

System identification for small scale fisheries development in Riau Province waters

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Abstract. System identification for small scale fisheries development was designed using System Methodology. This system identification consisted of construction related Causal Loop Diagram and Input-Output Diagram. It was found that system approach was an effective tool in identifying an complicated system. It could provide a set of holistic information necessary for solving such intricate problem systematically. The study conclude that beside favorable incentives created by the Government, accurate information along with a synergetic network among the actors involved were the key elements to develop small scale fisheries. Accurate information were needed on business for small scale fisheries and industrial capacity on the effectiveness of suitable fisheries and also for the processing technology, on the quality and quantity of accessible raw materials could be on the proper product prices and finally on the appropriateness of labor wages. The system development should also explore a control subsystem to repress trade monopoly practices, diminution in product quality, excessive payment transaction and damage of the environment.

Keywords: system identification, small scale fisheries, accurate information

Introduction

Riau Province is one of the regions in Indonesia which has the potential for substantial fish resources and located between the two main marine waters of the South China Sea and the Malacca Straits. Potential fisheries in the South China Sea at 602,384 tonnes/year and the sustainable potential of 361,430 tons which utilization rate of 216,960.3 tonnes, while for the Malacca Straits by 141,546 tonnes/year by the sustainable potential of 84,928 tons and utilization rate of 96513.1 tonnes (DPK Riau Province, 2009). The problem of marine fisheries development in Riau Province, among others, is that fishing capture is dominated by small scale fisheries. In 2009, small scale fishermen was about 82% of total fishermen in this province (Riau dalam Angka, 2010). They are characterized with low input of technology which results to low productivity, and finally low income of the fishermen. Small-scale fisheries requires a comprehensive fisheries management in order to be sustainable. Fishing activities that take place around the beach with orange offshing grounds are still limited.

Fundamental issues relating to the development of fisheries is there's no a comprehensive perspective of all stakeholders on the state of fisheries as a system. This system involves a state issue fisherman, catching productivity, income levels, availability of fish resources and fisheries management activities. These problems can be grouped into five major aspects, namely aspects of the market, technical, economic, social and environmental friendly (Dahuri, 2004). The existence of conflicts in Riau waters requires a more serious effort in the development of fisheries areas as an effort to increase productivity and incomes in a sustainable fishing. Development of small-scale fisheries is one of the 1945 Constitution in the provision of employment and improved living standards for the people especially fishermen and people around the fishing village. The vision of the development is supposed to support the potential of fishing communities to increase participation, productivity and efficiency of existing resources. Thus, it will strengthen the small-scale fisheries and other small-scale fisheries grow by strengthening technology in the field of marine fisheries.

Materials and Methods

A systems approach is very appropriate to be used to solve complex subject, dynamic and probabilistic. The complex nature of the interactions can be observed that factor related to very complicated. The hall mark of a dynamic problem, namely the factors that change according to the time and was followed by a process of conjecture the future. Probabilistic

characterized by uncertainty through the use of function opportunities in reaching conclusions and providing recommendations. The method starts with doing system requirements analysis, system identification, system modeling, verification, implementation and ending with periodic valuation of the decision-making models to be developed (Eriyatno, 2002). The system is a group of elements that are interconnected and organized to achieve the goal. Thus the suitability and equivalence relations become important in the identification of a system where there is no element left. Characteristics goal oriented systems approach of holistic and effective. While such a system has a finite group of the group of elements, so that these restrictions can be described clearly.

Needs Analysis

The parties involved in the effort to increase the income of small scale fisheries are fishermen, traders and middlemen, the fish processing industry, supporting industries, consumers, the Ministry of Maritime Affairs and Fisheries, Cooperation, local governments, and financial institutions. Needs of each party can be seen in Table 1.

Systems identification

Diagrams are used for system identification is the circumference of a causal diagram and diagram input output. Causal diagram illustrates the relationship between the components in the system small scale fisheries development (Figure 1). The diagram illustrates input and control output of this model (Figure 2).

Table 1. Actors Needs Analysis

No.	Actors	Needs
1.	Fishermen	<ul style="list-style-type: none"> • adequate income for fishermen and families • improvement of fishing capture and post-harvest technology • stable and reasonable prices
2.	Traders and retailers	<ul style="list-style-type: none"> • gain maximum sales • ease of obtaining fish and fishery products • quality assurance and continuity of supply • a good trading system and secure
3.	Fish processing industry	<ul style="list-style-type: none"> • maximum benefits and investment incentives • accessibility of financial resources and technology • ease licensing procedures investment, taxation, export and import of auxiliary
4.	Supporting industries	<ul style="list-style-type: none"> • Maximum selling price • Repayments and services • Ease of export and import licensing procedure
5.	Consumer	<ul style="list-style-type: none"> • stable and reasonable prices • quality assurance, safety, and halal products • the availability of products at any time
6.	Ministry of Maritime Affairs and Fisheries	<ul style="list-style-type: none"> • fish production to meet market demand • sustainable fish stocks
7.	Cooperation	<ul style="list-style-type: none"> • ease of obtaining price information, products favored by consumers, technology and financial resources • an efficient trading system
8.	Local Government	<ul style="list-style-type: none"> • expansion of employment • increased revenue • minimal environmental pollution
9.	Financial institutions	<ul style="list-style-type: none"> • current loan repayment • high interest rates • the number of customers increased

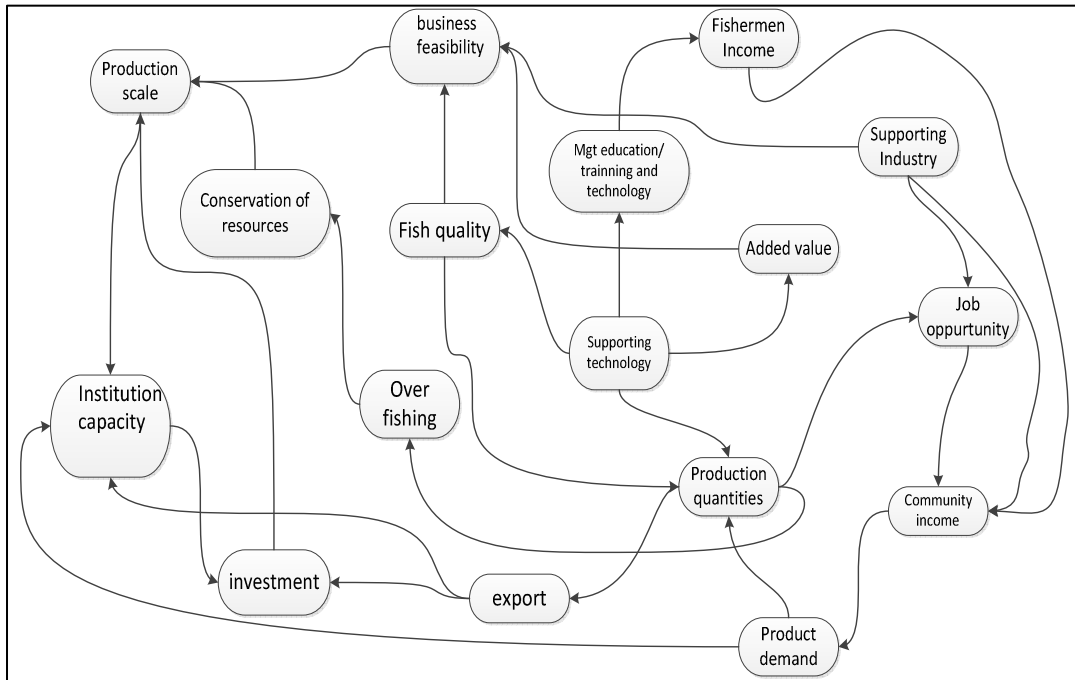


Figure 1. Causal Diagram of System Development of Small Scale Fisheries

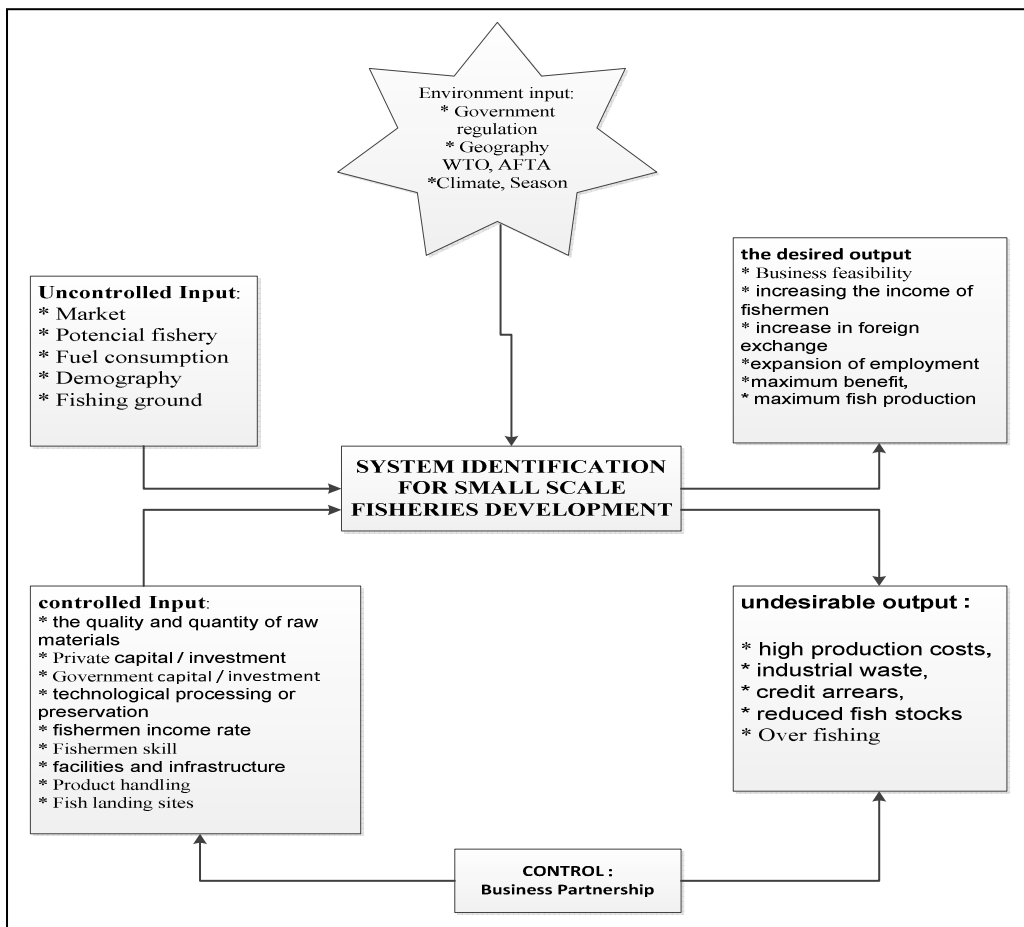


Figure 2. Diagram Input Output System Development of Small Scale Fisheries

Results and Discussion

Preparation of a causal flow chart system development of small scale fisheries should consider all the factors that can affect the system. These factors may have a positive impact or a negative impact on the system. Factors that positively impact given positive sign, while the negative impact will be negative marks (Figure 1). Formulation development model should consider the actors involved and associated in the system. Thorough analysis of the need of each offender must be done first. The next stage is to consider the components contained in the input output diagram (Figure 2). Goals to be achieved in a box composed of the desired output, while the negative impacts that may arise arranged in a grid undesirable output that can be controlled through effective management and business partnerships. Input that can not be controlled is the market price of fuel and demographic areas should not be overlooked in the preparation of the development model. In the environment should also be considered and carefully anticipated as law enforcement, climate, and the procedures and rule.

Fish processing is a process that is expected to provide added value. This is because processing can enhance economic value through improving the quality and value of the product. The problem, which is controlled by the processing technology is simple fishermen so that the resulting product has no added value as expected. In order to encourage the improvement of the quality of the products, the government should develop technologies that can be applied directly and have been controlled by the fishermen. The efficiency of the application of these technologies can be seen from the added value of the products produced. Small business development is complex and complicated, due to the nature of small businesses in this state between the state of chaotic (chaos) to the all-state basis (Eriyatno, 2002).

Government assistance can be provided to the private sector (small businesses) and to the cooperative. Forms of government intervention may include production credit with low interest rates without collateral, the import duty exemption processing equipment components and fishing units, VAT exemption role in domestic sales, the development of appropriate processing technology, setting UMR fisheries and licensing facilities investment. The increase in the income of fishermen measured by the wage rate minimum wage. Niga governance efficiency gains measured from each trade costs (the price of fresh fish, freight cost, retribution TPI) and profit middlemen. The effectiveness of the export can be seen from the number and value of exports of fishery products and the contribution of export fishery products to the national GDP. Expansion of employment can be measured by the percentage of the labor force is absorbed. The increase in foreign exchange can be measured by the percentage increase in the contribution of foreign exchange from exports of fishery products. Policy parameters based on the achievement of all of the desired output as optimal as possible and avoid the appearance of undesirable outputs.

Conclusions

Marine and fisheries sector should be able to provide welfare for the actors who were in it. Also expected to contribute to the national economy through employment and value added. Efforts to increase the income for small scale fisheries must be supported by the government, because most fishermen are still weak in terms of technology and information. Thus, government interference is still dominant, but this does not make over protection against excessive fishing. Firmness in carrying out law enforcement will reopen investment opportunities from a number of countries in the fishing industry. Formulation of the model of development should consider the actors involved and associated in the system and the components contained in the input-output diagram. Unwanted output can be controlled through effective management system. The success of analysis for the system development

can be done by tracing the paths starting from the procurement of investment decisions, operational phase until the output is produced.

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