



## STUDY ON INTERNET OF THINGS BASED MARINE ENTREPRENEURSHIP DEVELOPMENT TO INCREASE WOMEN INCOME

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### Abstract

The development of the marine sector processing industry continues to increase. Unfortunately, the increase is not evenly distributed at the MSME business level, especially since it is not yet fully able to adopt the technology. Currently, technology is like a bridge to generate income. The quality of dried Kemamah fish sold by women entrepreneurs on the coast is still not optimal and traditional. This study examines the readiness of women entrepreneurs in the marine sector to implement the IoT concept. The study was conducted by interviewing and collecting the necessary data and conducting a risk analysis based on the business model, making recommendations for IoT development to see the feasibility and quality of dried fish. This study was conducted using a descriptive analysis method with a qualitative approach. The study results show that the use of IoT affects women's income, where product quality, product selling value, efficiency, human resources, and the application of IoT-based technology can indirectly affect women entrepreneurs to increase income.

**Keywords:** *Businessman, IoT, Women Income, Business Model, Risk.*

### Abstrak

Perkembangan industri pengolahan hasil laut terus meningkat. Sayangnya peningkatan tersebut belum merata di tingkat pelaku usaha UMKM, terutama belum sepenuhnya mampu mengadopsi teknologi. Saat ini, teknologi ibarat jembatan untuk menghasilkan pendapatan. Kualitas ikan kemamah kering yang dijual oleh perempuan pengusaha di pesisir pantai masih belum maksimal dan masih tradisional. Penelitian ini mengkaji kesiapan perempuan pengusaha di sektor kelautan dalam menerapkan konsep IoT. Kajian dilakukan dengan wawancara dan pengumpulan data-data yang diperlukan serta melakukan analisis risiko berdasarkan model bisnis, memberikan rekomendasi pengembangan IoT untuk melihat kelayakan dan kualitas ikan kering. Penelitian ini dilakukan dengan menggunakan metode analisis deskriptif dengan pendekatan kualitatif. Hasil penelitian menunjukkan bahwa pemanfaatan IoT berpengaruh terhadap pendapatan perempuan, dimana kualitas produk, nilai jual produk, efisiensi, sumber daya manusia, dan penerapan teknologi berbasis IoT secara tidak langsung dapat mempengaruhi wirausaha perempuan untuk meningkatkan pendapatan.

**Kata Kunci:** *Wirausaha, IoT, Pendapatan Perempuan, Model Bisnis, Risiko.*

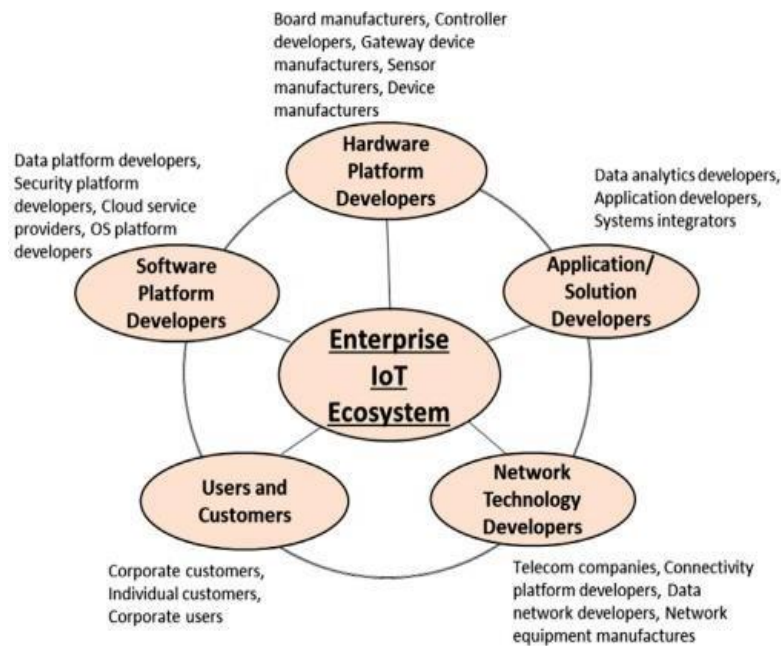
## A. INTRODUCTION

A case that often occurs in the increase in Women Income (WI) is that women are often trapped in gender stigma at work, they are more often used in administrative and assistant jobs in the workplace, this is supported by the stereotype that female managers are seen as incompetent (Bhirugnath-Bhookhun & Kitada, 2017). In fact, many factors affect success in entrepreneurship. Business entities undergo several stages of transition before reaching the maturity level of a sustainable business model. From carrying out compliance in core business areas to assuming greater responsibility. On the other hand, business entities can establish partnerships with upstream and downstream chain members to collaborate in dealing with problems in a sustainable manner (Wang et al., 2020). Using IoT to improve entrepreneurial competence, create business transformation, financial prudence and business culture (Mishra & Tripathi, 2020). Until finally it can be successful, as well as support management to make timely decisions (Dara, 2019).

The concept of the blue economy in the development of marine sector entrepreneurship shows that the ocean and coast offer great opportunities for economic activities, job creation, and poverty alleviation (Lestari et al., 2022). Although challenges related to finance, uncertainty, and consumer acceptance tend to be greater, the potential and opportunities for increasing women's entrepreneurship should be very large and sustainable (Ingemarsdotter et al., 2020). In China, female entrepreneurs are considered patriotpreneurs because they advance China's dream of entrepreneurship, advancing their families, Chinese citizens, and nation towards economic glory (Blalock & Lyu, 2023). The Internet of Things (IoT) in Indonesia holds tremendous potential to drive digital transformation across various sectors. With its large population and growing adoption of technology, IoT presents strategic opportunities to enhance efficiency, foster innovation, and boost competitiveness, particularly in agriculture, transportation, healthcare, education, and industry. This technology enables automation, real-time data collection, and in-depth analysis, facilitating faster decision-making and resource optimization. However, significant challenges remain in implementing IoT across the country. Uneven network infrastructure poses a major obstacle, especially in remote areas that require connectivity to fully utilize IoT. Data security and privacy concerns are also critical issues, given the interconnected nature of IoT devices, which makes them vulnerable to cyber threats (Syah, 2025). Additionally, a lack of awareness and technical expertise among the public, business actors, and policymakers further hampers widespread adoption.

On the regulatory side, the Indonesian government has begun developing policy frameworks to support the IoT ecosystem. Nevertheless, more concrete measures are needed to foster innovation, safeguard user data, and encourage collaboration between public and private sectors. Furthermore, multi-sector collaboration involving the government, technology companies, educational institutions, and the community is key to the successful development of IoT in the country. The improvement of appropriate technology such as IoT in developing the concept of the blue economy in entrepreneurs provides a multiplier effect such as the realization of tourist villages, increasing local and foreign tourists and indirectly increasing Regional Original Revenue (PAD) so that here the government also has an important role in supporting this issue (Lestari & Suarja, 2022). The development of IoT-based entrepreneurship also has a clear impact on entrepreneurial development such as (1) the ability to analyze risks, including: organizational investigation risk, asset identification and asset evaluation, threat and vulnerability assessment,

calculation of annual loss expectations (2) the use of the Enterprise IoT Ecosystem (as in Figure 1.1) which will ultimately have an impact on increasing WI and supporting the realization of tourism villages (Lestari et al., 2022).



Source: Lee (2019)

**Figure 1. Five Keys in Enterprise IoT**

IoT has generated a huge impact and new opportunities for the food industry , especially in big data on social media (Misra et al., 2022). IoT plays a crucial role in this business model through tracking, monitoring, and optimization capabilities (Ding et al., 2023). As many as 98 percent of survey respondents reported that most companies include enterprise IoT initiatives, which are a strategic roadmap for them to improve service operations, increase visibility into operations, enable new business models, and create new product and service offerings. While large companies have adopted early and benefited from IoT innovations, more and more small and medium enterprises (SMEs) are also taking advantage of these innovations. IoT services serve customers better, increase productivity, expand the market base, and remain competitive (Lee, 2019a). By means of monitoring and control, automation, and management processes. Technologies such as the Internet of Things (IoT) offer companies the possibility to manage product functions, remotely and globally, enabling the design of innovative business models. The use of artificial intelligence in marketing such as sales, pricing and cash flow will reduce business risks (Paiola et al., 2022). A narrow business environment affects business risks (Dvorsky et al., 2020). Risks have an impact on business continuity, so knowledge is needed to manage and overcome business risks (Durst & Zieba, 2020). The urgency in this study is the inability of women preneurs to maximize the use of IoT and analyze risks to businesses that will have an impact on low income. lack of women's welfare in the success rate of business creation (Chatterjee et al., 2022). This is important because (1) not all women preneurs understand the literacy of the importance of using IoT to increase income and; (2) not all women preneurs are utilizing IoT in increasing sales; (3) not all women preneurs who use IoT can analyze risks in business; (4) lack of competition in running a business.

The novelty of this study is to analyze economic factors in terms of Woman Income (WI) by using a new approach of the Internet of Things (IoT) as a measuring tool in the development of marine sector businesses so that it is more unique compared to previous research. The problem-solving advantage of previous studies is that it is still rare to measure economic factors with Women's Income. The use of IOT is still very new in the entrepreneurial sector. The novelty in this study is to examine economic factors in terms of Woman Income (WI) by using a new approach of the Internet of Things (IoT) as a measuring tool in the development of marine sector businesses so that it is more unique compared to previous research. The problem-solving advantage of previous studies is that it is still rare to measure economic factors with Women's Income. This can be seen from the distribution of research in Figure 2.

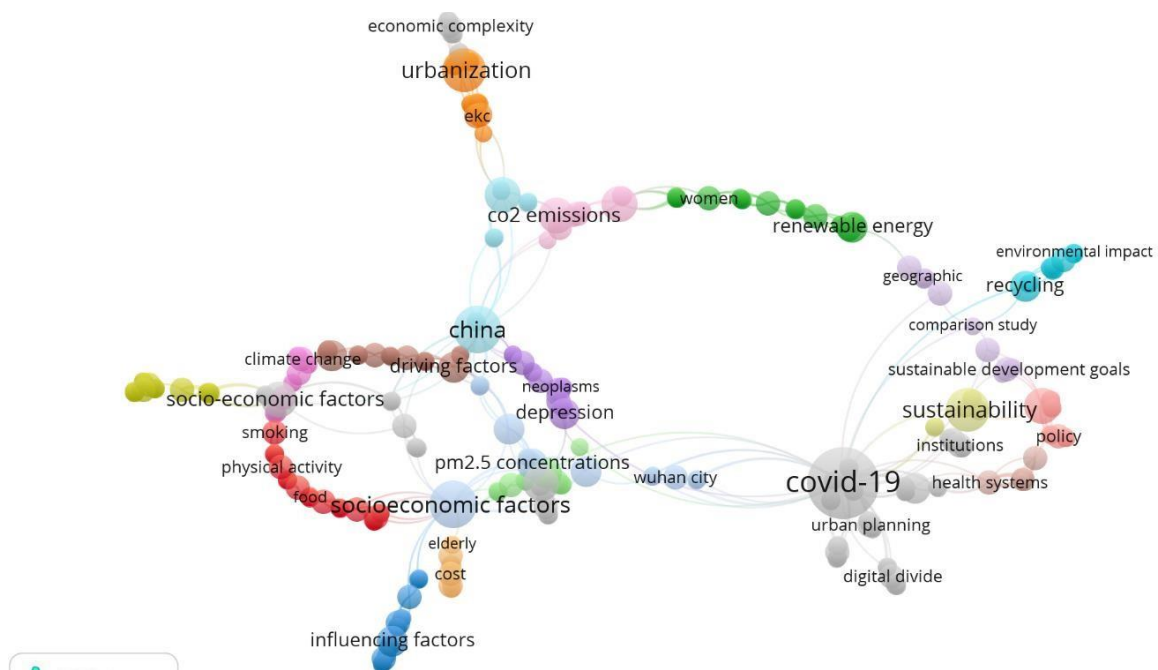


Figure 2. Distribution of Research Novelty

Basically, this study is a continuation of previous research entitled Women's Involvement in Increasing Village MSMEs in 2022 (Lestari & Suarja, 2022) and Blue Economy: The Impact of Budget Planning on Sustainable Economic Development in 2023 and sustainable village development factors(Lestari & Suarja, 2022). Previous research by (Chatterjee et al., 2022) obtained different results, where women who are not supported by their families in entrepreneurship will have an impact on unrealistic results, while entrepreneurs who are supported by families and thrive tend to have realistic goals and expectations.

## B. LITERATURE REVIEW

### Product Quality

The problem-solving approach is carried out based on IoT with the aim of increasing women's income (WI) in the field of entrepreneurship in the marine sector, where there are still many women preneurs who find it difficult to develop their businesses. The presence of information technology does not only affect individuals but also business-oriented organizations (companies)(Lestari et al., 2023). The business segmentation model in business can also be measured by conducting an IS-LM business stability

analysis(Hidayati et al., 2019) (Hidayati, 2019). Problem-solving strategies that have been formulated in the development of marine sector entrepreneurship include:

1. Product Quality
2. Product Selling Value
3. Efficiency
4. Human Resources
5. Utilization of Technology (IoT)

The results of this study are expected to be the initial data for creating IoT sensors using the Naïve Bayes method, where this method is very flexible and obtains an accuracy of 94.4% (Sandi et al., 2020).

Product quality plays an important role in the success of women's businesses. Women-run small businesses show higher revenue increases when they focus on improving product quality and innovation (Subasman et al., 2023). In addition, factors such as education, entrepreneurship training, and access to finance also play an important role in improving the performance of women entrepreneurs. By investing in quality improvement and acquiring relevant business skills, women can increase their competitiveness in the market (Ayinaddis, 2023).

Improving product quality significantly contributes to an increase in women's income, especially in the micro and small business sector. Quality products not only increase consumer loyalty but also allow for higher selling prices, which ultimately has an impact on increased profitability (Abramsky et al., 2019).

### **Product Selling Value**

The selling value of a product indicates the quality possessed by the product. Higher selling points provide direct benefits for women in MSMEs through increased profit margins and access to a wider market. Products with high selling value tend to attract the premium consumer segment, which ultimately increases women's income. A low bid indicates low revenue. People will pay for quality care and services, and will no longer be judged on the basis of their practical benefits, but on the basis of their friendship (Cron et al., 2009). There are several approaches used to determine pricing, including: supplier costs, prevailing market prices, or customer value as a reference for pricing. The pricing strategy must also be aligned with the business strategy that the organization runs, and the pricing approach also depends on the competition and the type of product (Lee, 2019b).

### **Efficiency**

Efficiency will have an impact on (1) Reduction of operational costs: By increasing efficiency, women who run businesses can reduce production or operational costs. This cost reduction allows them to increase their profit margins without having to increase the price of their products or services. (2) Higher Productivity: Efficiency allows business actors, including women, to produce more with the same resources. This increase in productivity can directly impact an increase in revenue because more products are sold. (3) Optimal Use of Resources: Women who manage businesses efficiently can make optimal use of their resources, including time, labor, and capital. This can improve business

performance and generate more revenue in the long run. (4) Increased Competitiveness: Efficient businesses have higher competitiveness in the market. With efficient operations, women can offer more competitive prices or adapt products/services to market demand, thereby increasing their income. (5) Time for Innovation and Development: Efficiency in operational processes allows for more time and resources for innovation. Product or service innovation can create more value, expand the market, and increase revenue.

### **Human Resources (HR)**

In addition to increasing sales, the quality of business people's resources also needs to be improved periodically (Wulandari et al., 2022). Human Resource Management on the Performance of Government Institutions. In a rapidly changing economic environment, which is characterized by trends such as globalization, increasing investor and customer demand, along with increasing product competition in the market, government agencies continue to strive to improve their performance by minimizing costs, updating products and procedures, and improving quality in order to compete and continue to survive in the environment (Anwar & Abdullah, 2021).

Fish is one of the food ingredients that spoils easily after the rigor mortis phase is over. Fish have a very rapid deterioration if not handled properly. The factors that cause the spoilage are caused by the existence of three systems that act on the fish, namely the enzymes of the fish itself, the enzyme system of microbiology, and rancidity. Among the three processes, the microbiological process is the most dominant. In living fish, the source of these bacteria is found in the gills, skin, and gastrointestinal tract. If the fish dies, there will be decay caused by bacteria that develop very quickly in the muscles, especially in the intestines, which causes the decay process. The process of changing the decay of the fish's body occurs due to the activity of enzymes, microorganisms, or oxygen oxidation. One of the efforts to prevent fish spoilage is through the preservation process, for example by salting, drying, smoking, or cooling. Prolonged soaking also results in the softening of the structure of the fish so that water will more easily enter the cell structure and the water content is higher. The higher the concentration of salt, the higher the solubility of the protein. Soaking for 30 minutes can reduce the protein level of keumamah fish (Jumhuri et al., 2014).

### **Application of IoT Technology**

With the rapid development of information technology, the Internet of Things (IoT) is rapidly penetrating into the manufacturing industry and MSMEs, several manufacturers are beginning to adopt Internet of Things technology to produce smart products. When viewed from pricing, the impact of IoT technology developments can regulate product prices. This can also be used by MSME (household product producer) products to obtain appropriate market share. Network effects and product innovation levels are important factors that influence manufacturers (smart household product manufacturers) to gain a competitive advantage (Pan et al., 2019). Many small-scale IoT developments provide several services such as data storage, wireless sensor networks, data analytics, and IoT platforms (Lee, 2021).

Fish freshness checks in Small and Medium Enterprises are still carried out by means of microbiological and chemical analysis where this method is still not effective because it uses a lot of human labor (Sandi et al., 2020). The storage period of dried fish (keumamah)

using the ASLT (Accelerated Shelf-Life Testing) method of the Arrhenius model, namely the storage period of dried fish based on moisture content and TPC tested during the study. The longer the radiation process is carried out, the drier the fish will be produced and the color change is very significant, this is due to the water content in the fish has been reduced through the microwave process. The simulation results in the study show that the best shelf life of keummah fish is 120 days (storage 55 °C, radiation 5 minutes)(Sulaiman & Khairi, 2023). Fish freshness prototypes can be carried out on the basis of TCS230 where the device detects the freshness level of catfish (Mutmainnah, Asry, 2022). Our results should be of interest to device manufacturers considering adopting or have adopted IoT technology and policymakers interested in overall channel performance (Sun & Ji, 2022). This system is implemented into the Arduino Uno by using a color sensor as a freshness detection tool that replaces the sense of sight in humans in determining the freshness level of fish. K-Nearest Neighbor as a method to recognize the freshness level of the tested fish (Dwiyatno, S., Iksal & Nugraha, 2018).

### **C. DATA AND METHODOLOGY**

This research was carried out using a qualitative descriptive approach to explore how the application of the Internet of Things (IoT) in marine-based entrepreneurship can increase women's income. This study aims to understand the experiences, challenges, and opportunities of women involved in marine entrepreneurship with the support of IoT technology. The subjects of the study were women involved in marine-based entrepreneurship. In this study the subjects were kemamah sellers. The data collection method used was in-depth interviews to explore the readiness of IoT applications, their benefits to income, and the challenges faced. The results of this IoT research will later be developed into monitoring the suitability of fresh fish, sensor-based fish stocks and IoT-based digital marketing.

The sample used in this study was 15 female entrepreneurial respondents. The location of this research will be carried out in the Banda Aceh area, more precisely the Lampulo area, Banda Aceh City, where this area is the location of the Samudera Fisheries Port (PPS), the area is included in the largest fish market in Banda Aceh and there are many types of fresh and dried fish, one of which is keumamah. Keumamah is a traditional Acehese food preparation, this food is made from fish that is salted/permented and then dried in the sun.

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This research has been conducted in 2024. The data source used in this study is primary data. Primary data was obtained from interviews with respondents to explore the needs of respondents in improving sales quality. The variables used in this study are five independent variables, namely product quality, product selling value, efficiency, Human Resources (HR) and Technology Utilization (IoT). and one dependent variable, namely Women Income. Testing of research instruments in the form of questionnaires uses

validity tests that are used with the aim of measuring the accuracy of what is to be measured in the research, so that the instrument can be said to be valid. And reliability testing is carried out to see how reliable a measurement is.

#### D. RESULTS AND DISCUSSION

Kemamah fish is a processed fish that is dried and used as food. This fish is a typical food of Aceh. Because it is durable, this food is often a provision for people traveling long distances. This fish also has great potential for export, due to the large amount of fish stocks in Aceh. But unfortunately, the processing of raw mamah fish has not met export quality standards. The sale of kemamah fish is still very traditional and difficult to develop. Based on the results of field tests on womenpreneurs in the field of kemamah traders in Banda Aceh, it was found that:

Respondent Characteristics by Age

#### NUMBER OF TRADERS BY AGE

■ 20-30 Year ■ 31-40 Year ■ 41-50 Year ■

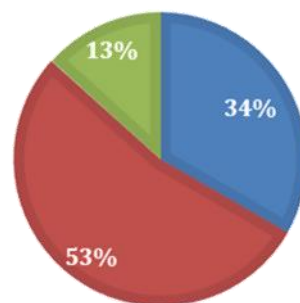
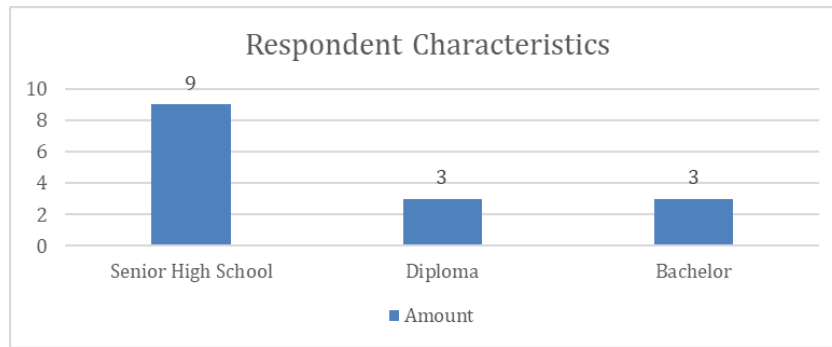


Figure 3. Number of Traders by Age

Based on Table 4.2, it shows that most of the respondents are 20-30 years old with a total of 5 respondents, some also have 31-40 years old as many as 8 people and respondents who have 41-50 years old are 2 people, so the total respondents are 15 people with the most respondent age is 31-40 years old who have MSMEs, and the least is 41-50 years old. From the table above, it shows that most fish processing business owners have a productive age of 31-40 years.

If viewed from the characteristics of respondents based on the level of education, there are 60% of womenpreneurs for fish processing who graduated from high school, 20% who graduated from Diploma and the other 20% who graduated from bachelor's degree one. The results of this study show that the majority of womenpreneurs engaged in the field of brain processing are still poorly educated. This has an impact on low human resources so that it is difficult to develop businesses and adopt technology. The results of the interviews show that the majority of business ages start from 2014 to 2024 where the business age has reached 10 years. But unfortunately, business growth is slow and tends to be stagnant. This kemamah business is also run from generation to generation so that the recipe remains the same but there is no increase in production.





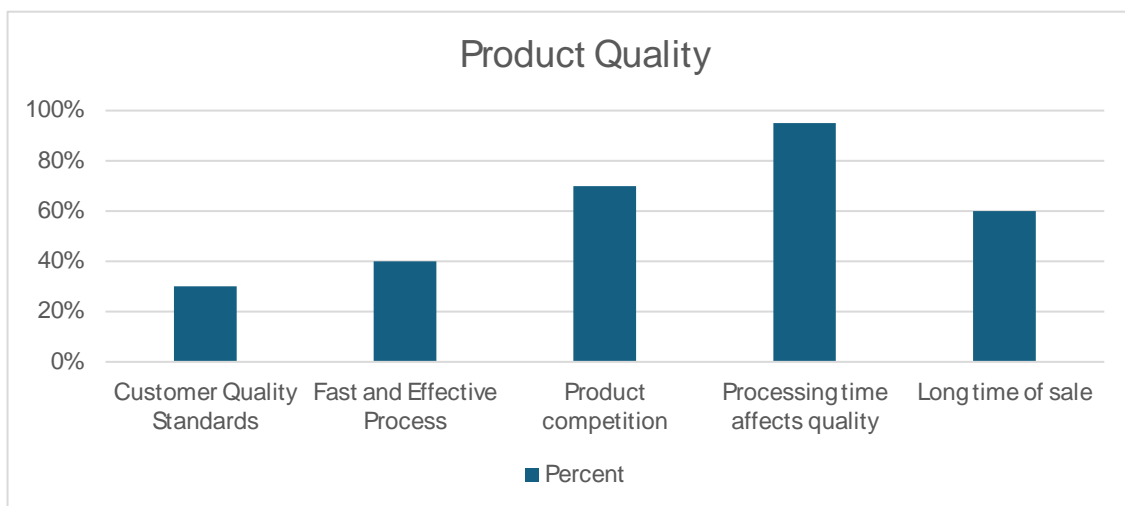
Source: Primary data processed (2024)

**Figure 4. Respondent Characteristics Based on Education Level**

### Product Quality

The quality of the products has not met the quality standards expected to compete in a competitive market. This is seen from the production process that has not implemented hygienic in the production process and the production flow has not met quality standards. This causes the quality of the fish to not have a certain standard for quality. For packaging, there is also no so that the product is easily contaminated with air. Based on the results of interviews from 15 kemamah fish MSMEs, none of them have sold with packaging. It is difficult to detect that the fish sold is still fresh or already itchy.

In handling customer complaints related to product quality, it shows that it is still difficult to handle customer complaints, this is because whether the product is good or not will only be detected when it has been processed, so it is difficult to maintain consumer loyalty. So based on the results of this research, it will be followed up with the application of fresh dried fish detection sensor products with IoT technology. Product quality affects revenue. Poor product quality will be difficult to meet market demand, which will have an impact on decreasing income.



**Figure 5. Product Quality Results**

1. **Customer Quality Standards** means, only about 30% of respondents believe that meeting customer-defined quality standards is a critical factor for product quality. This could imply that businesses might not prioritize customer feedback or specific expectations when defining their product quality benchmarks. Alternatively, it may

suggest that other operational factors outweigh customer preferences in influencing quality. There may be a missed opportunity for businesses to align product quality with customer-specific demands, potentially limiting customer satisfaction and loyalty. This is also because there are still very few small MSMEs that compete nationally so they still use traditional assumptions for trading and do not compete on income.

2. **Fast and Effective Process** means, Nearly half of the respondents (around 40%) view having a streamlined and effective production process as essential to ensuring quality. This highlights the significance of operational efficiency in maintaining consistent product standards. Delays, inefficiencies, or errors in the process could degrade the quality or lead to inconsistencies. Businesses need to focus on process optimization, reducing inefficiencies to improve quality outcomes and enhance productivity.
3. **Product Competition** means, About 70% of respondents identify market competition as an important driver for improving product quality. Businesses are motivated to improve quality to keep pace with or outperform competitors. This indicates that competition pushes small and medium enterprises to innovate and invest in quality improvements to retain market share. Small and medium enterprises may benchmark their quality against competitors, striving for differentiation. However, excessive focus on competition might lead to neglecting internal quality improvement processes or customer needs.
4. **Processing Time Affects Quality** means, A striking 95% of respondents believe that processing time has a direct impact on product quality. This suggests that the time allocated for production, testing, and quality control is a crucial factor. Rushed production may lead to lower-quality products, while excessive time could result in inefficiency or increased costs. Businesses must strike a balance between speed and thoroughness. Proper planning and workflow management can ensure that processing time optimizes quality without compromising efficiency or profitability. This can be overcome with IoT.
5. **Long Time of Sale** means, Around 60% of respondents agree that the duration a product spends in the market impacts its quality. This could relate to issues like product shelf life (for perishable goods), relevance (for technology or fashion items), or durability over time. Products that deteriorate quickly may lose their value in the eyes of customers. Businesses must account for storage, transport, and durability when designing products to maintain quality throughout their lifecycle. especially for the sale of kemamah fish, the longer it is exposed to sunlight and is not hygienic, the lower the quality of the fish.

### **Product Selling Value**

The selling value of a product affects revenue. The better the quality of the fish, the higher the selling value. Hygienic and traditional processing can increase the selling value of kemamah fish. Kemamah products that are processed in traditional ways are considered more authentic, so the price is higher. Vacuum packaging can make the product more durable and safer to consume. But unfortunately, the sale of kemamah fish is still very traditional, so satisfaction with the selling value of the product is relatively low. The quality of the product that cannot be maintained according to the standards also has an impact on the selling value of the product where the durability of the dried product can last for a long time, if it is too long it will be hard like wood but if the rainy season tends to be humid and can be moldy. Lack of control over the quality of fish moisture can affect the quality of

fish which will cause itching. So, technology is needed in the form of IoT that is able to detect the quality of dried fish with a grade suitable for consumption.



Figure 6. Product Sales Value Results

**Efficiency**

Efficiency affects income. The efficiency carried out in the sale of kemamah products is very high but not proportional to innovation, where the increase in efficiency is inversely proportional to innovation. So that to minimize the operation of the fish farm, kemamah does not innovate products because it will increase operational costs. This is actually a boomerang in business because increasing innovation will increase income. Efficient is also balanced by better product or service quality, which increases customer satisfaction. Satisfied customers tend to make repeat purchases and recommend products or services to others, which directly increases sales and revenue.

The production process runs efficiently because production is still carried out very traditionally. But unfortunately, the production time is long due to the long sales turnover. This is also influenced by the nature of the product that is able to last for a long time. The product sales process runs efficiently due to minimal product distribution.

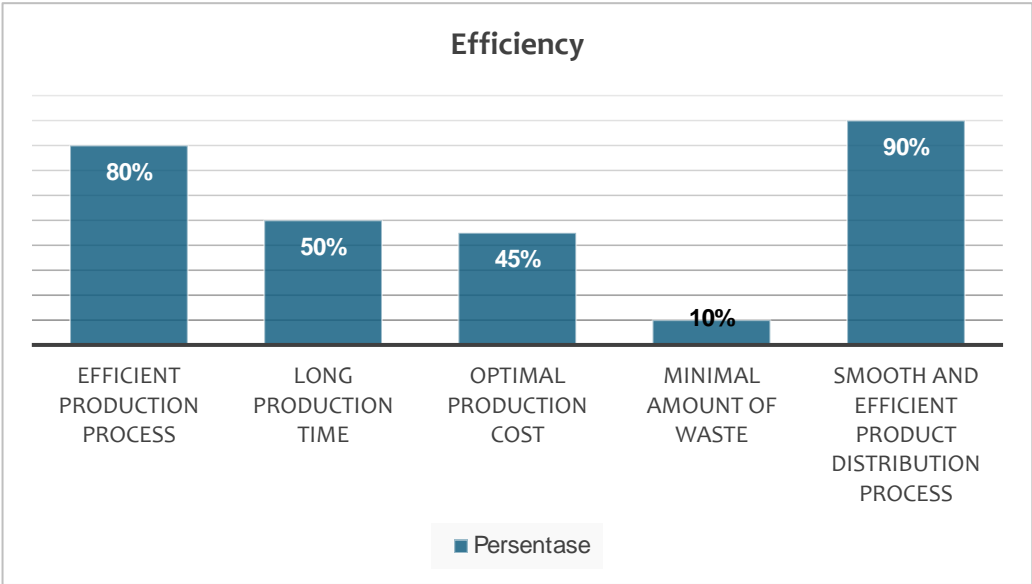


Figure 7. Sales Efficiency Data

## Human Resources

Human resources affect income. Human resources who have high skills and competencies tend to be more productive and innovative. Within a company, employees who have strong technical, managerial, or creative abilities can produce better, faster, or more efficient products or services. This has a direct impact on increasing the company's revenue because they are able to generate higher value with existing resources. Qualified human resources can be a source of innovation and creativity, which is essential for the development of new products, service improvements, or new ways of operating. This innovation can create a competitive advantage that supports increased profitability and revenue. Human resources who are skilled in customer service will be able to provide a positive experience to customers. Good service will increase customer loyalty, which can lead to repeat purchases and increase long-term revenue.

The service in the sale of kemamah is still very traditional. This is due to the lack of competence and human resources and the lack of efforts to improve the quality of human resources both in the form of independent training and training provided by the government.



Figure 8. Percentage of Human Resources Quality

## Utilization of Technology (IoT)

The use of Internet of Things (IoT) technology can have a huge impact on income, especially for companies that are able to integrate technology well in operations and services. IoT enables greater connectivity and automation, which can increase efficiency, reduce costs, and open up new opportunities for fish product innovation and fish sales services. IoT enables real-time monitoring and control of equipment or processes through connected devices. This improves operational efficiency, as companies can easily detect problems, fix outages, and optimize resource usage. Higher efficiency often results in increased margins and reduced costs that have a direct impact on increased revenue.

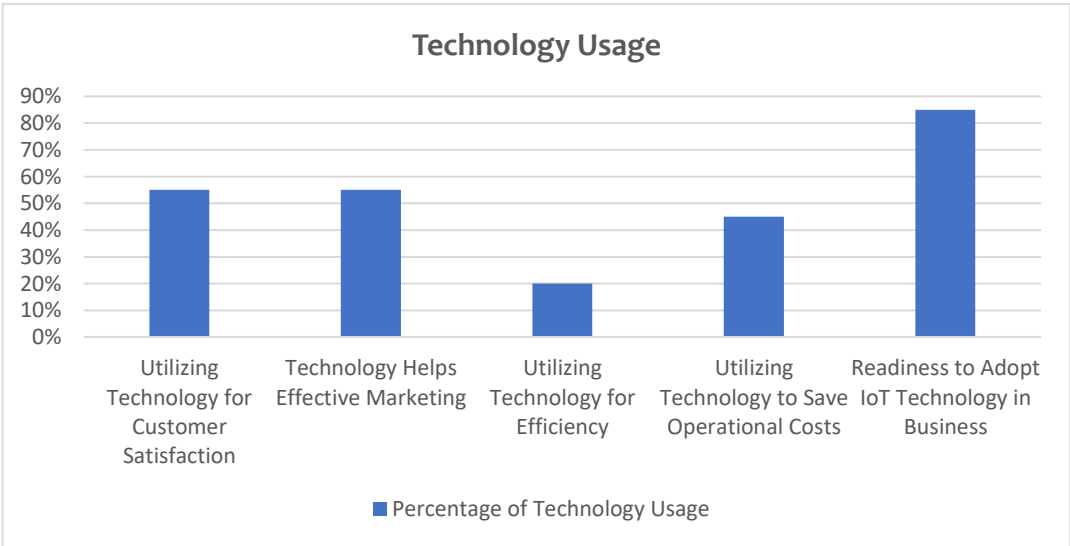
IoT opens up opportunities to create new products and services that were not possible before. With the integration of sensors and internet connectivity, it can create new business models, such as data-driven subscription services for the supply of jellyfish or products that offer additional features through software updates. IoT provides better

visibility across the supply chain, allowing companies to better manage stock, order delivery as well as better monitoring, companies can reduce overstocking, avoid shipping delays, and ensure product availability according to market demand. This not only reduces costs, but also increases the speed of the sales cycle, which has an impact on increasing revenue. IoT enables the collection of large amounts of data (big data) from various devices and operational points.



**Figure 9. IoT Keumamah Fish Quality Detection**

Based on the results of the interview, the results were obtained that to increase women's income from the sale of kemamah fish, IoT is needed to improve the quality and flow of the business process to be more developed, because previously the business owner had not used technology in the production process but had already utilized technology in the marketing process.



**Figure 10. Percentage of IoT Technology Usage Woman Income**

In Aceh, the gender pay gap or wage gap between women and men still exists. Women often receive lower wages than men despite having the same job or equal level of education. Women are more likely to work in the informal sector or lower-paying jobs, such as in services, education, and health, while men tend to work in industrial or technical sectors that offer higher salaries. According to a report from the Central Statistics Agency (BPS), in 2020, the average wage of women in Indonesia was lower by around 24.46% compared to the wages of men. Many women entrepreneurs have difficulty getting loans or financial support from banks and other financial institutions. Many women set up small businesses in the trade, culinary, and craft sectors, which often provide lower incomes than businesses in large industrial sectors. Increasing access to education and training for women, especially in the technology and STEM (Science, Technology, Engineering, and Mathematics) sectors that tend to offer higher salaries.

The main income comes mostly from the sale of the fish. But unfortunately, the increase in income fluctuates from year to year due to not getting access to the right financing, lack of training to increase income. And many of the kemamah fish entrepreneurs from the women's business group whose income affects the welfare of the family. This means that working women also have a great contribution to the welfare of the family.

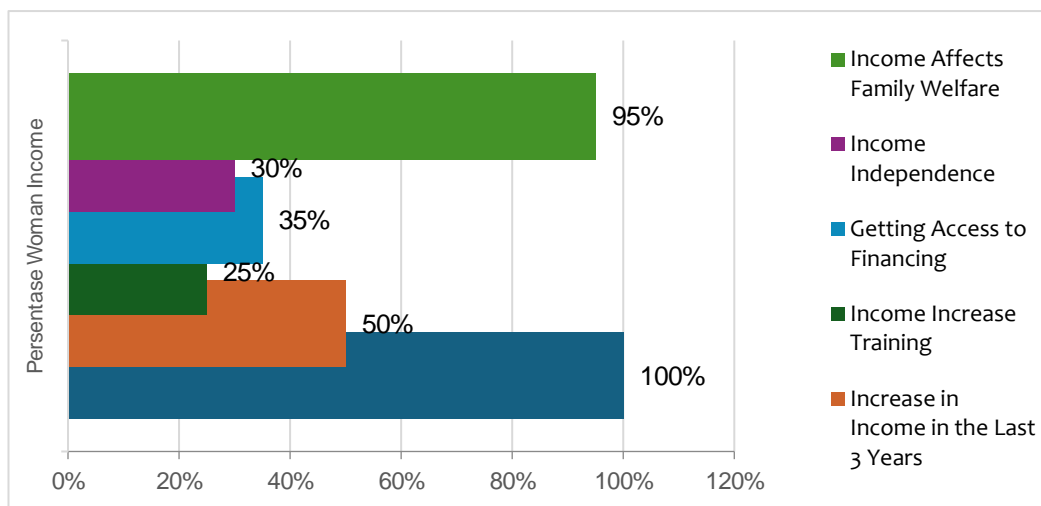


Figure 10. Percentage of Woman Income

## E. CONCLUSION AND SUGGESTIONS

Product quality, product selling value, efficiency, human resources, and the use of IoT technology have a significant influence on women's income in various sectors, especially in the field of entrepreneurship and micro, small, and medium enterprises (MSMEs). When women produce high-quality products, they are able to attract more consumers and create market loyalty. Quality products also allow women to set higher prices, which instantly increases their income. The selling value of a product also plays an important role in determining how much profit can be achieved. When women can position their products as something of more value in the eyes of consumers, they can optimize sales potential and expand market reach, which leads to increased revenue. In addition, efficiency in the production and distribution process is a key factor to reduce operational costs and increase productivity. With more efficient processes, women can maximize time and resources, produce more products, and achieve higher profits. Quality human resources are also very

decisive. The development of workers' skills and abilities, especially for women involved in business management, can improve the overall performance of the company. Trained and competent human resources are able to run business operations better, which has an impact on increasing business efficiency and profitability. In the digital era, the use of IoT technology is increasingly playing a role in increasing women's income. IoT allows women to automate processes, monitor real-time data, and improve the efficiency of their businesses. This technology not only helps reduce errors and production time, but also opens up new opportunities in terms of wider marketing and distribution. With technology in place, women can more easily innovate, reach more consumers, and scale their businesses, ultimately increasing their revenues significantly.

## **SUGGESTIONS**

This research can be developed by creating Internet of Things (IoT) technology for Kemamah Fish businesses that can help business processes, especially in production so that IoT is able to detect good fish quality and can further export.

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