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The Development of a Biotechnology Product Innovation Strategy for The Medium-Scale Seaweed Industry Company in Indonesia on The Company's Business Growth

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ABSTRACT

Biotechnology is a developmental process of product innovation that can provide many benefits to the environment and consumers. One resource that has great potential is derived from the sea, namely seaweed. Utilization of Seaweed product innovation using a biotechnology approach can be a new prospect for various industries in the future. This study aims to see what strategies can be carried out for business actors in this industry to increase their business growth. The method used in this study was to survey respondents using convenience sampling and analyzed descriptively. The data obtained in this study is regarding consumer demographics, awareness from consumers and also perceptions regarding the importance and how the innovation strategy should be carried out for seaweed biotechnology products. The results obtained show that the level of knowledge of respondents regarding the innovation of seaweed biotechnology products is still low, but there is confidence from respondents regarding the potential benefits of this product innovation in the future. It can be concluded in this research that product innovation must continue to be improved by being oriented towards consumer needs and must also be accompanied by a good marketing strategy, especially in increasing digitalization which can make it easier to reach target buyers.

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KEYWORDS: Consumer Oriented, Innovation, Product Awareness, Seaweed Biotechnology.

INTRODUCTION

The rate of innovation is a measure of the industrial growth of a country's economy. A country's capacity to enhance innovation determines its capacity to increase sustainable economic growth. Product technology research-based innovation will immediately influence sustainable productivity, which can hasten a country's economic growth (Dhewanto et al., 2013). A resource-driven economy must adopt innovative and dynamic economic strategies to be able to compete globally (Al-Belushi et al., 2014). Innovation management also needs to be supported by managerial and entrepreneurial skills. For the industry's future development, the problems that will be faced must be addressed immediately, one of which is regarding the entrepreneurial ability of the managers (Ratnaningtyas et al., 2018).

In addition to studying the impact of the development of innovation on the business growth improvement that has occurred. It is also necessary to pay attention to the future business prospects in the industry. Therefore, one of the innovation pathways that will be studied in this research is the development of marine biotechnology in the seaweed industry. Indonesia is one of the largest maritime countries in the world. The number of islands in Indonesia is recorded at 17,508 islands stretching from Sabang to Merauke according to the UNCSGN Conference United Nations which took place in Montreal in 1987 (Ardiansyah, 2011). This excellent biodiversity potential also affects the economic pattern of the Indonesian people. The Central Statistics Agency (BPS) noted that around 25.14% of the total population of the national underclass depends on marine natural resources for their livelihood (Sukamto, 2017).

Utilization of marine natural resources can be done by creating products with high selling value and intrinsic value. One way to increase the added value of a product is through product innovation. In promoting high-quality marine economic development, technological innovation should play a leading role (Liu et al., 2021). Marine-based biotechnology products have a very wide product range. Marine biotechnology, which is the term for the application of marine biological resources in traditional and developing

marine bio-industry sectors like fisheries, aquaculture, and drug development, is becoming increasingly recognized as a significant economic growth area on a global scale (Al-Belushi et al., 2015).

Seaweed is one of Indonesia's leading fishery export commodities, most of which are exported in the form of dried seaweed (Arthatiani et al., 2021). However, it does not necessarily dominate Indonesia in the international seaweed market rivalry. Around 90% of Indonesia's seaweed exports are raw materials, therefore seaweed has little added value (ARLI, 2018). Especially in the seaweed downstream business which does not yet exist, the growth of the processing industry lags behind output. The innovation in this Industry in Indonesia appears to be simply processing more seaweed into semi-refined carrageenan (SRC) and alkaline treatment cottonii (ATC), producing very little refined carrageenan (RC) (Sumule et al., 2021). Carrageenan is one of the derivatives of seaweed products. Carrageenan is a common constituent in gels, thickeners, and stabilizers used in food, pharmaceutical, and cosmetic preparations (Saputro et al., 2021).

So far, what has been developing in the marine industry in general, seaweed products have not been utilized optimally. Seaweed needs proper post-harvest handling so that its potential can be utilized optimally and has a higher economic value (Masduqi et al., 2014). Biotechnology is one of the most profitable post-harvest processes to add value to natural products such as seaweed. Products from the downstream of biotechnology can increase the high selling value and benefits (Yulianto et al., 2021). Therefore, this study will be about the use of seaweed in biotechnology to impact the company's business growth. The maximum utilization of seaweed potential will provide results that can not only be enjoyed by customers and producers but also farmers on the coast (Soejarwo and Yusuf, 2018).

The progress of product innovation in this industry also encourages the blue economy concept. The Blue Economy is a strategy for economic growth that integrates land and water development (Rochwulaningsih, 2019). Based on this description, this study will examine how the pace of seaweed biotechnology product innovation development is carried out by middle-class companies that are members of the industrial cluster and measure the impact generated by increasing the company's business. it is hoped that this research can help develop the company's business in this industry and provide an overview of the impact of the benefits of the Blue Economy for improving the national economy from the Bio-industry sector.

The study was conducted by looking at the impact resulting from the rate of product innovation in the company and how the resulting impact is on the company's business growth. High innovation, both process innovation, and product innovation will increase the company's ability to create quality products. High product quality will increase the company's competitive advantage which in turn has an impact on company performance (Hartini, 2012). This research will look at how important the pace of innovation is based on customer needs. Because a successful business is a business that is always customer oriented. Customer presence in an innovation process can have a different impact than shareholder-based innovation (Rubera and Kirca, 2017). Because of this background, this research will be carried out and is expected to be useful for anyone concerned.

Then It Can Also Be Formulated The Main Objectives Of This Research, Among Others, About To Be Able To Measure The Influence Of Seaweed Biotechnology Product Innovations On Business Growth In Companies In The Industry By Looking At The Perspective Of The Customers Who Are The Target Of The Business And Later Can Be A Reference For Implementing Future Potential Development Strategies And The Contribution Of The Industry To The National Economy And Towards The Global As Prospects To Cover Wider Scale. The Scope Of This Research Is Limited To Perspective Of Existing Customers In Indonesia Regarding Biotechnology Innovation Products In Companies In The Indonesian Seaweed Industry And How The Resulting Impact Affects Their Business Growth.

LITERATURE REVIEW

Marine Product Innovation

Seaweed industry innovation cannot be separated from the development of technology based on biotechnology. The definition of biotechnology is the use of living things as a whole or their parts to produce or modify useful products through certain principles or technologies. the utilization set recombinant DNA methods within a larger narrative of how humans have tinkered and modified seeds to optimize their utility for humans, with a focus on the technology involved in the development of plants and plant kinds (Dietrich et al., 2021). all technological uses of marine resources are included in the concept of marine biotechnology. There is a lot of untapped potential from marine living biota resources, especially from macroalgae or commonly known as seaweed (Yetti, 2006).

The marine biotechnology-based product industry has become an emerging sector in various business environments in the world economic system. The existence of biotechnology innovations in the marine industry can help sustain the utilization. In many aspects, coastal regions depend on their ecosystems for their survival, including marine organisms. As a result, they need a stable and healthy environment to thrive (Pribadi et al., 2020). A lot of research has been done and in the last 5 years has been studied on the development of this industry. Research from Grysole (2019) states At this time, many marine products

have replaced conventional products, and this has become a significant fuel for the emerging marine biotechnology industry, in this case between provinces in Canada as research locations.

Because of this, it is important to focus on developing Marine Biotechnology, especially in Indonesia because Indonesia has great potential to be utilized. The research conducted by Rahmizal (2022) shows that According to the regression estimation, the amount of fish caught at sea in Indonesia grew between the years 2000 and 2015. This shows that the declining stock inventory that a prior study believed would have an impact on the catch has not been demonstrated in Indonesian seas. Management of marine and fishery resources requires comprehensive, integrated, and targeted policies, considering that this area has unique problems, potential, and characteristics. The enactment of Law No. 27 of 2007 has given strategic meaning and challenges to implementing marine and fishery resource management in Indonesia (Arianto, 2020).

The development of the marine biotechnology industry and improving the quality of human resources must be accompanied by solid innovation. A range of resource inputs is used in the innovation process for marine technology to produce new knowledge (Xia et al., 2019). It is possible to think of the measurement of the maritime technology innovation index as a standard multi-criteria decision-making problem where it is necessary to decide the relative value (weight) of each criterion (Liu et al., 2021). The increase in biotechnology innovation is currently still led by the research and academic sectors such as the research in Oman by Al-Belushi et al. (2015) which shows Universities and public sector laboratories or research centers are the main sources of knowledge generation. The education and research programs make up the bulk of knowledge creation in marine biotechnology in Oman.

Innovation Management

The development of this product innovation must be accompanied by good management in its management and implementation. The theoretical and practical foundations of innovation management are currently undergoing a period of very rapid and profound change. Dramatic changes occur in innovation management due to contexts that perform dynamically and alter so markedly. In the end, innovation management is how a series of processes in managing technology, markets, organizational structures, and skills requirements can form a good management system in the field of innovation and can survive and thrive from disruption and continue to transform (Agarwal et al., 2022).

The process of innovation management requires a long journey, as in the research of Risal et al. (2019) which shows that the implementation of activities still takes a long time to finalize the achievement of goals because new partnerships can be achieved through continuous development and improvement from year to year. Achievement of the implementation of activities still found some weaknesses. Therefore, it is necessary to reflect as feedback on the next year's service action planning. The limited support from various parties including the local government and the low motivation of the people make this economic opportunity unattainable and non-productive.

Therefore, in carrying out the management concept, especially on innovation, several things need to be considered as factors for the success of the process, including anticipating knowledge gaps, improving information systems and stable production, promoting technological potential, exploring potential ideas, and the last is maintain the continuity of the process (Mudita, 2021). This management concept can lead to a Blue Economy because the Indonesian Sea is the richest in the world. With the diversification of biota and the potential of natural resources contained, it is appropriate that the paradigm of economic development is directed to the sea and the coast (Ghalidza, 2020). Though it is still in its infancy, research at the nexus of innovation management is gathering steam, ushering in a period of ferment that may lead to fresh perspectives and deeper understandings (Appio et al., 2021).

Strategy for Business Growth

The emergence of the marine biotechnology industry as a new force forms a new paradigm regarding the Blue Economy. Initiatives for a "blue economy" are founded on the idea that the oceans, coasts, and seas are crucial in tackling the numerous long-term difficulties facing the global economy (Badri et al., 2019). A new paradigm for society's sustainable development is the bioeconomy. Innovative applications of blue bioresources and biotechnology products, developed in collaboration with value chain partners, drive innovation and advance new circular business models. The successful implementation of bioeconomy initiatives depends on bottom-up strategies that share visions, needs, and knowledge (Vieira et al., 2020). Various marine-derived compounds are currently being investigated for their excellent bioactive qualities, and biotechnology is increasingly viewed as a sustainable means to realize their potential (Daniotti and Re, 2021).

Another recent study on this topic is on economic growth caused by innovation. The Indonesian government is fully aware of the importance of the fishing industry in boosting the country's economy. After 1951, it considerably increased in terms of per-capita output and consumption. Fish catch has risen from 324,000 metric tons to more than 1 million metric tons annually since 1951 (Rochwulaningsih et al. 2019). The number of businesspeople in Indonesia is still far insufficient to make the country affluent. Due to Indonesia's low proportion of entrepreneurs in its total population, efforts to boost entrepreneurship must continue.

Access to finance, the importance of innovation, entrepreneurship training, and the role of the government in fostering a favorable business climate are the four aspects that need to be taken into account while developing entrepreneurship (Khamimah, 2021).

The bioeconomic concept is steadily rising and has become an important concept and is expected to transform the economic system in the future from all sectors (Befort, 2020). Especially Today, coastal areas are excellent. Coastal areas provide opportunities for economic, social, and psychological well-being. People are starting to turn to the sea because the sea is rich in biodiversity and ecosystems which if used and managed properly and professionally can have an impact on the welfare of the community (Akoit and Nalle, 2018). The various explanations that have been given above regarding the basic theory, empirical data, and future concepts will become a reference for studies on product innovation in the seaweed industry which will later be carried out in this research.

Data Collection in Previous Research

The data employed can be divided into two categories, namely main data and secondary data, depending on the source. Primary data are those that were gathered directly from the first source at the research site or object (Bungin, 2007). While secondary data is information gleaned from reading, studying, and comprehending content from other media, such as books, articles, and business documents (Sugiyono, 2014). Secondary data can also be used for quantitative data if it is based on numerical analysis. Quantitative data is a type of data that can be measured or calculated directly as a variable number or number (Advernesia. 2020).

In previous studies, data collection in research similar to this topic was carried out by qualitative and quantitative methods. Data collection here is to collect research primary data. A primary data qualitative approach can be done using the interview technique. The research of Maino et al. (2022) examined the Influence of product innovation, price perception, and promotion on buying interest in Verel Bakery and Coffee. That of Conducted using interview techniques and analyzed descriptively and qualitatively. Interviews were conducted with five people informants who are considered to represent the object of the problem in the study. In the research of Venandra and Wimala (2022), interview techniques were also carried out. The interviews' results in qualitative data were analyzed comprehensively with the two-cycle coding analysis method.

Descriptive Analysis Approach

Similar studies were found to indicate the use of a descriptive data analysis approach. A descriptive approach can be used to find out the research results on the impact of strategic innovation on the company's business growth. Such as research from Kurniasari and Memarista (2017) which uses descriptive analysis with the Balanced Scorecard to analyze company performance with the case study method. Then other studies such as Labantu et al. (2021) regarding the Influence of Promotion Strategy, Process, and Product Innovation on Buying Interest of Bonbon Factory Manado Customers. The results of the study show that promotional strategies do not have a significant effect on buying interest. process and innovation have a significant influence.

Qualitative descriptive research is aimed at describing and describing existing phenomena, both natural and human-engineered, which pays more attention to the characteristics, quality, and interrelationships between activities (Sukmadinata, 2011). Descriptive research does not provide treatment, manipulation, or changes to the data under study, but rather describes a condition as it is. The only treatment given was the research itself, which was carried out through observation, interviews, and documentation (Atmoko, 2018). Qualitative data is information that is descriptive or not numerical and is typically expressed verbally, symbolically, or visually (Putra, 2020).

Conceptual Framework

Based on the background and business issues that have been described, a conceptual framework can be formulated to understand the path of this research from upstream to downstream as shown in the following diagram. The framework is illustrated in a diagram as follows:

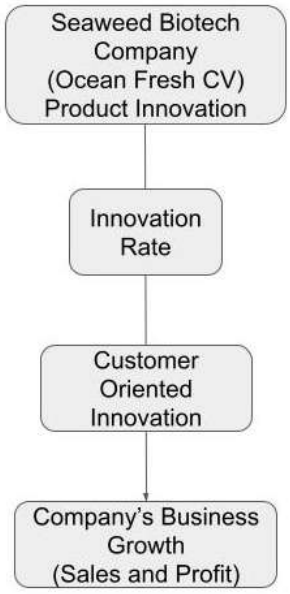

Figure 1. Conceptual Framework

Based on the diagram, a conceptual framework has been designed for this research. The way of thinking in this research starts with products that already exist in this industry by looking at the role of each stakeholder. Then it will be measured how high the rate of product innovation that is currently running or which has become a marketed

product. In the end, the impact on the company's business growth will be seen and simultaneously its potential contribution to future business prospects will be seen.

As shown in figure 1 above, the conceptual framework formulated is regarding the independent factor here in product innovation and causally will determine the dependent factor, namely the impact on the company's business growth.

There is also a mediator variable, namely the rate of innovation which will later examine how far the innovation has been carried out. Also will examine how external factors will be discussed through external factor evaluation by assessing awareness from customers regarding product innovations that have been produced by this company because this research will see what orientation customers need for innovation in this industry. Then in the end the framework of thinking will arrive at the dependent variable by looking at the impact resulting from product innovation on the industries.

RESEARCH METHODOLOGY

The research method is descriptive research which will be carried out using a questionnaire survey to consumers using convenience sampling on their perceptions of innovative products based on seaweed biotechnology in Indonesia. This research is descriptive and preventive which is intended not to fix the problems that occur in the industry but to analyze the phenomenon and evaluate the performance that has occurred. Will be able to project how the company can determine future strategies to increase its business growth even better. It is hoped that if the business growth in the company has increased, it is better and can be sustainable, and it will be able to have a positive impact on the macroeconomy.

Data Collection

The collection of data in this study was carried out using a convenience sampling technique with a questionnaire survey given to respondents based on the theory of Ginting and Situmorang (2008), namely Survey and Observation. to see the demographics of consumers, awareness of innovative products based on seaweed biotechnology, and consumer perceptions of how innovation in this industry should be carried out in the future. Then the data will be analyzed qualitatively descriptive of the existing phenomena and survey results.

Data Analysis Method

After taking the data, then an analysis of the data that has been obtained can be analysed according to the purpose of the data to get output in the form of answers to the formulation of the problem in this study.

1. Reliability Test

The data analysis that will be carried out in this study begins with testing the reliability of Cronbach's Alpha to determine the validity of the questionnaire that we use to survey the respondents. The basis for the decision on the Cronbach's Alpha test is as stated in the book by Sujarweni (2014) which states that the reliability test can be carried out jointly on all items or questions in the research questionnaire. The basis for decision-making in reliability testing is as follows:

1. If Cronbach's Alpha value > 0.60 then the questionnaire is declared reliable or consistent
2. Meanwhile, if Cronbach's Alpha value < 0.60 then the questionnaire or questionnaire is declared unreliable or inconsistent.

2. Guttman Scale and Descriptive Analysis

The Guttman scale is a scale that only provides two answer choices, for example, yes–no, good–bad, ever–never, and so on. Therefore the data generated is nominal data, where positive answers are given a value of 1 and negative answers are given a value of 0 (Bahrun et al., 2018). Besides that, a descriptive analysis was also carried out regarding the demographics and awareness of consumers towards seaweed biotechnology products.

3. Likert Scale Measurement

The Likert scale is a scale used to measure the perceptions, attitudes, or opinions of a person or group regarding an event or social phenomenon (Saputra and Nugroho, 2017). There are two forms of questions on the Likert scale, namely positive questions to measure a positive scale, and negative questions to measure a negative scale. Positive questions are scored 5, 4, 3, 2, and 1; while negative questions were given a score of 1, 2, 3, 4, and 5.

RESULTS AND DISCUSSION

1. Questionnaire Reliability Test

At the beginning of conducting the survey, a preliminary test was carried out to ensure the quality of the questionnaires given to the respondents. First, a readability test was carried out on 5 respondents and it showed that the results of the questionnaire could be read properly in each question given. Then a follow-up questionnaire test was carried out by spreading it to 30 initial respondents to test the reliability of the questionnaire using the Cronbach's Alpha test using SPSS software version 25. The results obtained from the Cronbach's Alpha Reliability Test are as shown in the following table.

Table 1. The Reliability Test of Measuring Instruments

Measuring instrument	Cronbach's Alpha
Consumer Perspectives on Seaweed Biotechnology Innovation Products	.837

Based on the results of the Cronbach's Alpha test, the result was 0.837 (exceeding 0.6) which indicated that the questionnaire was reliable. As referring to Sujarweni (2014) if the Cronbach's Alpha test results exceed 0.60, the questionnaire is considered reliable and consistent.

2. Consumer Demographic

The research was conducted using a non-probability sampling method, The convenience sampling method, specifically, was adopted in this study since it prioritizes participants who are simple to identify and their desire to participate. This aims to make it simpler for researchers to recruit participants. In addition, this method was selected due to its effectiveness and efficiency (Gravetter & Forzano, 2017). Sampling was carried out online using the Google Form application The application is a web-based survey questionnaire making it easier to get respondents without being limited by space and time (Pranatawijaya et al., 2019). In the survey that has been carried out, the results of the respondents were 107 respondents. The results obtained can be seen in the following Table.

Table 2. Participant Demographics

Characteristics	Frequency	Percentage
Gender		
Man	57	53.3%
Woman	50	46.7%
Age (in Years Old)		
Under 18	1	0.9%
18-25	69	64.5%
26-39	31	29%
40-55	5	4.7%
Above 55	1	0.9%
Monthly Expenses (in Indonesian Rupiah)		
Under 1 mio	12	11.2%
1 - 3,9 mio	48	44.9%
4 - 6,9 mio	24	22.4%
7 - 9,9 mio	10	9.3%
Above 10 mio	13	12.1%

N=107

3. **Consumer Awareness**

After looking at demographics, the next data is about Consumer Awareness which aims to see the extent of knowledge of respondents about innovative seaweed biotechnology-based products on the market. Later, data regarding consumer awareness will become a consideration for what strategy will be carried out for the industry to increase consumer awareness about its products. The following is the data obtained as shown in the table.

Table 3. Consumer Awareness

Description	Frequency	Percentage
Consumers are turning to biotechnology products in general		
Already as a whole	11	10.3%
Already in particular	46	43%
Not at all	50	46.7%
Consumers know the brand in the market		
Yes	39	36.4%
No	68	63.6%
Consumers have consumed the product		
Yes	32	29.9%
No	16	15%
Not Sure (didn't know before)	59	55.1%

N=107

The following is also data on what media made the respondents aware of knowledge about seaweed biotechnology products and also what types of products are known by the respondents.

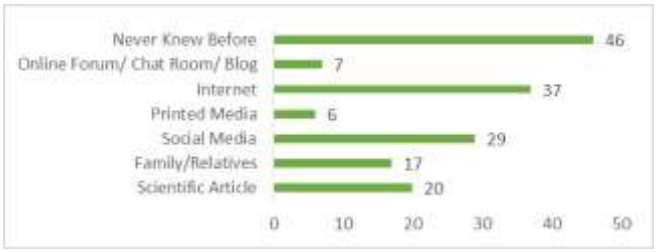

Figure 1. Media sources of information for respondents

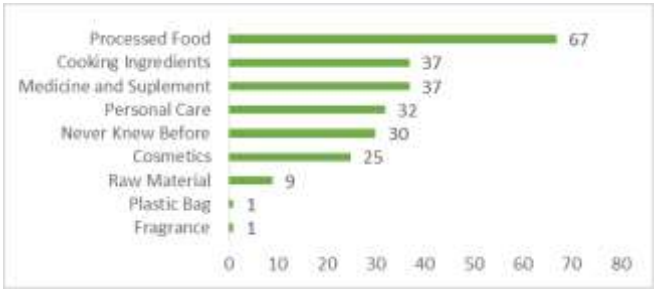

Figure 2. Types of products that respondents already know

Based on the graphs in figures 1 and 2, it shows that in figure 1 it is dominated by respondents who still do not know clearly about previous information about seaweed biotechnology products and the media that provides the most information according to respondents is from the Internet. After that, figure 2 shows the types of seaweed biotechnology products that most respondents know are processed food, followed by cooking ingredients and medicines.

4. Consumer Preferences and Perception on Innovation

Data regarding preferences in this study that were obtained from 107 respondents were regarding preferences where the most attractive places for respondents to buy products resulting from seaweed biotechnology innovation and what media platforms could make them interested when viewing the advertisements. This preference data can be useful for companies in this industry to be used as a reference in determining future sales strategies. The following data is obtained as in the following figures.

Based on the graphs in figures 1 and 2, it shows that in figure 1 it is dominated by respondents who still do not know clearly about previous information about seaweed biotechnology products and the media that provides the most information according to respondents is from the Internet. After that, figure 2 shows the types of seaweed biotechnology products that most respondents know are processed food, followed by cooking ingredients and medicines.

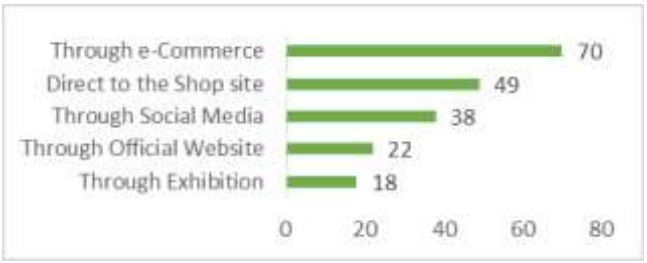

Figure 3. Consumer preferences on how to buy the products

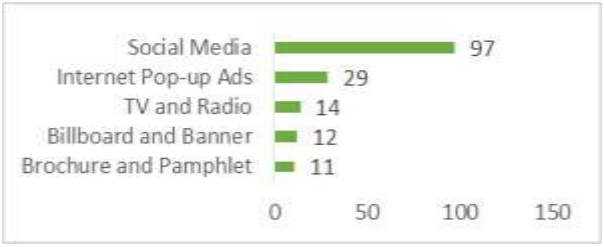

Figure 4. Consumer preferences on how to advertise the products

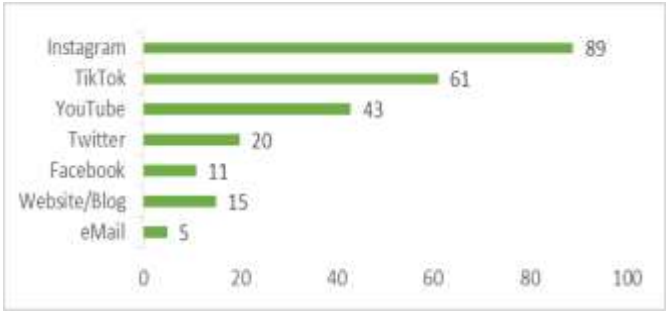

Figure 5. Consumer preferences on the most effective social media to use

Based on the results on the graph in the figure, it shows that the main preference that can help consumers buy products is through e-commerce. Then figure 4 shows the media which according to the respondents is interesting to look at is through Social Media. After that regarding what social media is most effective in marketing is to use Instagram which is quite popular for consumers in Indonesia. After that, data were also obtained regarding the perceptions of consumers regarding the importance of product innovation and its development in the seaweed biotechnology industry in Indonesia. As in the following table which shows a description of each indicator and the values obtained.

Table 4. Description of the Measuring Instrument

Indicator Code	Description
IN1	Consumers knows the product well
IN2	Consumers want to buy the product
IN3	The Products is beneficial for the consumers
IN4	The Products give the latest options
IN5	The products comes as a solution for consumers
IN6	Products innovation must follow consumers needs
IN7	The products is environmental friendly
IN8	Product innovation needs to be sustainable
IN9	The development of product innovation can change market orientation
IN10	Biotechnology-based products can lead the market in the future

Based on the description that has been explained regarding each indicator in the question instrument in the questionnaire. Measurements on the questionnaire were carried out using a Likert scale. Analysis of the Likert scale is carried out by calculating the average value obtained for each indicator and then categorizing it based on the interval value. Interpretation of the descriptive analysis is determined through class intervals with the following formula proposed by Lind et al., (2016):

$i = H-L/K$

$i = 4-1/5$

$= 0.8$

H is the highest score, L is the lowest value, and K is the number of classes on the Likert scale. Based on the formula above, the class interval in the study is 0.8. So that it can be concluded regarding the level of agreement by respondents regarding the indicators that have been determined. The following are the results obtained as in Table 5.

Table 5. Consumers Perspective

Indicator Code	Average Value	Interval Category
IN1	2.60	Strongly Disagree
IN2	3.34	Neutral
IN3	3.36	Neutral
IN4	3.55	Agree

IN5	3.25	Neutral
IN6	4.06	Agree
IN7	4.03	Agree
IN8	4.24	Strongly Agree
IN9	3.89	Agree
IN10	3.95	Agree

DISCUSSION

Based on the results previously described, starting from the demographics of the respondents who are representative of consumers. Demographic analysis is important because according to reviews, sociodemographic characteristics such as age, education, income levels, gender, and prices were important indicators that influence consumer awareness and consumption of some products (Gok and Ulu, 2019). The result shows it is dominated by the age segment in the 18-25 year range with monthly spending dominated by 1-3.9 million rupiah per month with the comparison ratio between men and women not too significantly different. This condition shows that the segmentation that can be targeted in the marketing of this seaweed biotechnology product in the future is in this segmentation range. The importance that companies and other organizations rely on customer segmentation to target specific customer groups with content and products that consumers within a segment may find relevant (An et al., 2018).

Then data regarding consumer awareness in Indonesia of this industry based on respondents shows low awareness. This is because more consumers do not know whether they have ever used or consumed these products and are not aware of any brands on the market regarding this seaweed biotechnology product. Apart from that, there has also been a little awareness to switch to using biotechnology-based products in general, although it is still partially and still dominated by consumers who have not switched at all.

In addition, sources of information are also still minimal regarding this product knowledge and are more widely spread on the Internet. The types of products in this industry are also still dominated by processed foods and followed by cooking ingredients and medicines for products that are most widely known by consumers. This low level of product awareness and knowledge can be a major concern for business actors in this industry to carry out their strategy to improve the company's business performance.

Awareness of being the main problem can also be seen from the survey results regarding the consumer perspective. In the indicators that mention product knowledge, the desire to buy and the benefits of innovative seaweed biotechnology products, it shows that the respondents disagree about these indicators in the current products. However, the respondents have a belief that this product can be an environmentally friendly product, has the opportunity to disrupt the market in the future and also innovations that must be carried out on an ongoing basis so that they can provide the latest solutions that are more widely known by consumers. The strategy that can be used to increase this according to the respondents is to utilize social media, especially Instagram to market products and digitize sales by using e-commerce as a means of selling products.

Based on the discussion regarding the results that have been obtained, this can be a consideration for business actors in this industry to develop product innovation strategies and how to increase business growth in the future. So that bio-economy will be achieved with the advancement of the seaweed biotechnology industry in the future.

CONCLUSION

This research shows that the main problem that needs to be addressed is the knowledge and awareness of consumers who are still low on innovative seaweed biotechnology products. Digitalization needs to be carried out by companies and business actors in this industry to increase consumer awareness so that later it can improve the performance of business growth in this industry. The innovation strategy that needs to be carried out in this industry must be consumer oriented. Based on the survey obtained, it shows that there is a positive signal regarding consumer confidence that this product innovation can be of great benefit to the market in the future. Therefore the development of product innovation must be accompanied by good marketing performance and focus on the orientation of the needs of the consumers themselves.

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