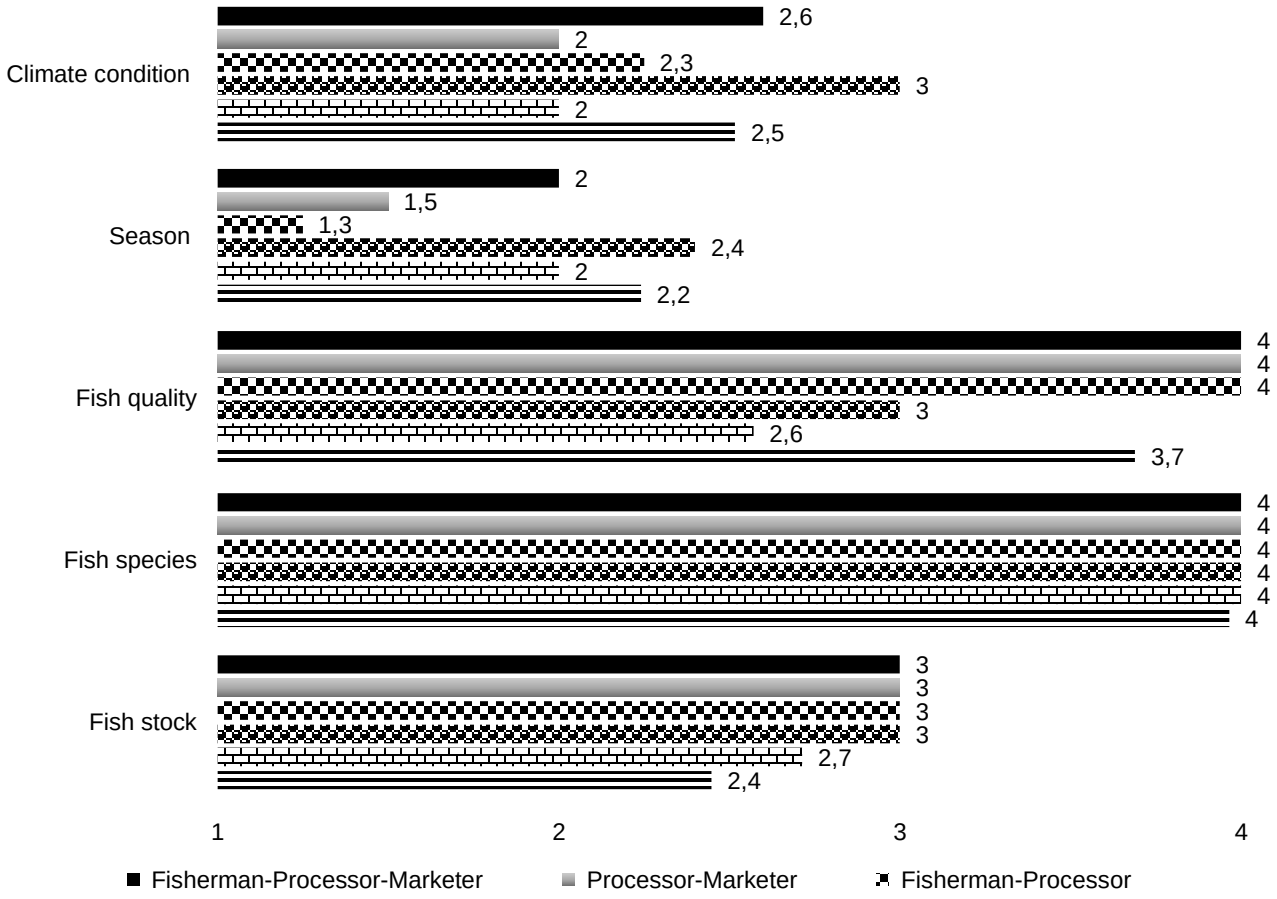


Figure 1 Vulnerability level of the natural aspect.

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

fishermen-processors. The fish processing procedure, which was still being conducted out in Central Tapanuli Regency, required suitable weather to dry the processed fish products (Silalahi *et al*. 2022). When poor weather strikes, enterprises owners lose money because drying procedures were hampered, causing processed fish to spoil (Sosiawati 2019).

Unlike fisherman and fish processors, who were extremely sensitive to nature, the marketer groups and the combination groups (catcher-processor-marketer) were perceived to be quite durable. This was because the weather did not have a direct impact on marketing. They would explore alternative sources of goods outside the region so that the lack of raw materials in Central Tapanuli did not impede operations. Weather conditions only have an impact on the number of processed items available, not on business operations.

As previously said, fishermen were sensitive to weather conditions, which had a direct impact on fish availability. As a result, the availability of fish resources impacted the fishermen's vulnerability. In general, fishermen's income was based on fish caught at sea, hence a lack of fish contributed to their vulnerability. In addition to the weather, the drop in catch was thought to be driven by environmentally unfavorable fishing tactics such as small trawls. Wijaya *et al*. (2017) discovered that micro trawls, often known as 'tiger trawls', were still used in Central Tapanuli Regency. Although the fishermen have complained to the appropriate agencies, the issue has not been effectively remedied. In contrast to the previous features, the quality and variety of fish accessible demonstrated resilient circumstances for all enterprises, which greatly helped the continuity of business operations from fishing to marketing.

Vulnerability to Human Resources

The susceptibility of small-scale enterprises in the fisheries industry in Central Tapanuli in terms of human resources was analyzed using four criteria: knowledge and abilities, market recognition skills, long-term planning skills, and the appropriate number of personnel. According to the interviewees, access to market information was the most significant barrier to the sustainability of small-scale enterprises in the fisheries sector, particularly in the fish processing industry. This was especially true for processors and fishermen-processors, who were hampered by a lack of available information sources and an understanding of how to use existing market data.

This criterion did not, however, apply to marketers, fishermen, and combination groups, which had been determined to be resilient in terms of market identification. This was due to marketers collaborating with numerous parties and having a center as a sales site, as well as an extensive distribution network outside of the city in Medan, Pekanbaru, Tarutung, Padang, Aceh, and other locations (Situmeang and Koswara 2021). The study's findings revealed that they were successful in developing a strong and effective product distribution network.

Fishermen's organizations were considered to have resilient capabilities since they were supported by fish caught that provide shelter in the form of marketplaces and fish processors, demonstrating that the fishing value chain had been successfully constructed. Similarly, the combination group (fishermen-marketers-processors and processors-marketers) showed exceptional adaptability and flexibility in responding to market changes. Overall, this occurrence was linked to fishers' ability to recognize and respond to market changes, which was critical for minimizing vulnerabilities in the fisheries value chain (Bassett *et al*. 2021).

Meanwhile, in terms of long-term business planning, processing and fishery business actors were classified as highly fragile. They tended to concentrate on day-to-day operations and lack the ability to foresee resource utilization planning or access to the information required to develop effective long-term strategies. This group must improve its long-term planning capacities to be more resilient to market fluctuations and other external factors. In contrast, all combination business groups were considered resilient in long-term planning. This was supported by larger capital with wider business diversity. Diversification and careful planning can help to boost business resilience (Hidayat 2023).

The number of personnel, expertise, and skills were all factors that contributed to the long-term viability of small-scale enterprises in the fisheries sector in Central Tapanuli. Most small-scale fishery operations in Central Tapanuli are passed down through generations (Winati *et al*. 2022). This adds to a rise in knowledge, skills and the quantity of workers. Knowledge and skills are essential in establishing a fisheries business. Figure 2 provides additional information regarding the human aspect.

Level of Vulnerability to Financial Resources

The element of financial resources on the susceptibility of small-scale enterprises in the fisheries sector was analyzed through the features of changes in fish prices, capital, access to financing, selling prices, earnings, as well as taxes and financial laws. According to the respondents, fluctuation in fish prices posed a risk to fishing and processing firms in Central Tapanuli. This susceptibility was due to market instability and seasonal changes that affected fish availability. Furthermore, fluctuation in fish prices reduced profitability and income in the fishery industry.

Unlike the previous group, the marketer and combination groups were more resilient to fluctuation in

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

fish prices. The availability of suitable storage capacity was a critical aspect in enabling firms to control price fluctuation. Furthermore, business diversification through combination groups helped in risk management and advantage of opportunities in various aspects of the fishery business. If fish price fluctuation could be controlled, earnings would rise and remain stable. Figure 3 shows more details.

On the other hand, various factors, such as access to financing, capital, selling prices, taxes, and financial rules, helped small-scale enterprises in the fisheries sector in Central Tapanuli remain viable. This characteristic promoted resilience across all business groups. The government and banking institutions' efforts to provide enough financial support and accessibility were also vital. It is an excellent approach toward building financial resilience, like the Ramayana capital loan program offered by the Central Tapanuli Regency's Marine and Fisheries Service. Ganlin *et al*. (2021) emphasized the relevance of government policies in promoting financial accessibility, which had a favorable impact on enterprises' financial resilience. As a result, the local government's policies and financing programs have a significant impact and play an important role in enhancing the financial resilience and sustainability of small-scale firms in the regional fishing industry.

Vulnerability to Physical Resources

The vulnerability of physical resources was quantified using four attributes: corporate ownership, sufficiency of business equipment, availability of physical infrastructure, and storage capacity. The results of the respondents' perceptions revealed that all traits were resilient, meaning that they all contribute to the fisheries business's long-term viability. Most of the small-scale fishery sector in Central Tapanuli were privately owned. This condition demonstrated that business owners had complete control over their operations, strategic

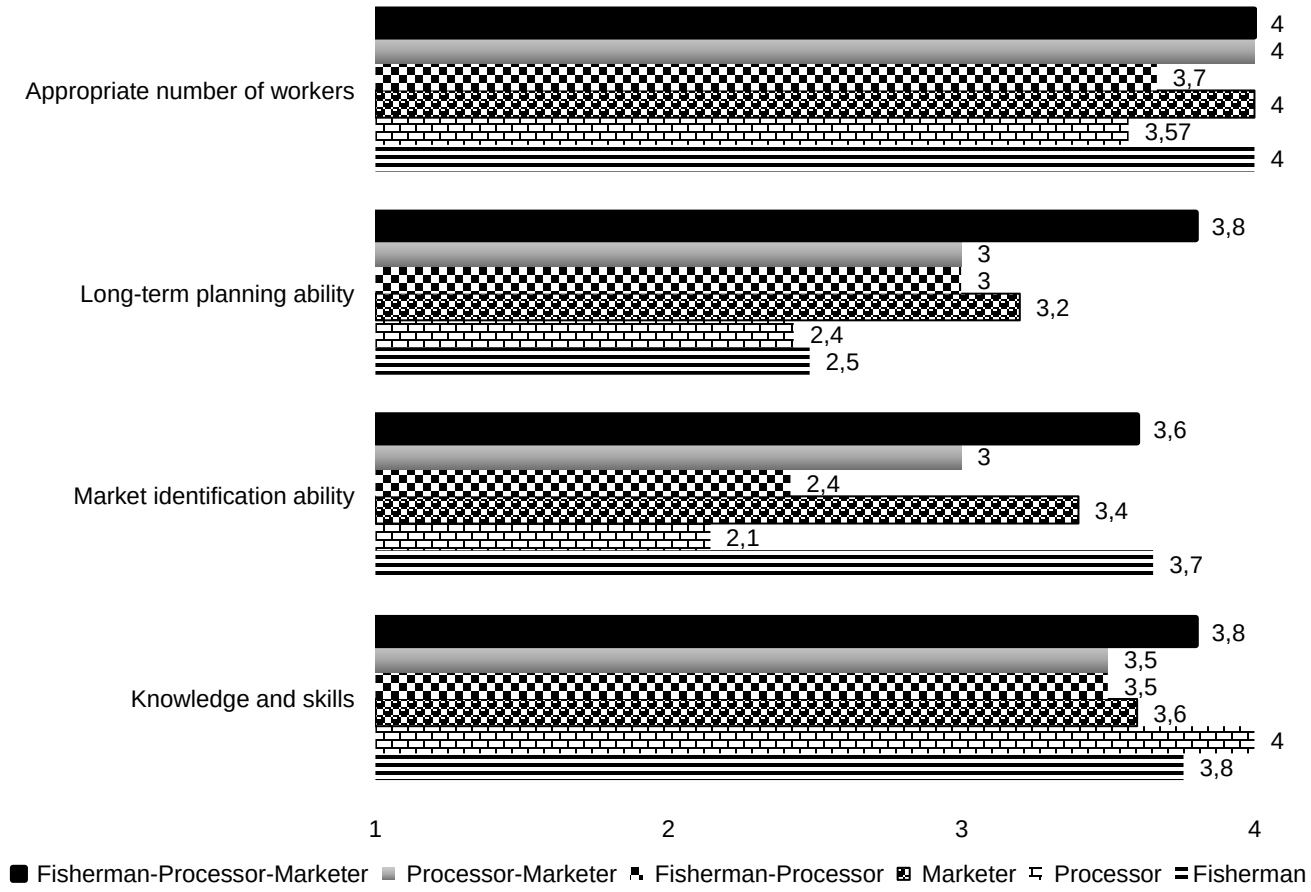


Figure 2 Vulnerability level of the human aspect.

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

decisions, and business tools, with no reliance on other parties. According to Wicaksono and Effendi (2019), private ownership could improve the fishery business's efficiency and output. This promotes business ownership and ensures that equipment is in good condition.

Another physical aspect is the full and well-maintained physical infrastructure that supports the fishery sector in Central Tapanuli. Furthermore, good road connectivity, conveniently accessible markets, and the availability of energy facilitated business operations and product distribution. Storage capacity was also a significant aspect in the resilience of fishing firms, as it allowed fishermen to keep their catch in good condition and limit the danger of spoilage. Other groups saw resilience as well, most likely because they had appropriate storage warehouses, allowing them to manage product stockpiles more effectively and respond promptly to demand fluctuations. Figure 4 contains further information.

Vulnerability to Social Resources

Vulnerability based on social resources was measured using features such as cooperative business connections, commercial assurances, social structures (mutual help), justice, and social dispute resolution. Figure 5 shows that respondents perceived business security to be the most vulnerable factor. The culprit was a lack of understanding and access among business actors. This lack of information could jeopardize the survival of fishing enterprises (Lindawati and Rahadian 2016). As a result, it is critical for business guarantee providers and related stakeholders to perform socialization to raise understanding among business actors about the management of guarantees for their firms.

Social conflict and tension were two more social characteristics that are particularly sensitive. According to d'Armengol *et al*. (2018), fighting for fishing area was still a common issue, particularly among fisherman, which added to their vulnerability. Meanwhile, other groups demonstrated resilience due to their easy access to resources and capacity to avoid conflict. The social structure based on the mutual help concept was effective and contributed to the long-term viability of the fishery industry at the research site. According to Mariam and Ramli (2023), strong and mutually supporting social connections among group members could considerably increase the long-term viability of micro and small-scale

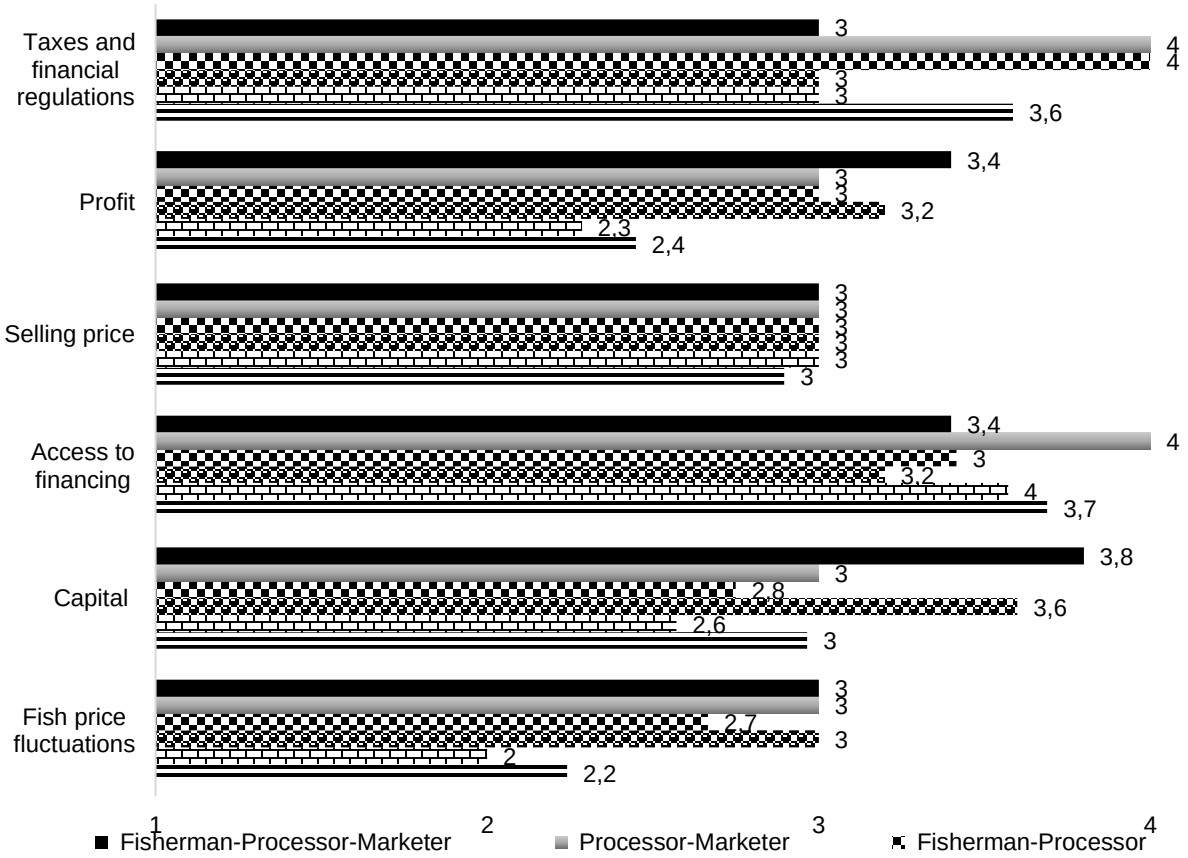


Figure 3 Vulnerability level of the financial aspect.

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

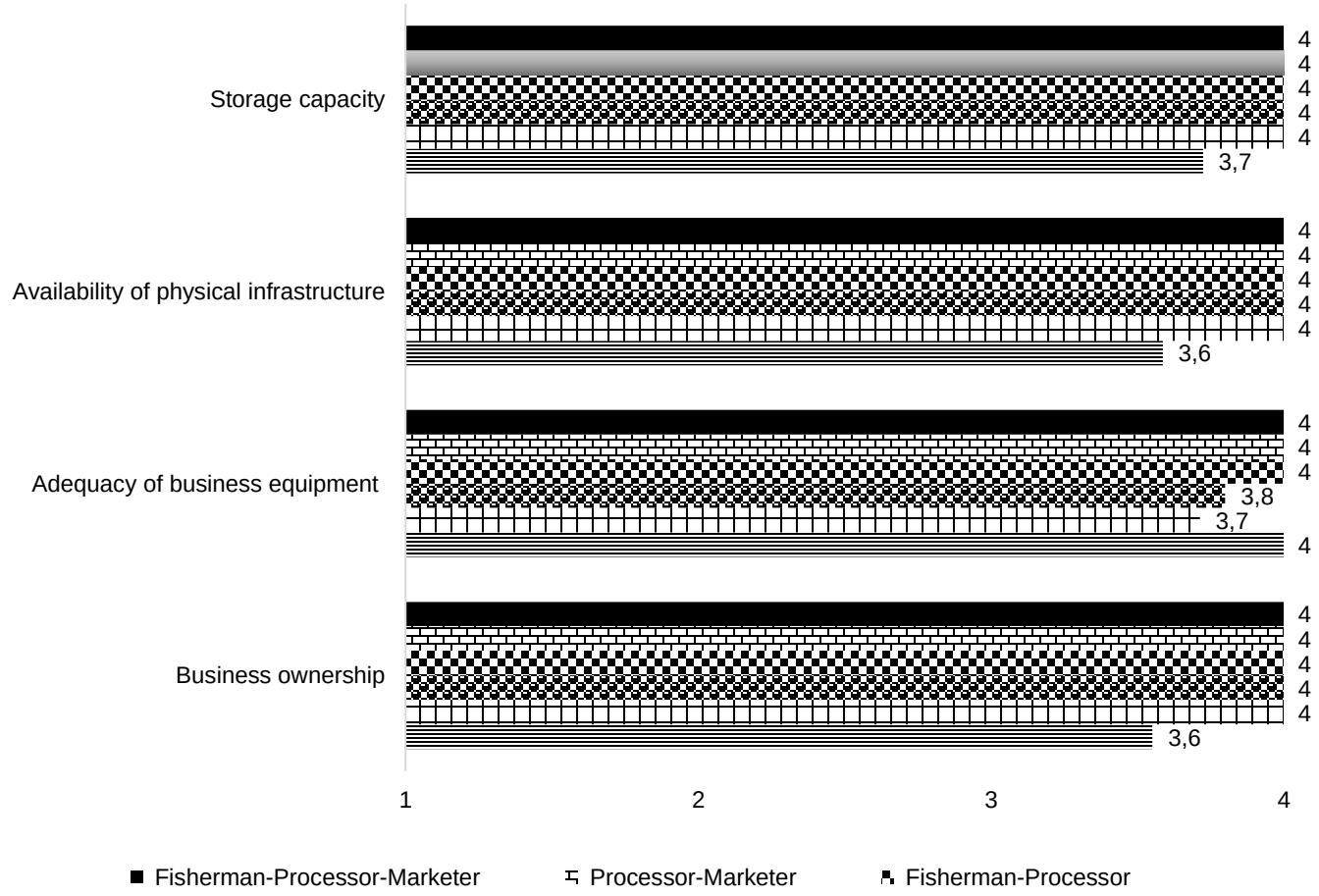


Figure 4 Vulnerability level of the physical aspect.

enterprises. On the other hand, the principle of fairness had been utilized effectively in profit distribution and access to fishing resources. This establishes a fair and suitable climate for all business actors, so promoting the fishing industry's long-term survival.

Vulnerability to Institutional Resources

The presence of business groups, counseling, training, support or involvement, empowerment, and short- and long-term assistance were all used to assess vulnerability based on institutional resources. Based on the respondents' experiences, extension workers were the most vulnerable attribute for fisheries enterprises in Central Tapanuli. In this case, the number of extension workers actively working in business groups remained low, affecting the vulnerability of training elements and short- and long-term assistance. This is consistent with Ristianingrum *et al*. (2016) findings that a lack of counseling and training can impede the development and sustainability of small-scale firms.

Vulnerability also existed in the support or involvement of the fishing, processing, and combination groups, but not in the marketer group. In this case, the marketer group offered coaching sessions that demonstrate the government's support for the enterprises. This demonstrated the differences in support received by various groups. Empowerment was also vulnerable because of a lack of projects or assistance tailored to the specific needs of business players. This underlines the significance of targeted interventions that address the unique needs of each business group to increase the resilience and sustainability of the small-scale fisheries enterprises.

According to the previously explained, enhancing the existence and function of business groups was critical in increasing the durability and sustainability of small-scale enterprises in Central Tapanuli's fisheries business. This demonstrates how crucial cooperation and mutual help assistance are in overcoming obstacles and attaining mutual goals. Furthermore, a robust social structure can

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

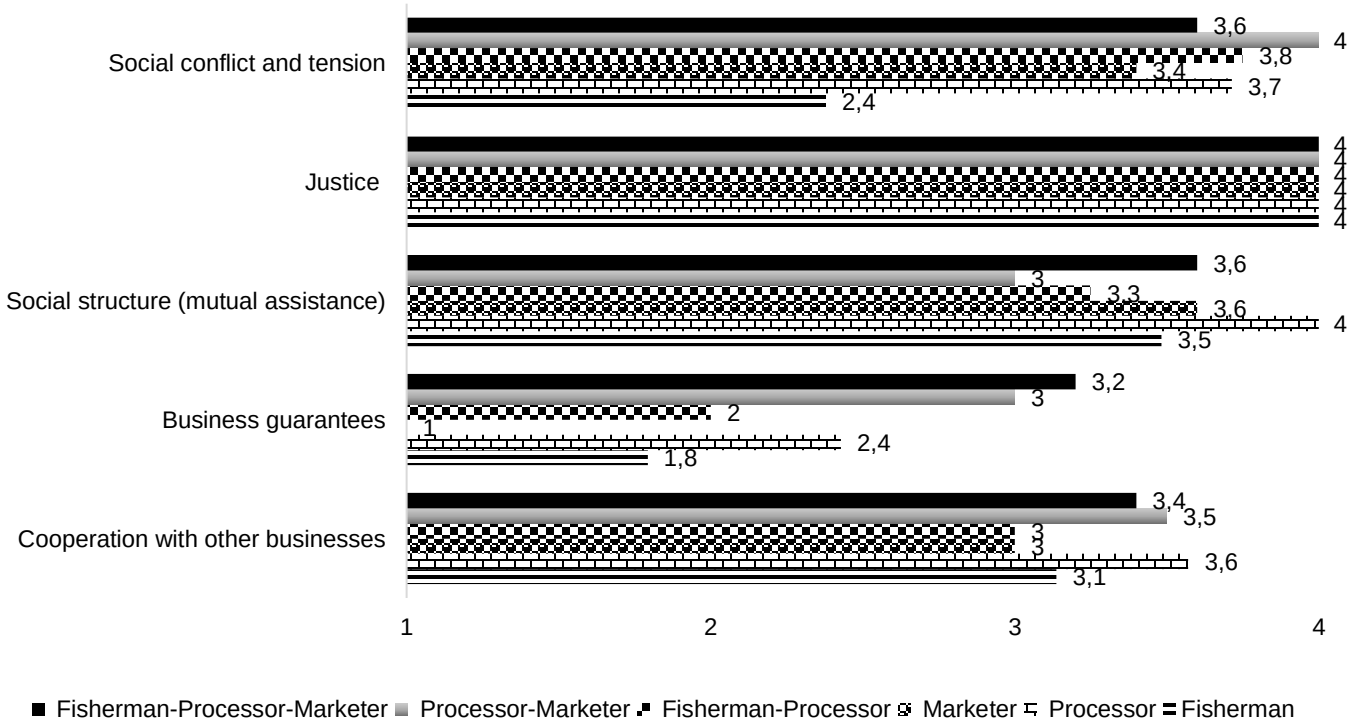


Figure 5 Vulnerability level of the social sphere.

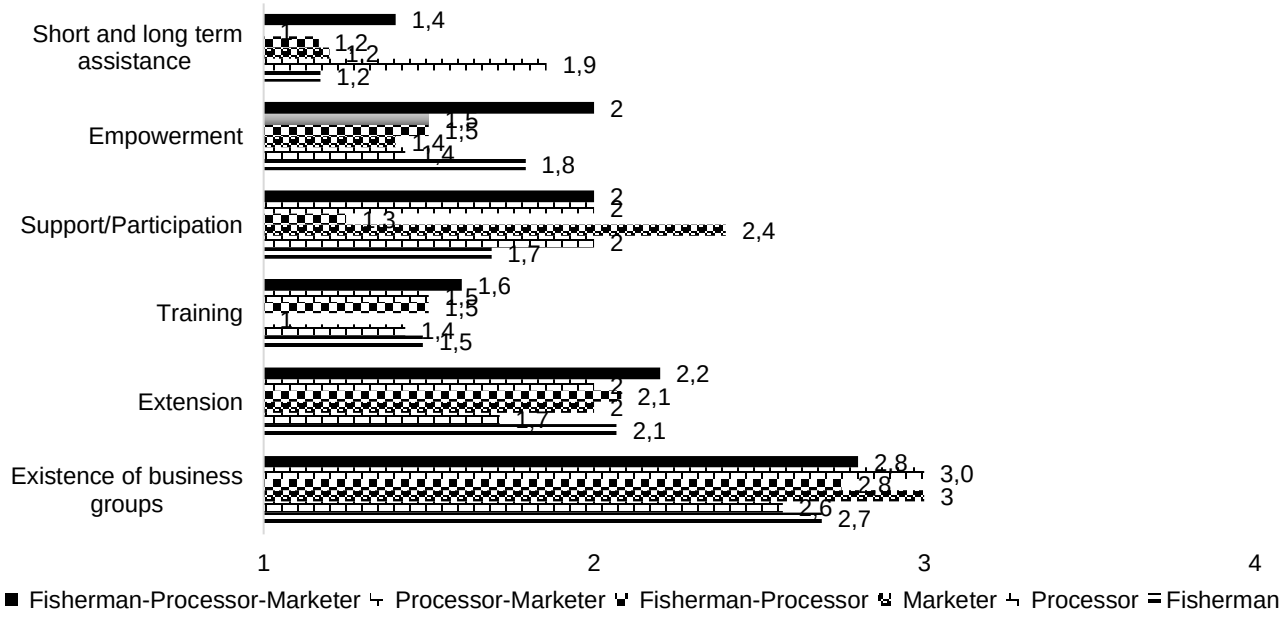


Figure 6 Vulnerability level of the institutional aspect.

serve as a stable foundation for small-scale fisheries enterprises to grow and prosper. As a result, the government, relevant institutions, and business players must work together to develop business groupings and boost the resilience and sustainability of small-scale fisheries enterprises in Central Tapanuli Regency.

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

CONCLUSION

This study identifies the vulnerability of small-scale en terprises in the fisheries industry in Central Tapanuli Regency, highlighting the primary problems they confront, such as weather, institutional, and social aspects. Key findings emphasize the importance of targeted interventions to boost business groups' ability and promote more inclusive institutional frameworks. The primary objectives are to increase market knowledge, build long-term planning skills, and improve fish pricing management capabilities and storage facilities. Furthermore, the study not only confirms that natural and institutional vulnerabilities play a significant role in the success of fisheries businesses, but it also provides practical guidance for improving the resilience and sustainability of small-scale businesses in the region, highlighting the importance of evidence-based strategies in developing effective policies and interventions.

REFERENCES

Ambarini NS B. 2016. Perlindungan dan pengembangan usaha mikro kecil bidang perikanan sebagai upaya pengendalian pencemaran wilayah pesisir dan laut. *Jurnal Hukum Lingkungan Indonesia*. 3(1): 31–50. https://doi.org/10.38011/jhli.v3i1.33

Ambarini NSB. 2019. Implementasi undang-undang no. 20 tahun 2008 dalam pengembangan usaha perikanan berkelanjutan. *Supremasi Hukum: Jurnal Penelitian Hukum*. 26(2): 32–50. https://doi.org/10.33369/jsh.26.2.32-50

Ambarini NSB, Sofyan T, Satmaidi E. 2018. Hubungan Hukum Pedagang Perantara Dan Pelaku Usaha Dalam Bisnis Perikanan Nasional. *Jurnal Hukum & Pembangunan*. 48(4): 743–762. https://doi.org/10.21143/jhp.vol48.no4.1801

Andemora SN, Matheosz JN, Mamosey WE. 2021. Perilaku nelayan bagan ikan teri di desa labuan uki kecamatan lolak kabupaten bolaang mangondow. *HOLISTIK, Journal of Social and Culture*. 14(4).

Bassett HR, Lau J, Giordano C, Suri SK, Advani S, Sharan S. 2021. Preliminary lessons from COVID-19 disruptions of small-scale fishery supply chains. *World Dev*. 143. https://doi.org/10.1016/j.worlddev.2021.105473

Choirunisa AK, Giyarsih SR. 2016. Kajian kerentanan fisik, sosial, dan ekonomi pesisir samas Kabupaten Bantul terhadap erosi pantai. *Jurnal Bumi Indonesia*. 5(4): 1–10.

d'Armengol L, Castillo MP, Ruiz-Mallén I, Corbera E. 2018. A systematic review of co-managed small-scale fisheries: Social diversity and adaptive management improve outcomes. *Global Environmental Change*. 52: 212–225. https://doi.org/10.1016/j.gloenvcha.2018.07.009

Delafrinda A, Sudaryat Y, Afif RT. 2021. Perancangan animate karakter pada dampak paceklik ikan bagi nelayan di pantai pandeglang banten menggunakan media informasi film animasi 2d. *eProceedings of Art & Design*. 8(6).

Ganlin P, Qamruzzaman MD, Mehta AM, Naqvi FN, Karim S. 2021. Innovative finance, technological adaptation and SMEs sustainability: the mediating role of government support during COVID-19 pandemic. *Sustainability.* 13(16): 9218. https://doi.org/10.3390/su13169218

Hidayat A. 2023. *Diversifikasi Usaha Tani dalam Meningkatkan Pendapatan Petani dan Ketahanan Pangan Lokal*. Osfpreprints. https://doi.org/10.31219/osf.io/bgpqr

Intyas CA, Abidin Z. 2018. *Manajemen Agribisnis Perikanan*. Malang (ID): Universitas Brawijaya Press.

Koronis E, Ponis S. 2018. Better than before: the resilient organization in crisis mode. *Journal of Business Strategy*. 39(1): 32–42. https://doi.org/10.1108/JBS-10-2016-0124

Lindawati, Rahadian R. 2016. Identifikasi faktor dan penilaian risiko pada usaha perikanan tangkap di Kabupaten Sambas. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 11(1): 99–107. https://doi.org/10.15578/jsekp.v11i1.3175

Mariam S, Ramli AH. 2023. Pelatihan dan pendampingan membangun praktik digital marketing unggul untuk peningkatan pemasaran UMKM di Kota Jakarta Barat. *Indonesian Collaboration Journal of Community Services*. 3(4): 379–390. https://doi.org/10.53067/icjcs.v3i4.149

Muna Z, Fuah RW, Khobir ML, Purwangka F, Marbun AS. 2023. Analisis kondisi sosial ekonomi nelayan bagan tancap di Tapanuli Tengah, Sumatera Utara. *ALBACORE Jurnal Penelitian Perikanan Laut*. 7(3): 359–369. https://doi.org/10.29244/core.7.3.359-369

Nurani TW, Wahyuningrum PI, Iqbal M, Khoerunnisa N, Pratama GB, Widianti EA. 2021. Dinamika musim penangkapan ikan cakalang dan tongkol di Perairan

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)

Palabuhanratu. *Marine Fisheries: Journal of Marine Fisheries Technology and Management*. 12(2): 149–160. https://doi.org/10.29244/jmf.v12i2.37112

Putri A, Kancana S, Mulyanto IH. 2021. Analisis sikap dan keputusan nasabah dalam penggunaan produk jenius-perbankan digital (studi pada forum jenius-jenius co.create). *Paradigma: Jurnal Masalah Sosial, Politik, dan Kebijakan*. 25(2): 591–609. https://doi.org/10.31315/paradigma.v25i2.5327

Rahmadani S, Suburian JP. 2020. Kajian sosial ekonomi masyarakat pesisir di Kelurahan Hajoran Induk Kabupaten Tapanuli Tengah Provinsi Sumatera Utara. *Pelagicus*. 1(2): 53–61. https://doi.org/10.15578/plgc.v1i2.8871

Rasmikayati E, Pardian P, Hapsari H, Ikhsan RM, Saefudin BR. 2017. Kajian sikap dan perilaku konsumen dalam pembelian kopi serta pendapatannya terhadap varian produk dan potensi kedainya. *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*. 3(2): 117–133. https://doi.org/10.25157/ma.v3i2.563

Riady A, Alam S, Suryani S. 2021. Pemberdayaan kelompok nelayan bagan tancap Pulau Bulupoloe Malili Kabupaten Luwu Timur. *Jurnal IPMAS*. 1(1): 1–10.

Ristianingrum A, Chozin MA, Mulatsih S. Optimalisasi keberlanjutan pengembangan usaha padi organik di Kabupaten Cianjur, Jawa Barat. *Jurnal Manajemen & Agribisnis*. 13(1): 37–37. https://doi.org/10.17358/JMA.13.1.37

Rizky D. 2020. Kerentanan nelayan jaring rampus di Kali Adem, Muara Angke. [Undergraduate thesis]. Bogor (ID): Institut Pertanian Bogor.

Silalahi AS, Hutagalung B, Lubis A, Putra AF. 2022. Optimization of turnover through digital marketing training for fisherman products in Desa Pasar Sorkam District Sorkam Barat Regency Tapanuli Tengah. *Abdimas Talenta: Jurnal Pengabdian Kepada Masyarakat*. 7(2): 738–744. https://doi.org/10.32734/abdimastalenta.v7i2.9824

Situmeang AW, Koswara AY. 2021. Prioritas variabel pengembangan industri pengolahan perikanan tangkap skala rumah tangga di Kabupaten Tapanuli Tengah. *Jurnal Teknik* ITS. 9(2): 34–39. https://doi.org/10.12962/j23373539.v9i2.52556

Sosiawati E. 2019. Aspek teknik dan kelayakan usaha pengeringan usaha (Stolephorus sp) di Desa Ambesia Selatan Kecamatan Tomini Kabupaten Parigi Moutong Sulawesi. *Jurnal Pengolahan Pangan*. 4(2): 39–44. https://doi.org/10.31970/pangan.v4i2.28

Stanford RJ, Wiryawan B, Bengen DG, Febriamansyah R, Haluan J. 2017. The fisheries livelihoods resilience check (FLIRES check): A tool for evaluating resilience in fisher communities. *Fish and Fisheries*. 18(6):1 1011–1025. https://doi.org/10.1111/faf.12220

Vatria B. 2019. Evaluasi pembangunan perikanan tangkap skala kecil di Kabupaten Kayong Utara Provinsi Kalimantan Barat. [Disertation]. Bogor (ID): Institut Pertanian Bogor.

Walker BH. 2020. Resilience: what it is and is not. *Ecology and Society*. 25(2): 1–3. https://doi.org/10.5751/ES-11647-250211

Wicaksono E, Effendi Y. 2019. Determinan efisiensi nelayan di Indonesia: Sebuah analisis stochastic frontier of fisher's efficiency in Indonesia. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 14(1): 115–124. https://doi.org/10.15578/jsekp.v14i1.6868

Wijaya RA, Adrianto L, Yulianto G. 2017. Studi keberlanjutan program pengembangan masyarakat perikanan marjinal di Kabupaten Tapanuli Tengah, Provinsi Sumatera Utara. *Jurnal Sosial Ekonomi Kelautan dan Perikanan*. 4(2): 121–135. https://doi.org/10.15578/jsekp.v4i2.5825

Winati SE, Priyono BS, Yuristia R. 2022. Determinan faktor motivasi kerja pembuat ikan kering di Kota Bengkulu. *Jurnal AGRIBIS*. 8(2): 45–58. https://doi.org/10.36563/agribis.v8i2.642

Copyright © 2024 by Authors, published by Indonesian Journal of Agricultural Sciences.
This is an open-access article distributed under the CC-BY-NC 4.0 License
(https://creativecommons.org/licenses/by-nc/4.0/)