

## Maritime Food Development Strategy as National Economic Pillar using SWOT Analysis Interpretative Structural Modelling (ISM)

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**Abstract:** The rapid growth of population result in demand for food exceeds its supply capacity. The gap between the needs and availability of food is inseparable from the existing policies. The ability of a nation in fulfilling the needs of food affects the state sovereignty. The aim of research is to formulate strategies in promoting food sovereignty in maritime sector. Maritime potential can be viewed from to what extend a nation realizes and exploits the sea. This research used McKinsey 7S method, PEST analysis (Political, Economic, Socio-cultural, Technology), SWOT analysis and Interpretative Structural Modeling (ISM). This research is expected to encourage the government in national maritime food development. Based on the results of SWOT matrix analysis, the SO strategy consists of five strategies. The ST strategy consists of five strategies. The WO strategy consists of five steps while the WT strategy consists of two steps. In the hierarchical structure model, it can be seen that WT-2 Strategy is at the first level. WO-5 strategy is at the level of strategy 2. Level of strategy 3 consists of six sub-strategies. Level of strategy 4 has three sub-strategies. Level of strategy 5 consists of six sub-strategies.

**Key words:** Maritime food, economic pillar (SWOT) analysis, Interpretative Structural Modeling (ISM), strategy, sub-strategies, development

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### INTRODUCTION

Indonesia is an archipelagic state with 60% of the population's activities are conducted in the ocean (McKinsey, 2012; Purwanto, 2016). Therefore, most of them are living from sea products. For this reason, an organized, integrated and sustainable ocean management is needed to support the realization of maritime food sovereignty (Folami, 2017).

The rapid growth of population result in demand for food exceeds its supply capacity (Asoka *et al.*, 2013). Marine wealth as the food source has not been managed seriously and massively. Maritime management and development are still concentrated on fisheries resources while the sea potential is not limited to fish only.

In addition, fisheries resource exploitation did not use an optimal fish management and processing technology. As a result, the current sea food productivity is still low. In addition, access to technology and capital is very limited because in general, the maritime food industry actors are the traditional fishermen.

The gap between the needs and availability of food is inseparable from the existing policies. The ability of a

nation in fulfilling the needs of food affects the state sovereignty. Management and development of seafood sources can help the government to reduce food dependence or import.

The aim of research is to formulate strategies in promoting food sovereignty in maritime sector. Maritime potential can be viewed from to what extend a nation realizes and exploits the sea. This research used McKinsey 7S method, PEST analysis (Political, Economic, Socio-cultural, Technology), SWOT analysis and Interpretative Structural Modeling (ISM).

McKinsey 7S method was used to analyze the internal factors. PEST method was used to analyze the external factors. SWOT analysis was used to formulate maritime food development strategies. ISM was used to provide priority and map out the formulated strategies.

This research is expected to encourage the government in national maritime food development. Moreover, this research is expected to provide an overview of formulation of national food development strategies. This research is limited by the exploitation of Indonesian maritime regions.

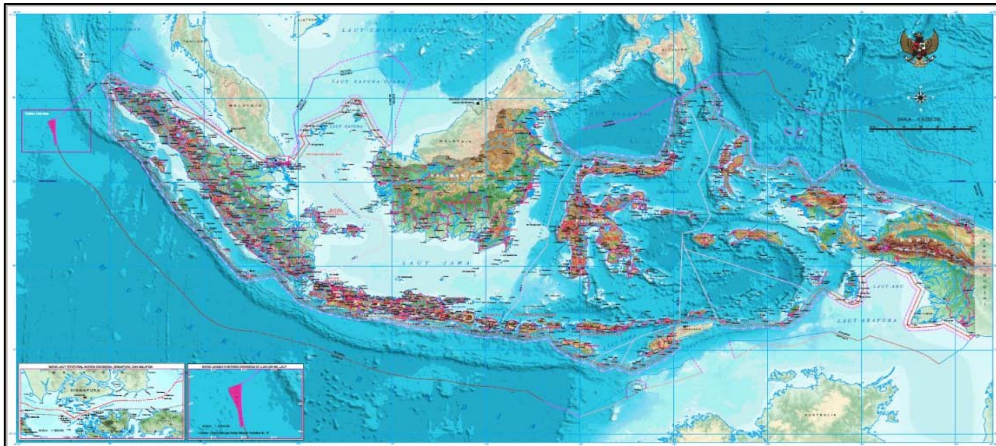


Fig. 1: Map of Indonesia (Yogi *et al.*, 2017)

## MATERIALS AND METHODS

**Sea territorial of Indonesia:** Maritime nation is the actualization of the archipelagic concept to provide movement on mindset, attitude and action of Indonesian nation in a unitary fashion (Reeve, 2001). The development of Indonesian maritime conceptions is in line with efforts to increase nation's ability to be a modern and independent nation in the scope of marine and aerospace technology for the welfare of Indonesian people.

As an archipelagic state comprising 80% of sea and 20% land area and therefore, the potential threat to Indonesia's sovereignty and territory lays on sea territory. The percentage of this threat is even higher because geographically Indonesia is located on world trade route (Putri, 2016).

Indonesian sea is very meaningful for the Unitary State of the Republic of Indonesia (NKRI) in which the sea means as a unifier of the nation as a medium for transportation as a medium for resources as a medium for defense and security and as a medium for diplomacy (Putra *et al.*, 2017) (Fig. 1).

**Maritime food and economic pillar:** The sea has the potential of abundant sources of food, various types of fishes, seaweed, alga and others. This is a potential food sources to support food security improvement program (Hehre and Meeuwig, 2016). There are four main pillars supporting food sovereignty (Jones *et al.*, 2015), namely pillar of natural resources, both on land and at sea, pillar of human resources, pillar of infrastructure, pillar of government policy.

The perspective of food security from the maritime sector is an identification of how much the potential

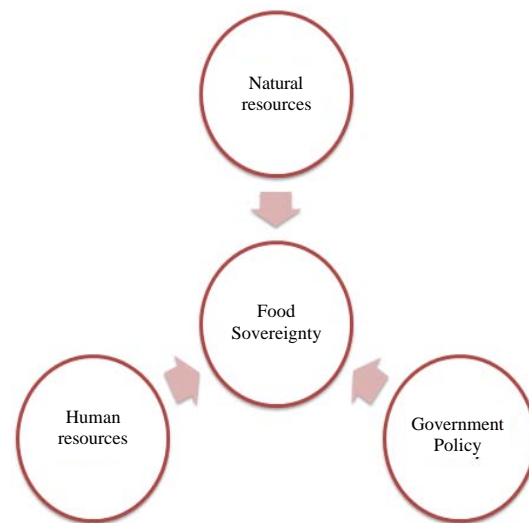


Fig. 2: The pillar of food sovereignty

marine resources are how the human resources are able to manage them how the infrastructure supports and government policies (partiality) in supporting the management of the maritime sector (Garnett, 2014). So, the pillars of the marine food sovereignty are fishermen, aquatic resources and supports of government policies (Edelman *et al.*, 2014) (Fig. 2).

**Strategy management:** Strategy management which originally grew and developed in the world of business and profit organizations has been applied to various forms of organizations including government organizations (Wheelen and Hunger, 2012). The expanding coverage of the strategy management is not only an intervention for

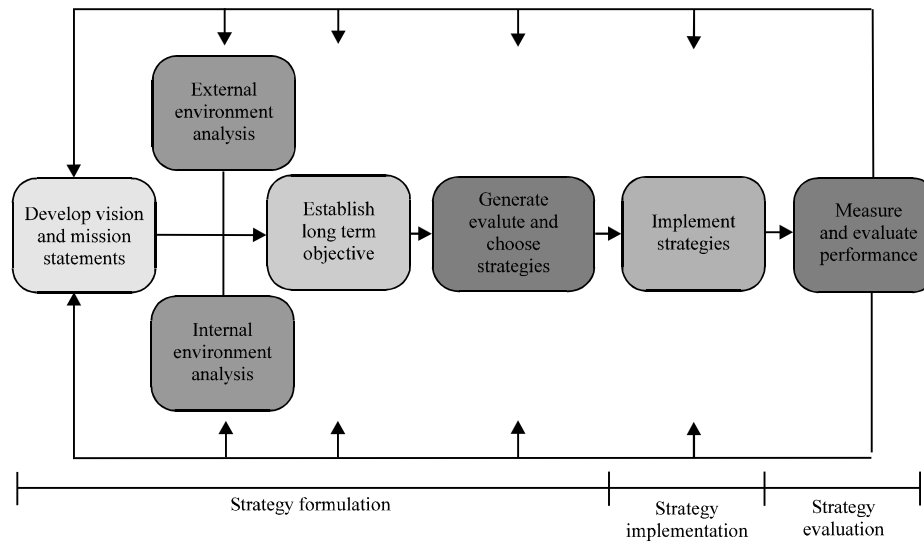


Fig. 3: Strategy management process (David, 2011)

change but it has become a fundamental need for the governance implementation in Indonesia. The strategy management theory can be measured through several indicators that is preparation of mission, goals and strategies, motivations, structures, system of functions, groups, culture and policies implemented in order to achieve the goals set (Bryson *et al.*, 2009). Other indicator is organizational performance which is a part of the process of evaluation and control of strategy management.

Strategy management consists of three processes (David, 2011). Strategy development including developing long-term mission and goals, identifying opportunities and threats from outside as well as organizational strengths and weaknesses, developing alternative strategies and determining the suitable strategies to be adopted.

Strategy implementation including determining annual operational goals, organizational policies, motivating members and allocating resources in order to implement the established strategies.

Strategy evaluation/control, covering efforts to monitor all results from strategy development and implementation including measuring the individual and organizational performances and taking corrective steps if needed (Fig. 3).

**McKinsey 7S:** A management model that outlines 7 factors for organizing a company in an effective and holistic manner. All of these factors determine how a corporation operates (Pothiyadath and Wesley, 2014). The corporate leaders must consider these seven factors of this model to ensure the successful implementation of

organization strategy. The role of each factor is not a matter whether it is small or great, since, all of these factors are interdependent and depending on each other. The significant level of each factor will vary as the organization developing.

There are seven variables affecting the success of an organization summarized in 7S McKinsey, namely strategy and structure (hardware of organization) and style, system, staff (employees), skills (abilities) and shared values (organizational culture) which is software of an organization (Alshaher, 2013). The analysis instrument is called as the 7S Model (Baroto *et al.*, 2014).

**Strategy:** A plan formulated by the organization to obtain sustainable competitive advantage.

**Structure:** The organizational structure is defined as a formal framework that aims to divide, coordinate and classify works.

**System:** System is the formal and informal procedures including an innovation system, compensation system, management information system and capital allocation system in order to manage the daily activities.

**Staff:** Reliable and skilled human resources are valuable assets for the organization to survive, grow and develop.

**Skill:** Skill is defined as the ability of an organization as a whole. It is an ability to manage the organization by employees all together, instead of individual ability.

**Style:** Style or the way how leadership is applied in an organization. From this definition, it shows that leadership

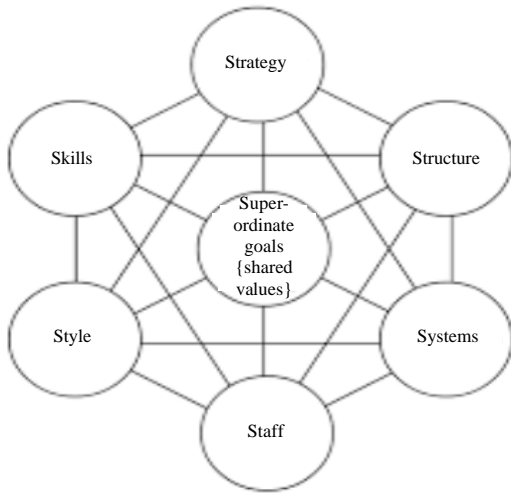


Fig. 4: McKinsey 7S framework (Gokdeniz *et al.*, 2017)

involves the exercise of authority and therefore, all relationships affecting each other is a matter of leadership.

**Shared values:** Shared values is one of the determining factors that become a reference for employee behaviour. Discussion of shared values in the organization is closely related to discussion of organization culture (Fig. 4).

There is some literature related it such as McKinsey 7S Model to integrate key criteria on multi-organizational determinants and combines a set of key determinants (Rahmat and Ibrahim, 2018). McKinsey 7S Model as a framework for the formulation of business intelligence and big data analysis (Jayakrishnan *et al.*, 2018). McKinsey framework as integrated model resource-based in industrial organizations (Baroto *et al.*, 2014). McKinsey framework as a determining factor in the implementation of supermarket strategies (Awino *et al.*, 2017). McKinsey framework uses to implement e-Learning system project (Alshaher, 2013). Development of the McKinsey Model as an assessment of Enterprise Resources Planning (ERP) readiness factors (Shiri *et al.*, 2014) (Table 1).

**PEST analysis:** PEST analysis describes the framework of macro factors used in the component scanning environment of strategy management. This analysis is a part of external analysis when conducting a strategy analysis or providing different illustration of macro factors that must be taken into consideration (Gupta, 2013). PEST analysis is an analysis of external business environmental factors covering the political, economic, social and technological fields. PEST is used to assess the market of a business or organizational unit. PEST analysis leads to framework for assessing a situation and assessing a

Table 1: McKinsey framework for maritime food sovereignty

McKinsey criteria	Analysis factors
Strategy	Strategic planning Vision and mission
Structure	Organization
System	Technology Platform support
Staff	Workforce management Project team
Skill	Management skill
Style	Leadership Communication
Shared values	Productivity, trust

strategy or position, direction of the company, marketing plan or idea (Mahara, 2013). PEST factors play important roles in creating the profit value of a strategy that is usually beyond the control of an organization and normally considers threats and profits. The basics of PEST analysis include these four factors (FME, 2013; Antoo *et al.*, 2015).

**Politics:** Political factors are basically how the government intervenes in the economic sector. In particular, political factors include: tax policy, labour law, environmental law, trade restrictions, rates and political stability.

**Economy:** Factors included in this aspect are: economic growth, interest rate, exchange rate, inflation rate. These factors greatly affect how a business operates and makes decisions.

**Social:** Social factors include the aspects of culture and health awareness, population growth rate, age distribution, career and emphasis on safety.

**Technology:** Technological factors include aspects of technology such as research and development, automation, technology incentives and technological change. Changes in technology will affect costs, quality, while intrigue and lead to innovation.

Several previous research used PEST in their studies. PEST was used as an integration model of seven stroke strategy (Kumar, 2015). PEST was used as an analysis of external factors on green jobs (Stoyanova and Harizanova, 2017). PEST was used to present fuzzy decision maps (Vazquez *et al.*, 2018). PEST was used to identify criteria for information system research questions (Peng and Nunes, 2007). PEST was used to analyze external factors of halal logistics in Malaysia (AbTalib *et al.*, 2014) (Table 2).

**SWOT analysis:** SWOT Analysis is an analysis consisting of micro environment analysis to find out the strengths and weaknesses of a company and macro environment analysis to find out opportunities and

Table 2: PEST analysis factor for maritime food sovereignty

PEST criteria	Factor analysis
Political	Government policy Policy
Economic	Economic growth Natural resources
Social	Human resources Culture
Technological	Technology development Technology transfer

threats for the company. This analysis is based on logic that could optimize strengths and opportunities but it could minimize weaknesses and threats at the same time (Collins-Kreiner and Wall, 2007). The strategic decision making process is always related to the development of missions, goals, strategies and policies of an industry/company. A research shows that industry or company performance can be determined by combination of internal and external factors. Both of these factors must be considered in the SWOT analysis. Internal factors include strengths and weaknesses while the external factors include opportunities and threats (Hill and Westbrook, 1997).

SWOT matrix is a decision-making formulation instrument to determine the strategies adopted based on logic to optimize strengths and opportunities of the company and simultaneously minimize the weaknesses and threats. Below are steps in preparing SWOT matrix (Yuksel and Dagdeviren, 2007). Compiling a list of external opportunities and threats of a company as well as the internal strengths and weaknesses. Developing SO (Strength-Opportunity) strategy by matching the internal strength with the external opportunities.

Developing WO (Weakness-Opportunity) strategy by matching the internal weaknesses with the external opportunities. Developing ST (Strength-Threat) strategy by matching the internal strength with the external threats. Developing WT (Weakness-Threat) strategy by matching the internal weaknesses with the external threats.

By Zivkovic *et al.* (2015) uses a SWOT analysis to applying the priority model of engineering faculty development strategy. Lumaksono (2014) uses a SWOT analysis to formulate the development strategy of traditional shipyard industry (Lumaksono, 2014). Yogi *et al.* (2017) uses a SWOT analysis to provide an appropriate strategic analysis to plan the relocation of the naval base. Oreski (2012) uses a SWOT analysis to identify internal and external factors prioritized by experts within the scope of tourism (Oreski, 2012).

**Interpretative Structural Modeling (ISM):** The Interpretative Structural Modeling (ISM) used for ideal planning is an effective method because all elements can be processed in a simple matrix (Wang, 2015). ISM was

Table 3: Rule of development SSIM (Firoz and Rajesh, 2012)

Symbols	Relationship between row (i) and column (j) elements
V	Barrier i will lead to barrier j, not in reserve direction
A	Barrier j will lead to barrier i, not in reserve direction
X	Barrier i and j will lead to each other, in both direction
O	Barrier i and j are unrelated

first proposed by Warfield in 1973. The interpretative structural modeling is a methodology that aims to identify the relationship between a particular item which defines a related problem or issue (Attri *et al.*, 2013) and a suitable modeling technique for analyzing the influence of one variable on another variable (Agarwal *et al.*, 2007).

ISM has been well proven to identify structural relationships among system-specific variables. The basic idea is to use practical experience and expert knowledge to parse complex systems into multiple sub-systems and build structured structural models (Firoz and Rajesh, 2012). The ISM-based approach is one of the versatile and powerful techniques that have been used to solve complex multi-factor problems. ISM is interpretative, since, the group assessment selected for the study determines whether and how the related variables (Soti *et al.*, 2010). There are procedures or stages in the use of the ISM method such stages as:

**Identify parameters:** Development of Structural Self Interaction Matrix (SSIM) (Table 3). The development of an interpretive structural model begins with preparation of a structural self-interaction matrix indicating the direction of the contextual relationship between elements.

**Reachability matrix:** From the Self-Interaction Matrix (SSIM), the relational indicator is converted to binary numbers 0 and 1 to obtain a square matrix, called the reachability matrix (Hussain, 2011) (Table 4).

**Partition level:** The construction of Interpretative Structural Modeling (ISM).

**MICMAC analysis:** MICMAC is used to check driving power and dependence power. Variables have been grouped into four criteria known as Autonomous, Linkage, Dependent and Driving/independent. The following is the meaning of the four categories (Panackal and Singh, 2015) variable autonomous linkage variables dependent variables independent variables.

The literatures of research about ISM. Jadhav *et al.* (2015) uses ISM for analyzing interactions between barriers to Just-in-Time (JIT) production operations. Paramitha and Nurcahyo (2018) uses ISM to analysis of core industry competencies in Pekalongan city. Roy and Misra (2016) use ISM to identify the drivers of travel

Table 4: Sample on reachability matrix (Hussain, 2011)

Enablers/(j)	Values							
	1	2	3	4	5	6	7	8
1	1	1	1	0	0	0	0	0
2	0	1	1	0	0	0	0	0
3	1	1	1	1	1	1	1	0
4	1	1	1	1	1	1	1	0
5	1	1	1	1	1	1	1	0
6	1	1	1	1	1	1	1	0
7	1	1	1	1	1	1	1	0
8	1	1	1	1	1	1	1	1

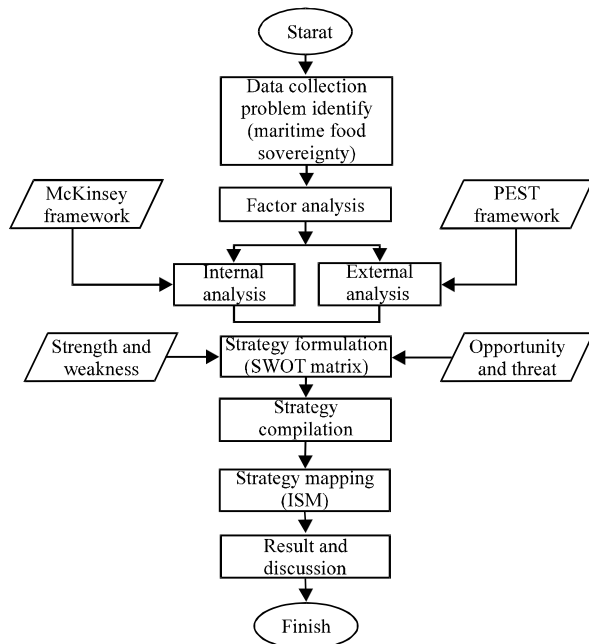


Fig. 5: Conceptual framework of maritime food sovereignty

tourism growth and build relationships between enablers. Panackal and Singh (2015) use ISM to study various aspects and correlations between youth and sustainable rural development. Firoz and Rajesh (2012) uses ISM to identify and rank the various criteria used for supplier evaluation (Fig. 5).

**RESULTS AND DISCUSSION**

The research stage was started with data collection by interviewing six personnel of Expert (E1-E6) in the maritime and food sector. After all data were collected, then the data were divided into 2, namely external and internal analysis to determine the strengths and weaknesses in internal conditions regarding maritime food while to determine the opportunities and threats, SWOT analysis was used.

SWOT also functions to determine the current condition of maritime food development. After the

analysis was performed, it followed by developing 4 types of strategy, namely: Strength-Opportunities (SO) Strategy, Weaknesses-Opportunities (WO) Strategy, Strength-Threats (ST) Strategy and Weaknesses-Threats (WT) strategy. The next step was compiling the four strategies to establish a strategy map with Interpretative Structural Modelling (ISM) method.

**SWOT analysis:**

**External factor analysis:** External environment is the external factors which can affect the choice of direction and action as well as affect the organizational structure and its internal process. External environment analysis indicates opportunities and threats in the development of maritime food. External analysis aims to obtain knowledge about new opportunities that can affect the development of maritime food strategy. It is not only limited to opportunities in implementing the strategy but also in the form of opportunities (Table 5).

The objective of this analysis is to provide a comprehensive information on external conditions to be used as inputs in form of maritime food development strategy planning process. PEST analysis model (Political, Economic, Social and Technology) was used to analyse the external factors. In the PEST analysis, there are eight factor analyses that affect the external conditions. These factors are illustrated below. Based on the external factor analysis there are eight factors in form of opportunities and six factors the form of threats (Fig. 6).

**Internal factor analysis:** Analysis of internal environment aims to identify a number of strengths and weaknesses contained in the internal resources and business processes. Internal resources and business processes are said to have strengths when they have the capabilities to create distinctive competencies, so that, an organization will gain excellence.

In maritime food development strategy, internal factor analysis is used to identify the strengths and weaknesses in establishing the maritime food security. Internal factor

Table 5: Result of external factor analysis

Analysis factors	Opportunity	Threat
Government policy	Global Maritime Axis (GMA) policies	
Policy	Good political stability	
Economic growth	Stable economic growth	Increased income from maritime sector
Natural resources	Abundant maritime potential	The threat of food security
		Threat of marine resources theft
Human resources	Abundant workforce	Threat of unemployment
Culture	History as a great maritime nation	Paradigm shifting from maritime to land
		Low awareness of maritime culture
Technology development		Minimum facilities and infrastructure toward industrial revolution 4.0
		Limited marine technology utilization toward industrial revolution 4.0
Technology transfer countries		Development of technology transfer in maritime sector with the developed

Table 6: Result of internal factor analysis

Analysis factor	Strength	Weakness
Strategic planning		The maritime strategy is still partial
Vision and mission	Making the sea as a new food source	
Organization		There is no special agency for maritime food issues
Technology	Having maritime service industry spread in several places	Minimum maritime technology
Platform support	The destiny as a maritime nation	
Workforce management	Good management of aquaculture	Low capacity of human resource in maritime sector
		Traditional maritime food management
Project team		Teamwork is still partial among the maritime stakeholders
		Minimal certification for ship crew
Management skill		
Leadership	There is a leadership at the level of coordinating minister	
Communication	Having the same communication language	Fellow stakeholder communication is still sectoral
Productivity, trust	Abundant maritime productivity	Low welfare of fishermen
	Good trust in the government	Low educational level of coastal communities
	Extensive export market	Poor quality of export product

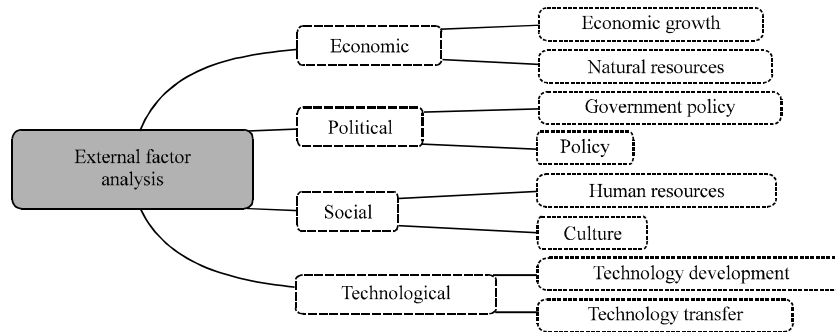


Fig. 6: Criteria of external analysis factor

analysis in this research was 7S McKinsey analysis model including (strategy, structure, system, staff, skill, style, share values) (Table 6).

There are eleven factors of analysis affecting the internal condition in McKinsey 7S Model. These factors are illustrated in the table below. Based on the internal factor analysis, there are nine factors of strength and eleven factors of weakness (Fig. 7).

**SWOT matrix:** The existing internal and external factors then combined to determine the alternative maritime food development strategies. The following strategies are formulated and generated from the SWOT matrix.

Based on the results of SWOT matrix analysis, the SO strategy consists of five strategies. The ST strategy consists of five strategies. The WO strategy consists of five steps while the WT strategy consists of two steps. The next step is to compile all these strategies into one, so that, there are seventeen steps in the maritime food development strategy (Table 6-10).

**Interpretative Structural Modelling (ISM):** This step is to determine the strategy map and strategy priority to be used. Based on the compilation of SWOT analysis there are 17 maritime food development strategies. In order to obtain the relationship between sub-strategies affecting the maritime food development

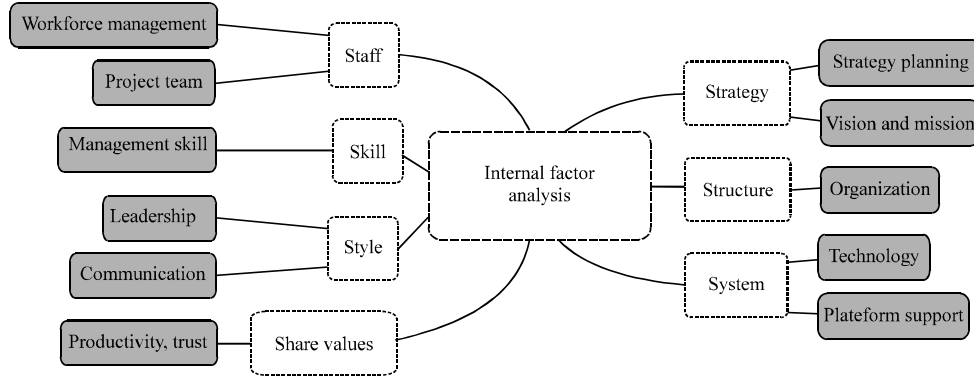


Fig. 7: Criteria of internal factor analysis

Table 7: SWOT matrix analysis (SO-ST)

Strengths	Opportunities
Making the sea as a new food source field	Global Maritime Axis (GMA) Policies
Having maritime service industry spread in several places	Good political stability
The destiny as a maritime nation	Stable economic growth
Good management of aquaculture	Increased income from the maritime sector
There is a leadership at the level of coordinating minister	Abundant maritime potential
Abundant maritime productivity	Abundant workforce
Good trust in the government	History as a great maritime nation
Extensive export market	Development of technology transfer in the maritime sector with the developed countries
<b>Strength</b>	<b>Threat</b>
Making the sea as a new food source field	Threat of food security
Having maritime service industry spread in several places	Threat of marine resources theft
The destiny as a maritime nation	Threat of unemployment
Good management of aquaculture	Paradigm shifting from maritime to land
There is a leadership at the level of coordinating minister	Low awareness of maritime culture
Abundant maritime productivity	Minimum facilities and infrastructure
Good trust in the government	Limited marine technology utilization
Extensive export market	

Table 8: SWOT matrix analysis (WO-WT)

Weakness	Opportunities
The maritime strategy is still partial	Global Maritime Axis (GMA) policies
There is no special agency for maritime food issues	Good political stability
Minimum maritime technology	Stable economic growth
Low capacity of human resource in maritime sector	Increased income from the maritime sector
Traditional maritime food management which	Abundant maritime potential
Teamwork is still partial among the maritime stakeholders	Abundant workforce
Minimal certification for ship crew	History as a great maritime nation
Fellow stakeholder communication is still sectoral	Development of technology transfer in the maritime sector with the developed countries
Low welfare of fishermen	
Low educational level of coastal communities	
Poor quality of export product	
<b>Weakness</b>	<b>Threat</b>
The maritime strategy is still partial	Threat of food security
There is no special agency for maritime food issues	Threat of marine resources theft
Minimum maritime technology	Threat of unemployment
Low capacity of human resource in maritime sector	Paradigm shifting from maritime to land
Traditional maritime food management which	Low awareness of maritime culture
Teamwork is still partial among the maritime stakeholders	Minimum facilities and infrastructure
Minimal certification for ship crew	Limited marine technology utilization
Fellow stakeholder communication is still sectoral	
Low welfare of fishermen	
Low educational level of coastal communities	
Poor quality of export product	

strategy, a structural model is required by using the ISM method. In the maritime food development strategy, the steps of ISM method are as follows:

**Structural Self Interaction Matrix (SSIM):** SSIM is a step to determine the dominant variables from the SWOT analysis results to identify the level of interrelationships



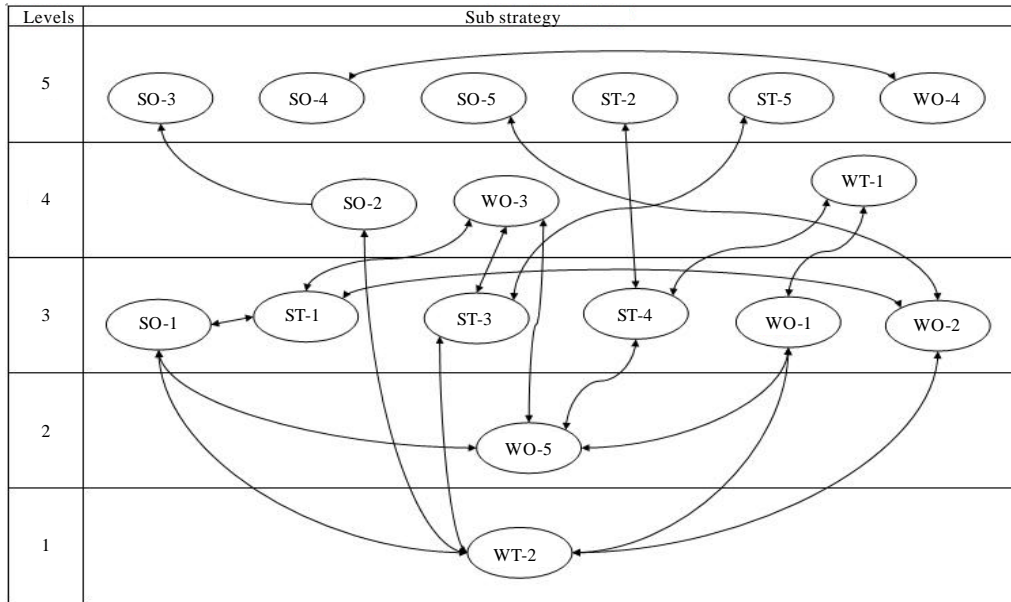


Fig. 8: Structural modeling for maritime food sovereignty strategy

Table 9: Strategy formulation of maritime food sovereignty

X/S	W
S-O strategy	W-O strategy
O/Extensification and intensification of maritime food businesses	Building synergy among stakeholders in maritime sector
Strengthening the management of fisheries	Cooperation and development of marine technology with developed countries
Strengthening the fisheries products	Increasing the number of education and marine academic institutions, especially in coastal areas
Increasing the capital (financial) access to coastal communities	Improving the welfare of fishermen
Strengthening the sea connectivity and maritime industry	Establishing maritime food management agencies
<b>T/S-T strategy</b>	<b>W-T strategy</b>
Increasing and strengthening the role of marine science, research and information systems	Establishing special unit to eradicate illegal fishing
Conducting management of the small outermost islands	Developing human resource competency standards in marine sector
Strengthening and revitalizing the maritime culture	
Conducting moratorium with foreign fishermen.	
Building maritime domain awareness	

Table 10: Strategy compilation from matrix SWOT analysis

Code	Strategy compilation
SO-1	Extensification and intensification of maritime food businesses
SO-2	Strengthening the management of fisheries
SO-3	Strengthening the fisheries products
SO-4	Increasing the capital (financial) access to coastal communities
SO-5	Strengthening the marine connectivity and maritime industry
ST-1	Increasing and strengthening the role of marine science, research and information systems
ST-2	Conducting management of the small outermost islands
ST-3	Strengthening and revitalizing the maritime culture
ST-4	Conducting moratorium with foreign fishermen
ST-5	Building maritime domain awareness
WO-1	Building synergy among stakeholders in the maritime field
WO-2	Cooperation and development of marine technology with developed countries
WO-3	Increasing the number of education and marine academic institutions, especially, in coastal areas
WO-4	Improving the welfare of fishermen
WO-5	Establishing a maritime food management agency
WT-1	Establishing special unit to eradicate illegal fishing
WT-2	Development of human resource competency standards in marine sector

between sub-strategies in maritime food development. SSIM management results the first step in developing ISM method. The data was taken from the questionnaires results of six selected experts (Table 11).

**Reachability Matrix (RM):** Furthermore, based on the xx table of SSIM matrix, a Reachability Matrix (RM) was created by replacing V, A, X, O into numbers 1 and 0. Therefore, the results obtained are presented (Table 12).

**ISM Model framework for maritime food development strategy:** From the results of SSIM and RM data processing, a sub-strategy framework was then formed which affects the maritime food development strategy. The ISM framework can be seen in Fig. 8.

In the hierarchical structure, it can be seen that the WT-2 strategy is at the first level. Human resource

**Table 11: SSIM data processing**

Values																	
Codes	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SO-1	X	V	X	A	O	V	A	O	V	O	V	X	V	A	V	A	-
SO-2	X	V	V	A	O	V	V	O	V	O	V	V	V	A	X	-	
SO-3	V	O	V	A	O	V	V	O	O	O	O	V	O	A	-		
SO-4	A	O	V	X	O	A	O	O	A	O	O	A	A	-			
SO-5	O	O	A	A	A	X	A	A	A	O	X	X	-				
ST-1	V	A	A	A	X	X	O	A	A	A	X	-					
ST-2	V	A	A	O	O	O	V	A	X	O	-						
ST-3	X	O	A	O	X	O	V	X	O	-							
ST-4	V	X	X	A	O	O	O	O	O	-							
ST-5	A	O	A	O	V	O	O	-									
WO-1	X	X	X	A	O	O	-										
WO-2	X	A	A	O	A	-											
WO-3	A	O	X	A	-												
WO-4	V	O	V	-													
WO-5	O	A	-														
WT-1	O	-															
WT-2	-																

**Table 12: Result of Reachability Matrix (RM)**

Values																		
Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	DP
SO-1	1	0	1	0	1	1	1	0	1	0	0	1	0	0	1	1	1	10
SO-2	1	1	1	0	1	1	1	0	1	0	1	1	0	0	1	1	1	12
SO-3	0	1	1	0	0	1	0	0	0	0	1	1	0	0	1	0	1	7
SO-4	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	6	
SO-5	0	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	5	
ST-1	1	0	0	1	0	1	1	0	0	0	0	1	1	0	0	0	1	7
ST-2	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	4
ST-3	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	1	5
ST-4	0	0	0	1	1	1	1	0	1	0	0	0	0	0	1	1	1	8
ST-5	0	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	0	6
WO-1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	6
WO-2	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	1	5
WO-3	0	0	0	0	1	1	0	1	0	0	0	1	1	0	1	0	0	6
WO-4	1	1	1	1	1	1	0	0	1	0	1	0	1	1	1	0	1	12
WO-5	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	0	11
WT-1	0	0	0	0	0	1	1	0	1	0	1	1	0	0	1	1	0	7
WT-2	1	1	0	1	0	0	0	1	0	1	1	1	1	0	0	0	1	9
DEP	8	5	5	7	10	13	9	5	7	4	8	10	7	2	10	5	11	

competency standards development is the main strategy in the maritime food development. WO-5 strategy is at the level 2. Establishment of maritime food development and management agency is a priority.

At the level of strategy III, there are six sub-strategies, namely extensification and intensification in maritime food development (SO-1) improvement and strengthening of maritime science, research and information systems (ST-1), strengthening and revitalizing the maritime culture (ST-3) moratorium with foreign fishermen (ST-4) building synergy with fellow stakeholders in the maritime sector (WO-1) cooperation and development of marine technology with developed countries (WO-2).

Level of strategy IV has three sub-strategies including Strengthening the management of fisheries

(SO-2) establishing maritime and fisheries academy in coastal areas (WO-3) establishing special unit to eradicate illegal fishing (WT-1) (Table 11 and 12).

Level of strategy V consists of six sub-strategies, including a) strengthening fisheries food products (SO-3) increasing financial access to coastal communities (SO-4) strengthening marine connectivity and maritime industry (SO-5) managing the small outermost Islands (ST-2) Building maritime domain awareness (ST-5) improving the welfare of fishermen (WO-4).

**CONCLUSION**

The rapid population growth will require a high need for food. Currently, Indonesia has a very potential at the sea sector as a food source. Management and

development of maritime food can be used as a new strategy in fulfilling food needs. The maritime food development strategy formulation generates seventeen sub-strategy steps including, so, strategy consisting of five strategy steps. ST strategy consists of five strategy steps. WO strategy consists of five steps and WT strategy consists of two strategy steps.

In the hierarchical structure model, it can be seen that WT-2 strategy is at the first level. WO-5 strategy is at the level of strategy II. Level of strategy III consists of 6 sub-strategies, namely SO-1 Strategy, ST-1 Strategy, ST-3 strategy, ST-4 strategy, WO-1 strategy, WO-2 strategy. Level of strategy IV has three sub-strategies including SO-2 strategy, WO-3 strategy, WT-1 strategy. Level of strategy V consists of six sub-strategies including SO-3 strategy, SO-4 strategy, SO-5 strategy, ST-2 strategy, ST-5 strategy, WO-4 strategy.

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