Role of Shrimp Pond Management Institutions Supporting Shrimp Productivity in the Peureulak Coast, East Aceh

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ABSTRACT Shrimp pond management institutions are the primary key in increasing shrimp productivity and as a means and infrastructure for developing ponds and coordinating all activities. This study aimed to analyze the institutional management of shrimp pond areas to support shrimp productivity in the National Priority Program on the coast of Peureulak, East Aceh, Aceh. This study uses the Interpretative Structural Modeling (ISM) method. Surveys interviews carry out data collection methods, focus group discussions (FGD) and questionnaires. Five (5) elements are analyzed, namely program objectives, influencing community sectors, program needs, main constraints, and institutions involved in program implementation. The analysis results show that support for the cultivation environment and the community, adequate facilities and infrastructure, and business capital availability are key sub-elements of the program objectives. Meanwhile, the Central Government (Ministry of Marine Affairs and Fisheries), Provincial Marine and Fisheries Service, and Fish Farm Cultivator Group are the institutions that play the most role in increasing shrimp productivity. At the same time, the delivery of technology that cannot be implemented, construction and layout of traditional ponds and knowledge of skills and the low attitude of pond managers is the main obstacle in the achievement of program objectives. In contrast, the community sector which is influential in supporting program objectives is transportation, fisheries and settlements.

Keywords: Institutional; key ISM; productivity; shrimp farming

INTRODUCTION

National shrimp production potential has increased (Wahyudi *et al.*, 2019) during the period (2015-2019), an average of 8.9% per year. The total export volume of shrimp for the January-April 2020 period was 78.80 thousand tons (19%) of the total export volume of fishery commodities of 414.6 thousand tons and with a shrimp export value of USD 648.72 million (38.67%) of the total export value of USD 1.68 Billion (BPS, 2019).

The Ministry of Maritime Affairs and Fisheries (KKP) in 2024 targets a 250 percent increase in shrimp production. To achieve the KKP target, a plan for shrimp farming is carried out in priority areas in 5 regions, namely East Aceh (Aceh), South Lampung (Lampung), Cianjur (West Java), Sukamara (Central Kalimantan), and Buol (Sulawesi). The results of the development of innovations in the five existing areas are improvements in increasing the productivity of ponds for the welfare of the marine and fishery community in a sustainable manner.

East Aceh is a district in Aceh Province with the core development of brackish aquaculture fishery development of 6.040.60 km2 (10.53% of the total area of Aceh province), coastline length of ± 124 km2 and administrative area of 24 sub-districts, 513 kampongs, 59 mukims, 1.596 hamlets. Total population is 436.081 people (BPS, 2019).

With 18.697 ha of ponds, 13.509 tons of shrimp production, and 6.637 pond cultivators (BPS, 2021).

Brackish water aquaculture (tambak) plays an essential role in improving the economy (Wahyudi *et al.*, 2019) to meet the needs of an area so that it is necessary to carry out feasible management (Utami *et al.*, 2014) which is directed at the pattern of Management Shrimp Culture Health Management (SCHM) (Fauzi *et al.*, 2007), and the institutional management system which is the primary key in measuring, regulating and managing the sustainability of the distribution of assets, income, and costs efficiently which directly affects productivity and growth community economy (Muchtar *et al.*, 2020), then affects incentives to invest (Azansyah, 2013), so that management is a guarantor of the availability that will be processed into products, because failures often occur due to inappropriate management of the aquatic environment which results in a decrease in allocation (Pantjara *et al.*, 2016), therefore the decline in shrimp productivity, damage to the ecosystem, the entry of various diseases due to selfishness in shrimp farming (Juarno *et al.*, 2017).

Brackish water aquaculture (tambak) plays an essential role in improving the economy to meet the needs of an area so that it is necessary to carry out feasible management is directed at the Shrimp Culture Health Management (SCHM) pattern, and an institutional management system

which is the primary key in measuring, and managing the continuity of the distribution of assets, income, and costs efficiently which directly affects the productivity and economic growth of the community, and then affects the incentives to invest often occurs due to improper management of the aquatic environment which results in a decrease in the allocation. Therefore, the decline in shrimp productivity, damage to the ecosystem, and the entry of various diseases occur due to shrimp farming selfishness.

The importance of institutions in top area management (Azansyah, 2013; Sukarniati & Khoirudin, 2017) are 1). Institutions support the process of product engineering in shrimp pond management; 2). Encourage a sustainable aquaculture business cycle and become a driving force for the pillars of national economic growth, namely Pro-poor, Pro-jobs, Pro-growth and pro-environment. There are critical factors in the concept of fishery industrialization, namely increasing value-added, efficiency and competitiveness to create a favourable business climate to increase income and community welfare; 3). Realizing the independence and competitiveness of aquaculture for the community's welfare; 4). Institutions make behavioural norms rooted in society and widely accepted to serve common goals that contain specific values and produce structured interactions between humans Regulation and enforcement of rules/laws (Natsir & Rachmad, 2018). Institutional aspects are needed to develop aquaculture areas and coordinate all activities ranging from planning, organizing, implementing, and evaluating the suitability of shrimp pond land (Syaugy *et al*., 2012).

To achieve the objectives, it is necessary to formulate several problem formulations: 1). How is the institutional management of the shrimp pond area as a means of coordination that can support the productivity of Peureulak coastal pond activities, East Aceh, Aceh?; 2). What is the institutional support for the productivity of the sustainable shrimp farming area in Peureulak Coast, East Aceh, Aceh?.

METHODS

This research was carried out in the Peureulak coastal aquaculture National Priority Program Area, East Aceh, Aceh in December 2020, with the method of institutional analysis starting from setting goals resulting from interviews, FGDs, questionnaires, primary and secondary data to analyze the Institutional Management of the Shrimp Farm area against the shrimp farmers of the Peureulak Coastal National Priority Program, East Aceh District, Aceh to increase productivity (Yuliani, 2018).

The data analysis technique uses Interpretative Structural Modelling (ISM). To solve various problems interconnected with the elements used ISM (Rimantho & Rosdiana, 2017). ISM is one of the models developed for strategic policy planning. ISM is a process that transforms an ambiguous and complex system into a more definitive model for various uses such as priority structures (e.g., more important than or should be studied previously) and categories of ideas (e.g. belonging to the same category as). ISM also describes two parts: the preparation of a hierarchy and classification of sub-elements through identification of internal structures that provide high-value benefits to formulate effective ways of making decisions or linking criteria to one another so

that they influence and support each other to achieve goals (Rusydiana, 2018).
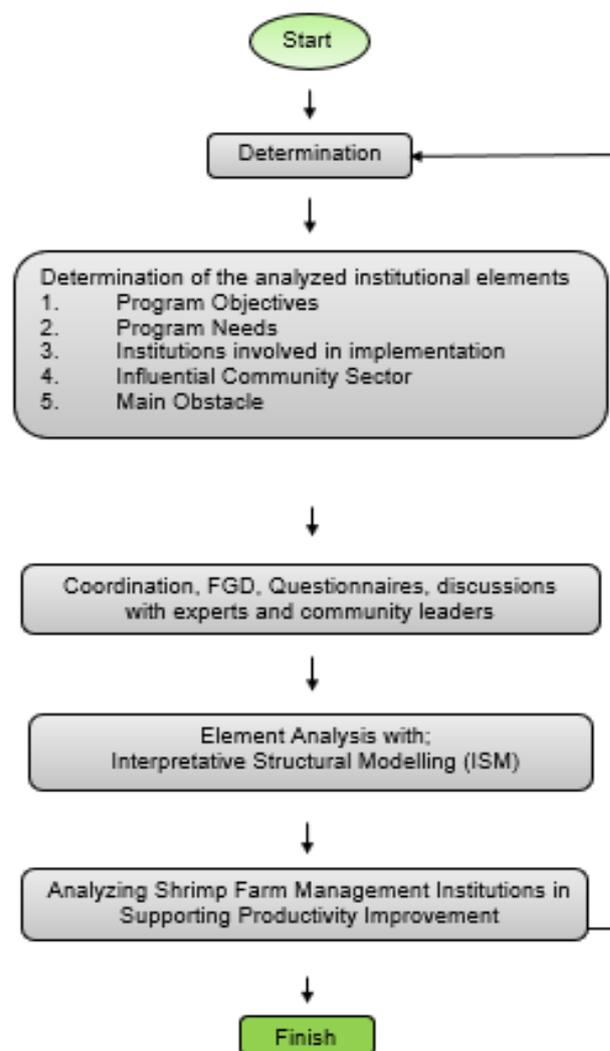

Figure 1. Shrimp pond management institutional scheme to support shrimp productivity on the coast of Peureulak, East Aceh.

The ISM program structure is divided into elements, and each element is broken down into several sub-elements. The basis for consideration in selecting the elements of the program to be achieved is the elements that have been consulted with experts. According to Kholil & Sutjahyo (2008), the program can be divided into nine elements, including 1). Affected sectors of society; 2). Needs of the program; 3). Main obstacle; 4). Possible changes; 5). The purpose of the program; 6). Benchmarks for judging each goal; 7). Activities required for action planning; 8). Activity measures to evaluate the results achieved by each activity; 9). Institutions involved in program implementation.

The National Priority Program for shrimp production on Peureulak, East Aceh, Aceh, consists of various areas, namely Rantau Selamat District 159.80 km², Sungai Raya District 189 km², Peureulak District 318.02 km² and Peureulak Timur District 182.70 km², with a total area of 849.52 km². The total area of the pond is 6120.3 km², and the productive pond area is 5072.14 km², with a total of 1999 shrimp farmers. Shrimp farmers in the Peureulak coastal area of East Aceh still adhere to the traditional

system and are only coordinated by fishery instructors under the Ministry of Maritime Affairs and Fisheries.

In the management of priority ponds for national ponds in the coastal area of Peureulak, East Aceh, Aceh, it cannot be separated from several institutions and stakeholders (Zainuddin, 2017) so that the productivity of shrimp farming can increase. Institutions involved in increasing the productivity of shrimp farming include central government institutions, local governments, business/industry, ports, non-governmental organizations (NGOs), research, universities, banking and other community groups (Efendy & Siang, 2015). Determination of stakeholders can be done with

the flow of activities identified through interviews with experts. In the analysis of stakeholders who play a role in decision making, they are often faced with various conditions, including unique and uncertain, dynamic, long-term and complex (Abidin *et al.*, 2012).

Community and government elements that influence the management of aquaculture areas each have a function and are closely related to one another (Pritasari & Kusumasari, 2019) (Table 1). describes the analysis of stakeholder needs in the management of shrimp pond areas to support shrimp productivity of the National Priority Program on the coast of Peureulak, East Aceh, Aceh.

Table 1. Analysis of the needs of stakeholders in the management of shrimp ponds to support shrimp productivity in the National Priority Program in Peureulak Coast, East Aceh, Aceh.

	Stakeholders		Needs
1	Central Government (Ministry of Marine Affairs and Fisheries)	1.	Increased and sustainable production according to target
		2.	Implementation of regulations/ laws that are easy to operate
		3.	The availability of adequate cultivation facilities
2	Department of Marine Affairs and Fisheries of Aceh Province	1.	Increased production
		2.	Good implementation of rules / regulations
		3.	Availability of accountable data and information
		4.	The availability of adequate shrimp farming facilities and infrastructure
3	Department of Marine Affairs and Fisheries, East Aceh Regency	1.	Application of Rules and Regulations in accordance with the program
		2.	Production sustainability
		3.	Environmentally sustainable
		4.	Increased local revenue
		5.	Carry out an easy administration of pond management
4	East Aceh District Food Security and Extension Agency	1.	Operational activities of extension personnel can be easily
		2.	Availability of human resources for cultivation that can anticipate problems in shrimp farming
5	Ministry of Forestry & Environment, East Aceh Regency	1.	The availability of a sustainable environment
		2.	Efforts to solve environmental degradation can run well
6	Ministry of Public Works and Public Housing	1.	Availability of supporting facilities and infrastructure
		2.	Good market demand
		3.	Opinions are increasing
		4.	Information that is easily accessible
7	Cooperatives Micro, Small, and Medium Enterprises	1.	Availability of jobs
		2.	Establishment of mutually beneficial cooperation
		3.	Market demand is increasing
		4.	Income increases
		5.	Security guaranteed
8	State Power Plant	1.	Shrimp production increases
		2.	Technology is easy to implement
		3.	Easily accessible information facilities

|	Stakeholders	Needs	
		4.	Income increases
		5.	Security guaranteed
9	Kelurahan or Desa	1.	Availability of jobs
		2.	Establishment of mutually beneficial cooperation
		3.	Availability of environmental sustainability
10	Panglima Laot	1.	Availability of jobs
		2.	Establishment of mutually beneficial cooperation
		3.	Availability of environmental sustainability
11	Fish Farm Cultivator Group	1.	Shrimp production increases
		2.	Availability of HR competencies
		3.	Technology is easy to implement
		4.	Easy waste management
		5.	Production facilities that are inexpensive and easy to obtain
		6.	Easily accessible information facilities
		7.	Income increases
		8.	Good market demand
		9.	Availability of affordable pond land
		10.	Guaranteed security
12	Industry	1.	Good cooperation between stakeholders
		2.	Availability of adequate land
		3.	Easy sewage treatment system
		4.	Guaranteed security
13	Research institutions		Development of easy shrimp farming applied technology
14	College	1.	Shrimp farming research that can be carried out properly
		2.	Easy college community service
		3.	Increasing the competence of human resources for shrimp farming in accordance with the program
15	Capital institutions (Bank and Non-Bank)	1.	Provision and distribution of business capital accordingly
		2.	Risk of failure to pay back capital
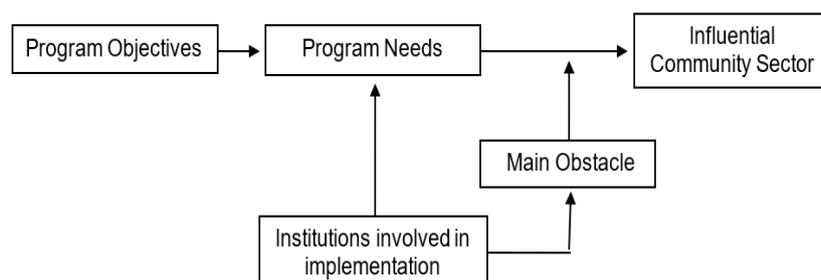
Figure 2. Relationships between elements to achieve goals.

The results of the data collected from discussions with experts, field observations and secondary data from Saxena & Vrat (1992) then take five elements to measure the need for management of shrimp pond areas in supporting shrimp productivity National priority programs on the coast of Peureulak East Aceh, Aceh are Program Objectives, Program Needs, Institutions that play a role, Influential community sectors, and Main Constraints. Stages of analysis as shown in Figure 2. The relationship between programs in elements to achieve goals.

Pond area analysis management agency involves multi-sector, multi-disciplines, cross activities and interests, cross administrative areas, so that in its implementation it must be integrated, identify the structure of actors/actors who play a role in management, and the structure of the need for the management of shrimp pond areas (Juarno *et al.*, 2017). Figure 2. describes the relationship between programs in elements.

RESULTS AND DISCUSSION

Elements of the objectives to be achieved by the management of shrimp ponds to support the productivity of national priority programs on the coast of Peureulak, East Aceh, Aceh, according to the opinion of experts, are translated into ten sub-elements.

Table 2. The purpose of the institutional program is to support the productivity of shrimp farming.

Code	Sub elements
T1	Adequate production facilities and infrastructure
T2	Innovative Efficient and effective technology
T3	Environmental sustainability
T4	Developing Cultivator Groups
T5	Sustainable production
T6	Support from the local community
T7	Establishment of cooperation between farmers
T8	Availability of jobs
T9	Making products competitive
T10	Balancing land use

From the results of the discussion of the relationship between the elements of the program objectives, it is known through the VAXO approach which can be seen in Table 3.
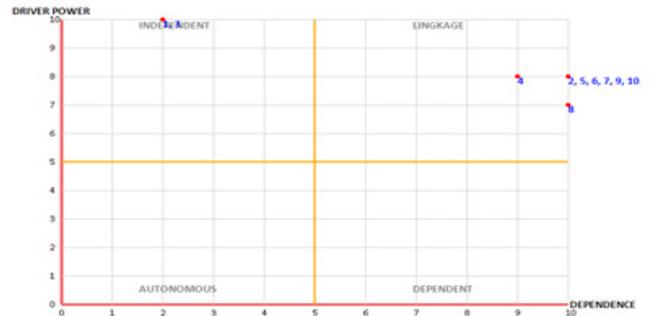

Figure 3. Driver power and dependence matrix program objectives.

In Table 3, it is continued into Table 4, namely the V, A, X and O notations to become the final Structural Self Interaction Matrix (SSIM) matrix that meets the rules of the objective elements.

Based on the higher ranking will be in the lower hierarchy as described in Figure 4 on the level structure. The mapping of the sub-elements of the program objectives can be seen

Table 3. The results of the final reachability matrix elements of the program objectives.

No.	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Driver power	Rank
T1	1	1	1	1	1	1	1	1	1	1	10	1
T2	0	1	0	1	1	1	1	1	1	1	8	2
T3	1	1	1	1	1	1	1	1	1	1	10	1
T4	0	1	0	1	1	1	1	1	1	1	8	2
T5	0	1	0	1	1	1	1	1	1	1	8	2
T6	0	1	0	1	1	1	1	1	1	1	8	2
T7	0	1	0	1	1	1	1	1	1	1	8	2
T8	0	1	0	0	1	1	1	1	1	1	7	3
T9	0	1	0	1	1	1	1	1	1	1	8	2
T10	0	1	0	1	1	1	1	1	1	1	8	2
Dependence	2	10	2	9	10	10	10	10	10	10		
Level	3	1	3	2	1	1	1	1	1	1		

Table 4. Final SSIM matrix that has complied with the rules of objective elements.

	1	2	3	4	5	6	7	8	9	10
1		V	X	V	V	V	V	V	V	V
2			A	X	X	X	X	V	X	X
3				V	V	V	V	V	V	V
4					V	X	X	V	V	V
5						X	X	X	X	X
6							X	V	X	X
7								V	X	X
8									X	X
9										X
10										

in Figure 3, explaining the Driver Power and Dependence matrix elements as objectives grouped into four sectors, namely autonomous, dependent, linkage and dependent. According to (Marimin, 2008). the first sector autonomous¬S1 is Weak driver-dependent weakness (slightly related to the system), although the relationship can be substantial. Sector 2 dependent-S2 is a weak driver-strong dependent (unfree element). The third sector, linkage-S3, which is vital driver-strong dependent (sensitive and unstable elements) here, must be studied carefully because the relationship between elements is unstable. The fourth sector is Independent-S4, a vital driver-weak dependent (free element); this element is crucial.

From the matrix of Figure 3, it can be seen that the sub-elements T1 and T3 are in the Independent sector, which means that these sub-elements have a massive role in the program's objectives. While the sub-elements T2, T4, T5, T6,

T7, T8, T9, and T10 are in the Linkage sector, which means these sub-elements must be studied carefully because these sub-elements can be decisive or even not have a significant role. Figure 4 shows that the sub-elements at level 4 determine which sub-elements are at the level above (3, 2,1). Figure 4 means that the sub-elements T1 and T3 affect other sub-elements in realizing an increase in shrimp productivity.
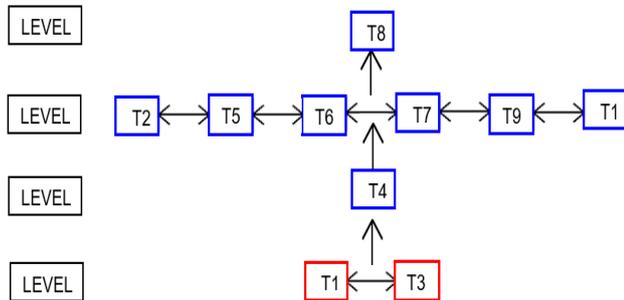

Figure 4. Interpretation of achieving program objectives.

Influential sectors of society

Institutional management in supporting shrimp productivity can be seen in Table 5 which describes the elements that affect the community sector below.

Table 5. Influential elements of the comunity sector.

Code	Sub elements
M1	Industry
M2	Transportation
M3	Settlement
M4	Port
M5	Urban
M6	Fishery
M7	Agriculture

From the results of the final reachability matrix analysis of the community sector that is influential in supporting the increase in shrimp productivity seen from the rank and level (Table 6), the influential community sector is ranked 1 M2 and M6. The results of the influential elements of the community sector can be seen in Table 6.

Furthermore, in Table 6, it is returned to Table 7, namely the V, A, X and O notations to become the final Structural Self

Interaction Matrix (SSIM) matrix. namely the assessment between the sub-elements of public sector relations.

Table 7. SSIM Matrix Final public sector relations sub elements..

	1	2	3	4	5	6	7
1		A	A	X	X	A	X
2			V	V	V	X	V
3				V	V	A	V
4					X	A	X
5						A	X
6							V
7							

From the analysis of Table 6 based on the ranking of each sub-element a hierarchy is made. Higher ranked sub elements will be lower in the hierarchy. To explain about driver power and dependence, mapping and boundary structure of elements of community sector relations are carried out which can be seen in Figure 5.
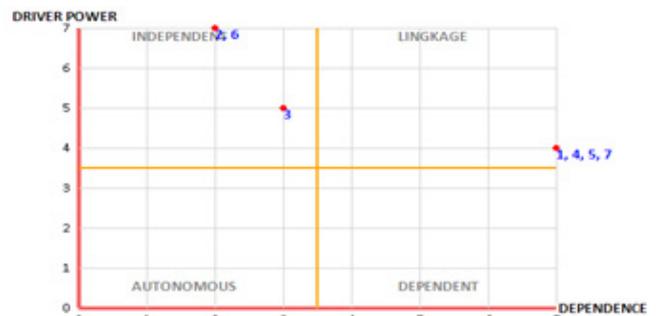
Figure 5. Matrix of influential drivers of power and dependence sector of society.
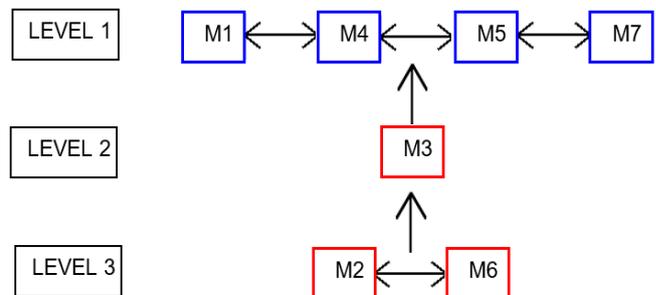
Figure 6. Interpretation of influential sectors of society.

Table 6. The results of the final reachability matrix elements of public sector relations.

No.	M1	M2	M3	M4	M5	M6	M7	Driver power	Rank
M1	1	0	0	1	1	0	1	4	3
M2	1	1	1	1	1	1	1	7	1
M3	1	0	1	1	1	0	1	5	2
M4	1	0	0	1	1	0	1	4	3
M5	1	0	0	1	1	0	1	4	3
M6	1	1	1	1	1	1	1	7	1
M7	1	0	0	1	1	0	1	4	3
Dependence	7	2	3	7	7	2	7		
Level	1	3	2	1	1	3	1		

In Figure 5 it can be seen through the Driver power matrix map that the most independent

the influential community sector elements that support the program's objectives to achieve increased shrimp productivity after being structured, there are three levels consisting of M2 and M6, meaning that in the transportation and fisheries sub-elements which must be prioritized and most importantly, then at level 1 the M1 sub-elements M4, M5 and M7 are sub-elements supporting influential elements of the community sector.

Program needs
Based on the expert opinion analysis, the program needs elements are divided into 10 sub elements. The need for institutional programs for shrimp pond management to support shrimp productivity can be seen in Table 8.

Table 8. Elements of program requirements.

Code	Sub elements
P1	Support of the aquaculture environment and society
P2	Accomodated Regulations / legislation
P3	HR competencies
P4	Adequate facilities and infrastructure
P5	Availability of business capital
P6	Accomodated marketing
P7	Security guarantee
P8	Environmental monitoring and evaluation
P9	Availability of coastal areas
P10	Profitable and innovative technology

The results of the analysis of the program requirements in Table 8 are then entered into the final reachability matrix of the results of the questionnaire data to determine the level of relationship between the sub-elements. The results of identifying the relationship between program requirements needed can be seen in Table 9.

Furthermore, in table 9 it is returned to Table 10, namely the notation V, A, X and O into the final Structural Self

Interaction Matrix (SSIM) matrix. namely the assessment of the sub-elements of program needs.

Tabel 10. SSIM matrix of program requirements sub elements.

	1	2	3	4	5	6	7	8	9	10
1		A	A	A	X	X	X	X	X	X
2			X	X	V	V	V	V	V	V
3				A	V	X	V	V	V	X
4					V	V	V	V	V	V
5						X	X	X	X	A
6							X	X	X	X
7								X	X	X
8									X	X
9										X
10										

From the analysis based on table 10 each sub-element can be made a hierarchy. Sub-elements with a higher rank will be in a lower hierarchy (Figure 11).
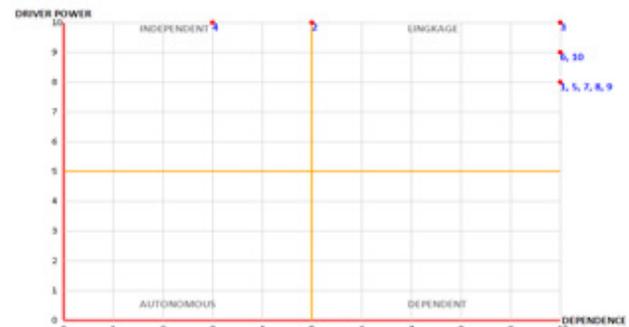

Figure 7. Driver power and dependence matrix of program requirements.

In Figure 7. it is explained that the most significant program needs or vital elements in supporting the increase in shrimp productivity are sector IV, namely P1, P4 and P5. Sector III, namely P2, P6, P7, P10 and P3, is an unstable sector and Sector II, namely P8 and P9, is a sector that is not free or

Table 9. The results of the reachability matrix of the final elements of the program requirements.

No.	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Driver power	Rank
P1	1	1	1	1	1	1	1	1	1	1	10	1
P2	0	1	1	0	0	1	1	1	1	1	7	0
P3	0	0	1	0	0	0	1	1	1	1	5	0
P4	1	1	1	1	1	1	1	1	1	1	10	1
P5	1	1	1	1	1	1	1	1	1	1	10	1
P6	0	1	1	0	0	1	1	1	1	1	7	0
P7	0	1	1	0	0	1	1	1	1	1	7	0
P8	0	0	0	0	0	0	0	1	1	0	2	0
P9	0	0	0	0	0	0	0	1	1	0	2	0
P10	0	1	1	0	0	1	1	1	1	1	7	0
Dependence	3	7	8	3	3	7	8	10	10	8		
Level	4	3	2	4	4	3	2	1	1	2		

dependent on other sectors. Then it is explained further in the schematic structure of Figure 8.
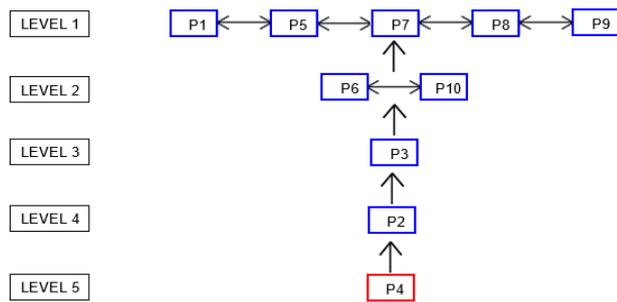

Figure 8. Schematic of interpretation of program requirements.

In Figure 8. to realize an increase in shrimp productivity, namely the five highest levels which are very strong in encouraging program needs, the very influential elements are sub-elements P1, P4 and P5. While P2, P6, P7, and P10 are at levels 4 and 3 and followed by level 2 P3 which is the level of unstable elements. Then level 1 P8 and P9 dependency levels (non-free elements).

Institutions involved in implementation
Institutions involved in the management of shrimp pond areas for increasing shrimp productivity have 15 sub elements which can be seen in Table 11.

From the discussion and analysis, the results of the final reachability matrix of elements of institutions that influence the management of the area are shown in Table 12.

Table 11. Institutions involved in the implementation of increasing shrimp productivity.

Code	Sub elements
L1	Central Government (Ministry of Marine Affairs and Fisheries)
L2	Provincial Marine and Fisheries Service
L3	Regency Marine and Fisheries Service
L4	Marine and Fisheries Extension
L5	Ministry of Forestry & Environment
L6	Ministry of Public Works and Public Housing
L7	Cooperatives Micro, Small, and Medium Enterprises
L8	State Power Plant
L9	Kelurahan or Desa
L10	Panglima Laot
L11	Shrimp pond cultivator group
L12	Industry
L13	Research institutions
L14	College
L15	Capital institutions (Bank and Non-Bank)

Furthermore, in Table 12, it is returned to Table 13, namely the V, A, X and O notations to become the final Structural Self Interaction Matrix (SSIM) matrix.

Table 12. The results of the final reachability matrix of the institutional elements involved in the implementation.

No.	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	Driver power	Rank
L1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
L2	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
L4	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L5	0	1	0	1	1	1	1	1	1	1	0	1	0	1	0	10	4
L6	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	5
L7	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	5
L8	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L9	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L10	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
L12	0	1	0	1	1	1	1	1	1	1	0	1	0	1	1	11	3
L13	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L14	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
L15	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	12	2
Dependence	3	13	3	13	13	15	15	13	13	13	3	13	11	13	12		
Level	5	2	5	2	2	1	1	2	2	2	5	2	4	2	3		

From the analysis of Table 13 sub-elements of institutions involved in the implementation of increasing shrimp productivity based on the ranking of each sub-element, a hierarchy can be made, a higher rank will be in a lower hierarchy. Figure 9 describes the mapping of the driver power and dependence of institutions involved in the

implementation of increasing shrimp productivity.

Based on Driver Power and Dependence, the 15 systems of institutions involved in the implementation of increasing shrimp productivity are grouped through a structure into seven levels according to Figure 10 and in Figure 9 Driver

Table 13. SSIM matrix of sub elements of institutions involved in the implementation of increasing shrimp productivity.

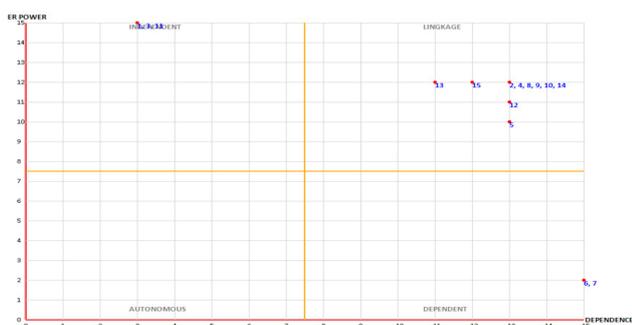|	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		V	X	V	V	V	V	V	V	V	X	V	V	V	V
2			A	X	V	V	V	X	X	V	A	V	X	V	X
3				V	V	V	V	V	V	V	X	V	V	V	V
4					V	V	V	X	X	X	A	X	A	V	X
5						V	V	A	X	X	A	X	A	X	A
6							X	A	A	A	A	A	A	A	A
7								A	A	A	A	A	A	A	A
8									X	X	A	V	X	X	X
9										X	A	X	A	X	A
10											A	X	A	X	A
11												V	V	V	V
12													A	X	A
13														V	X
14															A
15															

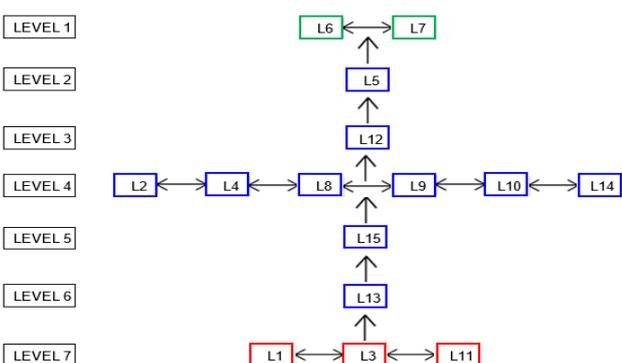Figure 9. Matrix of driver power and dependence of the institutions involved.

Figure 10. The scheme of interpretation of the institutional elements involved in the implementation.

Power at level 7, namely sub-elements L1, L3, and L11. Next, level 6 sub-elements L13, level 5 sub-elements L15, Level 4 sub-elements L2, L4, L8, L9, L10, and L14. Level 3 sub element L12, Level 2 sub element L5. Then institutions with more minor roles and are unrelated to shrimp productivity are level 1 sub-elements L6, L7.

Main obstacle
The main constraint element to achieve the objectives and needs of the shrimp productivity improvement program consists of 15 sub elements. We can explain these constraints
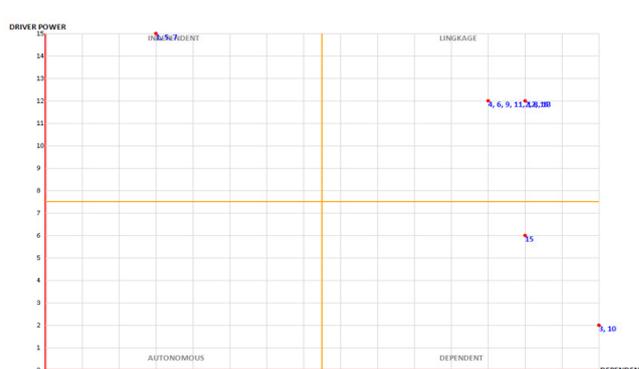

Figure 11. Matrix of driver power and dependence mapping of sub-elements of the main constraints in the management of increasing shrimp productivity.

through the sub-elements in Table 14.

The analysis of the results of the sub-elements of the main constraints can be seen in Table 15 of the final reachability matrix which explains the constraints in the management of increasing shrimp productivity.

Furthermore, Table 15 is returned to Table 16, namely the notation V, A, X and O into the final Structural Self Interaction Matrix (SSIM) matrix. namely the assessment of the sub-element constraints in the management of increasing shrimp productivity.

From the analysis of Table 16 SSIM matrix, the main constraints in the management of increasing shrimp productivity are mapped and ranked for each sub-element so that a hierarchy of each sub-element can be made. Sub elements with a higher rank will be in a lower hierarchy. Figure 11 describes the driver power and dependence mapping of the main constraint sub-elements in the management of increasing shrimp productivity.

Based on Figure 11, the 15 main constraint sub-elements analyzed by mapping and structured five levels in Figure 12)

are sector IV Independent level 5, which is the key element or the most decisive influence on the elements of program objectives, and elements of program needs for improving shrimp productivity management are K1, K5 and K7. Sector III Linkage level 4 and level 3 are unstable or sensitive elements, namely K4, K6, K9, K11, K12, K14, K2, K8 and K13. Sector II Dependent levels 2 and 1 K15, K3 and K10.

Based on the above discussion, the provision of production facilities and infrastructure and supporting environmental sustainability of shrimp farming is a crucial sub-element in the program's objectives to realize the institutional support

for increasing shrimp productivity in the pond area of the Peureulak Coastal National Priority Program, East Aceh, Aceh and is supported through program needs, namely support for the aquaculture environment. and community, adequate facilities and infrastructure and Availability of business capital. While the main obstacles faced in meeting the program objectives are the delivery of technology that cannot be implemented and applied, the construction and layout of the ponds are still traditional. The knowledge and skills, and attitudes of pond managers are still low, then to realize an increase in shrimp productivity, The institutions

Table 14. The main obstacle to achieving the goals and needs of the program.

Code	Sub elements
K1	Technology delivery cannot be implemented
K2	Public concern for the aquaculture environment is low
K3	Efforts to solve the problem are still temporary
K4	The water channels are not well ordered
K5	Construction and layout of traditional ponds
K6	Infrastructure support from various sectors is still low
K7	Knowledge of skills and attitudes of pond managers is still low
K8	The monitoring and evaluation activities of aquaculture are not yet routine
K9	Waste disposal from various sectors does not meet quality standards
K10	Infection with prawn disease
K11	Environmental management is not comprehensive
K12	Low capital
K13	The development of a pond management strategy has not involved stakeholders
K14	Implementation of new technology is still slow
K15	Cooperation between sectors is still weak

Table 15. The results of the final reachability matrix are the main obstacle elements to achieve the goal.

No.	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12	K13	K14	K15	Driver power	Rank
K1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
K2	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K3	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	2	4
K4	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
K6	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	1
K8	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K9	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K10	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	2	4
K11	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K12	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K13	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K14	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	12	2
K15	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	6	3
Dependence	3	13	15	12	3	12	3	13	12	15	12	12	13	12	13		
Level	4	2	1	3	4	3	4	2	3	1	3	3	2	3	2		

Table 16. The SSIM matrix is a sub-element of the main obstacles to achieving the goal.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		V	V	V	X	V	X	V	V	V	V	V	V	V	V
2			V	X	A	X	A	X	V	V	V	X	X	X	V
3				A	A	A	A	A	A	X	A	A	A	A	A
4					A	X	A	X	X	V	X	X	V	X	V
5						V	X	V	V	V	V	V	V	V	V
6							A	X	X	V	X	X	V	X	V
7								V	V	V	V	V	V	V	V
8									X	V	X	X	X	X	V
9										V	X	X	V	X	V
10											A	A	A	A	A
11												X	V	X	V
12													V	X	V
13														A	X
14															V
15															
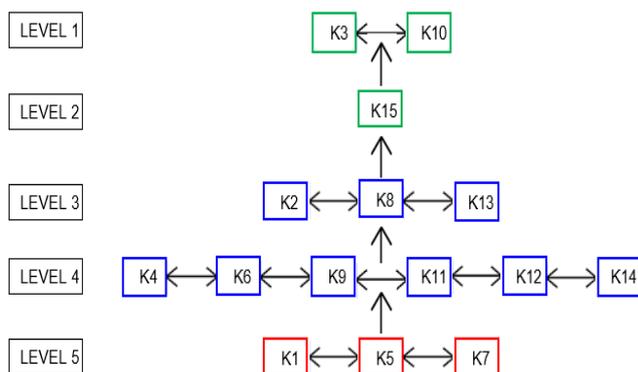
Figure 12. Schematic level structure of the main constraint elements in the management of increasing shrimp productivity

involved in the implementation are the Government Center (Ministry of Maritime Affairs and Fisheries), Provincial Marine and Fisheries Service and Pond Cultivator Groups, while the influential community sector to support program objectives in increasing shrimp productivity is the transportation, fisheries and settlement sectors.

The policy implications of this analysis can be recommended to stakeholders for increasing shrimp productivity in the coastal National Priority Program area of Peureulak, East Aceh, Aceh, making policies to provide adequate facilities and infrastructure programs that support environmental sustainability, facilitating business capital, conducting training and increasing competence, encouraging implementing and implementing technology, helping to make changes to the construction and layout of ponds into the system to facilitate Regional Government, influential community sectors and collaborating with various stakeholders.

Suggestions for realizing institutions in supporting the improvement of managing shrimp farming areas on the coast of Peureulak, East Aceh, Aceh in the long term, further research is needed and regularly, especially the carrying capacity and the combination of influencing elements.

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