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E-BLUE: IMPLEMENTATION OF AN INTEGRATED BLUE ECONOMY ECOSYSTEM TO INCREASE COASTAL MSMEs COMPETITIVENESS

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ABSTRACT

Introduction/Main Objectives: This study aims to determine the implementation and the right business strategy for sustainable fisheries that adopt the "E-Blue" blue economy ecosystem model. **Background Problems:** The challenges faced in developing a booming blue economy emphasize the need for strong commitment and collaboration between central and regional governments, to support overall development. The background problems also recognize technology's impact on activities of micro, small and medium enterprises (MSMEs) and stre the significance of quick responses to these changes. **Nove** This lies i the study's exploration of the role of digital transforma in s ainable fisheries within the blue economy framework. It empha es the need for commitment, innovation, and technologica daptatio to ensu the success of blue economy-based developmen **earch ethods** This qualitative study adopts a narrati oach t gath data ainable fisheries strategies aligned w the bl econ ystem model. The research utilizes this proa to g insig into t development possibilities fo research **Findi Results:** The study's findings hi light the ucial ro f the g rnment's commitment and decisi actions for the uccessfu velopment of the blue economy in the heries sector. T study u derscores the potential of digital ansi ati as a bridge ween stakeholders and consumers, enabling ci cien upply chain management and diverse product processing for mmun welfa **Conclusion:** The study concludes that successful e econ development relies on strong collaboration between gov ments, innovative policy programs, and swift responses to technological changes. The study emphasizes the importance of continuous innovation to enhance competitiveness and market access in Indonesia's fisheries sector.

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INTRODUCTION

As we know, Indonesia's marine and fisheries industry offers unique marine resources and natural beauty surrounded by waters both large and small, such as large rivers, seas and coasts, which are potential sites for economic development. Indonesia's marine and fisheries industry refers to the blue economy concept, which has been proposed in the Medium-Term Development Plan for the Maritime and Fisheries Sector 2013 – 2025 (Lynn & Bt Fathi, 2023). The blue economy is an activity that significantly contributes to the marine and fisheries industry through a sustainable innovation process, based on natural systems, without destroying the natural environment. The blue economy concept is an industrial development that focuses on innovation and creativity using the resources owned, by paying attention to an environmental economic system that is effective, efficient, friendly and in line with sustainable economic development. Sustainable economic growth is a process of change to build sustainable investment that is equitable, by prioritizing technological development to meet human needs without destroying natural systems (Aqmala & Putra, 2023). In the context of the blue economy, sustainable development goals must be inclusive and eco-friendly, and eco-balance concerning maritime affairs must be maintained. Implementing the blue economy is basically related to the survival of communities where most of the population earn their living as fishermen or fish farmers. The blue economy concept also focuses on utilizing all eco-friendly resources, not damaging the environment, and minimizing the accumulation of waste. It works very well if those involved in it are self-aware and act to protect both business and the environment. Proper fisheries business management is the main factor in successfully implementing the blue economy (Wajdi et al., 2023).

One of the coastal areas in Indonesia where most of the population works as fishermen or fish farmers is in Central Java, which has a fisheries education tourism development. In this village, the people are enthusiastic about developing the fisheries sector, either by searching in the sea or by creating a fish cultivation site, including nursery activities and fish rearing activities, so that the community can independently produce seafood. The existence of this fisheries tourism village can create employment opportunities for the local community by using their own skills to develop fish farming areas (Aqmala & Putra, 2022). This independent fishery in Central Java adopts a blue economy concept by creating a fish farming business, while still paying attention to cleanliness and protecting the environment by not polluting and destroying the existing environmental ecosystem. From making fish food, feeding fish, cleaning fishponds, harvesting fish and processing them, the work is carried out carefully so as not to cause air pollution due to smelly waste water. Waste from making fish food is reprocessed into new, more valuable products. Independent fisheries usually emerge idealistically from individuals hoping to improve their family's economy. From individual thoughts, a concept will create fisheries cultivation businesses by inviting other residents to cultivate according to their capacity and abilities (Aqmala et al., 2021).

Sustainable fisheries can be a business opportunity with a positive economic multiplier effect, a chance to promote business and create jobs. Increasing cooperation in the maritime and fisheries sectors, which carries the blue economy concept, can build and accelerate economic growth. Indonesia has the potential to develop its economy, because its marine resources are the country's largest commodity and main asset. Even with Indonesia's coastal areas being eco-

friendly and maintaining balance, most of the local population earn their living as fishermen and support the Indonesian economy through their catch (Psycharis et al., 2023). Governance in the fishing industry must be supported by digital transformation, because digital transformation can accelerate integration between the market's needs and demands. For example, fulfilling the need for fish food, fresh fish, and various other products can be done quickly through a digital application using just one touch, allowing fishermen to sell directly without going through mediators whose prices sometimes do not match expectations (Risgiyanti et al., 2023). Using appropriate technology for the fishermen can provide sustainable results that are both efficient and optimal. One example of what fishermen can do with digital transformation is to create market share and sell raw and processed products through the marketplace. Therefore, adapting new technology for fishermen needs special attention from the government, so that the fishermen can use and operate it wisely. This would allow fishermen and fish farmers to process raw materials into derivative products without leaving waste, in accordance with the blue economy concept (Bastian & Llopis, 2023).

The key to sustainable economic success is good governance in the marine and fisheries industry. In other words, it includes success seen from various aspects, including environmental sustainability and food security to increase people's incomes. The success of the blue economy ecosystem depends on eco-friendly industrialization in the fisheries and marine sectors being evenly distributed and supported by open access to labor needs, digital technology, creativity and product innovation, and chain improvements from upstream to downstream. This allows the economic cycle of people's businesses, especially in the fisheries sector, to develop continuously and sustainably (Hartarto & Wardani, 2023). The main problem faced by independent fish farmers in Central Java is the low role digital transformation plays in developing independent fisheries activities, due to difficulties in access to knowledge support either from the community itself or other institutions that should have a role in developing sustainable community businesses. Kordi et al. (2023) says creating a sustainable, eco-friendly technology-based fishing business is the biggest obstacle for fishermen and fish farmers. By processing resources into all kinds of products, both primary and derivative, sustainable fisheries resources can positively impact the people's income, and serve as an example and role model for similar businesses to grow in society. Micro, small and medium enterprises (MSMEs) in the fisheries sector must be able to create innovation through the support of digital transformation (Azmy, 2024). Several innovations can possibly be developed as follows:

Table 1. Digital Transformation of Fisheries Businesses

No	Aspect	Information
1.	Financial Technology (Fintech)	Access capital through crowd funding. Automatic fish
2.	Innovative Technology	Feeding and air control automatic equipment regularly to determine water quality
3.	Digital Processing & logistic	Creating processed fish products that are healthy and eco-friendly automatically.
4.	E-commerce	Marketing fishery products, processed fish and derivatives through e-marketplace.

Source: Bonkoungou & Nesterov (2023)

The blue economy concept seeks to ensure the sustainability of coastal and marine resources and environments, and encourage economic growth in the marine and fisheries industry, since Indonesia is a maritime country. Several countries and regions have proposed strategic frameworks and action plans to develop the blue economy. After five years of implementing the blue growth strategy, the European Union issued a report reviewing what has been learned and achieved. Five aspects are explained in that report, including: (1) encouraging growth in five focus areas, including blue energy, aquaculture, coastal and marine tourism, blue biotechnology, and seabed mineral resources; (2)the benefits of marine data, spatial planning and maritime supervision to facilitate blue economic growth; (3) promoting a partnership approach; (4) increasing investment; and (5) creating a growth strategy in line with future challenges (Yang et al., 2023). The study by Hoang et al. (2023) also proposed principles for developing the marine and fisheries industry based on the blue economy concept including formulating comprehensive economic and environmental protection policies, encouraging regional economic development, realizing sustainable development by promoting clean production systems and encouraging creative and innovative investment. If this potential resource is managed sustainably, it will have positive economic and environmental implications.

Studies on the contribution of the marine, fisheries and coastal tourism sectors to Indonesia's economic growth have been carried out several times. However, these studies are regional or only focus on specific areas, such as the one by Kerner & Kitsing (2023). Apart from that, the study above has yet to thoroughly examine the supporting sectors for the blue economy in Indonesia. There are few studies on the blue economy in Indonesia, because this concept is relatively new, and Indonesia itself is still in the process of determining the policies required to implement it. Studies in Indonesia on industrial sectors supporting the marine economy that have implemented the blue economy concept include those by Abdul-Talib et al. (2023), but they still specifically examine one industrial sector, which is micro in nature. Macro studies by Borojo et al. (2023)state there are several studies that have raised the concept of the blue economy and its role in Indonesia's economic development. However, the previous studies has yet to explain the challenges Indonesia faces in implementing blue economy policies to increase its economic growth or explain the strategies that need to be implemented by the government. Also has not described the financial contribution of industrial sectors in the maritime industry.

This study will discuss Central Java's potential and challenges in developing a blue economy ecosystem model to increase the country's economic growth. The issues that will be raised in this study include: (1) how much Indonesia's blue economy support sector contributes to the economy; (2) what are the challenges of developing the blue economy in Central Java; and (3) what strategies are being implemented by the government to develop the blue economy to create a sustainable economy in Indonesia. Based on the background of the problems explained above, this research will explore the implementation and appropriate business strategies by utilizing the role of digital transformation in increasing the economic resilience of sustainable fisheries, in accordance with the blue economy concept, which is suitable for developing the independent fisheries in Central Java. Research question of this research includes:

1. How is the implementation of the blue economy concept in developing a sustainable

fisheries business ecosystem in the coastal areas of Central Java?

2. What are the main challenges coastal MSMEs, especially independent fish farmers, face in adopting digital transformation based on the blue economy ecosystem?
3. To what extent does the supporting sector of the blue economy contribute to the growth of the Indonesian coastal economy, especially in the context of developing micro and small businesses in the fisheries sector?

LITERATURE REVIEW

Blue Economy

The concept of sustainability in a business is a concept that has been adopted for a long time and is used as a basis for many parties to create a better long-term economy by paying attention to the aspects of the economy, society, culture and environment that are integrated (Panjaitan, Adam & Hasan, 2023). In line with this concept, the primary components of the blue economy adhere to the principle of business sustainability, how the business can run well, be beneficial not only for the owner but be able to open up employment opportunities for other people, especially residents, with an eco-friendly existence that is well maintained. The blue economy in Indonesia is more embedded in maritime businesses, or those related to fisheries, because Indonesia is a maritime country composed of islands and oceans with abundant potential marine resources. One of the main drivers of change in the economy is the focus on strategies and concepts for adopting the principles of the blue economy (Navarro-Chávez et al., 2023).

The blue economy was originally an idea initiated by Hakam et al. (2023), which utilized the potential of natural ecological systems, without destroying them, to build a sustainable economy and create sustainable products, manufacturing, and ecosystems. The draft blue economy aims to provide not only an understanding but also a challenge for entrepreneurs to develop abundant fisheries resources that are more profitable, efficient and effective, and how to utilize the existing potential, create products with high retail value and quality, using workers from far away areas. Hakim et al. (2023) states that a better understanding of the contours and conditions of the local area environment will create an understanding and attitude of care for management that is appropriate and good for the surrounding environment. It will also create a business that is beneficial and does not damage the environment with pollution from the process, or production waste, both on land and at sea.

Blue Economy Policy in Indonesia

Sustainable fisheries (blue economy) is a good concept for balancing the economy and the environmental ecosystem. Maintaining the environment, not only keeping it but using it wisely, can be beneficial and not damage the environment around the business (Sambodo et al., 2023). The objectives of the blue economy's policy are as follows:

1. To increase the efficiency of natural resources, especially marine resources or fisheries, without causing pollution to the surrounding environment. Increasing the use and management of natural resources can be done jointly and responsibly.
2. It can be used as a guide to increase the diversity of economic activities that add value and have high sales competitiveness to create a good value chain from upstream to downstream.
3. It can be used as a guide to increase local communities' access to economic resources.
4. It can encourage the acceleration of the

development of more innovative and creative investment by creating a business or product that meets the needs of the local community.

Implementation of the Blue Economy in Various Countries and MSMEs Sustainable Business Activities

Sustainable fisheries are conceptualized in developing fisheries businesses that do not just process available resources into economically valuable items, but develop these resources into creative and innovative companies that are economically resilient by balancing natur[e] and the surrounding environment. Needs [and] dependencies will be com[bined] with [self]-awareness to protect each o[ther]'s co[m]panies [and] the environment [García-Al]er[t] al., 202[3]. Several countries [ha]ve impl[e]mented, [or a]re tryi[ng] to apply, the co[n]cept of th[e] blue economy fo[r] managi[ng] their [ma]rine resources and fishe[ry] activities. Sinc[e] 2015, to utilize its unexpl[o]red marin[e] resources, Bangladesh has [ta]ken th[e] initiative to develop a blue economy by [ho]sting several consultations and workshops on the blue economy (Zenzerović et al., 2023). The blue economy policy is also being followed by Bangladesh's neighboring countries in the South Asian regional area, such as Sri Lanka (Liu et al., 2023), India (Xia et al., 2023), and Pakistan (Kašťáková & Luptáková, 2023). Blue economy development has also occurred in countries on other continents, namely Africa (Nigeria [Moncada-Paternò-Castello, 2022]; South Africa [Hatfield et al., 2021]; Kenya [Sharku & Kumi, 2021]; and Tunisia [Donaldson & Mehra, 2021]) and APEC member countries, as well as European Union countries (Schlaak et al., 2023).

The blue economy has become an essential goal of APEC countries, to advance sustainable ocean and coastal governance to drive economic growth, including increasing marine protected areas, addressing illegal fishing, and facilitating sustainable regional trade in fisheries. APEC is committed to integrating environmental considerations in all sectors and at all levels of its work, moving toward trade liberalization and facilitation (Hsieh et al., 2020). Euro[pean] [U]nion countries coined the term blu[e] co[n]omy at th[e] United Nations Conf[e]rence on Su[s]tainable Development, whi[ch] imp[l]ements [a] blue [g]rowth strategy. Th[e] European Uni[on] released the [f]irst Blue Growth Strat[e]gy Towar[d] More S[u]stainable Growth and Jobs i[n] the Blue E[c]onomy, which e[x]amines what has [b]een learned and achieved si[n]ce the em[e]rgence of the blue economy, what is [e]meni[n]g and what is missing. ASEAN [C]ommunity leaders have committed to promoting the blue economy through the ASEAN Leaders' Declaration on the Blue Economy (Doan et al., 2023).

The declaration defines the blue economy as the sustainable, resilient, inclusive use, governance, management, and conservation of marine and coastal resources and ecosystems for economic growth in various sectors. ASEAN member countries have committed to promoting and advancing the blue economy in their respective countries in the United Nations Convention on the Law of the Sea (UNCLOS), the 2030 Sustainable Development Agenda, including the Sustainable Development Goals (SDGs), and the ASEAN Charter. From the experience of the countries above, the business activities that need to be developed to implement the blue economy concept can be explored (Markova, Taysever, & Angelov, 2024). The blue economy represents all the economic activities related to the oceans, seas, or coastal areas that are designed to encourage economic growth and development, increase employment opportunities, and improve the environment, while maintaining the ecosystem. These business activities include aquaculture, fisheries, tourism,

transportation, maritime shipping, shipbuilding, marine biotechnology, marine energy, and mineral extraction (Cao et al., 2023).

Previous Studies

Until now, the interaction between growth and the blue economy has generally been seen in the trade-off between the economy and the environment. Life that depends on water/marine resources can significantly contribute to food, energy and bio-based products. However, marine ecosystems are subject to increasing pressure and competitive use due to resource overexploitation and pollution (Hirsch, 2022). The overall growth of the world economy and the economic progress of most developed market economies has led to the increased use of natural resources and, at the same time, increased environmental depletion and pollution. In a sustainable blue economy, each country must find the best way to balance sustainability and economic growth, optimize maritime resources, while ensuring maximum environmental benefits (Hanoteau, 2023).

Islam Bhuiyan et al. (2023) stated that South Asia, especially Bangladesh, has begun implementing the concept of a blue economy. However, the region still needs to publish data on the economic and social value of ocean-based industries, or any assessment of the possibilities, prospects or types of industries and activities that can be carried out in line with the blue economy concept. The lack of available data limits the performance predictions of the industries under consideration. In line with this, Lee (2023) stated that the blue economy can contribute significantly to economic growth if a country's blue resources are mapped and well-integrated within a robust institutional framework and based on concrete policies and research. Caravella et al. (2023), who conducted a study of the South Asian Association for Regional Cooperation (SAARC) countries, concluded that countries in the region have the potential to implement a blue economy, which will lead to economic growth, but this requires strong political commitment, concrete research, public awareness and positive attitudes.

So, if SAARC countries use their resources properly, they will experience faster progress. This is supported by Aydin et al. (2022), who state that there has been no attempt to calculate how much the blue economy contributes to India's Gross Domestic Product (GDP) because this concept did not receive government attention until recently. The European Commission formulated a "blue growth strategy" to harness the possibilities of Europe's oceans, seas and coasts for growth and jobs. This strategy identifies five focus areas for blue growth: blue energy, aquaculture, maritime, coastal and cruise tourism, marine mineral resources, and blue biotechnology. Then, the progress report on implementing the strategy shows that research and innovation has always been the main focus of the European Union, marked by the budget allocation for marine research and innovation projects amounting to USD 911.68 million from 2020-2022.

Meanwhile, China's blue economy policy focuses on growing its maritime economy through cross-sectoral planning and spatial planning processes for economic development. However, China's emphasis is on something other than environmental protection. Although the Chinese government has taken several necessary steps to better protect marine ecosystems, its primary focus remains on economic development (Séogo, 2022). A study by Hesda (2022) found that, despite the tremendous potential to ensure ocean sustainability, the growth of the blue economy presents several challenges. The lack of standard, agreed blue economy growth goals is one of the most

apparent obstacles. However, de la Fuente (2020) says that when maximizing "inclusive" economic growth derived from marine and aquatic resources, it is impossible to reduce poverty unless the health of the marine ecosystems is guaranteed and preserved, because it is crucial for food security, livelihoods and the economy.

METHOD, DATA, AND ANALYSIS

This type of research is qualitative research, which aims to investigate, discover, describe and explain problem phenomena more comprehendsively (Dvorak et al., 2022). This research used a storytelling or narrative approach to obtain data related to sustainable fisheries strategies th match the concept of the blue economy, whic could then be developed on search objectives. In qualitative resea the p ential contained in the obie be res ch an be explored, as this type o search r s mo n the uniq ess and supe rity of t research object tained from extra g information in a field, than on gener ing the problem (Ng en et , 2022).

e rese location was in Central Java, here residents carried out daily activities fish farmers by creating an independent catfish fishery in front of each resident's house to obtain additional finances. The subjects of this research were considered to be the key informants or figures. Local micro, small and medium enterprises (MSMEs) who own catfish fishing businesses were deemed to have sufficient information related to the themes raised in this research, and could provide essential business data about environmentally based fishing activities. The data collection technique in this research was purposive sampling, which used unique criteria or specific considerations in drawing the sample. In this research, there were criteria for consideration, namely that the informant was a business actor with a catfish fishery business and continued it until the research was carried out, and had the skills and adequacy to provide information that would be explored further.

We obtained a purposive sample of 191 coastal MSMEs registered as official beneficiaries of the Central Java Provincial Office for Cooperatives and MSMEs. These includ ere and small enterprises engaged in h f ing, seafood processing, fish pr t marketing nd eco-tourism with f ries ntegr n. selection follo purposiv mpling tech nique, t ting MSM that me e fol ng criter

- A ely eng ed in rine and fisheries-bas busine activities (e.g., aquaculture, eafoo ssing, fish feed production, c tal eco-tourism).
- Operate within designated coastal subdistricts in Central Java.
- Willing to participate in structured interviews and provide information related to business practices, digital adoption, and eco-friendly innovation.
- Representing varied levels of digital adoption and sustainability practices.

The type of data was primary data, in the form of information provided by the informants, which was obtained directly from the in-depth interview process carried out during the activity. Meanwhile, the data source was obtained from informants who were considered competent and had mastered the information related to the data required. The Interview questions for this research includes: (Murashima, 2022)

A. Understanding & Implementing Blue Economy
   1. In your opinion, has your business currently implemented environmentally friendly and sustainable principles? If so,

can you explain how it is practiced?

2. How do you maintain environmental sustainability in the production process (for example, waste management, feed use, or raw materials)?
3. Is there any support or training from the government or other parties related to developing a business with a blue economy concept?

B. Business Conditions and Challenges

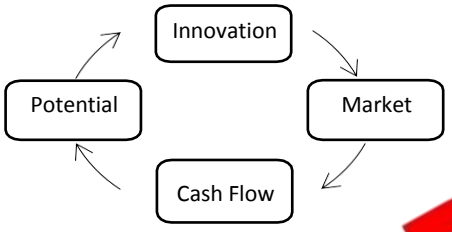
1. What are your main challenges in running a fisheries business in this coastal area?
2. What are the market conditions for your products? Are there any difficulties in distribution, promotion, or access to customers?
3. Do you have difficulty accessing financing or capital? If so, where do you usually get financial support from?

C. Ecosystem Support & Expectations

1. In your opinion, what kind of assistance do coastal MSMEs need most to be more competitive?
2. Are you open to collaborating with other MSMEs in cooperatives or joint business ecosystems?
3. What are your expectations of the government or other institutions in developing sustainable and integrated fisheries businesses?

The key elements in the success of the blue economy are innovation, markets, cash flow, and potential. Innovation is the process of creating new products and looking for opportunities for sustainable economic development according to the offerings needed by the market. Innovation influences new cash flows that come from the innovation. Additional cash flows are supported. These elements can be described as follows:

Figure 1. The Success Key Elements in Blue Economy Ecosystem



Source: Qiao (2022)

The data analysis method uses the analytic hierarchy process (AHP) to describe the relative importance of one element above another. This value is in the form of a comparison scale between one and nine. A scale with these units is acceptable and reflects how we can differentiate the intensity of the relationship between the elements. This number describes the relative importance of an element compared to other elements. The next step was to develop an ecosystem model. The AHP was used to make it easier to determine the hierarchy of decisions (Aliekperova & Aliekperov, 2023). Applications in the Development of the "Blue Economy" Ecosystem Model include:

- Mapping component dependencies (resource availability, environmental impact, economic added value, community involvement).
- Determining intervention priorities (choosing the most important environmentally friendly technologies, financing schemes, or investment locations first).
- Integrating cross-disciplinary experts (biologists, economists, entrepreneurs, regulators assessing criteria together through pair wise comparison, so that decisions are collective and transparent).

The Analytic Hierarchy Process (AHP) offers several advantages, making it an effective tool for complex decision-making. First, AHP is intuitive and structured, allowing for the breakdown of significant problems into smaller,

more manageable components for analysis. Additionally, AHP accommodates quantitative and qualitative data using a comparison scale of 1 to 9, which enables assessors to express their preferences more flexibly. A significant feature of AHP is its consistency test, which ensures that the assessments made do not contradict each other logically. However, the method does have some limitations. For instance, the number of pairwise comparisons increases exponentially with adding more criteria or alternatives, making it less efficient when tackling scenarios wi many elements. Furthermore, AHP relies on th subjectivity of the assessor, w can introduce bias into the final result evertheless, s bias can be minimize through pan discussions, expert vali on, and se itivity an sis to t the de ons' stability.

RESULT AND DISCUSSION

Characteris the Central Java Sea Coast MSMEs Ecosystem

e process of the growth of micro, small and medium enterprises (MSMEs) in the coastal areas of Central Java, based on findings in the field, shows that business actors develop products based on marine biological resources for several reasons. Businesses are also passed down from generation to generation. Coastal MSMEs also provide benefits, so they can increase family incomes, as they can open up employment opportunities for coastal communities, thereby reducing the number of unemployed. The abundant availability of primary raw materials is why coastal MSMEs develop these products. Another reason these businesses operate is because there are natural and religious tourism destinations that attract tourists. In providing the primary raw materials, in the form of marine biological resources, the business actors obtain them in various ways, either by making direct purchases at coastal village markets and paying in cash, or by placing orders directly from collectors who are also paid in cash. The main obstacle these business actors face is the need for more raw materials reduced fishermen's catches caused by in ment weather conditions. The busi capital u by these marine coastal M MEs mes fr m ca l obtained indep ly or p ally by t business actors, loa apital fr relati or close amily and lo capital formal fina al institutions or v ge cooperatives. The creati industr s products are marketed in rious ys, in ding:

1. directly to small and large traders in village and city markets using land transport-tation.
2. Entrusted to several restaurants and outlets/ gift shops typically found on the Central Java coast.
3. Selling directly to consumers without using a sales force.
4. Marketing to several agents in various cities/regencies in the North Coast region (PANTURA) via land transportation, where MSMEs bear the transport costs.

Contribution of the Blue Economy Integrated Ecosystem to the Competitiveness of Central Java's Economy

The high competitiveness of coastal MSMEs is influenced by extensive market networks, competitive quality products, affordable prices, official legality, and interactive promotional programs supported by a good market ecosystem, regardless of the conditions. In the last two years, the seafood market has been dominated by products from coastal MSMEs in Central Java, which have contributed a market share of 30-40% at the national level, especially in packaged products supplied to souvenir and tourism shops. The practical business performance of coastal

MSMEs is evidence of increasing practical ecosystem configurations that provide facilities for the development of knowledge, which is the basis for competitive advantage that cannot be created in advance if a good ecosystem chain does not support it. This must be continuously supported and fostered by the government and other stakeholders. Product innovation can make a real contribution to increasing competitive advantage, because coastal MSME products attract consumers, are easy to store, and have a good reputation in the eyes of consumers. An excellent blue economy ecosystem will encourage the ability of coastal MSMEs to penetrate national and international industries, supported by the production of much higher quality products, based on applicable standards.

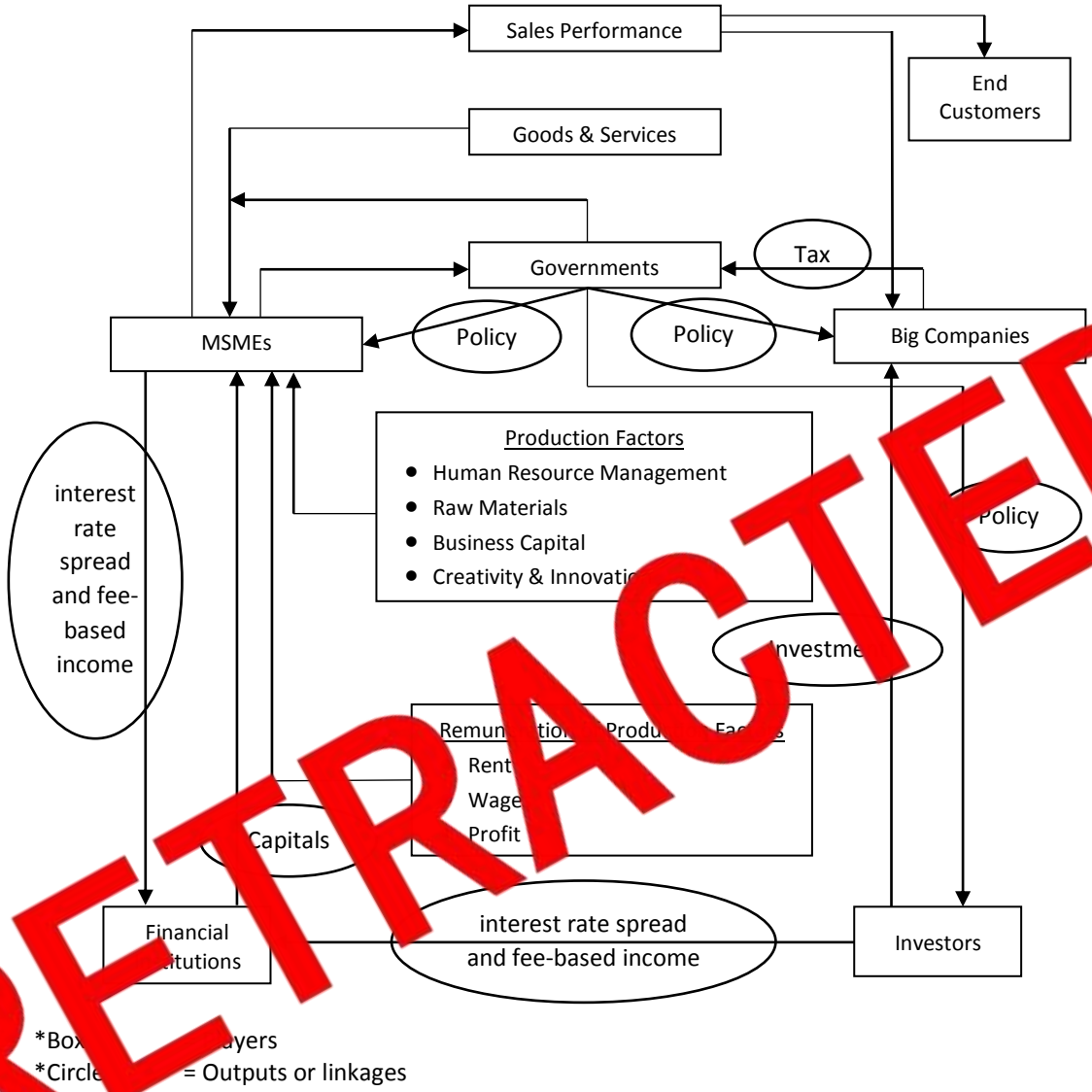
Marine fisheries, aquaculture and fi processing represent the most critical sea-base sectors, contributing 83% of the tot added value of Central Java's si lue nomy ectors. In 2022, Indones pr uced 67 total added valu m six se rs across e ASE memb . In particular, 84 of the a d value erat fr marine processing in AS AN ntries came from Indonesia, as did 73 of the ded ue of marine fisheries and 94% f th added value of mariculture. donesia also has the most significant added ue from sea transportation (USD 2.6 billion) and sea passenger transportation (USD 2.2 billion) among ASEAN countries (Brosio et al., 2022). The marine economy has diverse and varied components in each Indonesian province, as they have a collection of sectors that directly or indirectly depend on marine resources. The sectors include traditionally exploited marine resources and the use of the sea for tourism, education, seaports and shipping.

The sectors also include ocean-based sectors that have recently emerged due to advances in science and technology, such as offshore wind farms, tidal and wave energy platforms, marine aquaculture, seabed mining for metals and minerals, marine biotechnology, and biopros-pecting. Environmental services such as coastal protection also significantly contribute to economic and other human activities (Biscione et al., 2022). However, the economic potential of Central Java, which originates from the sea and its resources, includes its fishing ind (Zinecker et al., 2022), the marine-ba food processing industry, coastal to m (van tten et al., 2016), trade, tra spo tion and log s (Yu & Xiao, 202

Blue onomy Indus l Develo Model in th Coastal Area of tral Java

Base the int al and external environmental nditi for th existence of the blue economy y, and the increasing competitiveness of MSM s, the appropriate alternative model is institutional innovation through "E-Blue: A creative and innovative integrated blue economy ecosystem model." The primary considerations for the integrated blue economic ecosystem development model in the coastal areas of Central Java are: (1) the differences between the characteristics of wet-processed products (fermented-shrimp and shrimp-paste) and dry products (crackers); (2) the micro, small and medium enterprises and primary raw material providers are close to each other and interact with each other in an area that forms a community; (3) they have the potential to form a small-scale Joint Business Group (KUBE). Schematically, the model for developing an integrated blue economic ecosystem, based on biological resources in the micro, small and medium enterprise industrial centre community in Central Java, is shown in Figure 2.

Figure 2. E-BLUE : An Integrated Blue Economy Ecosystem of Central Java's Coastal MSMEs



The impact of developing an integrated blue economic ecosystem development model, based on the marine biological resources available to the micro, small and medium enterprise industrial center community in Central Java includes:

1. Micro, small and medium enterprise industries
   - Improve their expertise/skills as a result of interaction and interrelation between industrial groups through socialization and learning together to develop potential products within the cluster.
   - Obtain potential economies of scale due to several factors, namely (i) specialization in processed products; (ii) purchasing primary and complementary raw materials, when carried out collectively in clusters, has an effect on the efficiency of transportation costs and lower raw material prices due to the large capacity; and (iii) creating a joint market for processed products, both directly to consumers and supplying the needs of large companies.
   - Access to the information flow in the ecosystem is relatively easier, especially

regarding (i) accessibility to financial/ banking institutions and investors for providing business capital; (ii) access to the government regarding formal legalities for creative industries in the form of processing business permits; and (iii) information relating to other service sectors.

- Business actors can generate profits from their business activities, thus providing adequate wages for their workers to improve their welfare.

2. Government
   - Positive role in government performance because creative industries in small industrial centers have formal legality in the form of business permits.
   - Government regulations for small-sca and large-scale industries/co ies an investors in developing tive in tries, so that they obta come ugh xes.
3. Big Comp ies
   - E lish mutually eneficia business p ership with sm -scale industries, bot the form of ra materials, semi-finish prod , and finished products ith th ected quantity and quality.
   - Establish access to financial institutions and investors to increase business capital capacity.
4. Financial institutions
   - Obtain income from MSMEs and Big Companies in the form of interest rate spread and fee-based income.
   - Distribute credit to small industrial groups, large-scale industries and investors.
   - Assisting small-scale creative i tries regarding their financial ma me
5. Investors
   - Supporting ness c l or MSI industries
   - ntri e to pro ing mark i mation r MSMEs produc
6. E Custom

Ther a g antee of obtaining quality and lthy biological resource-based seafood products.

The results of the identification of the driving and inhibiting factors for the development of an integrated blue economy ecosystem model, based on the marine biological resources available to Central Java's micro, small and medium enterprises are as follows:

Table 2. Encouraging and Inhibiting Factors for the Development of Integrated Blue Economy Ecosystem Model

No	Driving Factors	No	Obstacles
D1	The sea coast is dominated by wet processed products and dry products	H1	Dependence of raw material suppliers (fishermen) on natural wisdom (weather)
D2	MSMEshave experience from generation to generation	H2	MSMEs production locations are still scattered
D3	Processed products based on biological resources have flavors that are in great demand by consumers	H3	Production houses are not yet representative, especially regarding comfort and cleanliness
D4	Availability of raw materials for MSMEs	H4	MSMEs still use simple technology, so production capacity is limited

No	Driving Factors	No	Obstacles
D5	There are sales outlets for seafood-based products available	H5	Limited capital for MSMEs
D6	The reach and market access for processed marine products is quite extensive	H6	Limited infrastructure in coastal locations
D7	Guidance and assistance provided by the local government	H7	MSMEstend to be individualistic in developing their businesses

The strategy to focus on the results of the analysis can be formulated so that the key forces or drivers that have been selected are focused on the goals that have been set, namely to develop an integrated blue economy ecosystem model based on the biological resources of Central Java's marine industry. The selected driving factors are wet-processed products and d products, while the inhibiting factors are th micro, small and medium enterpri d to b individualistic in developing eir bu esses. The strategy option e: (1) i Joint Business Group (KUBI s a foru or lea g and ex ging informa n betwe business actors,) utilizing innova s that support the lop of biological source products acc ding the products' characteristics and ess ca capability; (3) expanding oope n networks with raw material sup- ers, microfinance institutions, and mass media; (4) strengthen communication and coordination with local governments and stakeholders. The challenges of developing a blue economy must be studied for each industrial sector (Table 3). This is because each industry faces diverse and unique conditions. There are challenges facing each blue economy industrial sector operating in Central Java, which still needs to develop. Much of the waste produced when processing seaweed can be recycled for other uses. For example, liquid waste can be used as liquid fertilizer, while solid waste can be used as the raw material for making ceramics, particle boards, fertilizers, and even lightweight bricks. Another challenge concerns the limited management capacity of several weed factories, which are owned by the ocal governments, but run at o 30% to 40 of their productive ca ity. Th lo apacity most likely due o a k of acce to seaweed, c lack o t access.

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velop nt ba d on the blue economy will be sful if the central and regional govern- ments are mutually committed, take sides, and are brave and firm in providing real action as a form of comprehensive development support, so the direction of policy programs must be innovative and creative. The involvement and active role of the community is the key to optimal implementation of the activities and the application of the appropriate renewable tech- nology. Technological developments must be responded to quickly, because technology can change people's thinking, especially fish farmers. Technology can influence their activities from seeding, cultivation, and harvest to post-harvest, by making increasingly diverse processed products. Digital technology can help sustain concept-based fisheries businesses and the blue economy, where the basic foundation is maintaining the local wisdom of the area, and processing all the fishery resources owned, so they can be utilized for the community's welfare without destroying the existing ecosystem. Ecosystems can be maintained by keeping waste or rubbish to a minimum, so it does not pollute the environment. It can be reprocessed into

animal feed, flour or a biogas energy source for sustainable business production. There must also be support for social equality, related to employment opportunities, using comprehensive community empowerment, meaning there is a role for all the stakeholders, such as academics, the government, and community leaders, to provide ongoing training and assistance to create product innovation and its derivatives, so that fisheries businesses are independent. This has been put in place and is still running.

The role of technology is to be able to work side by side to answer challenges in the blue economy. Resource optimization must go hand in hand with environmental sustainability. Digital transformation can be a bridge for business owners (stakeholders) with the market, as consumers (customers) will inte[illegible] efficiently with each other in m[illegible] the pr[illegible] chain's supply and [illegible] m[illegible]ket's [illegible] Innovation in [illegible]igital [illegible]ransf[illegible]mation must continue [illegible] be carried o[illegible] and [illegible]pport[illegible] by h[illegible]n resource[illegible] kills, to [illegible]crease compete-[illegible]veness and open [illegible]arket ac[illegible]s as widely as [illegible]. Therefore, [illegible]s necessary to carry out co[illegible]nuous training so that the economic effi[illegible]c[illegible] of sustainable fisheries can be [illegible]chieved. Adopting digital technology in aquaculture applications can make the villages better prepared for competition. The potential contribution of the blue economy's support for this sector of the Indonesian economy is huge. The most significant contribution can be seen from the fisheries sector and aquaculture. However, of all the industrial sectors in the blue economy, Indonesia still needs to optimally develop the renewable energy, bioeconomy, and biotechnology sectors. The sea-based industry sector has several challenges, including:(1) micro, small and medium enterprises dominate the industry; (2) the capacity of sea-based food processing units is generally still low; (3) the human resources suffer from a lack of skills and technical knowledge regarding production standards, as well as low-quality assurance of the products and raw materials; (4) the risk of an unsustainable supply of raw materials; (5) dynamic changes in consumer preferences.

In facing these challenges, Indonesia has made several efforts, including implementing marine zoning to control overfishing, enacting regulations in the maritime secto[illegible] [illegible]rying out strict enforcement. [illegible]nd [illegible]mpleme[illegible]ng muscular coordinatio[illegible]etween the [illegible]akehol[illegible]s with duties a[illegible] fun[illegible]ns in [illegible]e m[illegible]time [illegible]d fisheries [illegible]rs. It is [illegible]a that futur[illegible]rch will examine [illegible] detail, [illegible] impact [illegible] each blue eco[illegible]y indu[illegible]ial secto[illegible] the economy quantitatively, [illegible] describing regional and [illegible]ational [illegible]onditions, so that future studies can [illegible]vide [illegible] accurate picture of the impact of the blue economy, producing a "new" sector that is sustainable for Indonesia.

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