Fisheries Planning and Management in Vietnam

an explanation of ineffectiveness

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FISHERIES PLANNING AND MANAGEMENT IN VIETNAM

AN EXPLANATION OF INEFFECTIVENESS

BY
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- An explanation of ineffectiveness

by

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 Any errors and omissions contained within the dissertation are the responsibility of the author. This work is that of the author, and has not previously been submitted for publication for any purpose. To my knowledge and belief, all data and information contained in this dissertation were not previously published nor written by any person, except references or quotations are made in this dissertation. All sources are acknowledged appropriately in a scientific manner, and the research ethics were respected while the author worked in Aalborg university as well as in Vietnam.

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VU DUYEN HAI

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Abbreviations

ADB: Asia Development Bank

AIBM: Adaptive Indicators-based Management

ALMRV: Assessment of Living Marine Resources in Vietnam project funded by DANINA

ASEAN: Association of Southeast Asian Nations

B: Biomass of fish stock

CCPC: Central Communist Party Congress

CFP: Common Fisheries policy

CoCPC: Chairman of Communal People's Committee

CoDPC: Chairman of District People's Committee

CoNA: Chairman of the National Assembly

CoPPC: Chairman of Provincial People's Committee

CPC: Communal People's Committee

CPUE: Catch per unit effort

DARD: Department of Agriculture and Rural Development (at provincial level)

DECAFIREP: Department of Capture Fisheries and Resources Protection

D-Fish: Directorate of Fisheries

DOFI: Department of Fisheries (at provincial level)

DPC: District People's Committee

DPI: Department of Planning and Investment

EEZ: Exclusive economic zone

EPY: Exploitable potential yield

EU: European Union

FAO: Food and Agriculture Organization of the United Nation

FSPS: Fisheries Sector Programme Support funded by DANIDA

GDP: Gross Domestic Product

GSO: General Statistics Office

HP: Horse power

ICES: International Council for the Exploration of the Sea

IFM:	Innovative Fisheries Management –An Aalborg University Research Centre
IO:	Institute of Oceanography
MARD:	Ministry of Agriculture and Rural Development
MFST:	Marine Fisheries Specialist Team
MOFI:	Ministry of Fisheries
MoMARD:	Minister of Ministry of Agriculture and Rural Development
MPI:	Ministry of Planning and Investment
MSY:	Maximum sustainable yield
NA:	National Assembly
NADAREP:	National Department of Aquatic Resources Exploitation and Protection
NCPC:	The National Communist Party Congress
NGOs:	Non-Government Organizations
OECD:	Organization for Economic Co-operation and Development
PM:	Prime Minister
PPC:	Provincial People's Committee
RIMF:	Research Institute for Marine Fisheries
RTC:	Regional Technical Consultation
SCAFI:	Strengthening of Capture Fisheries Management project funded by DANIDA
Sub-DECAFIREP:	Sub-Department of Capture Fisheries and Resources Protection (at the provincial level)
TAC:	Total allowable catch
TC:	Total catches
TL:	Total fish landings
UN:	United Nation
US:	United States
VASEP:	Vietnam Association of Seafood Exporters and Processors
VIFEP:	Vietnamese Institute for Fisheries Economic and Planning.
VINAFISH:	Vietnam Fisheries Association
WB:	World Bank

WCPFC:	Western and Central Pacific Fisheries Commission
WWF:	World Wildlife Fund
WWSD:	World Summit on Sustainable Development

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Abstract

Unsustainable exploitation of the marine fisheries resources in Vietnam was documented already in the early the 1990s. In order to address this issue, innovative approaches to fisheries management were introduced into the Vietnamese fisheries through pilot projects funded by international donors. However, the effectiveness of fisheries management in Vietnam has not lead to sustainable marine capture fisheries. The government has been unable to control the development of its fisheries (i.e. total landings and fishing effort in terms of fishing vessels employed) resulting in depletion of fisheries resources and marine capture fisheries has got into a vicious cycle.

This research sets out to explain the ineffectiveness of the fisheries management system in Vietnam with an emphasis on the planning system to provide a more inclusive understanding about issues facing the fisheries management system in Vietnam; logics of the fisheries development objectives; credibility of the knowledge base used for planning and management purposes; co-management arrangements; and unsuccessful implication of innovative approaches to improve effectiveness of fisheries management in Vietnam.

Various approaches and frameworks are used to address research questions of the research. The fisheries system approach is used to identify issues facing the fisheries management in Vietnam. The triangle paradigm framework is used to understand logics of the fisheries development objectives. Eleven conditions for sustainable fisheries co-management have been used to understand success and failure of co-management approach in Vietnam.

This research concludes that: i) the available data in the Vietnamese fisheries draw out a contradictory understanding about the natural and human systems, thus management system is unable to make effective intervention on the human and natural systems; ii) conflicting discourses in planning fisheries result in inconsistent development and management decisions on the Vietnamese fisheries; iii) the knowledge base used for planning fisheries in Vietnam is incredible; iv) the management tools decided in the fisheries master plan are not implemented at local levels and not enforced at the fishing communities, and the Vietnamese fisheries are under the open-access regime which fishers are allowed to catch as much as they can; and v) unsuccessful implementation of innovative approaches to fisheries management in Vietnam is due to a lack of supportive institutional arrangement and without a framework for fisheries management.

Abstrakt

Det blev dokumenteret allerede i begyndelsen af 1990'erne.at fiskeressourcerne i Vietnam ikke blev bæredygtig udnyttet. I bestræbelserne på at ændre på denne situation blev innovative tilgange til fiskeriforvaltning afprøvet gennem internationale donorer finansierede pilotprojekter. Effektiviteten af fiskeriforvaltningen i Vietnam er dog ikke blevet forbedret. Udviklingen af fiskeriet har reelt været ude af regeringens kontrol og derfor er over-fiskeri i kystfiskeriet kun blevet forstærket.

Denne afhandling analyserer fiskeriforvaltningssystemet i Vietnam og kortlægger et ineffektivt system, som er drevet af planøkonomi. Afhandlingen giver en indgående forståelse af de problemer, som fiskeriforvaltningssystemet i Vietnam står over dets logik. Den analyserer troværdigheden af videns grundlaget for såvel udviklingsplanlægningen som forvaltningen af fiskeriet med specielt fokus på implementeringen på lokalt niveau, herunder inddragelsen af lokale fiskere fiskeriforvaltningen eller manglen på sammen gennem en analyse af praktiserede medforvaltningsmodeller i vietnamesiske fiskeri.

Forskellige tilgange og analyseværktøjer har været anvendt i forhold til at besvare forskningsspørgsmål. Fiskerisystemets tilgang er brugt til at identificere spørgsmål vedrørende fiskeriforvaltning i Vietnam. En triangulære paradigme forståelse har været anvendt til at forstå logikken i mål og politikker for fiskeriudviklings planerne. Der er taget udgangspunkt i 11 faktorer som har stor indflydelse på samarbejde mellem det politiske system og lokale fiskerisamfund i bestræbelserne på at skabe en bæredygtigt udvikling af fiskeriet i Vietnam.

Denne afhandling konkluderer, at: i) de data hvorpå forvaltningen af vietnamesisk fiskeri bygger på, giver en modstridende forståelse af de naturlige og menneskelige systemer.; ii) modstridende diskurser i planlægningen af fiskeriudviklingen har ført til inkonsekvente og uhensigtsmæssige beslutninger for de bagvedliggende 5 og 10 årsplaner.; iii) videns grundlaget for planapparatet er mangelfuldt; iv) der udarbejdes ikke fiskeriudviklingsplaner på lokalt plan, ligesom plan implementeringen og håndhævelse af fiskeriforvaltningen ikke sker på lokalt niveau. Det betyder, at vietnamesiske fiskeri *de facto* er et klassik open acces fiskeri, hvor den enkelte fisker stort set ikke er underlagt nogen form for regulering og v) manglende politisk opbakning til innovative tilgange til fiskeriforvaltningen, herunder modstand mod at skabe de nødvendige institutionelle forandringer har undermineret at der er indført et effektivt fiskeriforvaltningssystem i Vietnam.

CHAPER 1: INTRODUCTION

1.1 INTRODUCTION

The marine capture fisheries (hereafter called as fisheries) take an important role in social-economic development and food security throughout the world, especially in the developing countries. According to Food and Agriculture Organization of the United Nations (FAO), in 2013 fish accounted for about 17% of the global population's intake of animal protein and 6.7% of all protein consumed (FAO, 2016). It provided more than 3.1 billion people with almost 20% of their average per capita intake of animal protein. It is a vital nutritional source for billions of people in least-developed countries where total protein intake level is lower than developed nations. In 2014, total number of fishing vessels in the world was about 4.6 million vessels, of which the fleet in Asia was the largest, consisting of 3.5 million vessels accounting for 75% of the global fleet. They provided employment for nearly 38.0 million people in the world and produced the total production of 81.5 million tons (FAO, 2016).

According to FAO (FAO, 2016), the world's fisheries expanded continuously to a production peak of 86.4 million tons in 1996, but have since exhibited a general declining trend to 81.5 million tons in 2013. In spite of the challenges facing the world's fisheries, good progress is being made to reduce fishing rates and restore overfished fish stocks and marine ecosystems through effective management actions in some areas. However, the state of the world's fish stocks has not improved overall. In 2013, most of fish stocks are fully fished with no potential for increases in production. Indeed, the number of fish stocks exploited at the biologically sustainable level decreased from 90% in 1974 to 68.6% (of these, 58.1% of fish stocks were fully fished and only 10.5% of fish stocks were underexploited) and 31.4% of fish stocks were fished at the biologically unsustainable level in 2013 (FAO, 2016). This is one of the main reasons leading to hunger and poverty of more than one billion of people in the world. A large rate of people living in poverty and hunger inhabited in most developing countries, of which the fishing communities are at the bottom of the socio-economic ladder. The root causes of this may be associated with the following factors: i) unbalance of conservation and production growth objectives in the fisheries policies. Many fisheries have been still subsidized to enlarge fishing fleets and increase fishing rates to obtain the short-term objectives of providing livelihoods and employment for the local communities (Charles, 2001; European Paliament, 2013; FAO, 2004a), ii) the insufficient and distorted knowledge base used within the single species models leads to ineffective policy and management decisions (FAO, 2004; Lorenzo & Wilson, 2006; Raakjær, 2009; Raakjær et al., 2007), iii) the effectiveness of the fisheries management system has not been improved clearly (Lee, 2004; Walters, 2007; Wilson, Raakjaer, & Degnbol, 2003). This research takes the Vietnamese fisheries as a case study to explain how these factors influencing on the fisheries system in general and the Vietnamese fisheries in particular.

1.2 BACKGROUND TO THE RESEARCH

In Vietnamese context, the term of "*fishery sector*" is used commonly. It is composed of the capture fisheries (including marine capture fisheries and inland capture fisheries), aquaculture, processing, and fisheries logistic service. This research only focuses on the marine capture fisheries and the term of *"fisheries"* used in this research means the marine capture fisheries only.

Being with the long coast of over 3,260 kilometers and around 1.0 million square kilometers in the economic exclusive zone (EEZ), the fisheries have an important role in the national economy regarding in providing foreign exchange, food security, employment, coastal livelihoods, and national security (Prime Minister, 2006, 2010a). Vietnam was the seventh biggest producer in the fisheries of the world in 2014 (FAO, 2016), its total fish landings were over 2.7 million tons. In the last three decades, the fishing effort and total landings of the Vietnamese fisheries increased gradually. According to Directorate of Fisheries (D-Fish, 2017a), the total number of fishing vessels of Vietnam was 110,950 in 2016 (increase 39.1% times compared to 2000, and decrease 14.1% compared to 2010[1]). They provided employment for approx. 764,000 professional fishers and livelihoods for millions of people living in 628 communes of the 28 coastal provinces of Vietnam. This fleet produced the total landings of 2.876 million tons (1.37 and 2.25 times higher than that in 2010 and in 2000 respectively), equally over 3.3 billion USD in value in 2016. These figures are closely

[1] There was a suddenly increase in number of fishing vessels in 2008-2009. It was from 95,609 vessels in 2007 to 123,609 in 2008 and 131,000 in 2009 due to a subsidy policy of the government.

connected with the centrally planned economy which had been operationalized in Vietnam before implementing an economic reform in 1986.

Theoretically, the Vietnamese fisheries are managed under the state planning system which are based on the mandate research and operationalized by the government-based and top-down mechanism. In this system, the total landings planned for the coming year are set higher than that of the previous year; and the estimation of annual fish landings always exceeds the total catches planned by the government and even is higher than the exploitable potential yields of fisheries resources. This may be a reason leading to the gradual increase in fishing effort and total landings of the Vietnamese fisheries in the last three decades. By contrast, the degradation of fish stocks and conflicts among fishing communities have been commonly seen throughout the country. The catch per unit of effort (CPUE) of the most prominent species has gradually decreased at the average rate of approx. 5% per annum in 1990-2016, from 0.9 tons/HP/year in 1990 to 0.2 tons/HP/year in 2016 (D-Fish, 2017a; GSO, 1996, 2001, 2006, 2011a, 2016). In addition, conflicts among fisheries and destructive fishing activities have become increasingly common throughout the country (D-Fish, 2015). Clearly, there is a hidden fact behind figures in the Vietnamese fisheries. But, it is an evidence that the fisheries have developed out of control of the state fisheries planning system. In other words, the existing fisheries management system in Vietnam is ineffective.

In order to improve effectiveness of the existing management system, the co-management and adaptive indicators-based management approaches were imported to Vietnamese fisheries. The co-management approach is considered as a useful tool to halt the decline of fisheries resources by involving fishers in protecting and managing the natural resources (Pinkerton, 1989). It is closely associated with the adaptive management approach to form an adaptive co-management framework which can solve the uncertainty and complexity of fisheries. This approach, therefore, has been widely introduced into the fisheries in the world (FAO, 2005a; Long, 2002). Actually, the co-management approach has been introduced into Vietnamese fisheries since 1994. It was officially endorsed by MARD in 2007 by establishing the Fisheries Co-Management Task Force. Since after that, over 40 fisheries co-management models have been piloted in the Vietnamese fishing communities. However, most of them were not kept going on effectively, even being collapsed after ending external financial supports (Lai, 2008). This approach might be impeded by: i) the lack of a clear definition of the management authorities, ii) legitimacy of the co-management organization, iii) the unresponsiveness of stakeholders, and iv) heavily dependence on the external supports.

The adaptive indicators-based management structure is to reduce uncertainty of management choices (Holling, 1978; Walters, 1986) and provide broader understanding about the system being managed (FAO, 1999). This was evaluated as the best choice for the existing situation of the Vietnamese fisheries (Kato, 2001; Raakjær, 2004; Raakjær et al., 2007). In fact, this structure has successfully introduced into some African and Asian fisheries (Garaway & Arthur, 2004; Raakjær, 2009). However, most of case studies on this approach have failed in the sense that no experimental management program was ever implemented (Walters, 2007). The adaptive indicators-based management structure was introduced into Vietnam in 2003 as a working package of a program[2] funded by Danish International Development Agency (DANIDA). It was then endorsed officially in 2007 by the Minister of MARD (MARD, 2007) establishing the Marine Fisheries Specialist Team. A series of activities facilitating the structure had been implemented and supported by the program in 2003-2012. Most of these activities emphasized the capacity building for the Marine Fisheries Specialist Team and developing a working framework for the structure. However, this structure was collapsed after DANIDA ending their support. This frustration may result from the poor synergy of actors and their irresponsiveness, without leadership to changes, and the lack of political supports. Another reason is that the actors did not play their roles as the structure required. Of these, fisheries managers did not make requests to Marine Fisheries Specialist Team for advice and maintain the data collection programs and other relative researches (Management, 2004).

1.3 RATIONALE OF THE RESEARCH

The research is aspired the failure in achieving management objectives of the Vietnamese fisheries master plan by 2010. The Decision No. 10/2006/QD-TTg dated 11/01/2006 of the Prime Minister (PM) approving the master plan for the Vietnamese fisheries development

[2] DANIDA funded the Vietnamese fisheries to implement a program of the Fisheries Sector Program Support in 1996-2012.

by 2010. It adopted strategies to reduce fishing effort from over 90,000 vessels in 2005 to 50,000 vessels by 2010, and to keep fishing level (total catches) by 2010 at 1.5-1.8 million tons. But, in 2010, the number of fishing vessels was 129,376 vessels and total catch was 2.1 million tons. This means that the Vietnamese fisheries developed out of control of the master plan adopted by the government. This research hypothesizes that the failure of the master plan resulted from the ineffectiveness of the current fisheries management system in Vietnam in both aspects of making and implementing fisheries plans in practice. In terms of making fisheries plans, it seems to be a lack of coherent linkage among elements within the state planning system i.e. strategies, master plans, five-year plans and annual plan in setting the agreed objectives. Moreover, the knowledge base used for planning fisheries is implicitly provided by the mandate researches of the governmental institutions, and indigenous knowledge and experiences are not taken into account in the fisheries planning processes. In terms of implementation, it seems to have a gap between the state planning system and the fishing communities. The government cares its planning system through making figures; meanwhile the local fishers attempt to maximize their own catches and profits.

This ineffectiveness of the existing management system is not only seen in the Vietnamese fisheries, but also found commonly in the global fisheries (FAO, 2004a; Raakjær, 2009). Therefore, understanding failures of the Vietnamese fisheries management system will contribute to improvement of effectiveness of the fisheries management system in Vietnam on one hand, and contribute to the mainstream of the global fisheries management on the other hand.

1.4 THE AIM AND OBJECTIVES OF THE RESEARCH

The Vietnamese fisheries are in crisis that their management objectives are out of control of the management system. The fishing effort and fishing level exceeded far from the expected levels planned by the government. In a review of the 2010 fisheries master plan, Quyen argued that the failure of the 2010 fisheries master plan in Vietnam is due to two main reasons: i) its management objectives (e.g. total catches and number of fishing vessels) are unrealistic; and ii) the government did not allocate resources to implement investment projects and development programs attached in this master plan (Quyen, 2012). In addition to this, innovative fisheries management approaches (i.e. co-management and adaptive indicators-based management structures) were imported to improve the effectiveness of the fisheries management system in Vietnam. However, their outcomes and implications are not seen clearly, even were completely failed in practice. Therefore, this research aims to explain ineffectiveness of the Vietnamese fisheries management system in order to contribute to: i) understanding about unrealities of management objectives leading to ineffectiveness of the fisheries management system, especially in the developing fisheries, and ii) building more knowledge in fisheries management towards an effective and efficient fisheries management system.

The research is conducted based on the empirical investigations to understand the logics of establishing management objectives in the fisheries planning system in Vietnam in five aspects: i) identifying issues of the fisheries system, ii) setting management objectives, iii) using knowledge base for planning fisheries, iv) planning fisheries at the local communities, and v) measures to improve infectiveness of the fisheries planning system. It aims to achieve 5 following objectives:

Objective 1: Provide insights into the fisheries system under lights of the fisheries system approach to answer the research question that ***"What issues are facing the fisheries management system in Vietnam?"*** and sub-questions are:

i) What is the situation of the natural system (fish stocks and marine biodiversity?
ii) What is the situation of the fishing industry and the local fishing communities?
iii) How is the fisheries management system organized?

Objective 2: Analyze fisheries discourse to address the research question of "***How the fisheries master plan deals with the issues of the fisheries?***". This will work with the following sub-questions:

i) What is background (i.e. issues facing fisheries management system) to formulating the fisheries master plan by 2010?
ii) How are fisheries discourses emerged and institutionalized into the fisheries master plan by 2010?

Objective 3: Discuss on the knowledge base used for planning fisheries i.e. the total catches (TC) to answer question that ***"How uncertain are the objectives of the fisheries master plan?"***. The following sub-questions are addressed:

i) How was the TC-based management approach conceptualized in the Vietnamese fisheries?
ii) what and how knowledge inputs were used to define TC in Vietnam?

Objective 4: Explore implementation of the fisheries master plan at the local level and fishing behaviours of the fishing communities to answer the question that ***"How the fisheries master plan intervenes the fishing communities?"***. This is addressed with the following sub-questions:

i) How is the 2010 fisheries master plan implemented at the local level?
ii) What are preferences and interests of the local fishers?
iii) What and how are factors influencing on the fishing behaviours of the local fishers?

Objective 5: Examine application of innovative fisheries management approaches: co-management and adaptive indicators-based management structure in the Vietnamese fisheries to answer the question of ***"Why were these approaches not successfully implemented in the Vietnamese fisheries?"***. This addresses the following sub-questions:

i) How the innovative management approaches were implemented in the Vietnamese fisheries?
ii) Do they improve the effectiveness of the existing fisheries management system in Vietnam?
iii) What are obstacles to implementation of these approaches in the Vietnamese fisheries context?

1.5 THESIS STRUCTURE

The thesis consists of nine chapters. Following the introduction chapter (chapter 1) is the theoretical perspectives (chapter 2) and chapter 3 presents methodologies of the research. In chapter 2, it analyzes literature on the knowledge base for fisheries management and the fisheries co-management to learn about the current understanding and their gaps in using knowledge for managing fisheries and implementing the fisheries co-management in the world. It also analyzes analytical frameworks of relevant research topics of the thesis. In chapter 3, the research methodologies are presented. Firstly, it presents the conceptual frameworks connecting with specific research topics to guide relevant data and information need to be collected. Secondly, it explains the research methodologies of the thesis. In this section, it describes the research approaches and methods used to collect and analyze data to provide inputs for arguments.

Chapter 4 provides insights into the fisheries system under lights of the fisheries system approach with emphasis on the deficiencies of the existing management system to guide research questions of the following chapters. It analyzes the state of the natural system including marine biodiversity and fisheries resources in Vietnamese marine waters. It then looks at the fishing fleets and fishing communities to understand about the human system in the Vietnamese fisheries. Finally, this chapter examines the fisheries management system to understand the ways to manage fishing practice of the human system in Vietnam.

Chapter 5 analyzes in detail the fisheries master plan by 2010 which used at the key tool for planning fisheries in Vietnam. It is commenced with an explanation on the context of the political, socio-economic and fisheries influencing on the fisheries master plan by 2010. It is followed by an analysis on the policy discourses and actors getting involved into planning fisheries to identify the storylines and dynamics of actors. It then analyzes storyline discourse coalitions in planning the fisheries to understand the nature of management objectives (i.e. total catches and number of fishing vessels) of the fisheries master plan. Finally, this chapter identifies a new approach to planning the fisheries and new conflicts coherently connected with the planning system in transition.

Chapter 6 goes deeper to understand the nature of conflicts among actors in planning fisheries in Vietnam. Firstly, it explains about the concept of the total catches (TC) in Vietnamese context and how the TC-based management approach was introduced into the Vietnamese fisheries. It then examines the knowledge inputs to define the TC to understand the nature of the TC figure presented in the fisheries master plan by 2010 in Vietnam.

In chapter 7, two cases of the commune fisheries selected to be analyzed to understand planning fisheries at the local fishing communities in practice. It is commenced with an explanation on selecting two cases of the commune fisheries to analyze. It is followed by an explanation on how the fisheries master plan by 2010 was implemented in these cases to understand the efficiency of the fisheries planning system of the government. It then investigates fishing behaviours of the local fishers to understand how they are accommodated with the fisheries planning system of the government and the root of the ineffectiveness of the existing fisheries management system in Vietnam.

Chapter 8 explains the introduction and implications of innovative fisheries management approaches into Vietnam to draw out lessons learnt in changing a fisheries management system. It explores implementation of the co-management and the adaptive indicators-based management structures in the Vietnamese fisheries. It then examines the effectiveness of introducing these structures in the Vietnamese fisheries. Finally, it analyzes the main obstacles to implementing successfully the co-management and the adaptive indicators-based management structures in the Vietnamese fisheries context.

Finally, chapter 9 concludes the main findings of the research and provides theoretical reflections to scholars of the knowledge base for fisheries management and the fisheries co-management. Firstly, it revisits and answers all research questions asked in chapter 1. Secondly, it provides contributions to theories of the knowledge base for fisheries management and the fisheries co-management. Finally, it defines the limitations of the research and suggests future works to the relevant scholars.

CHAPTER 2: THEORETICAL PERSPECTIVES

2.1 INTRODUCTION

This research is about the effectiveness of fisheries management in Vietnam. It follows the definition of fisheries management as: *"The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives"* (Cochrane, 2009 p.2). The fisheries management can be divided into two main tasks for analysis: i) making management plans; and ii) enforcing management plans to control fishing activities in reality of fishing communities. Both these tasks contribute to the effectiveness of a fisheries management system. This research focuses on the first task of the management process - the making management plan including earlier stages (e.g. gathering and analyzing data and information, planning, consultation, and adoption of management plan stages). It is associated with knowledge used for planning fisheries and institutional arrangements in producing knowledge and making decisions. The research also examines implementation of the national management plans at local levels and influences of the fisheries planning system on the fishing behaviour of the fishing communities. This research hypothesizes that the knowledge base used for planning fisheries in Vietnam was problematic. Many stakeholders' knowledge was ignored on one hand, and production of knowledge was not communicated transparently among interested groups. Therefore, this research emphasizes empirical methods and relates to theories of knowledge base for fisheries management and co-management which may contribute to enhancement of the knowledge base. This chapter provides a general review of literature on: i) the knowledge base for fisheries management; and ii) the co-management approaches as theoretical foundation to address the research questions of this research. More detailed perspectives of theory for specific research topics may be supplemented in the specific chapters.

2.2 LITERATURE REVIEW

2.2.1 KNOWLEDGE BASE FOR FISHERIES MANAGEMENT

The knowledge base for fisheries management may be defined as *"biological information about fish stocks, economic information about fisheries, and social information about the requirements of effective fisheries governance"* (Motos & Wilson, 2006 p.1). These types of knowledge may be produced and presented in various forms by stakeholders involved in the fisheries management. Johannes and Neis classified into two types of the knowledge used for fisheries management: the scientific knowledge and the fisher's knowledge (Johannes & Neis, 2007). The scientific knowledge is produced and presented by scientists relying on scientific observations (Degnbol, 2005). Meanwhile, the fisher's knowledge is primarily of a qualitative and narrative nature accumulated over time and transmitted within specific local fishing communities (Baelde, 2007). It is named differently by authors such as indigenous knowledge, traditional knowledge, or local ecological knowledge (Doubleday, 1990; Haggan, Neis, & Baird, 2007; Nirmale et al., 2007; Wilson, 1999, 2004).

2.2.1.1 The scientific knowledge and fisheries management

Fish stocks may be renewable, but they are not infinite. They may be able to provide production and ecosystem services for ever if they are utilized properly, in contrast they will be exhausted if they are harvested under an ineffectively managed manner (FAO, 1997). In 1883, Huxley recognized threats to the sustainability of the fisheries resources by asking that "*Whether fisheries are exhaustible; and if so, whether anything can be done to prevent their exhaustion?"* (Huxley, 1883 p.5). In order to maintain the productivity of fish stocks, biologists suggested rules on the size of fish to be caught and number of fish are allowed to catch in specific areas to protect and maintain productivity of fish stocks (Russell, 1931; Schaefer, 1991). Consequently, the concept of maximum sustainable yield (MSY) has been used as tools to control mortality rate of the exploited fish stocks and protect fisheries resources. It is defined as *"the highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing (average) environmental conditions without affecting significantly the reproduction process*" (Cochrane & Garcia, 2009 p. 488). It also refers to sometimes as potential yield. This then has been used commonly as the key reference points for managing fish stocks in both developed and developing fisheries

(Caddy & Mahone, 1995; European Commission, 2011; United Nations, 1982, 1995, 2002). It is believed that fishing at the level producing MSYs of fish stocks, and then the fisheries will be sustained in a certain period (Cochrane & Garcia, 2009). This guides fisheries researches in general and fish stock assessments in particular to provide knowledge for fisheries management in over the world (Degnbol, 2004; Raakjær, 2009). In this regime, the state of individual species is assessed through biological parameters (e.g. fishing mortality, natural death, growth rate, recruitment, etc.) and their MSY is predicted by mathematic models (Sparre & Venema, 1998) on an annual basis or multi-annual basis. Based on the MSY estimation, the fisheries authorities decide the total allowable catch (TAC) of individual fish stocks in metric tons. This TACs are divided as catch quotas and allocated to fishers/fishing organizations (hereafter called as the TAC-based management regime). This work is implemented and presented systematically and scientifically by scientists, therefore it is easier to understand and communicate (Degnbol, 2005; Johannes & Neis, 2007).

In reality, there are interactions among species and cohorts, and between fisheries resources and their environment within specific marine ecosystems. These interactions are complicated and unpredictable (FAO, 2003). Therefore, predictions the state of fish stocks by mathematic models are uncertain and impossible (Larkin, 1977; Sissenwine, 1978). As a result, a such knowledge is unable to maintain productivity of the harvested fish stocks and variability of fisheries in over the world (Degnbol, 2004; FAO, 2004a; Raakjær, 2009). Hilborn & Peterman (Hilborn & Peterman, 1995) identified seven major sources of uncertainty in fish stock assessments: i) estimates of fish abundance or other measures of the state of the system; ii) model structure; iii) estimated model parameters; iv) response of users to regulation; v) future environmental conditions; vi) future social, political and economic conditions; and vii) future management objectives. They also suggested two main ways to reduce uncertainty in scientific advice for fisheries management: i) do sensitivity analyses with quantitative models, and ii) develop more sophisticated quantitative methods for estimating components of stock assessments from data sets.

Addressing this, scientists suggested supplementary modules and principles toward a more holistic approach. For instance, introduction of the precautionary approach to fisheries management (FAO, 1996a; Garcia, 1995). This approach considers natural ecosystems as a set of complex interactions and feed-back mechanisms among preys and predators. By that time, in order to understand complexity of the fisheries, the approach of the fisheries system was also suggested (Charles, 1994; 1995). This approach not only considers the biological parameters of the harvested fish stocks, but takes into account a broader scale of the natural system (i.e. fish stocks, biodiversity, physical environment) also the human system and the management system. Another is the introduction of the ecosystem-based approach to fisheries management (FAO, 2003). This confirms that marine ecosystems are impacted directly by fisheries on one hand, and are also impacted by other human activities on the other hand, so they need to be managed in an ecosystem context. Both of them requires broader considerations (e.g. interactions among species in a food web and between environment and fish, interactions of fisheries with other industries) are taken into account in decision-making process of fisheries management. The sustainablity of fisheries is a multi-dimensional issue. It is, therefore, necessary to balance information regarding many aspects of fisheries in the process of decicion making (Degnbol, 2004). An ecosystem based approach cannot be based on biological science alone, but also other its dimensions such as ecological, economic, and social (Berkes, 2012).

In terms of applied aspects, scientists develop models integrating ecosystem factors to provide evaluations of impacts of fisheries and environment processes on marine ecosystems. For instance, series of bio-economic analytical model (BEAM) provide the analysis of the bio-economic and socio-economic effects of the transition process from a poorly managed fishery on investment to a better managed fishery (Sparre & Willmann, 2001). Another is technical management measures package (TEMAS). It is a fleet-based bio-economic software of combining five modules: biological, fishing effort, fleet behaviour, catches, and economic to evaluate management strategies accounting for technical measures and fleet behaviour in one or several areas (Ulrich et al., 2007). As an expansion of TEMAS and earlier models, a bio-economic simulation and optimization model for fisheries (FISHRENT) was developed to provide scientific advice for fisheries management in EU waters (Salz et al., 2011). This combines six modules: biological, economic, interface, market, behaviour, and policy to provide scenarios for fisheries management in particulars situations. Another one is ecological/ecosystem modeling software suite (EwE). This combines modellings for ecosystem trophic mass balance analysis (called as Ecopath), with a dynamic modeling capability (called as Ecosim) to examine past and future impacts of fishing and environmental disturbances on the ecosystems as well as to explore optimal fishing policies in specific spaces (Christensen & Walters, 2004). In addition, International Council for the Exploration of the Sea (ICES) introduced multi-annual plans to manage the depleted fish stocks (European Council, 2004), and the long-term plan for cod stocks and the fisheries exploiting those stocks (European Council, 2013) to manage TACs adaptively to the practical conditions.

2.2.1.2 The fishers' knowledge and fisheries management

What fishers' knowledge is

For many decades, fisheries managers have relied heavily on scientific advice derived from fish stock assessments. However, these assessments are costly and normally and do not cover all resources or fishing areas of interest (Degnbol, 2004). Therefore, it is important to develop management approaches that allow incorporation of alternative information sources from stakeholders (e.f. resource users, enviromnetists) into assessment models and decision-making processes (FAO, 1995; Garcia, 1995). There are different definitions of the fishers' knowledge. Berkes et al. define fishers' knowledege that *"A cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment"* (Berkes et al., 2000 p.1252). Fisher et al. define that *"Fishers' knowledge comprises the body of experiential knowledge including ecological, resource-based, ecosystem, fishing practices, fishing communities and livelihoods, governance and markets, and their dynamic relationships. This knowledge is developed in a social-cultural and geographical context"* (Fischer et al., 2015 p.4). By that time, Seixas and Veira defined fisher's knowledge in a broader way as *"Fishers understanding of biological species (morphology, behavior, growth, feeding habits, reproduction, etc.), species interactions, ecosystem dynamics (including terrestrial, marine/freshwater and weather dynamics), as well as of social-ecological interactions and feedbacks dynamics"* (Seixas & Veira, 2015 p.231).

How relevant it is

Throughout the world, local fishers demonstrate a diversed range of knowledge of fish, fisheries and marine ecosystems. Saavedra-Díaz et al identified Colombian fishers having 16 categories of knowledge in various aspects such as social, ecological, biological, cultural, economic, fishing techniques, institutional arrangements, marketing, fisher organization, national security, natural hazards, etc (Saavedra-Díaz, Rosenberg, & Pomeroy, 2015). In terms of fishing techniques, most fishers of small-scale fisheries rely extensively on indigenous technical knowledge as oberseved in Canada and Malawi (Narcisse, 2007; Nsiku, 2007). Indigenous technical knowledge of local fishers informs fishing methods and devices, fishing craft, and it is transmitted generation by generation as cultural values. This fishers' understanding of events and issues in ecology and climate would be applied to fish conservation through mechanisms such as co-management and fisheries monitoring schemes.

In terms of ecology and ecosytems, local fishers demonstrate a wide range of knowledge of fish biology, ecology and marine ecosystem. Indeed, fishers in the Philippines have a good understanding about seahorses in their traditional waters. They argued that taking of pregnant seahorses as the primary cause of population depletion, and that the ensuing lack of adults and juveniles will contribute to further decline. They also linked population decline directly to habitat destruction (Meeuwig et al., 2007). In addition, local fishers have knowledge about target species and show a more detailed ethnotaxonomy for target species than for non-target species. They also have knowledge about fish diet and fish reproduction. Local fishers also have know well ecological features of target (Begossi, 2015; Silvano & Begossi, 2012). Silvano and Valbo-Jørgenssen argued that the Brazilian coastal fishers exhibit detailed knowledge of fish behavior and ecological factors that facilitated complementation of scientific information (Silvano & Valbo-Jørgensen, 2008). In fact, fishers in Puerto Rico show extensive knowledge about ecology of adult land crabs and conditions that lead to crab spawning aggregations (García-Quijano et al., 2013). Similarly, the local fishers have also shown detailed and nuanced knowledge of biological and ecological parameters of large juvenile and aldult neils within their traditional waters (Forrester et al, 2013). Traditional knowledge of herring stocks in Haida water contributed to reassessing reference points for the management of herring in Haida territory (Jones, 2007). Local fishers fishing cod within the Gulf of Maine have good understanding about distribution of historical spawning grounds seasonally. This may help to define functional ecological boundaries for fisheries management areas and to validate survey methods used conventionally by scientists (Ames, 2007).

Local fishers also provide useful knowledge in participatory research programs with the scientists. Commercial fishers in Canada have been involved and provided knowledge of fish distribution patterns for designing sampling and survey transects to improve quality and reliability of fish stock assessments (Stanley & Rice, 2007). In addition, fishers provided detailed information on the fishery, navigation, fishing effort distribution, individual species, fish behaviour, productivity, seabed biology, geology, and oceanography. This is integrated with scientific survey data to illustrate the seacape in a way that would not have been possible from scientific data alone (Williams & Bax, 2007). The fishers's knowledge is an important sources of information for fisheries management throughout the world. It may be used in combination with scientific knowledge in participatory fisheries management arrangements (Pomeroy, Katon, & Harkes, 1998; Raakjær, 2009; Sen & Raakjaer, 1996; Wilson, Raakjaer, & Degnbol, 2003), or used solely in autonomous management arrangements (Berkes et al., 2001; Ruddle, 1998; Stobutzki et al., 2006). Satria proves clearly that knowledge of fisher in North Lombok, Indonesia assists the local community in addressing issues of overexploitation, access rights and lack of enforcement of fishing regulations in their nearshore waters effectively (Satria, 2007). Morefover, it is also a viable alternative for future resource management and complement the conventionally scientific approach. It is a key to bridge two systems of traditional ecological knowledge and scientific knowledge.

How useful it is

In fact, fishers' knowledge does not always require scientific validation to be accepted or used for fisheries management, and scientific knowledge needs not be the baseline which fishers' knowledge is compared to (Mackinson & Nøttestad, 1998). The quantitative data regularly support scientific research, and qualitative information provided by fishers regarding changes in environmental factors, abundances of target species or catch size have an intrinsic value and therefore they should be used appropriately in decision-making process. Similarly, fishers' knowledge may not necessarily be systematized according to conventionally scientific methods to make a valuable contribution to fisheries management. It should be rather to use as substantial and complementary agreement between two systems (i.e. fishers' knowledge and scientific knowledge) (Silvano & Begossi, 2012). In another way, scientific analysis is contrasted to make conclusions and apply results to decision-making processes (Rivera et al., 2015). In some cases, fishers' knowledge may be only used as a source of available information as defined within the precautionary principle that claims to use the best information available to conserve natural resources (Garcia, 1995). Fishers' knowledge is indeed a necessary and irreplaceable data source for fisheries management under community-based regime in Brazil and elsewhere, especially in fisheries of poor data. However, its approach and assessment is complicated, requiring effective and locally elaborated methods and communication skills (Leite & Gasalla, 2015).

However, integration of the fishers' knowledge and the scientific knowledge to provide the best inputs for making decisions is often considered difficult because of the different cultural contexts in which knowledge originates, although institutional factors can play a significant role (Wilson, 2003). This is because fishers express growing frustration at scientists' inability to make direct use of industry information and views (Baelde, 2007; Smith et.al., 1999). They also fear that their information would be used against them such as managers can close off valuable fishing grounds (Williams & Bax, 2007). The local fishers make decisions to increase their catches and also find ways to bypass the management regulations to maximize their profits (Charles, 1995; Raakjær & Mathiesen, 2003). Fishers have historically been flexible and adaptive partly because they are constantly in a situation where they have to adapt to weather conditions, changes in fish prices and migration of the fish stocks. Fishers also run their business to compensate economic losses from regulation by adapting to the management regulations. In addition, fishers are also forced to make long-term strategic decisions in a fundamentally short-term environment (Christensen & Raakjær, 2006). The fishers' fishing behaviours may be different from fishery by fishery and those in the developed fisheries must be different the developing fisheries. Therefore, managers should assess the full impact of changed regulations. Recognizing fishers' preferences is vital to ensuring a close partnership between fishers and managers so that they can share responsibility for fisheries management and development, implementation of community programs and compliance with regulations is improved (Salas & Gaertner, 2004). A management regime may be undermined by the tactical and strategic adaptation by fishers (Christensen & Raakjær, 2006).

Meanwhile, scientists tend to believe that the usefulness of fishers' knowledge is limited because of the difficulties inherent in quantifying it (Hamilton & Walter, 1999; Holm, 2003). In addition, they had unrealistic expectations and a poor understanding about the nature and content of fishers' knowledge and failed to turn the fishers' knowledge into a useful form for scientific knowledge. Therefore, single-species stock assessments and reliance on MSY still remain a contention between fishers and scientists (Baelde, 2007).

The way forward

FAO stresses in the Code of Conduct for Responsible Fisheries (FAO, 1995) that conservation and fisheries management decisions should take into account traditional knowledge of fisheries resources and their habitat. The knowledge and technologies of small-scale fisheries should be investigated and documented in order to assess their application to the conservation of fisheries resources and habitats as well as to fisheries management and development. In addition, the ecosystem-based approach to fisheries emphasizes the need to plan, develop and manage fisheries in a manner that balances social needs while preserving the goods and services provided by marine ecosystems (FAO, 2003). This means that, the ecosystem-based approach aims to integrate the social, economic and environmental aspects of fisheries in a balanced way, highlighting the social value of fishing, the central role of the human component (Young et al., 2008). When moving towards the ecosystem-based approach to fisheries, it is important to establish the institutional arrangements which allow an appropriate science, policy, society interaction and facilitate stakeholder involvement in the advisory processes (Fletcher & Bianchi, 2014; Pitcher et al., 2009). Stakeholders bring experience-based knowledge and scientific knowledge into the process to deal with complex social-ecological enviroments. In which, stakeholders balances the push and pull between science and policy within an adaptive and iterative process that ensures close cooperation (Watson-wright, 2005).

In that environment, fishers' knowledge, in combination with scientific knowledge, has the substantial potential to contribute to sustainable development of fisheries. However, this would face but many challenges such as i) dialogue facilitation to bridge knowledge and build trust among managers, scientists and fishers; ii) a lack of flexible mechanisms to recognize fishers' knowledge; iii) managers and scientists are usually unskilled in working with fishers' knowledge; iv) adaptation of fishers to formal management arenas; v) group heterogeneity is not knowledge homogeneity; vi) moving from extractive use to collaborative exchange; vii) capacity building; and viii) connection between participatory monitoring and evaluation and management in ecosystem-based approach to fisheries management (Medeiros et al., 2015).

In order to address the above challenges, a collaborate arrangement should be a way forward. Indeed, a partneship framework composed of scientists, fishers, managers, and enviromentists was established in Australia. This was an important step toward promoting fishers's involvement in fisheries assessments and management (Smith et al., 1999). This partnership between government institutions and resource users may serve to further enhance prospects of achieving sustainable use of resources (Phelan, 2007). Based on experience, regular collaborative partnerships involving fishers, scientists/technicians and managers constitute the most effective way to engage fishers' knowledge in fisheries assessment and management (Orensanz et al., 2015).

In the Vietnamese fisheries, the knowledge base used for planning fisheries includes official statistics, the general socio-economic development strategies, fish stock assessments and other relevant information (Government of Vietnam, 2006). However, these data were extremely poor and were constrained by the low categorical resolution and the non-transparent aggregation of data into mere administrative spaces (Zwieten et al., 2002). Therefore, they were not suited for planning and managing the fisheries in Vietnam (FAO, 2004b).

Small-scale fisheries, especially in the developing countries, represent a diverse and dynamic subsector, often characterized by seasonal migration and received less political or economic influence than other sectors: tourism, aquaculture, agriculture, energy, mining, industry and infrastructure developments. In addition, conflicts with large-scale fishing operations are an issue, and there is increasingly high interdependence or competition between small-scale fisheries and other sectors. Many small-scale fishers and their communities are often vulnerable and marginalized groups. They are directly dependent on access to fishery resources and on the health of aquatic ecosystems and associated biodiversity. They are commonly located in remote areas and tend to have limited or disadvantaged access to markets, and may have poor access to health, education and other social services. They also commonly suffer from unequal power relations. All these factors make it difficult for small- scale fishers and their communities to make their voices heard, defend their human rights and tenure rights, and secure the sustainable use of the fishery resources on which they depend. FAO in 2015, therefore, developed the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF) as a complement to the 1995 FAO Code of Conduct for Responsible Fisheries to provide complementary guidance with respect to small-scale fisheries in support of the overall principles and provisions of the Code. The Guidelines are intended to support the visibility, recognition and enhancement of the already important role of small-scale fisheries and to contribute to global and national efforts towards the eradication of hunger and poverty. The Guidelines have six objectives as follows: i) to enhance the contribution of small-scale fisheries to global food security and nutrition and to support the progressive realization of the right to adequate food; ii) to contribute to the equitable development of small-scale fishing communities and poverty eradication and to improve the socio-economic situation of fishers and fish workers within the context of sustainable fisheries management; iii) to achieve the sustainable utilization, prudent and responsible management and conservation of fisheries resources consistent with the Code of Conduct for Responsible Fisheries and related instruments; iv) to promote the contribution of small-scale fisheries to an economically, socially and environmentally sustainable future for the planet and its people; v) to provide guidance that could be considered by states and stakeholders for the development and implementation of ecosystem friendly and participatory policies, strategies and legal frameworks for the enhancement of responsible and sustainable small-scale fisheries; and vi) to enhance public awareness and promote the advancement of knowledge on the culture, role, contribution and potential of small-scale fisheries, considering ancestral and traditional knowledge, and their related constraints and opportunities (FAO, 2015). Implementation of these Guidelines in the world, the integration of ingenious knowledge of local fisheries and their communities into fisheries management decisions would be improved on one hand, and the voices of the small-scale fishers would be heard by policy-makers on the other.

2.2.2 CO-MANAGEMENT ARRANGEMENT FOR FISHERIES

Co-management extends to all stages of management, from planning to implementation, to evaluation and adaptation in an iteratively ongoing process. When used appropriately, involving resource users and stakeholders in natural resource management offers both normative and objective benefits. These include improved planning due to incorporation of better data and local ecological knowledge as well as more effective and efficient enforcement due to increased legitimacy of the management structures (Berkes et al., 2001; Ebbin, 2009; Pinkerton, 1989; Wilson, Raakjaer, & Degnbol, 2003). Pinkerton identified benefits of co-management to enhance the functions of: i) data gathering; ii) logistical decisions; iii) allocation decisions; iv) protection of resources from environmental damage; v) enforcement of regulations; vi) enhancement of long-term planning; and vii) more inclusive decision making (Pinkerton, 1989). Clearly, the co-management arrangement enhances collecting, sharing data as well as debating knowledge base for planning fisheries which is a topic of this research.

As a type of the partnership arrangement, the co-management arrangement is expected to lead to more appropriate, efficient and equitable management of fisheries (Pinkerton, 1989). It represents a variety of management arrangements that result in the sharing of responsibility and authority for management between resource users and other stakeholders and government (Berkes et al., 2001). There are various definitions of co-management used in fisheries management as in box 2.1.

The co-management arrangements may be developed for a number of reasons, including the recognized failure of centralized arrangements and/or because of economically driven reforms and constraints (Wilson et al., 2003). Armitage et al. sees the co-management in seven different faces: i) co-management as power sharing; ii) co-management as institution building; iii) co-management as trust building; iv) co-management as process; v) co-management as social learning; vi) problem solving; and vii) co-management as governance (Berkes, 2007). According to him, the co-management is as power sharing, as institution building, as trust building, as process, as social learning, as problem solving and as governance.

Box 2.1: Definitions of fisheries co-management

i) *"Communities' political claim to the right to share management power and responsibility with the state"* (McCay & Acheson, 1987 p.1).

ii) *"Government and agencies, though their cooperative organizations, are sharing responsibility for management functions" and "the responsibility for initiating regulations is shared"* (Jentoft, 1989 p.143).

iii) "*The sharing of power and responsibility between the government and local resources users"* (Berkes, George, & Preston, 1991 p.6).

iv) *"Power-sharing in the exercise of resources management between a government agency and a community organization of stakeholders"* (Pinkerton, 1992 p.331).

v) *"The sharing of responsibility and/or authority between the government and local resource users/community to manage a fishery resource"* (Pomeroy, R.S. Williams, 1994 p.7).

vi) *"An arrangement where responsibility for resource management is shared between the government and user groups"* (Sen & Raakjaer, 1996 p.406).

vii) *"The collaborative and participatory process of regulatory decision-making among representatives of user-groups, government agencies and research institutions"* (Jentoft, McCay, & Wilson, 1998 p.423).

viii) *"A situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources"* (Borrini-feyerabend et al., 2007 p.1).

At the same time, Ostrom and Pinkerton identified 11 key conditions for viable fisheries co-management: i) clearly defined boundaries, ii) clearly defined membership, iii) group cohesion, iv) existing organization, v) benefits exceed costs, vi) participation by those affected, vii) management rules enforced, viii) legal rights to organize, iv) cooperation and leadership at community, x) decentralization and delegation of authority, xi) coordination between government and community (Ostrom, 1990, 1992; Pinkerton, 1989). These conditions are further discussed in chapter 8.

Pinkerton identifies three main benefits of co-management: i) co-management for community-based economic and social development; ii) co-management to decentralize resources management decisions; and iii) co-management as a mechanism for reducing conflicts through participatory democracy (Pinkerton, 1989). She also argued that co-management may enhance the functions of: i) data gathering; ii) logistic decisions such as who and when can harvest; iii) allocation decisions; iv) protection of resources from environmental damage; v) enforcement of regulations, vi) enhancement of long-term planning; and vii) more inclusive decision-making. In addition, the sufficient participation in management by those who are subject to regulations can assist in conflict management (Noble, 2000); improve compliance to regulations (Kaplan & McCay, 2004); reduce the costs of data collection, monitoring and enforcement; and provide more locally relevant management plans (Garaway & Arthur, 2004). In the context of resource depletion and conflict among resource user groups are getting worse and the government fails to manage natural resources at local level (Pomeroy et al., 2007), then the co-management arrangement is supported widely in the global fisheries.

Although for over three decades of introduction into fisheries, the co-management arrangement has encountered many obstacles to implementation in practice. For instance, there is a lack of legitimacy of the co-management arrangement and resources to coordinate activities (Pomeroy & Williams, 1994); lack of a clear management framework (Sen & Raakjaer, 1996). Daniel defined a number of current and future challenges facing the co-management practitioners in Viet Nam, including: i) empowering local communities, ii) realigning traditional views on hierarchy and power, iii) the lack of an enabling legal framework, iv) the lack of understanding of co-management; and v) developing the capacity of local communities and authorities (Daniel et al., 2010). Research on the fisheries co-management in Vietnam shows that the external support initiated and designed the fisheries co-management made the co-management system inconsistent and low effective (Nga, 2015).

Although the fisheries co-management approach has been implemented more than 20 year in Vietnam, its implications have been limited (Anon, 2009; VIFEP, 2014). Is the approach imported characterized with western culture which far from the Asian culture such as in Vietnam? In an Asian context, a type of co-management in Japan is called as the community-based fisheries management (CBFM) would be a good reference for the small-scale fisheries in tropical waters like the Vietnamese fisheries (Makino, 2017). This type of management acknowledges local fishers as the primary participants in management with the involvement and support of the broader community. Therefore, the transaction costs are cut down remarkably (Makino & Matsuda, 2005). It also facilitates the adaptive management in response to changes of fish stocks and ecosystem (Makino, 2017).

The CBFM system comprises three basic components: i) management of fisheries resources; ii) fishing efforts; and fishing grounds. Fishers' groups involved in any of these elements with or without written rules (Yamamoto, 1995). When fishers consider fish stocks as their property, they adopt a more positive attitude towards conservation and management measures. The 1949 fishery law of Japan allows establishment of a fishery coordination committee to make democratic and optimum use of fishery resources. A fishery coordination committee (FCC) is established for each prefecture (i.e. district level). It is a legal organization established based on the law and located in between a prefecture government and fishers. FCC is independent of the prefecture government and is not a part of the prefecture government. It works on behalf of fishers with six following functions: i) to formulate "a plan to make synthetic use of all fishery resources available in a sea area right off a prefecture on behalf of fishers, taking into account the conservation of fishery resources". For the establishment of the plan, a fishing right and a fishing license are used as its management tool; ii) issue an order to fishers concerned when required for fishery management. This may happen after the government issued fishing right and license; iii) organizes a public hearing as much as possible to listen the voice of fishers; iv) issue an order to regulate fishing operation, whenever necessary; v) amend or adjust the plan in accordance with natural change in the type and size of fishery resources in its sea area. This is done particularly at the time of the renewal of fishing right and fishing license, which is done at an interval of 5 or 10 years (Yamamoto, 2000).

This system is developed within two steps. A plan made by FCC is actually a fishery management plan in a broad sense as the first step. Using such a plan as a framework, an actual fisheries management plan which corresponds to CBFM, has been developed by fisheries management organizations (FMO) in fisheries cooperative associations (FCA) as the second step. For the establishment of the plan at prefecture level, fishing right and fishing license are used as tools. Fishing rights are analogous to territorial use rights for fishing (TURFs). Particular feature of these two steps are the fact that both two plans are formulated with the ideas of fishers but not from the managers of fisheries resources. Therefore, no compliance problem has occurred in the coastal fisheries in Japan. In fact, all management decisions made by local fishers (Makino & Matsuda, 2005). For instance, a FCC is composed of 9 elected fishers, 4 scientists, and 2 local government officials. It decides the allocation of fishing rights and licenses on one hand, and makes regulations of fishing restrictions (i.e. the FCC regulations) in areas within their jurisdiction. A FCA composed of local fishers decides operational regulations (i.e. the FCA regulations) that stipulate gear restrictions, seasonal/area closures of fishing grounds within their own waters. The FCA regulations stipulate more detailed fishing restrictions, applicable to local conditions, taking into account the restrictions set out in the FCC regulations, but including some restrictions that have not been stipulated in the FCC regulations. In the same manner, the FMO is allowed to decide their own regulations which are even more detailed, stricter than the FCA and FCC regulations. Clearly, in this system, the local fishers are central element. They decide management measures themselves with scientific support of scientists and administrational support of local government officials. This contributes to success implementation of fisheries management in Japan.

Uchida and Makino explained the success of CBFM system in Japan by four main reasons as follows: i) FCAs and TURFs are protected by law. The establishment of a FCC and a FCA, by which fishers were fully allowed to participate in the formation of a fishery management plan; ii) the closed relationships between scientists, government officials and local fishers in FCAs; iii) Japanese fishers have adhered to their co-management regime because it served their private interest; and iv) FCAs and TURFs, with their accompanying rules and legal authority, function to set boundaries and create exclusion (Uchida & Makino, 2008). However, the current Japanese co-management system still have two main weaknesses: i) there are discrepancies between the area in which a fish species reproduces and migrates and the jurisdictional boundaries assigned to managing FCAs and FMOs; ii) scientific information to support co-management is insufficient and underutilized (Uchida & Makino, 2008).

Moving beyond co-management, an adaptive co-management structure combines the iterative learning dimension of adaptive management and the linkage dimension of collaborative management in which rights and responsibilities and shared jointly (Olsson, Folke, & Berkes, 2004). It is a way to reduce uncertainty in natural resource and environmental decision making. This approach differs from other management approaches by emphasizing the importance of feedbacks from environment in shaping policies and followed by further systematic experimentation to shape subsequent policy. This approach requires a time-series data collection system and a continuous learning process to adapt to specific conditions of fisheries (Garaway & Arthur, 2004). The core concept in adaptive management is that policy choices should be treated as deliberate, large-scale experiments (Holling, 1978; Walters, 1986). The adaptive management recognizes that management decisions are necessary even when all desirable information is not available and when the outcomes of management decisions cannot be fully predicted. It considers management not only as a way to achieve objectives, but also as a process of learning gradually about the system being managed (Raakjær et al., 2007). Walter argued that adaptive management has been of little help in dealing with single stock management issue (Walters, 2007). Most programs of adaptive management have been less successful than their expectation from their intuitive appeal. He recognized three main difficulties in adaptive management programs: i) failure of decision makers to understand why they are needed; ii) lack of leadership for the complex process of implementing an adaptive approach; and iii) inadequate funding for the increased ecological (and often economic) monitoring needed to successfully compare the outcomes of alternative policies.

In order to promote the adaptive co-management, standards of information should be defined and agreed by stakeholders. Based on this, stakeholders gather information and present their knowledge to make fisheries assessments and management effectively. The concept of indicator is used for fisheries assessments and management (FAO, 1999). Indicators provide a readily understood tool for describing the state of fisheries resources and fisheries activity and for assessing trends regarding sustainable development objectives (FAO, 1999). They are a means to enhance communication, transparency, effectiveness and accountability in natural resource management in general, and assist in the process of assessing the performance of fisheries policies and management at various scales and in facilitate fisheries co-management (Degnbol, 2005). Fisheries management based on indicators is suited for tropical fisheries and has fewer economic-costs compared to the MSY-based one imported from single species fisheries (Kato, 2001, 2012; Raakjær, 2004; Wilson et al., 1994). Using indicators may lead to more informed decisions and more effective actions by simplifying, clarifying and making aggregated information available to policy makers (United Nations, 2007). Raakjær argued that adaptive management might be the way forward making fisheries management more robust and less costly (Raakjær, 2009). Furthermore, Makino demonstrates its usefulness in Japanese fisheries and argues that this approach will be well suited for small-scale fisheries in tropical areas (Makino, 2017).

2.3 ANALYTICAL FRAMEWORK OF THE RESEARCH

As mentioned in chapter 1, this research focuses upon fisheries planning system to explain the ineffectiveness of the fisheries management in the context of a developing country as Vietnam. Therefore, this research should employ an analytical framework which is suited for institutional arrangements and all fisheries, including the small-scale fisheries.

2.3.1 FRAMEWORK FOR ANALYZING FISHERIES

There are a number of analytical frameworks for analyzing various facets of a fisheries system in the world. They emphasize separate aspects (i.e. biology of fish stocks, management decision-making, involvement of stakeholders or look at the fisheries in a systematically holistic manner). Fisheries can be analyzed by a single-species management approach which is typically applied to individual stocks of a wide-spread species in temperate fisheries such as Atlantic cod, haddock, etc. (Rothschild, Sharov, & Lambert, 1997). Its objective is to specify optimal levels of size specific fishing mortality for a particular species. To do this requires one to assess the state of the stock (e.g. size and reproductive output). But often this is difficult to do, and different groups may view the same information in different ways, because of different assumptions (Starr et al., 1998). The single species management approach is based on the assumption that fish stocks can be viewed out of the context of their role in the ecosystem, and that if one simply knows enough about the vital information of the stock. It does not take into account the role of the fish stocks as it interacts with other species or the population dynamical processes. This leads to a failure of the single species approach to management of fish stocks (Larkin, 1996) and to an alternative one which reflect reality of the fish stocks and their interacts among them and between them with their physical environment.

Ecosystem-based management (EBM) is an integrated management approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation (Christensen et al., 1996). This marks a significant broadening beyond the ‘fish stock and fishing fleet’ sense of the fishery. Larkin stated that ecosystem management for the marine environment has three essential components: i) sustainable yield of products for human consumption and animal foods; ii) maintenance of biodiversity; and iii) protection from the effects of pollution and habitat degradation (Larkin, 1996). He also argued that these components must be reconciled with the social and economic costs involved and to a large extent their implementation will reflect the prevailing set of values. The ecosystem-based management approach was developed to address deficiencies of the single species MSY approach. It looks at fisheries with a broader perspective (Mahon et al., 2009; Sherman, 1994). This assesses and monitors the fisheries with five modules: i) productivity: photosynthetic activity, zooplankton biomass and biodiversity, oceanographic variability, ichthyoplankton biodiversity; ii) pollution and ecosystem health: eutrophication, biotoxins, pathology, emerging disease, health indices, multiple marine ecological disturbances; iii) fish and fisheries: biodiversity, finfish, shellfish, demersal species, pelagic species; iv) socioeconomic: integrated assessments, human forcing, sustainability of long-term socioeconomic benefits; and v) governance: stakeholder participation, adaptive management. It requires a large range of efforts to collect data, collate information and produce knowledge for assessing and managing a large marine ecosystem. Therefore, there have been still few case studies illustrating thorough application of this framework for assessing the marine ecosystems as well as the fisheries systems in the world (Wasson et al., 2015).

A ‘bigger picture’ should be needed to deal with inherent linkages between fisheries and human activities beyond the fishery system, especially in other coastal and marine sectors (e.g. aquaculture, tourism, agriculture, forestry, etc.) and in coastal communities. Moreover, as demands for fish, incomes, and livelihoods from fisheries requires attention to all elements of the fishery system. This associated with linkages between the fishery itself, and the corresponding fishing households and communities, and the broader socioeconomic environment surrounding the fishery. This provided a motivation for the ecosystem approach on the human side, namely a livelihoods approach. This perspective, also referred to as a sustainable livelihoods approach (Allison & Ellis, 2001). The concept of the livelihood integrates the critical factors affecting the vulnerability or strengthen of individuals or family survival strategies. It comprises three main elements: i) the assets possessed by people; ii) the activities in which people engage in order to generate an adequate standard of living and satisfy other goals such as risk reduction; and iii) the factors facilitating or inhibiting different people from gaining access to assets and activities. Allison and Ellis, therefore, defined *“A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household”* (Allison & Ellis, 2001 p.379). The key of a livelihoods approach is to broaden fishery discussions beyond fishing and ‘fishery jobs’ per se to emphasize the entirety of individual, household or community sources of well-being and livelihood, and in particular how individuals, households and communities develop ‘portfolios’ of livelihood sources (Charles, 2005). Allison and Ellis developed a framework for micro policy analysis of rural livelihoods including six elements: i) livelihood platform analyzes five main categories of assets: natural captical, physical capital, human capital, financial capital, social capital; ii) access modified by social relations, institutions, organizations; iii) in context of tremd, shocks; iv) resulting in livelihod strategies; v) composed of natural resource based activities and other non-natural resource based activities; and vi) with effects on livelihood security and environmental sustainability (Allison & Ellis, 2001). Besides, there are other frameworks for analyzing the livelihoods such as framework developed by Chambers and Conway in the early 1990s built on participatory research practices and ideas put forward by the World Commission on Environment and Development; United Kingdom Department for International Development (DFID) in 1999; The CARE livelihoods framework in 1999; The Oxfam livelihoods framework; The UNDP livelihoods framework; Policy Guidelines for Integrating Environmental Planning into Land Reform (PGIEP) framework; etc.

Charles argued that *"We will never achieve fishery sustainability if we restrict attention solely to what goes on within the fishery"* (Charles, 2005 p.230). Therefore, he proposes the fisheries system approach to see a fisheries system as a "bigger picture" in understanding and managing fisheries, which looks beyond conventional "fish and fleet" thinking. This approach incorporates the ecosystem-based management approach and the livelihoods approach (figure 2.1).

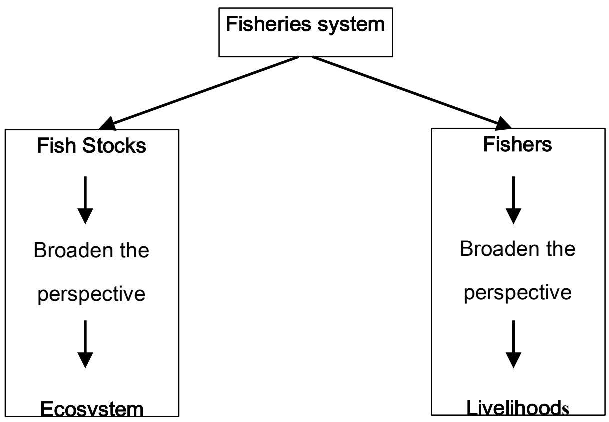


Figure 2.1: The fisheries system approach connected with the other approaches (Charles, 2005 p.225)

In general, the fisheries system approach allows us to include relevant factors affecting and interacting with fishery management from across the fisheries system and beyond. According to Charles, a fisheries system can be described by the component based approach (Charles, 2005). It is composed of three components coherently connected: i) the natural ecosystem covering fish stocks and marine ecosystems; ii) the human system where economic and social activities of the fishing sector and local communities take place; and iii) the management system where common policies and management decisions are produced to influence the socio-economic and the natural systems.

In applying this approach, a number of fisheries system were analyzed more comprehensively (Charles, 2005; Raakjær, 2009). Therefore, issues facing the management system have been recognized holistically and profoundly. This contributes to understanding about dilemma situations and vicious cycle of the fisheries in some developed fisheries (Barkin & DeSombre, 2013; Raakjær, 2009). Application of this approach, Raakjær provided clear explanation on the key factors for problems facing the European Union (EU) fisheries management system including: i) a fragmented fishing industry, leading to a fragmented interest structure in the EU fishing industry, ii) lacking commitment within the Council of ministers to ensuring sustainable fishing, iii) there is a persistent lack of political will in the Council of ministers and the member states to reform the Common Fisheries Policy (CFP), iv) the member states emphasize domestic interests, v) there is an inconsistency between structural policy elements and conservation elements within the common fisheries policy (CFP), vi) the TAC-based management regime is not effective in multi-species demersal fisheries, vii) there is a clash between the ways administrators and fishers view the goals and means of the management regime, viii) attempts to introduce elements of "new modes of governance" have not been successful in the fisheries domain, and ix) the type of co-management introduced has not led to responsible behaviours (Raakjær, 2009).

Kooiman et al. define a framework to analyze a fisheries governance system in an interactive manner (Kooiman et al.,). They see *"governance is the whole of public as well as private interactions that are initiated to solve societal problems and create societal opportunities. It includes the formulation and application of principles guiding those interactions and care for institutions that enable them"* (Kooiman et al, 2005 p.17). Governance is considered to be the most inclusive term, followed by public policy or politics, and by public management or public administration. In the interactive governance perspective, governing activities are brought together in three interrelated categories of human activities. All three orders of governance are needed for effective and legitimate governance of fisheries. This framework for understanding the variety of interactions that constitute governance and how they interact with each other. It focuses on the interactions among actors in a governance system rather than components of a fisheries system, thus it is more suited for examining the developed fisheries where actors and governance principles and rules were established in a fisheries system.

There were analyses on the Vietnamese fisheries. Pomeroy et al. in 2009 reviewed and discussed changes in fisheries policy in Vietnam since 1945. They identified many issues facing the Vietnamese fisheries system including: i) the fisheries law has not been adhered properly to by fishers on one hand, and not enforced comprehensively by government; ii) there is a lack of capacity and resources for government to plan and implement fisheries management; iii) the government policies have focused on increasing production output rather than on sustainable fisheries management; iv) there have been increasing levels of conflicts between small-scale and large-scale fishing vessels; v) the coastal communities are confronted with many problems (e.g. overexploitation of fish stocks in the coastal waters, using destructive fishing methods, a lack of alternative livelihoods, less opportunities to access to credit, etc.). Another research was conducted with application of the sustainable fishery framework (Charles, 1994) which is composed of four components: i) ecological sustainability involves retaining individual stocks and species at levels that do not foreclose future options, and maintaining or enhancing the capacity and quality of the environment; ii) socio-economic sustainability focuses on the generation of sustainable net benefits, appropriate allocation of these benefits among participants, and maintenance of overall viability within local and worldwide economies; iii) community sustainability emphasizes maintaining or enhancing the group welfare of participating and affected communities; and iv) institutional sustainability is related to the manageability and enforceability of fisheries regulations) was made use to examine the effectiveness of the formal institutions in managing the fisheries in Vietnam (Dang et al., 2017). This research argued that the formal institutions of the Vietnamese fisheries have been ineffective in managing the fisheries due to three reasons: i) weak capacity of the government agencies and social-political organizations; ii) fishers' compliance with fisheries regulations is low; and iii) the failure of the fisheries policy in practice (Dang et al., 2017).

FAO identified eight constraints of the Vietnamese fisheries as follows: i) there are too weak knowledge base for managing the fisheries; ii) enforcement of fisheries regulations in limited; iii) demands for trash fish are increasing and becoming a significant source of income for many fishers; iv) overcapitalization is a common feature throughout the waters of the country, and it is aggravated by invasion of bigger vessels into shallow-water fishing grounds; v) vessels and engine repair, and administration, has not kept pace with the development of the offshore fisheries; vi) destructive fishing methods are still used commonly; vii) credit for fisheries is limited and difficult for poor fishers to access to credit programs; and viii) coastal aquatic resources in many regions have been overexploited (FAO, 2004b). This reflects that the fisheries management system is facing with many issues, not only the formal institutions in managing the fisheries as recognized by Dang et al.'s research. This research makes use the fisheries system approach based on the components of fisheries (i.e. management, human, and natural systems) to explore issues facing the fisheries management in Vietnam. This holistic approach is suited for all fisheries, including the small-scale fisheries in Vietnam.

2.3.2 FRAMEWORK FOR ANALYZING THE LOGIC OF FISHERIES OBJECTIVES

In order to sustain long-term productivity of the exploited fish stocks, the United Nation adopted objective of the global fisheries is to keep the fishing level below the MSY (United Nations, 1982). FAO recognized three types of objectives for a fisheries policy: i) abundance of fish stocks is remained; ii) economic viability is maintained; and iii) social concerns are addressed and equity is ensured (FAO, 1983). These are conflicting with each other, for instance, the conservation objective may hinder economic and social aspects due to reducing fishing fleets and employments. This was conceptualized as a framework to look at conflicts in the fisheries management: conservation paradigm, rationalization paradigm, and social/community paradigm – the paradigm triangle (Charles, 1992). The conservation paradigm emphasizes taking care of the fish stocks and marine habitats, so it imposes direct control of total fishing effort, total landings, and technical measures to protect fish stocks and their habitats. Fishers are viewed as components of a predatory fleet in which all fishers act in their own self-interest. To save the fish stock, fisheries management must directly control the fleet, restricting fishing time, fishing location, total effort and/or total catches.

A key conflict in fisheries management is to balance the two objectives of wealth generation and distribution. Society often expresses dual desires to maximize the production created in the fisheries, while at the same time achieving a reasonable distribution of the cake, both now and in the future. The rationalization paradigm emphasizes the first of these two objectives, the pursuit of economic efficiency and increased wealth in the fisheries. The rationalization literature typically assumes that society should seek to maximize fishery rents, comprising economic benefits over and above payments to fishers and vessels. At the same time, the community paradigm focuses on community welfare, distributional equity, and other social and cultural benefits of the fisheries. An emphasis is placed on fishers as members of the coastal communities, rather than as components of a fleet as considered in the conservation paradigm or as individualistic fishing firms in the rationalization paradigm. This paradigm tends to be attractive to fishers' unions, fishing cooperatives, and those living in or involved with fishing communities. However, these groups were underrepresented among the staff and in management initiatives of many government fishery administrations. More recently, there has been an overwhelming interest in this paradigm, and the "advocacy" element in this paradigm is to seek for protect the small-scale fishers seen as being buffeted by economic forces beyond their control. This has contributed to a better understanding of its policy objectives even at the lower levels of the policymaking hierarchy.

Charles (Charles, 2001) recognizes four principal conflict classes of fisheries management as follows:

i) **Fishery jurisdiction:** This category lies at the policy and planning level. It deals with fundamental and philosophical conflicts over fisheries objectives, who owns the fishery, which controls access to it, what is the optimal form of fishery management, and what should be the role played by governments in the fishery system.

ii) **Management mechanisms:** This includes conflicts at the fisheries management level concerning relatively short-term issues arising in the development and implementation of fishery management plans, typically involving fishers/government conflict over harvest levels, consultative processes and fishery enforcement.

iii) **Internal allocation:** This arises among the direct participants in the fisheries system i.e. fishers and processors and related to differing perceptions of appropriate allocation of fisheries access and use rights between different user groups and gear types, as well as among fishers, processors and other players.

iv) **External allocation**: This incorporates the wide range of conflicts arising between internal fisheries players and outside or on the edge of the fisheries system including foreign fleets, aquaculture, and non-fisheries industries such as tourism, agriculture, forestry, etc.

Following this framework, Salayo et al. recognized five categories of conflicts in the Southeast Asian fisheries: i) conflicts in use rights and access (i.e. who controls the fisheries); ii) enforcement of regulations (i.e. how are the fisheries controlled); iii) fisheries group-related disputes (i.e. relations between the fishery users: linguistic, religion, ethnic, scale of fishing); (iv) non-fishery use of fishery resources (i.e. relations between fishers and other users of the aquatic environment: fishing vs. tourism and similar water resource-based industries); and v) non-fishery concerns affecting the fisheries (Salayo et al., 2006). Muawanah et al. set out a typology of intra-institutional conflict in power relations in fisheries management – the fishery village-level conflict (Muawanah et al., 2012). The principal actors that interact in the fishery political marketplace are fishers, environmental advocates, politicians and officials of government agencies. Some of these groups demand and others supply fishery policies and programs. The politico-economic marketplace is biased against conservation, and recommends reforms to counter this bias (Muawanah et al., 2012). In fact, the objective of conservation is commonly prioritized in the fisheries policy in both the developed and developing fisheries (DFO, 2013; European Commission, 2011; Prime Minister, 2006). However, the fishing level is often set up higher than the level suggested by scientists (Quyen, 2012; Raakjær, 2009).

For this research, the Vietnamese fisheries are taken as a case study which are developing fisheries in transition from a centrally planned system to a market-oriented based system, and with a limitation of available data. Therefore, the fisheries system approach is the most suited analytical framework for the Vietnamese fisheries. This approach builds on and incorporates the fisheries facet of the ecosystem-based management approach and the human side of the livelihoods approach. It looks at target fish species and fishing activities within the context of the ecosystem, and in an equivalent manner, and looks at human element in the fisheries system within a larger context of households, communities and the socio-economic environment. Importantly, this approach allows us to encompass relevant factors affecting and interacting with fisheries management from across the fishery system and beyond (FAO, 2005b). The comprehensive adoption of the fisheries system approach will ensure that we take into account impacts of the broader fisheries and coastal system on fisheries management on one hand, and also ensure that the broader consequences of management actions are assessed on the other hand. It may be an important mechanism to move in the direction of improved fishery sustainability and resilience. Following the view of seeing the fisheries as a system, the triangle paradigm (Charles, 1992) with three conflicting aspects: conservation paradigm, rationalization paradigm, and social/community paradigm is used to analyze policy discourses in developing objectives of the Vietnamese fisheries. This is further explained in chapter 3.

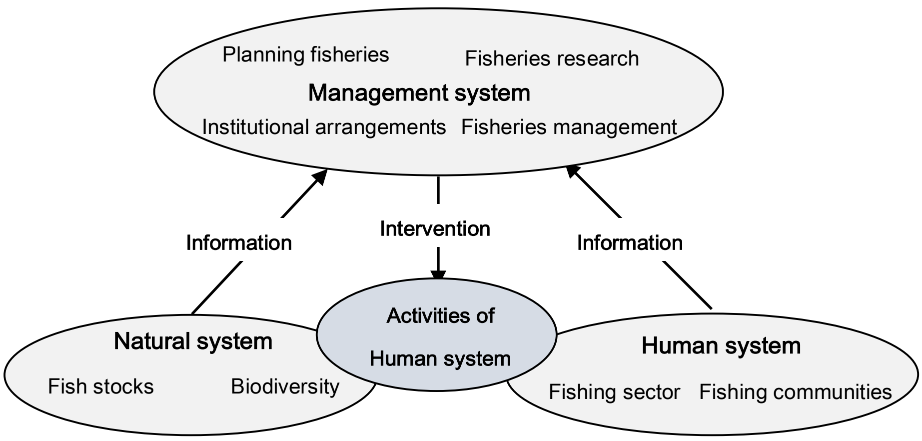
In order examine whether the fisheries planning system is implemented at local levels and influence the fishing communities, this research uses empirical methods and refers to the livelihoods approach to understand fishing behaviour in accommodation with the fisheries regulations and plans of the government. This is further presented in chapter 7. In order to understand obstacle s and factors leading to failure and success of the fisheries co-management in Vietnam, this research applies eleven conditions for viable self-managed, community-based management institutions and co-management (Ostrom, 1990, 1992; Pinkerton, 1989). Also, this research makes use of an approach of three consequent stages for evaluation of adaptive management structure which based on the appropriateness and feasibility (Rist et al., 2013) to explain the failure of the adaptive indicators-based management in the Vietnamese fisheries. These approaches are further illustrated in chapter 8.

CHAPTER 3: RESEARCH METHODOLOGIES

As mentioned in chapter 1, this research is to explain the effectiveness of the fisheries management system in Vietnam. Its starting point is the 2010 fisheries master plan is not implemented in practice. Therefore, this research employs empirical methods based on the observation and experience in the Vietnamese fisheries to draw up evidence explaining the ineffectiveness of the fisheries management in Vietnam.

3.1 CONCEPTUAL FRAMEWORK

The conceptual framework of this research is modified by the framework developed Charles (Charles, 2001) and Raakjær (Raakjær, 2009). This framework is adapted with three main components as the framework used by Raakjær (Raakjær, 2009), but elements of each component are modified to fit with the Vietnamese context as illustrated in figure 3.1. In this framework, three components coherently connected: i) the natural ecosystem covering fish stocks and marine biodiversity; ii) the human system where economic and social activities of the fishing sector and fishing communities take place; and iii) the management system where planning and management decisions of government, based on the information from the others, are produced to influence activities of the human system on the natural systems.



Source: Modified from Raakjær 2009

Figure 3.1: Conceptual framework to analyze the Vietnamese fisheries system

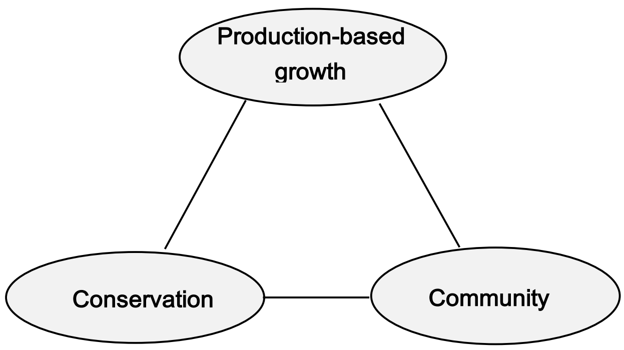
The component of the natural system, information on biodiversity of fisheries resources such as number of species, species composition of catches and it dynamics are presented to understand changes in marine ecosystems (i.e. proportion of species in the food web).

It then examines the state of the exploited fish stocks to understand tendency of fishing level or effects of human system on the natural system. In the component of the human system, human fishing activities are explored to understand dynamics of the fishing pressure of the human system on the natural system. The fishing sector is analyzed in terms of fishing capacity, fish production, economic performance of fleets and consumption of fish production, and the fishing communities are explored through looking at incomes, local organization of fishers, and education level of fishers.

The component of the management system addresses management measures (e.g. limitation of catches, limitation of fishing activities, technical measures) imposed on the human system to maintain the health of the natural system. In this component, four elements: fisheries planning system, fisheries management, fisheries research, and institutional arrangements are explored to understand the ways policy and management decisions to be made. It provides insights into the fisheries planning system within a general socio-economic planning system. It is followed by a description of competent institutions who have authority to decide policies and regulations. In the next section, an analysis on management measures used for controlling fishing activities in Vietnam is presented. Finally, it provides a picture of fisheries research and data collection in Vietnam. Under this framework, based on the available information (e.g. legal regulations, fisheries administrations reports, fish stock assessments, fisheries planning documents) and a frame survey on planning fisheries at the provincial level at 28 coastal provinces, the Vietnamese fisheries system is analyzed in chapter 4 to define challenges facing the fisheries management system in Vietnam. In addition to available information, in-depth interviews with fishers and fisheries managers are also used to clarify the state of fish stocks, fishing fleets and fisheries planning system.

The following chapters will go further to understand the logics of the management objectives of fisheries master plan – a planning tool of the Vietnamese fisheries (chapter 5). In chapter 6, the knowledge inputs to planning fishing level are examined to understand uncertainty of management and development objectives of fisheries planning documents. Going deeper, chapter 7 explores implementation of the fisheries master plan at the local levels, and examines effects of the fisheries planning documents (e.g. fisheries master plan) on the fishing behaviours of the local fishers. In chapter 8, it discovers obstacles to implementing innovative approaches (e.g. co-management and adaptive indicator-based management) to improve quality of knowledge inputs for planning fisheries as well as policy and management decisions.

In order to understand the logics of the management objectives of fisheries master plan, chapter 5 employs a framework (figure 3.2) modified from the paradigm triangle (Charles, 1992) to analyze policy discourses emerging in process of making the 2010 fisheries master plan in Vietnam. The production-based growth paradigm emphasizes an objective of increase in fish landings as well as fishing capacity aligning with general socio-economic development strategies adopted by political arenas (e.g. the National Party Progress, National Assembly) to generate more economic benefit and job opportunities for society. The conservation paradigm advocates protection of fish stocks and marine ecosystems. It follows the MSY approach to limit the fishing levels to remain the sustainable capacity of fish stocks. This opposes with the production-based growth paradigm when fish stocks were fully exploited or overexploited. The community paradigm champions the welfare, equity and social and cultural values of fishing communities. Generally, it promotes the objectives of generating welfare for society of the production-based growth paradigm. However, it tends to protect the traditional small-scale fishing communities who are vulnerable to loss livelihoods due to invasion of the larger scale vessels resulting from enlarging fishing capacity programs of the production-based growth paradigm.



Source: Modified from Charles 1992

Figure 3.2: The linkages among objective paradigms of a fisheries policy

In chapter 5, official documents, in combination with manuscripts of in-depth interviews with actors taking part in making the 2010 fisheries master plan and direct observation are used to understand policy discourses and logics of management and development objectives of the Vietnamese fisheries.

Analyzing the knowledge inputs used for planning fisheries, chapter 6 follows the conceptual framework for assessing knowledge co-production (Enengel et al., 2012) with modification to fit with this research. The framework composed of three components (figure 3.3): i) kinds of knowledge, ii) types of actors, and iii) production of knowledge to analyze what types of actors contributed what kind of knowledge for planning fisheries in Vietnam. The component of knowledge types addresses three dimensions of knowledge: i) scale dimension examines specific context and universal validation of knowledge types used for planning fisheries in Vietnam; ii) functional dimension look at capability to explain specific phenomena and connect with other elements in a system; and iii) epistemic dimension investigates degree that knowledge is validated (i.e. experiential knowledge, scientific knowledge).

The component of actor kinds investigates roles of four categories of actors involving into the process of producing knowledge: i) core scientists, who are the main scientific actors throughout the course of producing knowledge including collecting, processing, analyzing data, presenting and communicating results; ii) scientific consultants, who provide consultations for defining the research goals and developing research design, and also provide evaluation of the research results; iii) professional experts, who participate in formulating research design, selecting methodologies, analyzing data, structuring problems, and presenting results; iv) validation actors, who are the leaderships of research institutions and/or sectors being accountable for knowledge (i.e. information) under their management authority. The component of knowledge production explores 6 main steps of producing knowledge including: i) identification of problem; ii) research design and selection of methods; iii) data collection; iv) data analysis; v) reflection/interpretation and synthesis; vi) consultation and validation of knowledge.

In this chapter, the following data are used: i) available official documents regulating types of knowledge inputs for planning fisheries; ii) research and administration reports related to the knowledge types used for planning fisheries; iii) fisheries planning documents; and iv) manuscripts of interviews with actors (i.e. fisheries scientists, managers, experts, GSO staff) as well as direct observation of producing knowledge inputs for planning fisheries in Vietnam.

In chapter 7, it investigates implementation of the fisheries master plan (i.e. a planning tool) at local levels on one hand, and examines factors influencing on the fishing behaviours of the local fishers on the other. Doing this, two communal fisheries are selected as case studies to investigate how their fisheries plan is made and how they influence the fishing communities. The fishing behaviours of fishers are exhibited by their strategic decisions and tactical decisions. The strategic decision is made by the vessel owners related to investments in building and repairing vessels, installing electronic and mechanical equipment, and fish preservation systems. It comes up with the scale of vessel, gears used, fishing zone. Meanwhile, the tactical decisions are often made daily by skippers at sea to define places, fishing time, gears used, number of days at seas, etc. to maximize their catches. In some cases, the tactical decisions not only are independently made by the skippers but also consulted with the vessel owners.

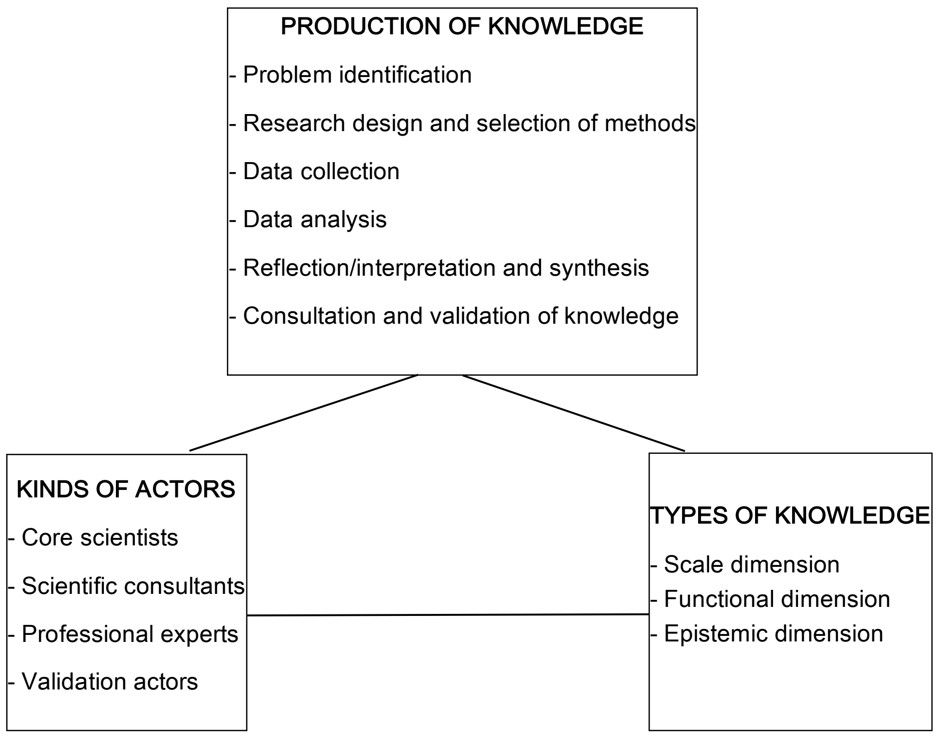


Figure 3.3: Conceptual framework for examining the knowledge inputs for planning fisheries in Vietnam

Fishing decisions are personally made by fishers (i.e. skippers and/or vessel owners) related with their own fishing business such as where and when to go fishing, what species would be targeted, which fishing gears would be employed, and what scale of vessel would be invested. These decisions often rely on the personal experience, practical conditions on resources, weather; market information; fisheries regulations (Christensen & Raakjær, 2006). Therefore, each fisher may decide differently on the same situation. In order to explain this, the following data are used: i) available official documents (e.g. fisheries plans, fisheries administration reports, statistic data of two communes selected; ii) manuscripts of in-depth/group interviews with local managers and informants and local fishers of two communes selected; iii) questionnaires with local fishers of two communes selected.

Chapter 8 focuses on investigation of implementing the co-management and the adaptive indicator-based management structures in the Vietnamese fisheries. For the co-management arrangement, this research uses 11 key conditions for viable fisheries co-management defined by Ostrom and Pinkerton (Ostrom, 1990, 1992; Pinkerton, 1989) to analyze fisheries co-management models in Vietnam (see more detailed in chapter 8).

To do this, some fisheries co-management models are selected as case studies, and the following data are used: i) profile of the selected fisheries co-management models, ii) available official documents related to co-management in Vietnam (e.g. legal regulations, decisions of local government); iii) research reports and publications on fisheries co-management in Vietnam; iv) manuscripts of in-depth interviews with fishers, fisheries managers and experts; and v) direct observation of implementing fisheries co-management at various levels (e.g. formulating regulations, providing consultations, implementing co-management models in practice).

For the adaptive indicator-based management structure, this research uses the conceptual framework of three aspects (Rist et al., 2013) to understand failure of this structure: i) appropriate to reduce ecological uncertainty, ii) feasible to the actual management context, and iii) the success of its application. However, this structure has no longer implemented in Vietnamese fisheries. Therefore, it is impossible to evaluate its appropriateness to reduce ecological uncertainty and the success of its application. This research only examines the feasibility and the appropriateness in terms of the perspective in order to understand causes of unsuccessful application of this structure into the Vietnamese fisheries context. To do this, the following data are used: i) available official documents on institutional arrangements of the fisheries administration of Vietnam; ii) research reports in fisheries resources and fisheries of Vietnam and international literature on adaptive management of fisheries resources; iii) manuscripts of in-depth interviews with fisheries managers and scientists who took part in implementing this structure; and iv) direct observation of implementing this structure in practice.

3.2 RESEARCH METHODOLIGY

This research uses the case study approach in combination with the mixed methodology (i.e. qualitative and quantitative methods). The general research methodology of this research as shown in figure 3.4.

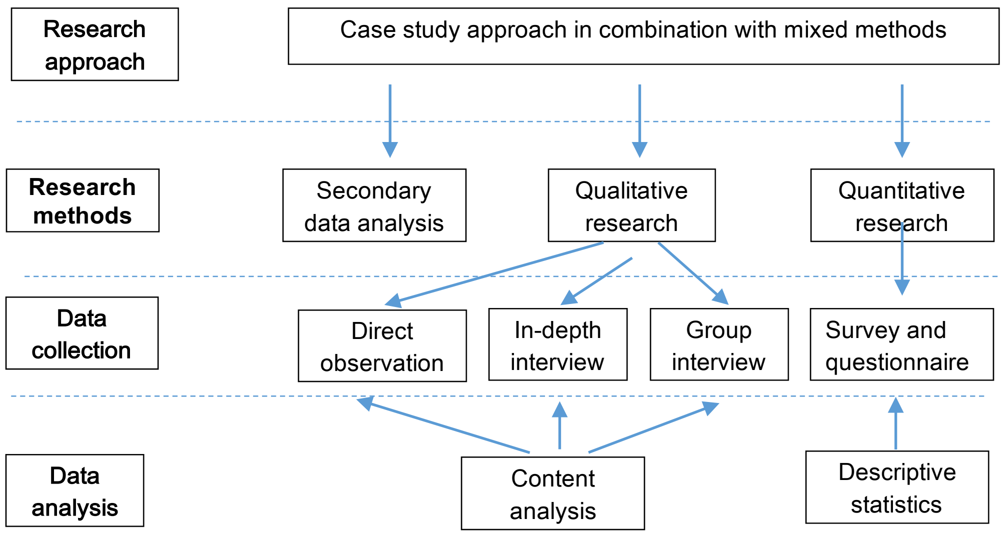


Figure 3.4: Research methodologies of this research

3.2.1 RESEARCH APPROACH

3.2.1.1 Case study approach

The case study approach allows intensive description and analysis on both the single units and a bounded system (Smith, 1978). In this approach, comments, ideas, perceptions and point of views of informants are acknowledged and respected equally. The case study is used to describe a process, to explore factors affecting a process and outcomes, and explain causes behind failures of outcomes and a process (Yin, 2009). This approach is chosen because the aim of this research is to explore and understand complex system i.e. different views of various stakeholders on processes of planning fisheries. This approach was used for addressing all research question of this research.

3.2.1.2 Choosing cases study

For chapter 4, in order to understand the current situation of the Vietnamese fisheries system. Coastal provincial fisheries are selected as case studies with the following criteria:

i) Having different fishing patterns, customs and diversity of the fisheries e.g. including off-shore and coastal fishing fleets, fisheries of catching demersal and pelagic species.
ii) Having different fishing behaviours within different regions e.g. the north, central and south regions.
iii) Having different conditions on natural environment and fisheries resources.

Based on these criteria, 14/28 coastal provincial fisheries were selected including: Quang Ninh, Hai Phong, Thanh Hoa, Nghe An, Thua Thien-Hue, Binh Dinh, Phu Yen, Khanh Hoa, Binh Thuan, Vung Tau, Tien Giang, Ben Tre, Ca Mau, Kien Giang to explore the current situation of the fisheries system. They also were used to examine the state planning system in terms of the vertical dimension. Moreover, fisheries managers in these cases were also selected to be interviewed within other research questions.

For chapter 5 and chapter 6, they look at the logics and knowledge inputs for developing development and management objectives of the Vietnamese fisheries. The 2010 fisheries master plan and fisheries planning documents in 2001-2010 are selected as case study to explain the process of planning fisheries and to examine knowledge inputs planning fisheries in Vietnam. This was selected because: i) this is the first time the master plan introduced into the planning system of government; ii) the 2010 fisheries master plan was first time developed in a context of emerging conflicting policy discourses in fisheries; iii) the planning circle was ended, so it would enable author to evaluate.

For chapter 7, it looks at implementing the 2010 fisheries master plan at the local levels. Legally, the Vietnamese fisheries administration system is arranged at four levels (i.e. the national, provincial, district, and communal levels). Off these, government at the communal level is in charge of implementing and enforcing the fisheries policies and management measures decided by the national and provincial levels. According to Chinh (Chinh, 2006), there were 628 coastal communes in all 28 coastal provinces where fishing vessels were registered. This means that there were 628 communal fisheries existing in Vietnam. However, they share the main characteristics of the Vietnamese fisheries as summarized in box 3.1.

Box 3.1: The main characteristics of the Vietnamese fisheries

The Vietnamese fisheries are characterized as the multi-gear and multi-species fisheries. Each vessel employs various gears to catch specific species and/or group of species depending on the fishing grounds and seasons. The investigation in eight provinces shows that small vessels of less than 90 HP in engine capacity are not migratory far from their home port, although they change the gears used to catch different species seasonally. Meanwhile, the bigger vessels often migrate among fishing grounds and use appropriate gears to catch different species such as tuna, squids, demersal fish and pelagic fish. Vessels may change the gears to catch other fish in the same fishing grounds or change the gears and move to other fishing grounds to catch other fish. For instance, trawlers in the north region use trammel net to catch shrimps and cuttlefish in the Northeast monsoon in the same fishing grounds. The tuna long liners in the central region usually use the hand line or falling net to catch squids in the south fishing grounds in the Southwest monsoon.

In fact, a vessel may change the gears to catch other species in the same fishing grounds depending on the monsoons. They also change the gears and move to different fishing grounds to catch other fish. For instance, a vessel in the central region uses the purse seine net in the Northeast monsoon to catch small pelagic fish and uses the bottom gill net in the Southwest monsoon to catch the demersal fish. The fishers in this region may use the long line to catch tuna in the Northeast moon soon and use hand line to catch squids. A vessel in the south regions uses bottom trawl net to catch demersal fish in the Southwest monsoon and uses hand line to catch squids. Similarly, in the north region, a vessel uses concurrently the falling net catching squids and small pelagic fish and the hand line catching squids and demersal fish. They also employ trawl net to catch demersal fish in the Northeast monsoon and use gill net/traps to catch fish, swimming crabs, snails, etc.

In conclusion, the Vietnamese fishing fleets often change their gears appropriately with targeting species. They operate within a specific area or move to other areas depending on the size of vessels and gears used. The bigger vessels are the more migratory

Due to limitation of time and resources, this research selects two communal fisheries as the case studies based on the 5 following criteria:

i) To present the migratory characteristic of fishing vessels. Cases selected include fishing vessels which are migratory and non-migratory far from their traditional waters/home ports.

ii) To present the characteristic of changes in gears to catch alternative species by seasons. Cases selected have fishing vessels changing their gears by seasons to catch different targeting species.

iii) To have dominant fishing fleets of the offshore and the coastal vessels. Communes selected have different scales of fishing vessels operating in the offshore waters and in the coastal waters.

iv) To have different targeting species/group of species. Cases selected have fishing fleets targeting different species/group of species e.g. demersal and pelagic species living in coastal and offshore waters.

v) To have different fishing patterns and customs. Cases should be selected to present fishing patterns and customs of various regions e.g. north, central, and the south regions.

Based on these criteria, the communal fisheries of Quynh Lap and the communal fisheries of Tam Quan Bac were selected. In Quynh Lap, the trawl fishery is dominant and presents for the less migratory fleets of small-scale fisheries operating in the coastal waters. It also presents for the fishing patterns and traditional customs in the north. In Tam Quan Bac, the tuna line fishery is dominant and presents for the more migratory fleets of lager scale fisheries operating in the offshore waters. It also presents for the fishing patterns and traditional customs in the south. The background and context of these cases are presented in the chapter 7.

For chapter 8, it explores implementation of innovative management approaches (i.e. co-management and adaptive indicators-based management structures) in Vietnamese fisheries. For the adaptive indicators-based management structure, it only was introduced and piloted within a DANIDA project in 2003-2012, and was disappeared after ending the project in 2012. Therefore, this research takes this as the case study. For the co-management structure, there have been 38 fisheries co-management models implemented in Vietnam (Anon, 2009; VIFEP, 2014). All of them have been funded by the international donors. Some of them have still existed after ending external supports, but most of them were collapsed soon after external supports ended. Cases would be selected based on the following criteria:

i) Being conducted for the marine capture fisheries in different fishing patterns and customs e.g. the north, central and south regions.
ii) Providing different services and livelihoods for the local communities e.g. harvesting different species and getting profits from services produced by the models.
iii) Providing different magnitude of success and failures. Cases have still persisted and disappeared after the external supports (e.g. finance and expert supports.
iv) Being documented or investigated by previous researches and located in place of easy to access.

Based on these criteria, six fisheries co-management models were selected. Their general information is shown in table 3.1.

Table 3.1: The general information of fisheries co-management models

No.	Location of models	Year of establishment	Objectives	Donors	Existing situation
1	Phu Long in Hai Phong city	1995	Control access rights to fish in the commune waters	German NGO	Already collapsed
2	Quynh Lap in Nghe An province	2007	Control access rights to fish in the commune waters	DANIDA	Operating under funding from WB from 2014
3	Vinh Giang in Thua Thien-Hue province	2007	Control access rights to fish in the commune waters	DANIDA	Good (operating by Fisheries Association)
4	Nhon Hai in Binh Dinh province	2007	Control access rights to fish in the commune waters and protect lobster stocks	DANIDA	Operating under funding from WB from 2014
5	Ran Trao in Khanh Hoa province	2000	Control fishing activities in the Ran Trao coral reef to protect fisheries resources and sea grass	IMA	Good

No.	Location of models	Year of establishment	Objectives	Donors	Existing situation
6	Thanh Phong in Ben Tre province	2007	Control access rights to harvest clam stocks in the communal waters	DANIDA	Not working (access rights are not controlled)

3.2.2 DATA COLLECTION METHODS

Data collection was conducted in two main phases: 2009-2012, and 2013-2017. In the first phase, collection of the secondary data, frame surveys and interviews with relevant stakeholders were conducted; and in the second phase, some secondary data and interviews were updated, verified, supplemented; and interviews with new informants and questionnaires were conducted in order to address the research questions after the research plan was updated. In addition, the direct observations were also conducted in 2009-2015, and also recalled since 2003 when consultation meetings for the 2010 fisheries master plan had been conducted.

The sequence of data collection was conducted as follows:

i) The secondary data was conducted firstly to provide an overview of the fisheries system and guide to further sources of data.
ii) A frame survey at 28 coastal provinces and informal interviews with fisheries managers, scientists were carried out to get more detail information about the fisheries system at the national and provincial levels. It provides information about the fishing industry, fishing communities, management system, planning system at the provincial level to design research methods, select methods of collecting data, select interviewees, design interview questions.
iii) Conducting in-depth interviews and group interviews with fisheries managers, experts, scientists, local fishers and informants in combination with the direct observations to understand points of view of different stakeholders and build more knowledge of the research topics. This also provided basis for design questionnaires.
iv) Questionnaires were conducted with local fishers to understand their fishing behaviours and rank factors influencing on fishing decisions of the fishers.

The survey, interviews and informal talks were conducted face-to-face, email, skype, messenger, and telephone. The methods used to collect data and number of interviews, surveys, questionnaires for each research questions are presented in the following sections.

3.2.2.1 Secondary data collection

Two types of secondary data and documents were collected and analyzed to form foundations and knowledge for addressing research questions. Firstly, the official documents being in effect were collected, including:

i) Ten political solutions adopted by the National Party Congress;
ii) The National Constitution 1992, 2013; fisheries laws 2003; and ordinance of fisheries resources development and protection adopted by National Assembly in 1989;
iii) Eight decrees issued by Government of Vietnam regulating the planning system and the fisheries;
iv) Nineteen decisions and directives made by Prime Minister, Chair of Provincial People Committee on planning and managing fisheries at the national and provincial levels;
v) Fourteen circulars, directives, decisions issued by Minister of MOFI/MARD to manage the fisheries.

They are delivered within the administration system of the fisheries as well as uploaded in the websites of MOFI/MARD. They were used to analyze structure, institutional arrangements, interactions, policy/planning system, regulations, administration, and development orientations of the Vietnamese fisheries.

Secondly, a series of reference documents including: i) journal articles on fisheries management; ii) scientific and research reports on Vietnamese fisheries; iii) administrative reports of the Vietnamese fisheries administration system; iv) fisheries and socio-economic planning documents in 1990-2016 of the national level and in fisheries selected as case studies; and v) statistical data in total fish landings, fishing vessels, and fisheries socio-economic published by GSO. The international journal articles were published in books or online, so author can access to in library or electric version from online library of university.

For the data in Vietnamese, they are delivered freely in the administration system, or downloaded freely from the competence institutions' websites.

3.2.2.2 Frame surveys

The frame surveys were conducted in MARD (DECFIFREP and Planning Department) and 28 coastal provinces to collect data and information about fisheries management (e.g. fishing fleets, total fish landings, fisheries planning documents) at national and provincial levels to build up a foundation for further investigations. The frame surveys were also conducted in RIMF and VIFEP to combine scientific reports, fish stock assessments, fisheries socio-economic data which are the knowledge base for planning fisheries. The frame surveys are conducted by telephone and email. The author as a manager in the fisheries administration is familiar with the local fisheries managers. Therefore, he is able to contact with and ask provincial fisheries managers to provide fisheries planning documents as well as fisheries administration reports of the province.

3.2.2.3 In-depth interview

In-depth interviews were conducted with fisheries stakeholders. Interviewees (i.e. fisheries scientists, managers at national and provincial levels, experts from NGOs, and local fishers/informants) were selected including people who were associated with making the 2010 fisheries master plan; understanding about local fishers' behaviours and customs; implementation of the fisheries co-management models and adaptive indicators-based management structure introduced by projects funded by DANINA in 2003-2012.

Totally, 94 persons (04 scientists from RIMF and VIFEP; 04 managers from MARD; 02 experts from VINAFISH, Vietnam WWF; 54 fishers and 6 informants in fishing communities; 04 staff working for GSO at the provincial level; 14 managers from 14 selected provinces) were interviewed with the main open-end questions related to process of fisheries management. Four scientists and 04 managers from MARD (02 from DECAFIREP and 02 from Planning Department) selected because they participated directly in making the 2010 fisheries master plan. An expert from VINAFISH was selected to represent its memberships - the fishers, and one from Vietnam WWF to represent environmentalists. Three fishers per province were selected by criteria: i) having much experience on his fishing business; ii) understanding well about his fishing communities; iii) living in different fishing communities and using different fishing gears. In two communal fisheries of Quynh Lap and Tam Quan Bac, twelve fishers (six per each commune) were selected randomly with different ages and fishing experience, and six informants (03 per each commune) who have the best understanding about their fishing communities in terms of history, traditional values, fishing patterns and fishing behaviours were selected to interview. The 14 local managers are the head of Sub-DECAFIREP or deputy director of DARD of 14 selected provinces were interviewed. And six representatives from 6 fisheries co-management models are interviewed.

For fisheries scientists, experts, managers, the author made an appointment by telephone or email first, then came and discussed according to topics prepared in advance. For local fishers and informants, they are suggested by 3-4 local fishers with the above criteria. Then author visited them at home and made an appointment to conduct interview. Each person may be asked more than once at any time to provide their perspectives and discussions on specific research topics by face-to-face, telephone, messenger, skype, email. Depending on the research topics, interviewees and questions were asked respectively as illustrated in appendix 1.

3.2.2.4 Group interview

Group interview method was used to investigate perspectives of local fishers' groups related to research topics in chapter 7 and 8. They were conducted after the frame surveys and in-depth interviews to refine and deepen information collected individually through discussions and interactions among fishers.

In chapter 7, six group interviews at 6 fishing villages in two communes (Quynh Lap and Tam Quan Bac) were conducted. Each group is composed of 07-12 fishers in the same area. These fishers are invited under suggestion of fishers to be a fisher' house, then author guides them to discuss according to topics prepared in advance as follows:

i) What factors influence the daily decisions on fishing business (when, where, how, what species to fish in fishing trips), where they come from? How are they ranked?

ii) What factors influence the investment decisions on fishing business (targeting species, gears used, scale of business, equipment) where they come from? How are they ranked?

In chapter 8, one group discussion was carried out with 09 representatives from fisheries co-management models of Phu Long – Hai Phong, Quynh Lap – Nghe An, Vinh Giang – Thua Thien-Hue, Quang Thai – Thua Thien-Hue, Cu Lao Cham – Quang Nam, Nhon Hai – Binh Dinh, Ran Trao – Khanh Hoa, Thanh Phong – Ben Tre, Cai Doi Vam – Ca mau to identify and compare successful implementation of co-management arrangement in their communities.

- **i)** Why the co-management models were established?
- **ii)** How are they organized and linked with fisheries authorities and other fisheries interest groups?
- **iii)** What are their objectives? Do they achieve objectives?
- **iv)** Are they successful or failed? Why?
- **v)** What are obstacles to implement the co-management in the local context?

3.2.2.5 Direct observation

The author used to work as researcher in RIMF from 1997-2004, as a fisheries research manager in MOFI/MARD from 2004-2015, and as a fisheries manager in D-Fish since May 2015. He was also a member of Marine Fisheries Specialist Team to support for the adaptive indicators-based management structure and of the team developing the strategy of implementing fisheries co-management in Vietnam. Therefore, he has conducted and participated directly in meetings, individual talks, and workshops with fishers, fisheries managers, and scientists about fishing patterns and fisheries socio-economic conditions at local communities. He also took part in committees to evaluate of stock assessments results and fisheries research projects; teams of formulating fisheries policies and regulations. Especially, he participated directly in working agenda of Marine Fisheries Specialist Team such as training courses, preparing multidisciplinary assessments, providing technical assistance for provinces of Nghe An and Ben Tre to facilitate the adaptive indicators-based management at the provincial level. He also involved in analyzing achievements, challenges and suggesting the ways forwards to application of fisheries co-management in Vietnam. In addition, he was also invited to provide consultations and meetings on developing the 2010 fisheries master plan, to review this master plan, and to make the fisheries mater plan by 2020. This gave him continuous storylines and discourses in managing fisheries in Vietnam, and producing knowledge inputs for planning and managing fisheries in Vietnam.

3.2.2.6 Questionnaires

Questionnaire method was used in chapter 7 to identify and evaluate importance of factors influencing on the fishing tactical and strategic decisions of the local fishers. It was carried out after the in-depth and group interviews with local fishers completed, when the factors influencing on fishers' decisions were identified and generalized within the communal context. The structure of the questionnaires was designed as shown in appendix 2. The total vessels registered in Quynh Lap and Tam Quan Bac communes in 2014 was 1,121 vessels, among of them, there were 584 tuna long-liners in Tam Quan Bac commune and 140 trawlers in Quynh Lap commune. This research conducted interviews (through questionnaires) with 242 owners/skippers (194 and 48 owners/skippers in Tam Quan Bac and Quynh Lap respectively) randomly selected from the list of vessel owners provided by the CPC of Quynh Lap and Tam Quan Bac communes. Nearly a quarter of questionnaires were filled up by face-to-face interview between author and fishers, the rest were filled up by individual fishers.

3.2.3 DATA ANALYSIS

Secondary documents were classified into 6 general folders including: i) legal regulations on planning system; ii) legal regulations on managing fisheries; iii) fisheries policies; iv) planning documents and fisheries planning reports; v) fisheries research and fish stock assessments reports; and iv) statistic data on fisheries. The information from individual interviews group discussions were written down according to specific research topics in separate notebooks as manuscripts. Information in 242 questionnaires were directly written on questionnaires by author or by fishers. Information from all methods was categorized into 13 different topics matching with 13 research sub-questions of the research articulated in chapter 1.

The information in questionnaires is encoded into and analyzed by Microsoft Excel to rank factors influencing most on the fishing decisions of local fishers. For information form secondary documents, they are reviewed to locate data and information related to 13 research sub-questions. This information then put into the 13 separate folders.

For interview data (i.e. group and individual interviews), they are stored separately by research questions, then they classified into guidance questions of each research topics as shown in appendix 1. For each guidance question, the data are analyzed in 6 steps: i) organizing and preparing the data. This involved sorting and arranging the data by source of information, and taking note as the headlines; ii) reading through all the data to obtain a general sense of the information and reflect on its overall meaning; iii) sorting the data by content according to the research conceptual framework; iv) generating a description and themes based on research topics sorted; v) presenting the descriptions and findings of analysis with illustrations such as quotations, pictures, stories; and vi) interpreting the data based on the findings and comparison between findings and literature.

CHAPTER 4: THE FISHERIES SYSTEM IN VIETNAM

4.1 INTRODUCTION

In order to identify and understand issues facing the fisheries management system, this research uses the fisheries system approach (Charles, 2001) to analyze the Vietnamese fisheries system. This approach looks at the fisheries system in three components connected coherently: i) the natural ecosystem covering fish stocks and marine ecosystems, ii) the human system where economic and social activities of the fishing industry and local communities take place, and iii) the management system where the state policies/planning and management decisions are produced to influence the human and the natural systems. The common policies may help to secure the sustainability of fisheries, and balance conflicting biological, social, economic objectives and demands for fish consumption of the present and the future generations. In order to contribute to the understanding issues of the Vietnamese fisheries, this chapter deals with the following questions: i) What is the situation of the natural system (fish stocks and marine biodiversity? ii) What is the situation of the fishing industry and the local fishing communities? and iii) How is the fisheries management system organized?

The chapter is composed of four main parts. Firstly, it describes the current understanding of the Vietnamese fisheries resources with focusing on the available fish stock assessments. Secondly, the fishing industry is depicted based on the available information on fishing fleets, fish landings, economic performance of fleets and consumption markets. Thirdly, the local fishing communities are described in terms of income, living standard of local fishers, and the fishers' structures at the local communities. Fourthly, it analyses the fisheries management system in four main aspects: planning system, rules and legislation, decision-making authorities, and fisheries research and data collection in Vietnam. Finally, the chapter identifies the main issues facing the fisheries management system in Vietnam.

4.2 THE NATURAL SYSTEM

4.2.1 MARINE BIODIVERSITY IN THE VIETNAMESE WATERS

The Vietnamese marine water are located in the tropical climate zone, coordinates $06^{0}00$N to $21^{0}00$N and $103^{0}00$E to $116^{0}00$E with an area over 1.0 million square kilometers (figure

4.1). It is assessed as one of the most abundant biodiversity areas in the world. According to scientific surveys in 2011-2015 (RIMF, 2017), 1.081 species were identified in the Vietnamese EEZ. There is no remarkable change in number of species in comparison to surveys conducted in 1996-2005. The surveys conducted in 1996-2005 by bottom trawling recognized more than 900 species of 10 main ecological groups (Ha et al., 2010) as illustrated in table 4.1. Almost all of them are small size, fast growing and have high productivity, short lifespan and widespread distribution (Thanh, 2009). Their distribution varies among areas and seasons (Ha et al., 2005; RIMF, 2014).

Fishing activities cause negative impacts on the marine biodiversity and ecosystems (Dayton et al., 2002; Jennings & Kaiser, 1998). They create changes in the food-web structure and downscale of the trophic level of marine ecosystems. In the last two decades Vietnamese fishers have focused on fishing valuable species (e.g. shrimps, squids, groupers and snappers) leading to changes in biodiversity in marine waters. Some species such as *Ilisha elongata*, *Otholithes biaurius* disappeared and others species (e.g. snappers and groupers) depleted seriously in the Vietnamese EEZ (Thi, Ha, & Thong, 2005). Furthermore, the proportion of shrimp, top predator species, high value species (e.g. grouper, shark, squid, mackerel, snapper, etc.) in total catches of the commercial fisheries declined critically, while the proportion of low value fish (e.g. ray-finned fishes, pony-fishes etc.) increased as observed in 2000-2015 (Ha et al., 2005; RIMF, 2017; Vinh, 2006). The number of endangered species seemed to increase gradually from 135 species in 1996 (Anon, 1996) to 236 species in 2008 (MARD, 2008b).

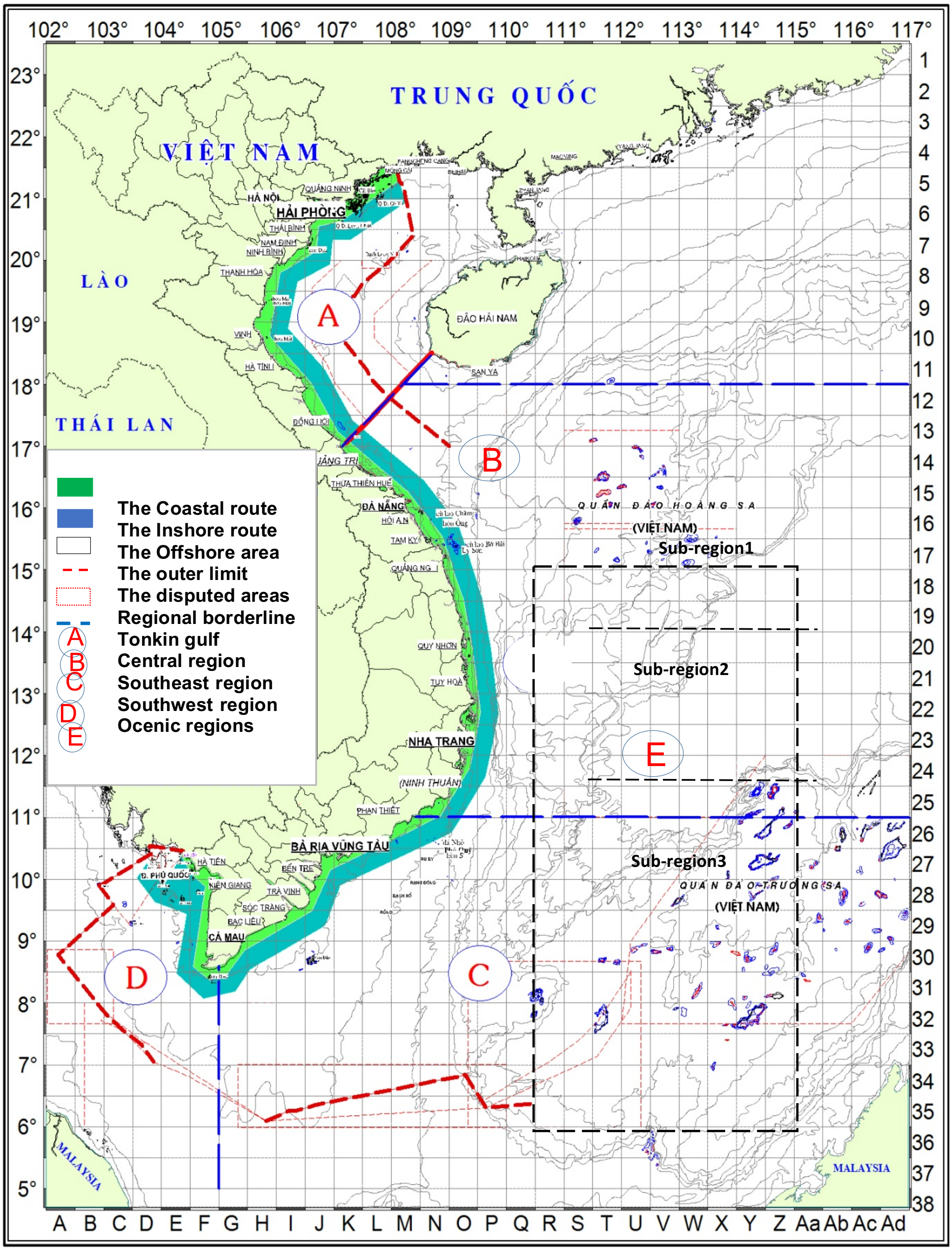


Figure 4.1: For stock assessment, the Vietnamese marine waters are divided into four regions: Tonkin Gulf, Central region, Southeast region, and Southwest region. Each region is further divided into coastal areas (inshore and coastal routes) and offshore area/routes. The stocks of oceanic migration fish were sometimes assessed separately in the oceanic regions (RIMF, 2014b).

Table 4.1: Number (N) of species caught by bottom trawl surveys in 1996-2005 in Vietnamese marine waters (Ha et al., 2010)

Ecological groups	Tonkin Gulf		Central region		Southeast region		Southwest region		All regions	
	N	%	N	%	N	%	N	%	N	%
Bathydemersal	5	1.0	18	3.8	16	2.4	2	0.5	**24**	**2.6**
Bathypelagic	2	0.4	5	1.1	4	0.6	1	0.2	**5**	**0.5**
Benthopelagic	30	5.7	33	6.9	40	6.0	32	8.0	**62**	**6.6**
Cephalopods	23	4.4	18	3.8	24	3.6	21	5.2	**32**	**3.4**
Crustaceans	51	9.8	38	8.0	51	7.6	53	13.2	**88**	**9.4**
Demersal	207	39.6	197	41.5	249	37.2	136	33.8	**357**	**38.1**
Horseshoe crab	2	0.4	1	0.2		0.0		0.0	**2**	**0.2**
Mollusks	4	0.8	2	0.4	2	0.3	2	0.5	**4**	**0.4**
Pelagic	63	12.0	40	8.4	72	10.7	53	13.2	**101**	**108**
Coral reef fish	136	26.0	123	25.9	212	31.6	102	25.4	**263**	**28.0**
Total	**523**	**100.0**	**475**	**100.0**	**670**	**100.0**	**402**	**100.0**	**938**	**100.0**

In addition to this, the proportion of trash fish (including low value species, small fish and juveniles) in the fish landings seemed to increase and accounted for 50-60% of the total landings of the commercial fisheries in Vietnam (FAO, 2004b). This proportion was particularly high for the shrimp trawl fishery, fish trawl fishery, stow net fishery, push net fishery taking at 60-80%, 40-80%, 90% and 90-93% respectively (Cuong, 2006). The rate of juvenile and undersized fish caught by commercial fisheries is also high. It accounted for about 22.5% of the total landings of commercial fisheries (Lung, 2010). This made a change in the population structure of the marine fish stocks in Vietnam. The rate of the demersal fish in total standing biomass declined from 37% in 1990 (Chung, 1990) to 30% in 2000-2005 (Nghia, 2007) and to approx. 14.7% in 2011-2015 (RIMF, 2017). This demonstrates that the current fishing patterns make a clear change in fish population and marine ecosystem structure in Vietnamese marine waters. The demersal fish stocks having longer life span and slow growth have depleted gradually in over the last two decades.

4.2.2 FISH STOCKS

4.2.2.1 State of fisheries resources

Fish stock assessments are implemented by Research Institute for Marine Fisheries (RIMF) in different scales, areas and limitations depending on the purpose of the specific investigation. In the assessment process, RIMF has not defined any reference points for the biomass of fish stocks or spawning stock biomass or the fishing mortality for particular species as done in other fisheries. Instead, fish stock assessments are normally conducted to estimate the standing biomass (B) and exploitable potential yield (EPY) for the combination of all species within specific regions, exception of specific projects conducting for specific species. The B is understood as the total weight in tons of all fisheries resources can be caught by fishing gear at a given time, and the EPY is often estimated as approx. 50 % of the standing biomass and understood as the volume of fish can be available to fish (see the way to calculate B and EPY in chapter 6). Consequently, the outputs of the fish stock assessments are normally presented in two figures of B and EPY. These figures are just the temporary state of combination of all species at the specific surveys. Therefore, based on this the fisheries managers may know a general trend of the fisheries resources in specific regions, but do not know the real state of individual fish stocks.

According to RIMF (RIMF, 2017), the standing biomass of fisheries resources in Vietnamese marine waters in 2011-2015 was about 4.364 million tons, decreased (nearly 16%) in comparison to period of 2000-2005 (table 4.2). This is able to provide the EPY of around 2.447 million tons per year. Table 4.2. shows that the biomass of most ecological groups in 2011-2015 decreased in comparison to period of 2000-2005. In more detail, the biomass of demersal fish went down in all regions. However, the biomass of the small pelagic fish in 2011-2015 increased in comparison to period of 2000-2005 in Tonkin Gulf, Central region and Southeast region.

However, in a longer time-series data on estimations of the B and the EPY also demonstrates an overall trend of increase in the fisheries resource in Vietnamese marine waters in period of 1993-2015 (figure 4.2). They increased in 1997-2007 and reached a peak in 2007-2010, and then they dropped in 2013 and got a light increase in 2015.

Table 4.2: The state of fisheries resources in the Vietnamese marine waters in 2011-2015 (RIMF, 2017)

Regions	Ecological groups	Route	B (x1000tons) in 2000-2005	EPY (x1000tons) in 2000-2005	B (x1000tons) in 2000-2005
Tonkin Gulf	Small pelagic fish	Coastal	172.2	103.3	
		Inshore	219.7	131.8	
		Offshore	234.2	140.5	
		Total	*626.0*	*375.6*	*433.1*
	Demersal fish	Coastal	30.2	15.1	
		Inshore	38.5	19.3	
		Offshore	41.1	20.5	
		Total	*109.8*	*54.9*	*153.3*
	Crustaceans		20.3	10.2	
	Coral reef fish		0.7	0.4	
	Sub total		***756.9***	***441.0***	
Central area	Small pelagic fish	Coastal	49.0	29.4	
		Inshore	113.1	67.9	
		Offshore	454.3	272.6	
		Total	*616.4*	*369.9*	*595.5*
	Demersal fish	Coastal	40.1	20.1	
		Inshore	92.5	46.3	
		Offshore	118.4	59.2	
		Total	*251.0*	*125.5*	*592.2*
	Coral reef fish		0.8	0.4	
	Sub total		***868.2***	***495.7***	
Southeast region	Small pelagic fish	Coastal	84.2	50.5	
		Inshore	193.1	115.9	
		Offshore	614.2	368.5	
		Total	*891.5*	*534.9*	*770.8*
	Demersal fish	Coastal	20.4	10.2	
		Inshore	46.7	23.3	
		Offshore	148.5	74.2	
		Total	*215.5*	*107.8*	*304.8*
	Crustaceans		11.3	5.6	
	Coral reef fish		0.9	0.5	
	Sub total		***1119.2***	***648.7***	
Southwest region	Small pelagic fish	Coastal	70.1	42.1	
		Inshore	131.4	78.8	
		Offshore	309.0	185.4	
		Total	*510.5*	*306.3*	*945.4*
	Demersal fish	Coastal	9.2	4.6	
		Inshore	17.3	8.6	
		Offshore	40.6	20.3	
		Total	*67.1*	*33.5*	*124*
	Crustaceans		6.5	3.3	
	Coral reef fish		0.1	0.1	
	Sub total		**610.0**	**250.7**	
	Large pelagic fish		1030.8	515.4	

Regions	Ecological groups	Route	B (x1000tons) in 2000-2005	EPY (x1000tons) in 2000-2005	B (x1000tons) in 2000-2005
Middle East Sea (Oceanic region)	Small pelagic fish		5.0	3.0	
	Coral reef fish		0.1	0.1	
	Sub total		***1036.0***	***518.5***	***1156.0***
All regions	Large pelagic fish		1030.8	514.4	1156.0
	Small pelagic fish		2649.5	1589.7	2744.9
	Demersal fish		643.4	321.7	1174.3
	Crustaceans		38.1	19.0	
	Coral reef fish		2.6	1.3	
	Gross total		**4,364.4**	**2,447.1**	**5,075.1**

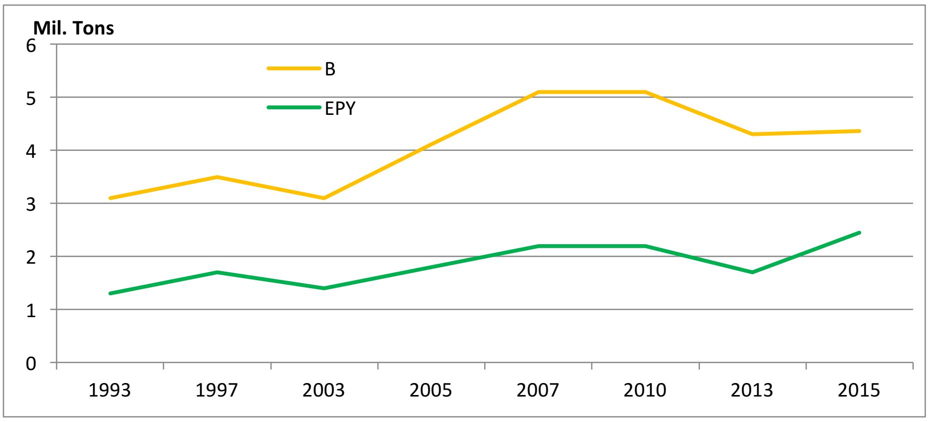


Figure 4.2: Dynamic of B and EPY within Vietnamese marine waters in 1993- 2015 (Chung, 1997c; Ha et al., 2010; Nghia, 2005, 2007, RIMF, 2014b, 2017; D. M. Son, 2003; Thuoc, 1993)

The biomass of fisheries resources estimated in 2013 and 2015 is nearly the same, but difference in estimation of EPY due to calculation models used differently. Figure 4.2 shows the same trend (parallel lines) of change in B and EPY of fisheries resources in the Vietnamese marine waters in 1993-2013, but there was a remarkable change in EPY estimation in 2015. This unusual change is explained in more detail in chapter 6. This trend may not reflect the real state of the fisheries resources because these estimations were not conducted in the same conditions (e.g. difference in the investigation area scale, investigation timing, sampling design, etc.). For instance, estimation of B and EPY by 1997 was implemented within the area of 92,000Km^2 and 261,000 km^2 in Tonkin gulf and in Southeast region respectively (Chung, 1997c); whereas, Son (D. M. Son, 2003) calculated within the area of 67,000Km^2 and 237,000 km^2 in the same regions. Surveys were carried out twice a year (i.e. the Northeast monsoon and Southwest monsoon) during investigation in 2000-2005, but only one time (alternatively the Northeast monsoon and the Southwest monsoon) due to limitation of budget.

In the specific regions (figure 4.3), the fisheries resources in the Tokin Gulf in 1997-2013 were in an almost stable trend. They decreased slightly in 2003 and kept stably in 2003-2010, and then increased again in 2013. The biomass of fisheries resources in the Central region and the Southwest region were in the same trend in 1997-2013. They increased in1997- 2007, the kept stable until 2010, then decreased in 2013. The fisheries resources in the Southeast region fluctuated during in 1997-2013. They went down from 1997 to 2005, then increased gradually and reached a peak in 2010. They dropped sharply (nearly a half) from 2010 to 2013.

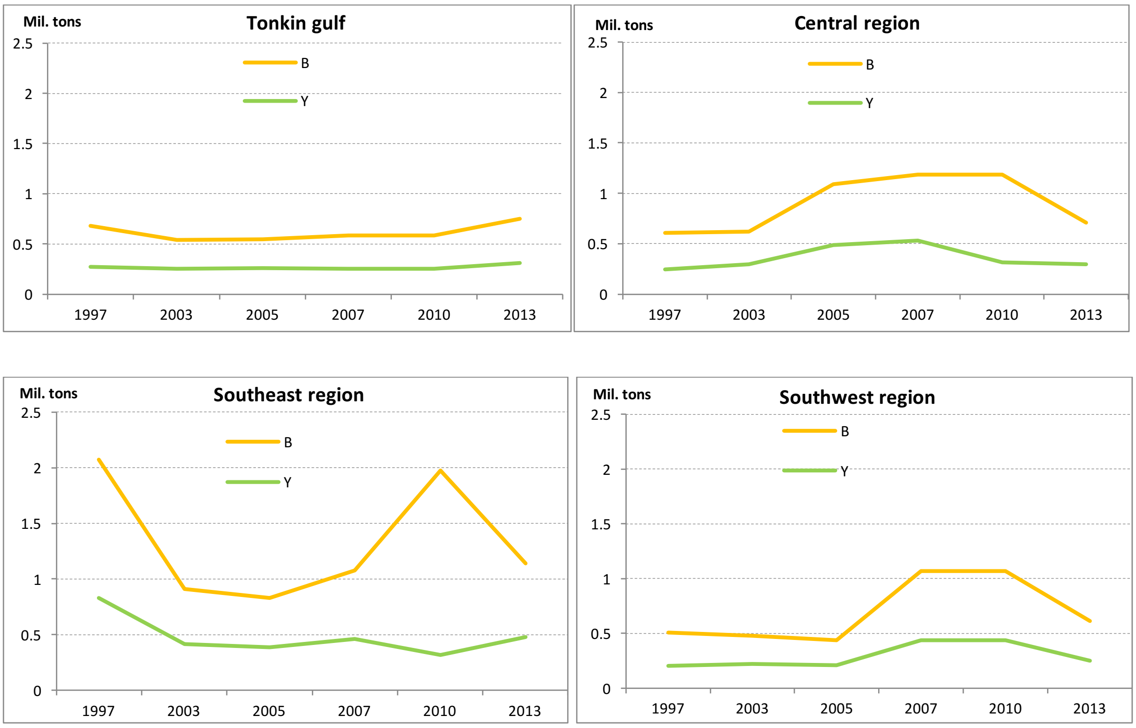


Figure 4.3: Dynamic of B and EPY by specific regions within the Vietnamese marine waters in 1997-2013 (Chung, 1997c; Ha, Thi, Nghia, & Thong, 2005, 2010; Nghia, 2007; RIMF, 2014b; D. M. Son, 2003)

By contrast, a decline trend in fisheries resources appears clearly when looking at the CPUE of the commercial fisheries as well as the catch rate of the scientific surveys vessels. According to GSO and Ministry of Fisheries (MOFI) (now is the Ministry of Agriculture and Rural Development (MARD)), the average CPUE of the commercial fishing fleets went down gradually in over the last two decades, from 0.9 tons/HP/year in 1990 to 0.2 tons/HP/year in 2016 (figure 4.4). In addition to this, the data from a fisheries enumerator program conducted within the Assessment of Living Marine Resources in Vietnam project (ALMRV) funded by

DANIDA in 2000-2005 at 77 landing sites in 26/28 coastal provinces also shows a decline trend in CPUE of most fishing fleets observed (figure 4.5). The CPUE of most fisheries of more than 30 fisheries observed exhibited decline trend in 2000-2005, among them, the CPUE of trawl fishery decreased most apparently in throughout regions. Similarly, the catch rate of purse seining fishery also in a decrease trend in all regions, except the sudden increase in CPUE of this gear in 2004 in the Tonkin Gulf.

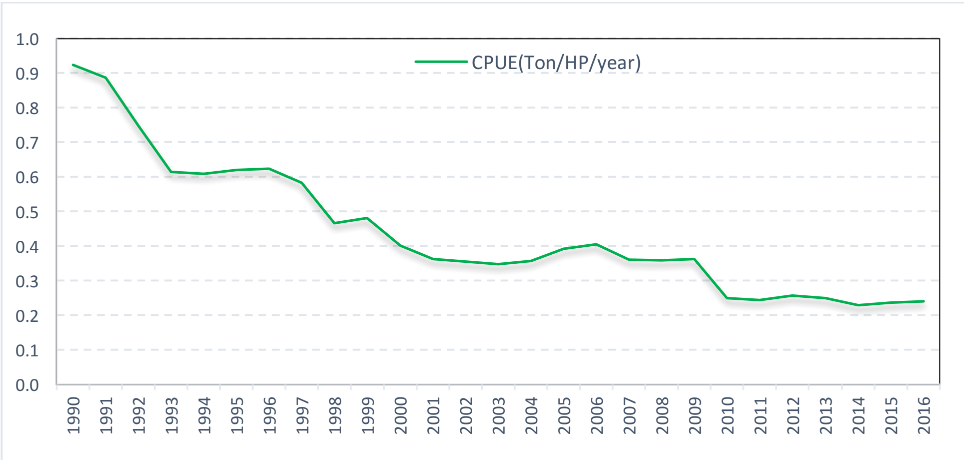
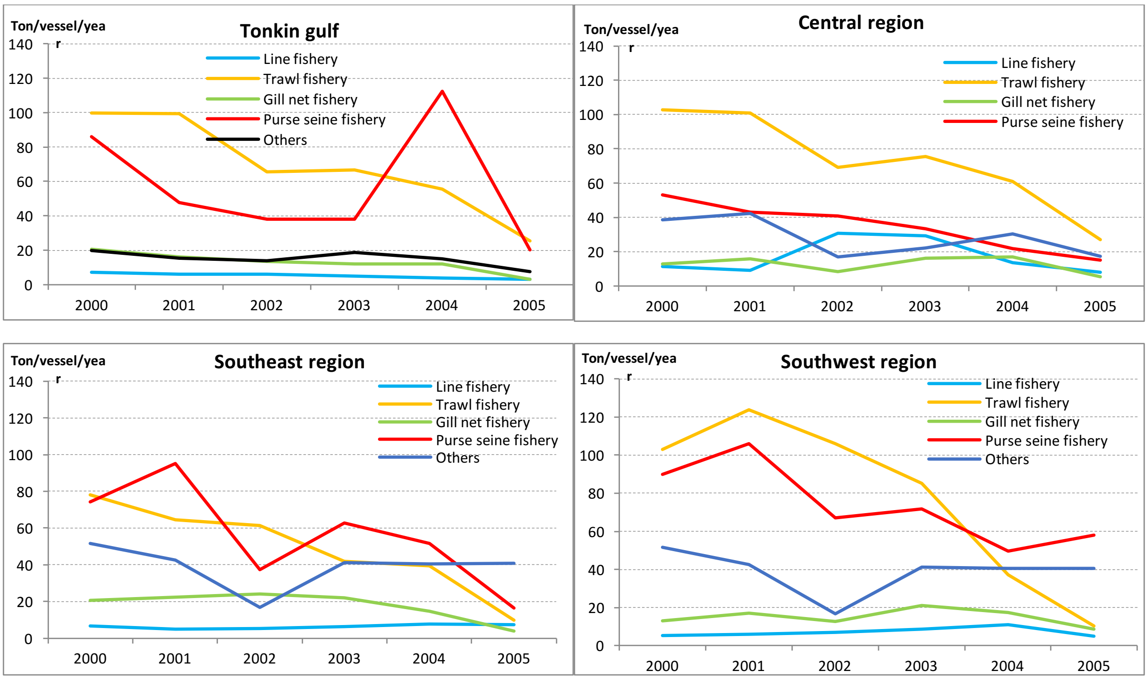


Figure 4.4: The trend of the overall catch rate of the Vietnamese fisheries in 1990-2016 (D-Fish, 2017a; GSO, 1996, 2001, 2006, 2011a, 2016)

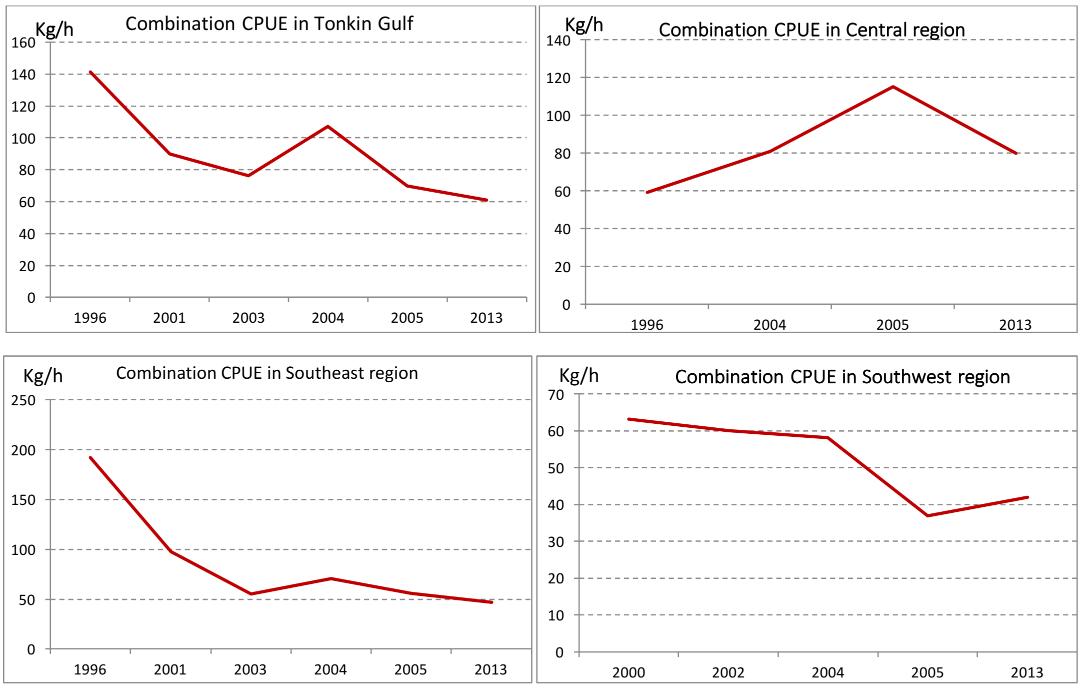


Source: ALMRV2000-2005

Figure 4.5: The trend of catch rate by the fisheries in specific regions in 2000 -2005.

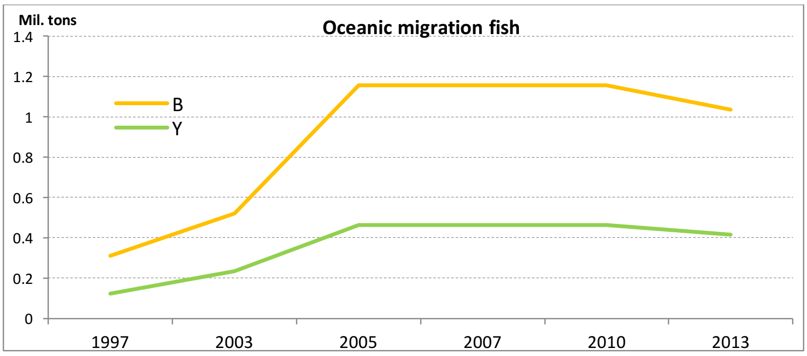
In the scientific surveys by bottom trawling, the data shows that there was a decrease trend in catch rate of the experiment bottom trawl in 1996-2013 in Tonkin Gulf, Southeast and Southwest regions (figure 4.6). In the Central region, the fisheries resources were more abundant in 1996-2013. They increased gradually in 1996-2005, then went down to the level equivalently to the level in 2004 (figure 4.6).

Unlike the fish stocks in coastal waters, the state of migratory large pelagic species in the Oceanic region (e.g. tuna, marlins, swordfish, sharks etc.) seems to be better situation. Their biomass and EPY increased gradually in 1997-2005, then remained stably until 2010 and got a slight decrease in 2013 (figure 4.7). However, there are no reference points for managing these stocks. Moreover, these species migrate in a far way and may be caught by fishers from other countries. Therefore, these figures would not tell the real state of the fish stocks.



Source: MARD/SCAFI 2010 and RIMF, 2014

Figure 4.6: Dynamic of the combination CPUE of all species by regions

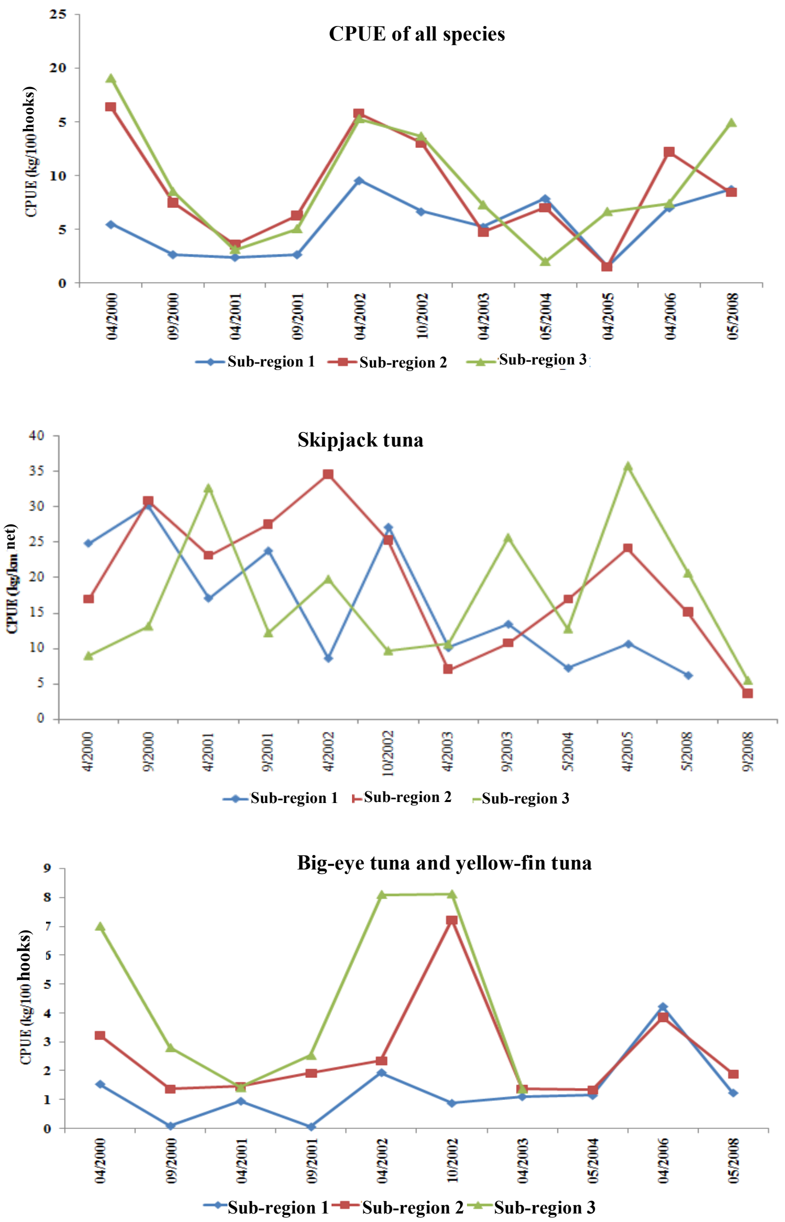


Source: RIMF, 1997, 2003, 2005, 2007, 2010, 2014

Figure 4.7: Dynamic of B and EPY of the large pelagic species in the Oceanic region within the Vietnamese marine waters in 1997-2013

In terms of commercial fisheries, the catch rate of gill net and long line operating in the Oceanic region in 2000-2008 was not in a clear trend. It tends to fluctuate seasonally as illustrated in figure 4.8. This could not tell the real state of the fish stocks. In fact, fishers have enlarged their fishing effort through improved fishing techniques and lengthening the fishing time in order to maximize their catch.

In summary, the available data exhibit a contradictory trend in dynamic of the fish stocks in the Vietnamese marine waters. Fisheries resources seem to be in the fine situation if looking at the trend of the biomass and exploitable potential yield in the combination manner. Meanwhile, they have been depleted apparently if looking at the CPUE of the commercial fishing fleets as well as the catch rate of the scientific surveys by bottom trawling. It is evident that the fisheries resources in the traditional fishing grounds and regions investigated by bottom trawling in period of 1996-2015 was in a decline trend. The migratory large pelagic species in the Oceanic region fluctuated seasonally and remained in a stable state in the period of 2000-2008. In general, if taking the EPY as a reference point of the fishing mortality of the fish stocks, then the fisheries resources in the Vietnamese marine waters have been over-exploited in the last three decades. In fact, the total landings have been always 3.0-5.0% higher than the EPY estimation in the fisheries planning documents (D-Fish, 2017a; MARD, 2011, 2016, MOFI, 1981, 1986, 1991a, 2001, 2006a).



Source: MARD/SCAFI 2010

Figure 4.8: Dynamics of CPUE of tuna and other migratory species in the Oceanic region.

4.3 THE HUMAN SYSTEM

4.3.1 FISHING FLEETS

4.3.1.1 Development of fishing fleets

Generally, the fishing capacity in the number of vessels as well as in engine capacity (HP) has increased gradually in 1990-2016 in Vietnam (GSO, 1996, 2001, 2006, 2011a, 2016). The growth rate of the vessel number was nearly 5% per annum and engine capacity was

12.6 % per year (figure 4.9). The figure 4.9 shows a sudden change in the fishing capacity in 2008. Nine fisheries managers interviewed from the national and provincial levels believed that this increase must be connected with launching a subsidy policy to support fishers maintaining the fishing activities on the seas. This policy provides subsidies on building offshore vessels, replacing bigger engine capacity, fuel costs, assurance fees and administration fees for fishing vessel owners registered at the fisheries authorities (Prime Minister, 2008). Therefore, many vessels had been unregistered previously, only officially registered with fisheries authorities, in order to receive the subsidy from the government. The fisheries managers interviewed argued that the number of vessels registered officially in the registration book at the local fisheries authorities increased, but the real number of existing vessels did not change in practice. According to D-Fish (D-Fish, 2011), the number of vessels registered just accounted for approx. 70% of the existing fishing vessels in Vietnam.

Despite the management measures made to control fishing capacity, changes in the numbers of fishing vessels fluctuates naturally and independently of government efforts. For instance, the government made plan to reduce the number of fishing vessels 50,000 vessels by 2010 (Prime Minister, 2006). However, vessel numbers not only decrease, but they actually increased by nearly 2.6 times to 129,385 vessels. The number of fishing vessels in Vietnam reached a peak in 2009 of 131,000 vessels. It then decreased gradually to 104,452 vessels in 2015, but increased to 110,950 vessels by the end of 2016. The fishing fleets in Vietnam are dominated by the small-scale vessels (figure 4.10).

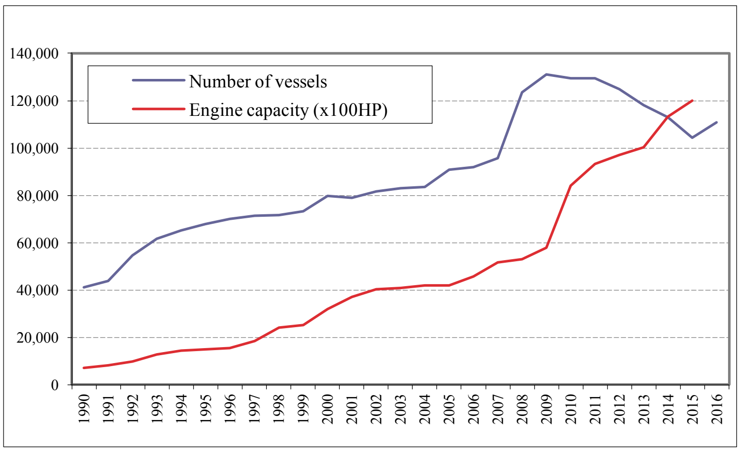


Figure 4.9: The number of fishing vessel and total engine capacity (HP) in Vietnam in 1990-2016 (D-Fish, 2017a; MARD, 2010, 2016, MOFI, 1996, 2001, 2006a)

The number of vessels powered with engine capacity less than 20 HP accounts for the biggest proportion of over 42%, followed by the fleet of engine capacity of 20-<90HP (26%), then the 400-800HP fleet (11%), next to the fleet of 90-<250HP (10%) and fleet of engine capacity from 250-<400HP accounts for 9% (table 4.3 and figure 4.10). The number of vessels powered with the engine capacity greater than 800 HP accounts for the least proportion (2.0%). The decree No.33/2010/ND-CP regulates that the fleet powered <20HP is only allowed to fish in the coastal route[3] and not allowed to fish in inshore route and offshore areas (see further in figure 4.1), and the fleet powered 20-<90HP is only allowed to fish in the inshore route and offshore areas. The other fleets are only allowed to fish in the offshore areas. Clearly, the fishing fleets in Vietnam are dominated by the small-scale vessels, in which, more than two of third (68% of the total vessels) do fishing in the coastal and inshore routes. In fact, the circular No.02/2006/TT-BTS prohibits fishing fleets powered <30HP to develop since 2006. However, these fleets still dominate in the Vietnamese fisheries.

Table 4.3: The structure of fishing fleets in Vietnam in 2016 (D-Fish, 2017a)

Engine capacity (HP) / Fisheries	<20	20-<90	90-<250	250-<400	400-<800	>=800	Total
Trawl net[4]	1,050	6,115	2,747	3,812	5,120	1344	**20,188**
Gill net	25,816	8,192	1,656	1,494	1,273	167	**38,598**
Purse seine net	160	1,137	1,115	1,458	1,516	296	**5,682**
Hook and line	7,111	5,635	2,115	1,592	2,312	194	**18,959**
Falling net	70	292	799	352	857	211	**2,581**
Others	12,314	7,317	1,817	757	389	14	**22,608**
Logistic service	206	18	332	418	716	144	**2,334**
Total	**46,727**	**29,206**	**10,581**	**9,883**	**12,183**	**2,370**	**110,950**

In Vietnam fishing vessels are categorized into two types: the fishing vessels using gears to catch fish and the logistic vessels providing service on buying and transporting catches.

[3] Decree No. 33/2008/ND-CP defines that the coastal route is limited by the shore and the line of 6 miles far from the shore, the inshore route is limited by the line of 6 miles far from the shore to the line of 24 miles far from the shore, the offshore area stretches from the line of 24 miles far from the shore to the outer limit of the Vietnamese EEZ.

[4] There is only bottom trawl fishery (no pelagic trawlers) operating in Vietnam.

In 2016, the number of logistic vessels was 2,334 accounting for 2% of the total fishing vessels (D-Fish, 2017a). There were 38 categories of fishing gears identified in eight provinces in 2014. These gears are named differently among local communities. They could be grouped into 5 main fisheries: trawl net, purse seine net, gill net, falling net, hook and line (figure 4.10). Of these, the gill net accounts for the biggest proportion of 35%, followed by the trawl net (18%), and by the hook and line fishery (17%). The purse seine fishery and the falling net account for 5% and 2% respectively. The rest (21%) is other gears such as push net, lift net, fyke net, trap, seine net, etc.

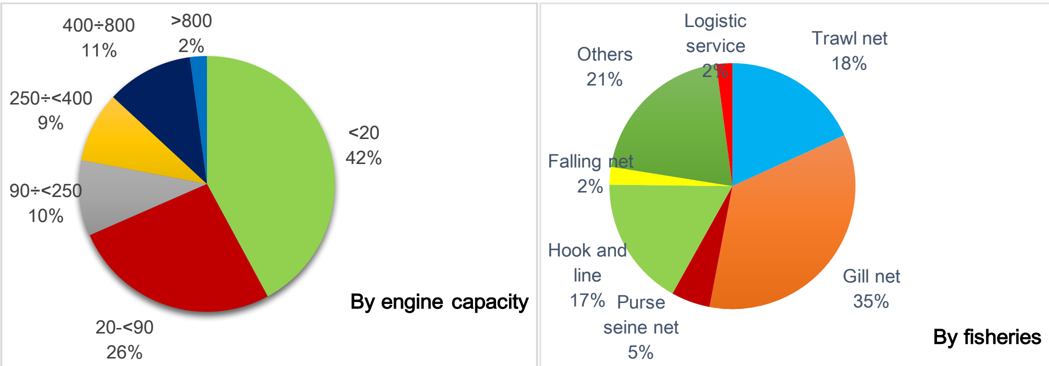


Figure 4.10: The structure of fishing fleets in Vietnam in 2016 (D-Fish, 2017a)

Figure 4.10 and table 4.3 shows that the trawl fishery still takes an important role in the Vietnamese fisheries. It dominates in the inshore route and the offshore area. Trawlers usually are powered with a big engine capacity and harvest in a huge area of waters and may damage the seabed because they operate year-around and their equipment plows the seabed to harvest fish, shrimps, clams. In fact, some countries e.g. Indonesia banned the trawl fishery in their waters due to its harmful impacts on the fish stocks and marine ecosystems. In Vietnam, the circular No.02/2006/TT-BTS prohibits the trawling fleet powered <90HP to develop since 2006, but, a large number of the trawlers powered <90HP are still used nationwide in Vietnam. According to decree No. 33/2010/ND-CP they are not allowed to fish in the inshore and coastal routes, but a number of big trawlers have sometimes fished in the prohibition areas as told by fisheries managers in provinces of Quang Ninh, Hai Phong, Thanh Hoa, Nghe An, Ben Tre, Ca Mau, and Kien Giang. In addition to this, a number of gill netters is the biggest, but most of them powered engine <90HP and operating the coastal and inshore routes. Among of them, there are a large proportion if the trammel net having a very low selectivity. These fleets are a big threat to the fisheries resources and ecosystems in Vietnamese marine waters.

4.3.1.2 Change in structure of the fishing fleet

Almost all fishing vessels are privately owned by fishing households. There were about 30 large-scale tuna long-liners owned by four joint stocks companies (DECAFIREP, 2010b), but these companies have gone bankrupt due to economic lost and lack of skilled skippers as told by a former director of Bien Dong fishing company. As neither restriction on catch quota nor on fishing days are applied in Vietnam, fishers usually change their fishing gears and methods to catch different targeting species according to particular seasons and fishing grounds in order to maximize their profits. For instance, fishers in Nghe An usually use trammel net for catching cuttlefish in the northeast monsoon period (from November in the previous year to the April in the following year). They use lift net for catching small pelagic fish in the southwest monsoon (from May to October); fishers in Kien Giang usually use gill net for catching swimming crabs during the rainy season (from April to November), and they use trawl net for catching shrimp and demersal fish in the dry season (from December of the previous year to March in the following year).

In addition, a majority of fishers have changed their fishing strategy to catch valuable species for high-end markets and/or to harvest trash fish[5] to be used as feed in fish farming. As observation in Khanh Hoa, Binh Dinh and Phu Yen, many fishers have changed from using gill net to using hand line or long line for catching big-eye and yellow-fin tuna; some fishers in Thanh Hoa, Nghe An and Ha Tinh intended to use hand line to catch large-head hair tail fish; some fishers in Quang Ninh, Hai Phong, Thanh Hoa, Nghe An, Binh Thuan, Vung Tau, Tien Giang etc. have concentrated on catching squids for export. Meanwhile, other fishers have changed their gear and methods and moved to coastal areas to catch the trash fish for farming as observed in Quang Ninh, Hai Phong, Khanh Hoa, Ben Tre, Ca Mau and Kien Giang in 2009-2011. Actually, 33/42 (78 %) local fishers interviewed in 2009-2011 intended to catch the trash fish in coastal waters to reduce variable costs and get

[5] In Vietnam, trash fish normally includes small fish, juvenile fish, and crushed fish that not being used as food for human.

more income. The change in the fleet composition of the Vietnamese fisheries in the recent years is illustrated in figure 4.11.

As shown in figure 4.11, the number of vessels within the fleets of <20HP and 20-49HP have increased dramatically since 2008, whereas the fishing fleet of 50-89 HP has dropped gradually since 2008. The number of the offshore vessels empowered engine capacity ≥ 90HP has increased gradually, with an average rate of 10.7% per annum in 2000-2013 from nearly 9,500 vessels in 2000 to over 35,000 vessels in 2006. Similarly, the fishing fleets by fisheries also have had a remarkable change in 2000-2013. More vessels were using gill nets and lines, whereas trawl nets and purse seines remained nearly the same during 2000-2013 as a result of increasing fuel prices and other variable costs such as fishing materials, services, food, etc.

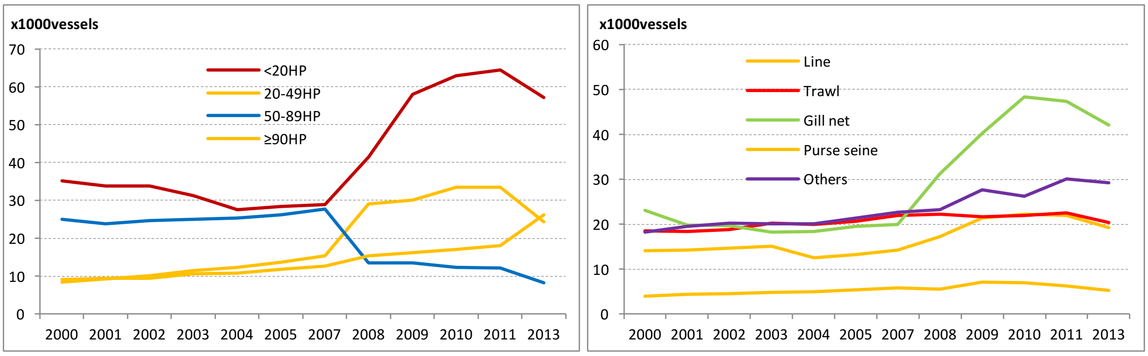


Figure 4.11: Structure of fishing fleets by engine capacity (HP) and by groups of the main fisheries of the Vietnamese fisheries in 2000-2013 (D-Fish, 2014)

In short, the number of fishing vessels in Vietnam has increased gradually in the last three decades, from 41,266 vessels in 1990 to 110,950 vessels in 2016. It experienced a sudden increase in 2008-2009 due to a subsidy policy of the government. Clearly, the number of fishing vessels is not controlled effectively by the government. Consequently, the number of the fishing vessels in 2010 was almost 2,6 times higher than the figure planned by the master plan made by the government. The number of the offshore vessels in 2016 was over 35,000 vessels, nearly 1.2 time higher than the level (30,000 vessels) planned by the government.

4.3.2 FISH LANDINGS

Legally, the estimation of total fish landings is officially conducted and periodically published by the GSO. Besides, the fish landings of the Vietnamese fisheries are sometimes estimated by particular projects. The fish landings are presented as below based on four available sources: from the GSO system conducted annually, the enumerator program conducted by ALMRV in 2000-2005, a research project conducted by RIMF in 2007-2009 and the production of tuna from a report in 2012.

The total fish landings of the Vietnamese fisheries in 2016 were 2.876 million tons (D-Fish, 2017a). It is over 1.3% higher than the level planned by 2020 (2.2 million tons) (Prime Minister, 2013a). The total landings of the Vietnamese fisheries have increased stably since 1990, with an average growth of over 6.0% per annum (see figure 4.12), regardless the fluctuation of the fishing capacity. The majority of fish landings (almost 53% of the total landings) were harvested in the offshore waters in 2015 (VIFEP, 2017). In 2015, the total landings of the offshore fleets were 1.5 million tons and of the inshore and coastal fleets were 1.34 million tons (VIFEP, 2017). These figures are higher than figures planned in the master plan (Prime Minister, 2013a). This indicates that fisheries resources were overexploited in both the coastal and offshore waters. In addition to this, 46/54 (85.2%) local fishers interviewed in 2009-2014 told that their catch rate decreased 30-50% in comparison to 1980s-1990s; and 8/54 (14.8%) fishers (using luring gears with lamps to catch small pelagic species) stated that their catch rate has remained the same over time and fluctuated seasonably.

The fisheries enumerator program conducted by ALMRV in 2000-2005 shows that the total fish landings in Vietnamese fisheries fluctuated in in this course (figure 4.13). Importantly, it did not increase stably as estimated by the GSO, but fluctuated year by year (from around 2.0 million tons in 2005 to nearly 3.3 million tons in 2003), and then increased stably in 2007-2009 estimated by a research project (Khang, 2011). In addition to this, the estimations of the GSO are lower than estimations conducted by ALMRV and the research project. This implies an incredibility of the estimations of the total fish landings published by the GSO (see further in chapter 6).

By the fisheries, the total landings of trawl fishery increased in 2000-2009, whereas the fish landings of the gill net fishery went down in the same period. The fish landings of the other fisheries seemed to be stable in period of 2000-2009 (figure 4.13).

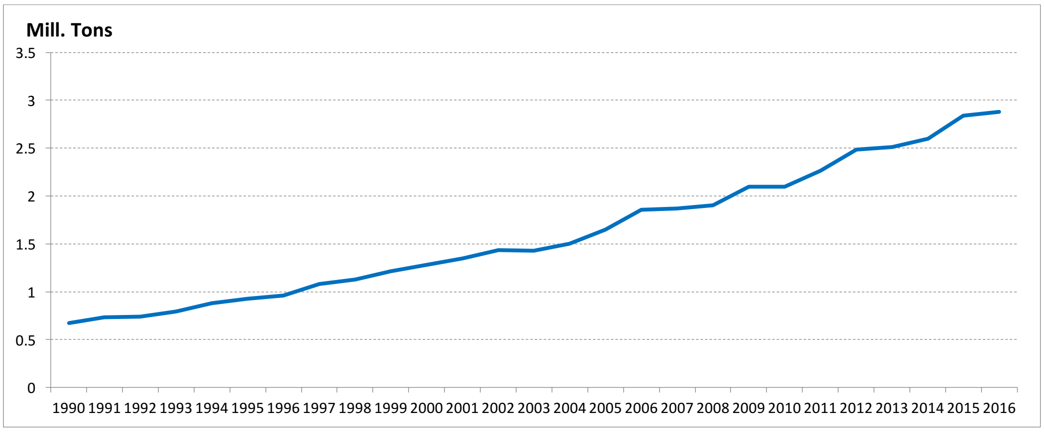


Figure 4.12: The total landings of the Vietnamese fisheries in 1990-2016 (D-Fish, 2017a; GSO, 1996, 2001, 2006, 2011a, 2016)

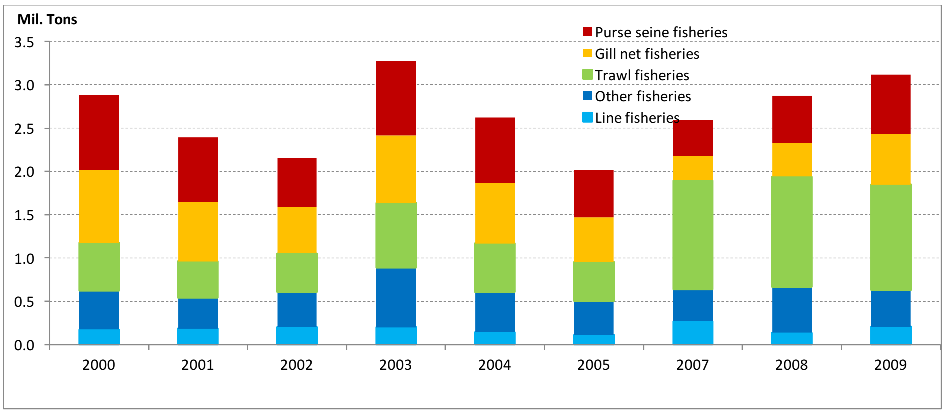


Figure 4.13: The total landings by main groups of fisheries in 2000-2009 (Assessment of the Living Marine Resources Project Phase II, 2005; Khang, 2011)**.**

For the tuna fisheries, the West Pacific East Asia Project conducted by the Western and Central Pacific Fisheries Commission (WCPFC) has estimated the total landings of tuna (skipjack, big-eye, yellow-fin and albacore tuna) and other large pelagic species (e.g. marlin, swordfish) of the gill net, purse seine, and line fisheries catching tuna in Vietnam since 2008. This project provides estimations of tuna landings in 2008-2015 as illustrated in figure 4.14. The figure 4.14 shows that the tuna landings decreased in 2008-2010, the increased gradually in 2010-2015. The total tuna landings of Vietnam in 2015 was nearly 109,478 tons (D-Fish, 2016b); in which, the landings of oceanic tuna (i.e. yellow-fin tuna and big-eye tuna) was 27,324 tons, 1.6 time higher than level planned by 2020 (Prime Minister, 2013a). However, fishers interviewed told that their catch was in decline trend, especially the rate of fish of bigger sizes (e.g. greater than 40 kg/fish) deceased apparently in comparison to the end of 1990s.

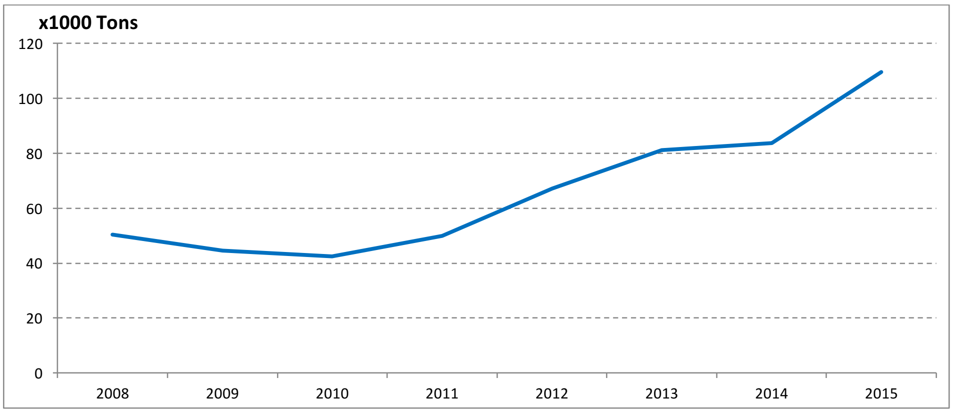


Figure 4.14. Total landings of the tuna fisheries in Vietnam in 2008-2015 (D-Fish, 2016b).

It is evident that the available data present a confused state of the total fishing landings in Vietnam. Understanding about fish landings of the Vietnamese fisheries. The officially statistical data provided by GSO shows a stable growth in line with the growth rate planned by the government, whereas the specific estimations show a fluctuation over time and are higher than that conducted by the GSO.

4.3.3 ECONOMIC PERFORMANCE OF FISHING FLEETS

There has not been a system to collect regularly data on the economic performance of fishing fleets in Vietnam. In fact, the fisheries economic performance may be analyzed by particular projects. This research referred to the latest data to provide understanding about the economic performance of the fishing fleets in Vietnam. As the above mentioned, most Vietnamese fishing vessels are the wooden small-scale vessels. Therefore, the investment capital[6] (fixed cost) for a vessel is cheaper than that in the developed fisheries. It depends on the size of vessel and fishing gear used on board. The investment capital for a motorized vessel ranges from 4,000-150,000 USD; the average rate of nearly 80,000 USD/vessel as investigated in 2015 (VIFEP, 2017). This investigation pointed that the bigger vessels

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[6]The fixed cost includes all costs for property and equipment on board, e.g. vessel, engine, gears, taxes, fees and fishing equipment. The variable costs include costs for fuel, ice, food etc. purchased for every fishing trip.

require higher investment capital (figure 4.15). In the last two years, nearly 300 steel fishing vessels have been built with a much higher capital. Each steel vessel costs from 650,000-800,000 USD as observed in provinces of Quang Ninh, Binh Dinh, Khanh Hoa, etc.

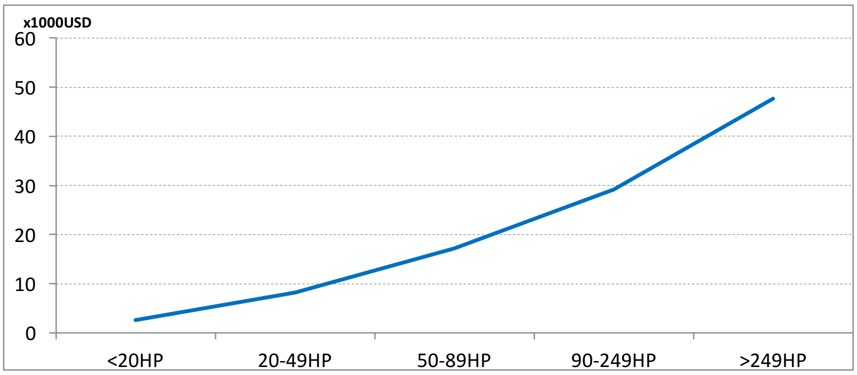

Figure 4.15: The average investment capital (fixed costs) of a fishing vessel in Vietnam (Khang, 2011).

As found during a 4 year (2007-2010) investigation, the variable costs for fishing varied by fisheries and size of engine (Khang, 2011). The average level of variable costs ranged from 10.0-2,000 USD/vessel/day. In which, the trawl fishery paid the highest costs because it spent a lot of fuel. According to this investigation, the fuel costs accounted for the biggest proportion of the total variable costs. For the offshore fishing fleets, it ranged from 36-92% dependently on fisheries, at an average rate of 67% total variable costs in 2005-2007 (Hai, 2008). The average of the fuel costs of the Vietnamese fishing fleets in 2008-2010 accounted for approx. 43% (Khang, 2011). This indicates that fishing vessels in Vietnam travelled a lot on a hand, and minimized expenditure for preservation, food, safety, labour, etc. on the other hand. This may be a reason leading to post-harvest loss is so high (about 25% as investigation of VIFEP in 2015). In addition to this, in 2009-2014, 54 (100%) fishers interviewed claimed that their fishing costs increased dramatically, but the price of fish did not increase accordingly. This pushed them to increase fishing power in a trip to maximize their catches, as told by fishers.

Investigation shows that the bigger the vessels, the profit the higher[7] for almost all fisheries, exception of the line fishery (figure 4.16). For the line fishery, the profit of the fleet of >249HP was lower than the fleet of 90-249HP. By contrast, in terms of return of

[7] Profit is the amount of money from total revenue subtracting all fixed and variable costs.

investment[8], smaller vessels got higher return than larger vessels as illustrated in figure 4.17. As show in figure 4.17, the efficiency of investment of bottom long line is highest followed by hand line, bottom gill net and surface gill net because their fuel costs were less than that of other fisheries. This means that the smaller-scale the vessels, the more efficient in the Vietnamese fisheries.

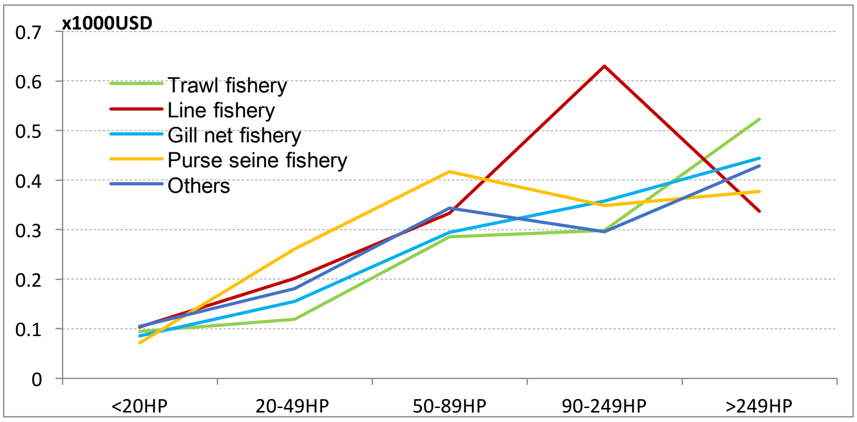

Figure 4.16: The average profit per year of fishing fleets in Vietnam (Khang, 2011)

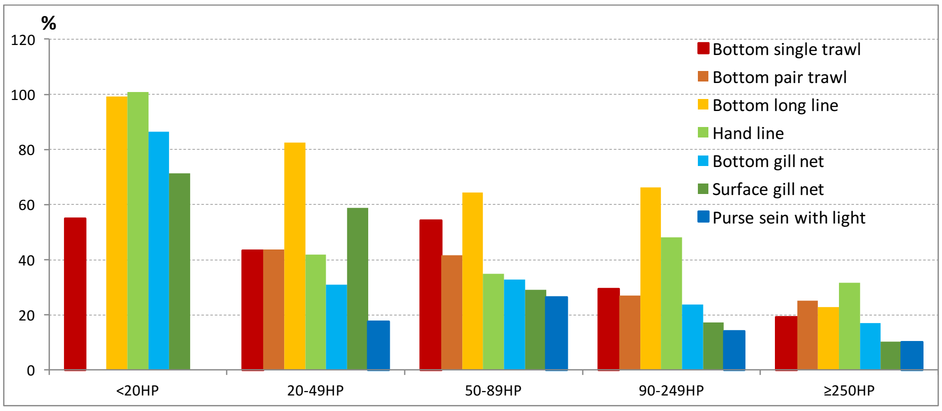

Figure 4.17: The efficiency of investment of fishing fleets by the main fisheries in Vietnam in 2008 -2010 (Khang, 2011)

In addition, economic performance by the offshore fishing fleets was reduced over the last two decades (Hai, 2008). In fact, a part of the fishing vessels has ceased to fish because of economic loss. Approx. 10-30% of the total fishing vessels experienced financial losses or were not able to cover their variable costs for purchasing fuel, supplementing net and

[8]The efficiency of investment is the proportion of the profit and the investment. I referred to the profit and the investment data presented by Khang 2007-2009 (Khang, 2011).

equipment, food, ice, etc. (Hai, 2008; La, 2007; MOFI, 2003), though the Vietnamese government have provided incentives for enhancing the fishing capacity. This may generate an overcapacity in the fishing fleets in Vietnam (Anon, 2010) as similarly observed in the EU fisheries (Raakjær, 2009). This information indicates that the existence of excess fishing capacity in Vietnam is the result of overcapitalization. This would affect the sustainability of fisheries, undermining the conservation and management efforts and leading to significant economic waste (Gréboval, 1999).

4.3.4 MARKETS

Data on consumption of fish landings have not been collected on a regular basis in Vietnam, exception of the data on export of fish products. Therefore, this chapter only refers to available export data on fishing products and some general information from researches and direct observation. The Vietnamese capture fisheries products are consumed in both international and domestic markets. A majority (72%) of fish landings were consumed in domestic markets, and only 28% of the fish landings were exported to international markets (Khang, 2011).

4.3.4.1 Domestic consumption

Edible fish landings are often referred to *'popular fish – Cá chợ'* and sold freshly at the local markets or supermarkets as daily food for people. This accounted for around 35% of the total landings in 2005-2007 (Hai, 2008). The per capita fish consumption in Vietnam has increased, and was 38.3 kg in 2015 (VIFEP, 2017) higher than the global one (around 20 kg). This would be an advantage for developing the domestic market. Another part of landings (25% of total landings) were sold to processing plants to produce various products as food for people or as feeds for farming, and the other (often called trash fish) were used directly as feeds in fish farming.

4.3.4.2 International consumption

There are four main groups of capture fish (e.g. tunas, squids, octopus, crustaceans and other fish) exported to international markets. They may be fresh, frozen, dried or in other processed products as shown in table 4.4.

Table 4.4: Export value (in million USD) of the Vietnamese fisheries products in 2012-2013 (VASEP, 2014)

Products	2012	2013	%
Canned tuna	182.9	199.5	9.1
Fresh/frozen/dried tuna	159.0	108.1	-32.0
Other products of tuna	225.5	219.0	-2.9
Marine fish	616.9	630.1	2.1
Fried fish and surimi	267.1	234.3	-12.3
Crab and other crustaceans	115.3	110.5	-4.2
Squid and octopus	621.3	560.7	-9.8
Total	**2188.0**	**2062.2**	**-5.7**

In general, the total export value of fisheries productions in 2013 was nearly 2.1 billion USD, decreased 5.7% in comparison to 2012. Only 2/7 products (canned tuna and marine fish) got growth in the export value, and 5/7 products got minus growth in export value in 2013 compared to 2012. In which, the export value of the fresh/frozen/dried tuna products dropped most (-32%), followed by the fried fish and surimi products (-12.3%), then followed by the squid and octopus products (-9.8%).According to VASEP (VASEP, 2014), tuna products were exported to 112 markets, fried fish and surimi to 34 markets, squid and octopus to 72 markets in 2013. The main markets were USA, EU, Japan and South Korea. The tuna export markets in 2013 is shown in figure 4.18. In addition to this, a part of the *'popular fish'* is also exported unofficially to China, Laos, Thailand and Cambodia.

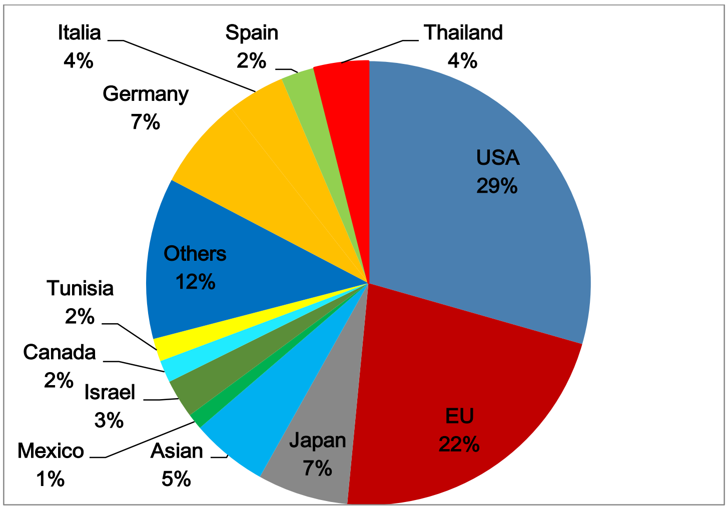

Figure 4.18: Export markets for tuna products of Vietnam in 2013 (VASEP, 2014)

Clearly, the available information on the market and consumption of fish landings of the Vietnamese fisheries are very limited and general. They are insufficient to provide thorough understanding about the state and tendency of the demand for and consumption of the marine capture production of Vietnam.

4.3.5 THE LOCAL FISHING COMMUNITIES

Similar to other fisheries economic information, data on fishing communities have not been collected on a regular basis in Vietnam. This chapter tried to draw a picture on the Vietnamese fishing communities through available information on living standards, local organization and education at the local fishing communities. There were 628 communes located along the 28 coastal provinces of Vietnam are associated with fisheries. The fisheries provided livelihoods for approx. 1.7 million people (Chinh, 2006). According to VIFEP (VIFEP, 2013) the number of fishers had increased steadily with an average rate of 3.1% per annum in 2000-2010. The number of professional fishers fluctuated year by year. It was 750,000 fishers in 2010, 431,764 fishers in 2014 and 763.980 fishers in 2015 (VIFEP, 2017).

4.3.5.1 Livelihoods and household incomes

According to the World Bank (World Bank and Ministry of Fisheries Vietnam, 2005), although the living standard of fishing households in Vietnam improved remarkably, fishers still lived in poverty, and 88% of the poorest households (with very low income) were fishing households. Incomes have improved, however, and this figure was reduced to approx. 44% in 2012 (Prime Minister, 2013a). A majority (about 93%) of the total income of the fishing vessel owners came from fishing and their living standards were higher than crewmembers (Khang, 2011). In 2015, there were over 330,000 fishing households in Vietnam. Each possesses from 01 to 17 vessels, many of them possess 03-05 vessels, for instance, there are more than 100 households possess more than 04 vessels (VIFEP, 2017). In 2008-2010 the average property value of a fishing vessel owner was approx. 27,000 USD (in 2015 was 80,000USD as investigated by FIFEP) and with an annual income of 8,300 USD per household (Khang, 2011). The average income of a fishing vessel owner's household had been improved apparently, from the level was lower than the poverty line in 1995-1997 (Thong, 1998) to level was higher than the average line of the whole country in 2010 (3,400

USD per household per annum) (GSO, 2011b). Similarly, incomes of fishing crew members are also higher than the average line of the whole country in 2015, for example, the average income of the offshore fishers in 2015 was around 5,053 USD/person/year, whereas, the average line was 2,109 USD/person/year (VIFEP, 2017).

4.3.5.2 Local organization of fishing communities

In local communities, almost all of fishers are members of one of social and/or socio-political organizations such as Farmer's Union, Vietnam Fisheries Association (VINAFISH). They also take part informal groups e.g. fishing guilds, fishing groups grouped traditionally to assist each other in fishing business. In fact, almost all Vietnamese citizen is deemed to be a member of social and socio-political organizations, e.g. Farmers' Union, Youth's Union, Women's Union, VINAFISH, Old People's Association, etc. All of these organizations are established by government and operated according to their statutes adopted by the government. The Farmer's Union is a socio-political organization belonging to the Vietnam Fatherland Front. It has been established and headed by the Vietnamese Communist Party. The VINAFISH is a socio-professional organization established by the Ministry of Home Affairs. Both organizations' activities and services are more related to the governmental mandates, thus they are not engaged much voluntarily by local fishers. Fishers just became honorary members as a citizen's obligation, but do not receive real benefits from these organizations. For instance, 44 (81.5%) local fishers interviewed in 2009-2014 argued that these organizations did not benefit them; but they became members because of the village culture: '*I did it because my neighbours did so*'.

Commonly, the local fishers get involved voluntarily in the fishing guilds to share fishing experiences, information and together solve practical issues at seas and at their own communities. Each fishing guild is commonly composed of from 2 to10 vessels of the same gears. The vessel owners in a fishing guild have family relationships or very close friendship. In 2015, approx. 18,565 fishing vessels and 123,788 fishers were grouped in approx. 2,620 guilds in the local fishing communities in Vietnam (VIFEP, 2017). Often, local fishers behave as their neighbours do following their own beliefs, moral rules and traditional norms. For instance, a lift net fisher in Nghe An told that he used to fish with explosion, but he gave up this method last year because his community agreed together to introduce a norm on combating the usage of explosion to fish in their community. At the same time, the legal regulation on banning explosion to fish was issued a long time ago in Vietnam. This means that the informal norm was complied with strictly rather than the legally formal regulations of the government. This custom has occurred long time ago – called "*Van Chai*" system (Ruddle, 1998). Clearly, the Vietnamese fishing communities are organized within traditionally informal groups having their own locally hereditary characteristics. The traditional values vary among communities (Thong, 2003). For instance, as observation in Binh Thuan, the purse seine fishers are not allowed to fish at other fishers' fish aggregating devices, meanwhile they are allowed to do so in Tien Giang.

In addition, the fisheries middlemen play a very important role in local communities. They provide credit and financial services as the '*black capitalists'* for almost all fishing vessel owners (Assessment of the Living Marine Resources Project Phase II (institution), 2005). They also take the rights to decide the classification of the catches and fix the price of each kind of catches. A majority of vessel owners use financial services of the middlemen. In fact, 47/54 (87%) vessel owners interviewed borrowed money from the middlemen to cover fishing costs, e.g. fuel, ice, nets, fishing equipment. As an informal rule, these vessel owners have to sell their catches to contracted middlemen, who lends money to them as a part of their debt payments. They cannot sell their catches to other middlemen even if their catches are offered a higher price. Over 90% of the total fish landings of the fisheries in Vietnam was sold to the local middlemen in 2010 (VIFEP, 2013).

4.3.5.3 Education in fishing communities

Crew members working on fishing vessels have limited education and lower than the national line. A majority (50%) of fishers graduates from elementary school, 40% of them goes to secondary school, illiteracy (6%), and 4% goes to high school (Khang, 2011). Only 30% of the captain and chief engineers were trained at the short courses in fishing expertise (MARD, 2014). This may be a constraint of transforming occupations and livelihoods for local fishers as well as of improving awareness of conservation and sustainable utilization of fisheries resources. In fact, they were unable to adapt new livelihoods due to the lack of working skills, education and capital (La, 2010). In 2009-2014, 32/54 (59.3%) vessel owners were trying to push their children getting better education to get out the fishing business, 24.1% (13/54) of them did not support their children going to school in order to help them caring their fishing business, and the rest (16.6%) did not care about education for their children and told that they would feed their children if their children want to continue going to school. This shows that opportunities for higher education of young generations in fishing communities are still a challenge.

4.4 THE FISHERIES MANAGEMENT SYSTEM

This next part of the chapter analyzes the Vietnamese fisheries management system in four aspects: the planning system, decision-making process, rules and legislation system, and fisheries research. Firstly, it explains the planning system to provide an understanding of planning Vietnamese fisheries. It looks at the fisheries legislation and enforcement system in order to understand how the Vietnamese fisheries are managed. The decision-making processes are also described to understand the involvement of stakeholders. Finally, the chapter provides information about the fisheries data collection and research to investigate what kind of knowledge is available in the Vietnamese fisheries.

4.4.1 PLANNING SYSTEM

4.4.1.1 Brief introduction to the planning system in Vietnam

The planning system for the national economy in Vietnam has changed since 1998 when the master plan was added to the planning system (Prime Minister, 1998). This system is a dual system: the general socio-economic planning system and the sectoral planning system (e.g. fisheries planning system) as basically illustrated in the figure 4.19. The general socio-economic planning system addresses all aspects of society (e.g. agriculture, forestry, fisheries, industry, transportation, infrastructure, culture, health care, education, foreign affairs, etc.). The sectoral planning system deals with specific aspects of a particular sector. For instance, the fisheries plan may address specific aspects of the marine capture fisheries such as planning the total catches, fleet structure, fishing infrastructure, etc. It may be included in a plan of the fishery sector including aquaculture, capture fishing, processing.

In each system, there are four components: strategy, master plan, five-year plan and annual plan organized hierarchically. The strategy guides the master, the master plan directs the five-year plan and annual plan follows the five-year plan (Prime Minister, 1998). Preparation and improvement of these documents are assigned to the governmental authorities at national, provincial, district and commune level (Government of Vietnam, 2006). The strategy is only required at the national level in both systems. The master plan is required at three levels: regional, provincial and district levels in the general socio-economic planning system, while only at two levels: national and provincial in the fishery planning system. The five-year plan and the annual plan are elaborated at all levels in the general socio-economic system; while the fishery planning system has its own five-year-plan as well as annual plans at national and provincial levels. At district and commune levels, the fishery plans are included in the general socio-economic plans respectively. This shows a mismatch between the sectoral and the general socio-economic planning systems which may create disturbances in the sectoral planning process.

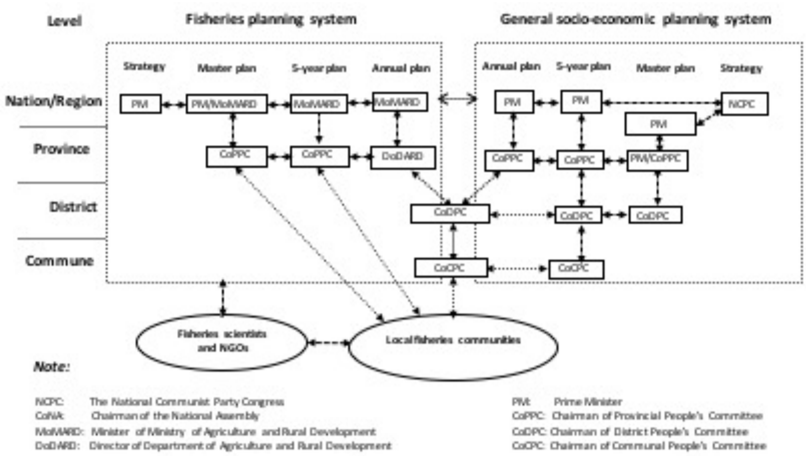

Figure 4.19: The state planning system is a dual system composed of the general socio-economic development planning system and the sectoral planning system

Strategy and master plan provide political directions and development targets of the nation and are decided by the Prime Minister or Chair of PPC, and thus are the legal documents and referred to as the '*policy*'. The general socio-economic strategies and master plans for national and regional levels are prepared by the Ministry of Planning and Investment (MPI), and the provincial strategy and master plans are prepared by Department of Planning and Investment (DPI). The master plans for the general socio-economic development for the district level and the provincial master plan of specific sectors development are decided by the Chair of Provincial People Committee (PPC). The sectoral strategy and master plan are developed by the sectoral agents at national level. They are normally approved by the minister or sometimes submitted to Prime Minister for approve. The provincial master plan for particular sectors are prepared by departments within the PPC and approved by the Chair of PPC. Meanwhile, the five-year plan and the annual plans are approved by relevant sector departments within the administration system. They are considered as administrative documents and referred to as the '*administrative reports*'. Importantly, the master plan makes the interplay between political strategies and implementation plans (i.e. the five-year plan and the annual plans) in the state planning system. It concretizes the broad goals of the development strategies into more specific development objectives of particular sectors or specific administration territories. Based on this, investment programs and development projects will be defined and implementation plans are made accordingly. Moreover, the master plan provides conditions to implement the programs and projects planned. Programs and projects not mentioned in the master plans may not be implemented (Prime Minister, 1998).

The five-year plan and the annual plans emphasize the administrative obligations in order to undertake their function of managing the sector or general socio-economic development according to directions adopted in the corresponding strategies and master plans. The five-year plan and the annual plans may include operational policies to address the urgent issues emerging from practical situations such as security at sea, fishers getting economic losses etc. These policies tend to deal with temporary short-term issues or to serve benefits of interested parties relevant with the field in question. For instance, a policy on subsidizing small-scale vessels was implemented in 2008. The following paragraphs present the main contents of the planning documents at the national level. These contents are also illustrated in the planning documents at the lower levels (Government of Vietnam, 2006).

4.4.1.2 The general socio-economic planning system

The general socio-economic development strategy

The strategy is a political document adopted by the Party Congress in a ten-year cycle. It analyzes all aspects of society of Vietnam and international context as well in order to establish strategic long-term goals for the coming ten years and visions for the next 20-30 years in relation to economic, social, culture, political and national security. For instance, the main goals and targets of the general socio-economic strategy by 2010 were to:

- Establish a foundation for modernization and industrialization by 2020,
- Gain political and social stability and being a democratic society,
- Double the gross domestic product (GDP)compared to 2000,
- Increase the contribution from the industry and service sectors to GDP to 82-84% by 2010,
- Remain the contribution from agriculture (including forestry, fisheries, animal farming, etc.) to GDP to 16-17% by 2010,
- Increase in total fish landings to be 2.0-2.2 million tons by 2010,
- Remain the population grow rate of 1.1% per annum, etc.

It provides directions for the developing sectors and industries such as agriculture, aquaculture, forestry, fishery etc. For instance, ensure sustainable exploitation of fisheries resources, developing the offshore fishing in combination with maintaining the national security and environment protection etc. It also provides implementation solutions and plans (National Party Congress IX, 2001b).

The general socio-economic development master plan

The master plan is established to operationalize the long-term goals of the strategy in specific administrative units, e.g. region, province and district. It provides operational objectives in terms of economic, cultural, social, environmental etc. It also provides a list of investment projects and solutions to be implemented. For instance, the master plan for the social-economic development in the southern region in 2001-2010 (PM, 1998) set up the following objectives:

- Growth rate in GDP to be13.5-14.5% per annum,
- Growth rate in trading and services to be 13-15% per annum,
- Increase in contribution from the industry to the regional GDP to be 50.4% by 2010,
- Enhancing marine fishing capacity and strengthening offshore fishing,
- Economic development should be connected with protection of the environment and enhancing national security, etc.

The general socio-economic development five-year plan

The five-year plan at the national level is established to implement the strategy and master plan in each five-year cycle. It provides overall goals such as stabilization of the macro-economic, building up foundation for industrializing and modernizing the countries, maintaining national security, changing the development paradigm and the development targets on economic, social and environmental aspects for the five-year term in question. For instance, the five-year plan for general socio-economic development in 2001-2005 (National Assembly, 2001) set the following objectives:

- Double growth in GDP compared to 1995 and with an annual growth rate of 7.5% per annum,
- Obtain growth rate in industries to be 11% per annum and in agriculture – forestry – fishery to be 4.3% per annum,
- Obtain growth rate in the population to be 1.2% per annum,
- Provide 1.5 million new jobs per annum,
- Increase the average life expectancy of Vietnamese people to be 70 years old by 2010, etc.

It could be seen that, objectives of the master plan do not match and connect with goals and targets presented in the corresponding strategy. It did not provide any specific objectives for fisheries as illustrated in the corresponding strategy. This may cause difficulties to achieve the targets and objectives adopted by the political strategy.

The general socio-economic development annual plan

The annual plan presents the state of society and economy of the nation through the officially statistical indexes provided by GSO. Based on this and in combination with the objectives planned in the corresponding strategies, master plans and five-year plans, it establishes the development targets for the next year. For instance, the annual plan for general socio-economic development by 2013 was to achieve the following targets (Prime Minister, 2012):

- Growth in GDP to be at approx. 5.5%,
- Growth in the export value to be at 10%,

- Providing 1.6 million new jobs.

As above mentioned, the strategy is developed in a political context, especially for the general socio-economic development strategies at national scale. It is often prepared by a group of experts coming from a wide range of disciplines headed by high-ranking politicians of the Communist Party. At the same time, the regional master plan and the five-year plan are often prepared by the MPI – a governmental agent. This may lead to disagreements in development targets and the objectives between strategy and the plans made by government. For instance, by 2010 the growth rate in population was set up at 1.1% in the strategy, while five-year plan set at 1.14%; similarly, the contribution from agriculture to the GDP was set up 16-17% in the strategy, while five-year plan set at 15-16% (National Assembly, 2006; National Party Congress IX, 2001b).

4.4.1.3 The fisheries planning system

Actually, the general socio-economic planning system includes all sectors and industries. Based on this the sectoral plans are developed in more detail. Therefore, a representative of specific sectors is normally invited as a member of the planning group headed by MPI to develop the general socio-economic development strategy and plans. The sectoral representative is required to draft and submit their sectoral strategy and plan to the MPI, so that the MPI (on behalf of the Central Government) compile the general socio-economic development strategy/plan and submit to the National Party Congress/National Assembly for approve. Accordingly, sectors and industries develop their own strategies/plans in line with the corresponsive strategies/plans of the general socio-economic development adopted by the National Party Congress/National Assembly.

The fisheries development strategy

A development strategy determines the visions for developing the fisheries, overall goals and development objectives, primary directions, macro solutions, and crucial projects and programs to achieve overall goals and development objectives the fisheries adopted in the general socio-economic development strategy/plan in a ten-year cycle. So far, there has been only one fisheries strategy elaborated and adopted in Vietnam - the fisheries development strategy by 2020. This was adopted by Prime Minister in 2010 (Prime Minister, 2010a). It addresses all aspects of the fishery sector (e.g. aquaculture, fish processing, capture fisheries, fishery logistics, etc.). For the fisheries, it defines the development visions and objectives by 2020 as follows:

- Moving from the '*people*' fisheries (i.e. small-scale fisheries) to the modern and industrialized fisheries;
- Modernizing and industrializing the fishing fleets;
- Enhancing investigation of the fisheries resources and forecast the fishing grounds for fishing practice;
- Restructuring the fishing fleets commensurately with fisheries resource base and natural conditions in specific regions;
- Establishing fishing corporations and co-operatives to do fishing in the offshore and oceanic waters;
- Strengthening the fisheries inspection to protect fisheries resources and secure national sovereign at seas;
- Total catches to be about 1.8-2.2 million tons;
- Triple income of fishers in comparison to 2010.

The strategy proposed a list of projects and programs such as making a master plan, developing industry of the fishing vessel engineering, establishment of the fisheries surveillance, application of fisheries co-management and transferring new fishing techniques. It also suggests solutions and tentative budget to implement this strategy (PM, 2010). It does not define objectives of the fishing capacity, and not provide solutions and measures to control the total catches.

The fisheries development master plan

A fisheries development master plan is elaborated based on the corresponsive fisheries development strategy and also on the general socio-economic development master plan. The master plan defines development objectives, specific targets, development directions and solutions to achieve the development objectives and targets. So far, there have been two fisheries development master plans (i.e. master plan by 2010 and master plan by 2020) adopted in Vietnam. The fisheries development master plan by 2010 (Prime Minister, 2006) defined development directions and overall objectives by 2010 as follows:

- Developing the sector as a commodity production with high competition and prestigious trademark;
- Growth rate in production to be 3.8% per annum;
- Enhancing offshore fishing and stabilizing coastal fishing;
- Total catches to be 1.5-1.8 million tons (Tonkin Gulf: 0.3 million tons, Central region: 0.4 million tons, Southeast region: 0.7 million tons, Southwest region: 0.2 million tons and Oceanic region: 0.3 million tons);
- Reduction in number of fishing vessels to 50,000 vessels (by specific fleets of engine capacity: <20HP: 10,000 vessels, 21-45HP: 20,000 vessels, 46-75HP: 14,000 vessels and >75HP: 6,000 vessels);
- Remaining the number of fishers at 500,000 people.

It also determined the solutions and programs to be done to achieve its objectives and targets such as conducting regularly fish stock assessments in specific regions; conducting projects on conservation of fisheries resources; mapping fishing grounds to guide commercial fishing fleets; transferring destructive fishing methods to more environment-friendly methods etc. However, a list of projects was not included in the decision on approving this plan. This did not meet requirements of the directive No. 32/1998/CT-TTg of the Prime Minister and decree No. 92/2006/ND-CP of the government. This may be a reason leading to the objectives and targets by 2010 were not accomplished.

The fisheries development master plan by 2020 (Prime Minister, 2013a) defined development directions and overall objectives by 2020 as follows:

- Total catches to be 2.2 million tons, by regions (Tonkin Gulf: 0.38 million tons, Central region: 0.7 million tons, Southeast region: 0.635 million tons, Southwest region: 0.485 million tons); by routes (in the coastal and inshore: 0.8 million tons, offshore area: 1.4 million tons); by species/groups of species (oceanic tuna: 15,000-17,000 tons, squids: 200,000 tons, shrimps: 50,000 tons; the rest is the other fish);
- Reduction in number of fishing vessels to 110,000 vessels and reduction rate of 1.5% per year.
- The number of the offshore vessels to be 28,000-30,000 vessels;
- Triple income of fishers in comparison to 2013;

- 50% fishers are trained in fishing techniques and management regulations.

In general, these objectives are in line with the objectives planned in the fisheries development strategy by 2020. They are higher than that planned in the master plan by 2010. This implies that the Vietnamese fisheries follow the production growth paradigm and ignore indications of overexploitation of the fisheries resources.

The fisheries five-year plan

A five-year fisheries plan is composed of two main parts: i) evaluation of the last five years, lessons learnt and ii) the development plan for the coming five-year period. In the first part, it reviews the outcomes and performance of the specific operational objectives and targets through development indexes (e.g. total landings, fishing vessels, etc.) and points out causalities and lessons learnt in implementing the fisheries policies and plans in the last five-year. For instance, the five-plan for 2006-2010 (MOFI, 2005b) evaluated the performance of the fisheries for 2001-2005 as follows:

- Growth rate in total landings was 4.2% per annum, higher than the expected level (4.0%);
- Total landings in 2001-2005 was approx. 7.36 million tons and by 2005 was 1.65 million tons;
- 8,680 new motorized vessels were built;
- Total number of fishing vessels by 2005 was 87,100 vessels, increased 18.3% compared with 2000;
- The credit program for building the offshore vessels was implemented in order to build 1,362 vessels;
- Release fisheries seeds to natural waters to restore fish stocks annually.

The operational objectives of the fisheries for the coming five-years are planned based on the corresponsive strategy and performance of the sector in the previous plan. For the fisheries five-year plan of 2006-2010, its objectives were developed based on performance of the fisheries in previous periods only, because the cause the fisheries strategy by 2010 was not developed. The operational objectives of the fisheries five-year plan of 2006-2010 were set as follows:

- Growth rate in total landings to be 0.6% per annum;
- Total landings for the five-years of 2006-2010 to be 8.9 million tons;
- Total landings by 2010 to be 1.8 million tons;
- Reduction of the number of fishing vessel to 50,000 vessels by 2010 (reduction of 27,100 vessels in comparison to 2005), but the total engine capacity of the fishing fleets increases more 90,000 HP.

It also provided a series of solutions and specific projects need to be done to achieve objectives such as: building more fishing ports; increasing number of offshore fishing vessels and reducing small-scale vessels; implementing fisheries resources protection programs; transforming occupations for local fishing communities; improving techniques for catching the high-value species for export and domestic consumption; and secure safety at seas. Clearly, these objectives are completely opposite to the outcomes and performance of the fisheries in the last periods, but seemed to be in line with the trend of the fisheries resources. This created a conflicting policy discourses in the Vietnamese fisheries (sea further in chapter 5).

On other case of the fisheries five-year plan of 2011-2015, its objectives were defined as follows:

- Maintaining a light growth rate in total landings in this period;
- Total landings by 2015 to be 2.15 million tons;
- Stabilizing the number of the offshore fishing vessels (about 24,000 vessels) and reducing gradually the number of small-scale fishing vessels.
- Reduction of the number of fishing vessel to 80,000 vessels by 2010 (reduction of 49,376 vessels), but the total engine capacity of the fishing fleets increases more 90,000 HP.

The objective of total landings by 2015 in this plan is agreed with those in the corresponsive master (Prime Minister, 2013a), but the objective of the fishing capacity is not in line with those in the corresponsive master.

The fisheries annual plan

Similar to the five-year plan, an annual plan of fisheries is also two parts. The first part evaluates the outcomes of the fisheries in a current year based on the development indexes (e.g. total landings and total number of fishing vessels) and performance of implementing fisheries management; and the second part set operational objectives and targets for the next year, and an action plan to implement. For instance, the fisheries annual plan in 2009 evaluated the main aspects as follows:

- Good weather, so all fishing fleets operating stably and producing the total landings of 2.31 million tons (5% higher than the level planned in 2009 and 5% higher than the total landings in 2008);
- The total number of fishing vessels be the end of 2009 was 130,926 vessels;
- Projects and programs were implemented sufficiently.

Based on this information, it set operational objectives in 2010 as follows:

- The total landings to be 2.0 million tons;
- 99% of the fishing vessels are registered at the fisheries authorities;
- The technical conditions of 47% of the fishing vessels are checked by the competent institutions.

It also provided solutions and an action plan should be implemented in 2010 such as providing fishing grounds forecast to fishers; improving the communication system between the management station and fishing vessels; proposing subsidies policy for marine fishing. Clearly, the objectives of this plan were not connected with that in the other planning documents. The figure of total landings was set higher than that in the master plan and the five-year plan(MOFI, 2005b; Prime Minister, 2006). This is the same to the fisheries annual plan in 2015.

4.4.1.4 Implementation of the fisheries planning system in practice

As a sectoral planning system, the fisheries planning system is required to be implemented in a hierarchical order (Prime Minister, 1998). However, in practice this order has been sometimes not complied with sufficiently. As above mention, there has had a lack of a coherent connection in both horizontal and vertical dimensions. In the horizontal dimension, the fisheries planning system is not aligned with the general socio-economic planning system. Similarly, in the vertical dimension, the lower plans (e.g. annual plan, five-year plan) are not in line with the higher documents (e.g. strategy, master plan) within the fisheries planning system. In addition, specific features of the fisheries such as uncertainty and unpredictability of the fisheries resources have not been taken into account in steps of planning and making decisions.

Ignorance of the specific features

The sectoral planning system is mostly addressed in the normative terms, which the same with other sectors, such as growth rate, contribution to GDP etc. The intrinsic characters of the specific sector are not taken into account during the planning process. For instance, uncertainty and fluctuation of fish stocks have never been analyzed in order to set up the catch level. The catch level has primarily been established increasingly based on the growth rate given in the general social development plans, without any considerations on fishing pressure on the fish stocks. In fact, a majority (19/28) of the coastal provinces did not make a fisheries development master plan by 2010 separately, but included within the general socio-economic development master plan. Hereby, the sectoral plan was not done in accordance with the specific nature of the sector; for instance, the sectors of fisheries, mine industry, transportation and construction were decided in a plan (Provincial People Communittee of Vinh Phuc, 2010). In other words, at the local levels the fisheries planning system was treated the same with and conducted together with other sectors that completely different.

Furthermore, the draft of policy decisions submitted to the Prime Minister (i.e. the strategy and master plan) are scrutinized by the MPI in accordance with the normative terms emphasizing growth rates, development targets in numeric and budgets requested across the sectors[9] (Prime Minister, 2011, 2013a, 2013b). The specific characteristics of the sectors, e.g. gas industry, chemical industry and the fisheries were not reflected into their own development policies. This means that the intrinsic characteristics of the fisheries:

[9]The targets in number for the gas industry, chemical industry and marine capture fisheries by 2015 to be 14 billion m^3, volume of NPK by 2015 to be 3.5-4 million tons, total catch of fisheries by 2015 to be 2.2 million tons respectively.

renewability, invisibility, unpredictability, uncertainty and reasonability were not taken into account in the planning process.

Coherence in the vertical dimension

There is a lack of coherent linkages among fisheries planning documents. At the national level, there was no fisheries master plan or a strategy for the fisheries development adopted before 2006 and 2010 respectively. At the local levels, only 9/28 coastal provinces (Hai Phong, Nghe An, Thua Thien-Hue, Binh Dinh, Binh Thuan, Ba Ria-Vung Tau, Ben Tre, Bac Lieu and Kien Giang) made their own fisheries master plan separately from the general socio-economic master plan in the period 2001-2010. This means that the fisheries five-year and annual plans in period of 2001-2005 at national level and in period of 2001-2010 of 21 coastal provinces were made based on inconsistent basis. In addition, adoption of the fisheries planning documents was not implemented in a hierarchical order in terms of the management level. For instance, the fisheries master plan by 2020 of Nghe An and Ba Ria-Vung Tau provinces were adopted before the fisheries master plan at the national level decided (Prime Minister, 2013a; Provincial People Committee of Ba Ria - Vung Tau, 2013; Provincial People Committee of Nghe An, 2008). In addition, the local fisheries managers always intend to set a growth rate in total landings rather than reduction of fishing level for conservation purpose. As observation in 2015, provincial fisheries managers in all 28 coastal provinces set up their total landings for the coming year higher than the total landings of the previous year. Fisheries managers in 15 provinces interviewed[10] argued that the central government had been promoting to enhance fishing at the offshore waters, then their offshore fishing fleets were allowed to fish any offshore waters throughout the country. This would bring an additional volume of landings to the current total landings of the province.

Furthermore, the five-year and annual plans were far from in accordance with the corresponsive fisheries strategy and master plan. For example, the annual plans for 2007, 2008, 2009 and 2010 were conflicting with the 2006-2010 five-year plan (DECAFIREP,

[10] They are Quang Ninh, Thanh Hoa, Nghe An, Thua Thien-Hue, Da Nang, Binh Dinh, Khanh Hoa, Binh Thuan, Ba Ria-Vung Tau, Ben Tre, Soc Trang, Bac Lieu, Ca Mau, and Kien Giang.

2010a; MOFI, 2005b) and also not in line with the fisheries master plan by 2010 (Prime Minister, 2006). In fact, the annual target in total landings of the annual plans was set higher than in the five-year plan and the master plan. In addition, the 2011-2015 five-year plan and the 2011 annual plan were decided before the master plan and strategy were approved. Clearly, the vertical connection among the elements in the fisheries planning system has not been addressed sufficiently. This may create disturbances in implementing the fisheries policies and management in Vietnam. Consequently, the Vietnamese fisheries in the last three decades has been developed in multi-directions, not followed a consistent management paradigm as defined by Charles (Charles, 1992).

Coherence in the horizontal dimension

Similarly, the linkage between the fisheries planning system and the general socio-economic planning system was insufficient. Indeed, the development visions and objectives of the fisheries stated in the fisheries development master plan by 2010 were disagreed with those articulated in the 2001-2010 general socio-economic development plan (National Party Congress IX, 2001a; Prime Minister, 2006). The 2001-2010 general socio-economic development plan intended to improve efficiency of the offshore fishing, while the fisheries master plan by 2010 intended to enhance offshore fishing capacity. The 2001-2010 general socio-economic development plan established the target landings by 2010 at 2.0-2.2 million tons, meanwhile the fisheries development master plan set at 1.5-1.8 million tons. In addition, the national fisheries strategy by 2020 was decided in 2010, but the general socio-economic development strategy by 2020 was adopted in 2011. This means that the fisheries strategy did not concretize visions and objectives of the general socio-economic development strategy.

Furthermore, the fisheries planning system was also conflicting with other sectoral planning systems (e.g. transportation, urbanization, education and tourism planning systems). For instance, a number of fishing villages and fishing ports in Hai Phong, Quang Ninh, Da Nang, Binh Dinh and Kien Giang had to move to other disadvantage places to implement projects on transportation, urbanization and tourism. The Nha Trang University of Fisheries was changed to the Nha Trang University with no longer emphasis on the fisheries only, but offer more disciplines such as land management, social science, information technology, etc. This has generated disadvantages and reduce opportunities for the Vietnamese fisheries in the recent years.

4.4.2 DECISION-MAKING BODIES AND PROCESS

Generally, the Vietnamese fisheries are managed by policy decisions and legal regulations, i.e. laws, ordinances, decrees, circulars and directives (see appendix 3) made by the government. The authorities and process of making decisions are articulated clearly in the laws (National Assembly, 2003, 2008). Accordingly, the authority to make the fisheries policy decisions (i.e. strategies and master plans) is assigned to the national government (i.e. the Prime Minister or Minister of MARD) for national level policies, and to the provincial government (i.e. the Chair of the PPC) for the provincial level policies (Government of Vietnam, 2006). They make decisions within a closed circle operated within the party-state-bureaucracy system, leaving little room for the participation, consultation and engagement of the civil society and non-government organizations (NGOs). In principle, the local fishers and relevant NGOs are invited to participate in the decision-making process and consulted with the policy and management decisions. However, they were almost not involved in the planning process as observed directly during the process of making the fisheries master plans by 2010 and by 2020. In fact, a bill of policies or legal documents would be passed and decided if it was agreed by relevant agents in that system.

At national level, a proposal of fisheries policies (i.e. strategies, master plans, and other development policies decided by Prime Minister) is prepared by MARD. Other interest groups, e.g. scientists, representatives of NGOs may be contracted to prepare some parts of ta policy proposal or being invited to provide comments to the drafting process. A fisheries policy proposal should be consulted officially with the relevant sectors (e.g. resources and environment, finance, science and technology, traffic and transportation etc.) and with the provincial government. Based on this, MARD revises the policy proposal and submits to MPI for evaluation comments. The MPI, as a *'gate guard'* for the Prime Minister, scrutinizes and provides an evaluation report on the policy proposal. Based on this, MARD revises the policy proposal according to the MPI's evaluation report and submits to the Prime Minister for approve. This process is applied at the provincial level. Department of Agriculture and Rural Development (DARD) is normally assigned to prepare the fisheries master plan of province. The proposal of the master plan should be consulted officially with MARD, the provincially relevant sectors (e.g. resources and environment, finance, science and technology, traffic and transportation etc.) and with the district government. Then, the Department of Planning and Investment (DPI), as a *'gate guard'* for the Chair of PPC, scrutinizes and provides an evaluation report on the proposal of fisheries master plan. Finally, DARD revises the proposal according to the DMI's assessment report and submits it to the Chair of the PPC for approve.

In terms of the legal regulations, MARD is assigned to prepare the bill of the fisheries law and ordinance and to lay the groundwork for making decision by the National Assembly. Similarly, MARD is responsible for drafting the bill of decrees on fisheries management and laying the groundwork for deciding by the national government of Vietnam. In fact, on behalf of MARD, Directorate of Fisheries (D-Fish), a competent agency in fisheries of MARD implement relevant works of fisheries. D-Fish also prepares and submits the bill of circulars, directives to minister pf MARD for approve.

At the provincial level, the Chair of PPC has the authority to issue directives and particular decisions to manage the fisheries within the provincial waters. DARD is in charge of preparing the bill of the directives/particular decisions and laying the groundwork for deciding by the Chair of PPC. The bill should be consulted with D-Fish/MARD and other provincial sectors before deciding by the Chair of PPC.

4.4.3 RULES AND LEGISLATION

4.4.3.1 Rules

The Vietnamese fisheries are managed under the following principles articulated in the fisheries law (National Assembly, 2003):

- The fisheries resources are the common property, owned by the Vietnamese people and under the unified management of the government. Individuals and organizations have the rights to access and harvest fisheries resources in compliance with the annual allowable catches and legal regulations of the government.
- The government conducts the fisheries surveys and stock assessments and sets up the annual allowable catches in specific waters and fishing grounds.

- The development of the Fisheries ought to follow the fisheries planning system as well as fit the master plan of the socio-economic development at the respective scales.
- Fishing practice has to be combined with maintaining national security, interests and sovereignty at seas.
- The Ministry of MARD is responsible for managing the fisheries in the offshore and international waters. The PPC is in charge of managing the fisheries in the coastal and inland waters. The DPC and the CPC are decentralized and guided to manage the fisheries in their coastal route waters.
- Individuals and organizations are encouraged to invest in scientific research, transferring technology and conservation of resources to develop the fisheries.
- Local communities are promoted and invited to take part in monitoring, detecting and prosecuting any violation of the fisheries regulations. They are also invited to participate in the co-management models for managing the fisheries in the coastal route waters.

4.4.3.2 Fisheries legislation

The fisheries law set up a combination approach (e.g. catch control, fishing effort control and technical measures) to manage the Vietnamese fisheries (National Assembly, 2003). Accordingly, the total catches are set yearly in the annual plans or periodically (five years, ten years) in the five-year plans, master plans. They are defined for specific regions and for administrative territories (i.e. national, provincial, district, and commune), but are not divided into catch quotas and allocated to the fishing entities, vessels, or individual fishers as done in developed fisheries. Finally, the total landings of fishing vessels, fishers have not been limited and controlled in practice. The local fishers are allowed to catch as much as possible (see further in chapter 7).

For fishing effort control, the Vietnamese fisheries authorities manage the fishing effort through the number of fishing vessels. In fact, the number of fishing vessels are managed under the fisheries plans adopted by fisheries authorities. It is calculated for specific regions to ensure that the fisheries resources are not overexploited. The provincial fisheries authority has the authority to control the number of fishing vessels registered in its territories. However, the number of fishing vessels defined in the fisheries plans is not divided and allocated to fisheries authorities, so fisheries authorities do not know the number of fishing vessels assigned to control. Therefore, they have no evidence to stop issuing the permission for building fishing vessels. In addition, MOFI introduced a regulation on banning development of fishing vessels powered with engine capacity less than 30HP in 2006 (MOFI, 2006b). However, the number of fishing vessels of this fleets has increased since after that (MARD, 2010, 2016). Consequently, the number of fishing vessels is not controlled effectively toward the number adopted in the fisheries plans.

The Vietnamese fisheries also are managed by technical measures. A set of regulations on fishing techniques and methods was issued to protect fisheries resources (MARD, 2008a; MOFI, 2006b). They include regulations of:

- i) Bans on using the fishing gears and methods (e.g. push net, stow net, destructive fishing methods of using electricity, poison, explosive);
- ii) Minimum mesh size (e.g. mesh size at cod-end of trawl nets >20mm, purse seines >18mm, gill nets >40mm);
- iii) Minimum fish size to be caught (e.g. round scads >120mm, anchovies >50mm, frigate mackerel >220mm);
- iv) Closed areas and seasons (e.g. Hon My – Hon Mieu (21^{0}18'N - 21^{0}24'N;107^{0}42'E - 107^{0}50'E) from 15th April to 31st July, Co To island (20^{0}56'N - 21^{0}06' N; 107^{0}40'E - 107^{0}53'E) from 15th February to 15th June), coastal area (from 0 – 5m deep) of Bac Lieu, Ca Mau from 1st April to 1st June);
- v) Zoning (e.g. banning trawl nets, fishing with light to fish in the coastal areas).

In addition, the government also issued regulations on administrative sanctions in the fisheries in Vietnam (Government of Vietnam, 2013). The financial sanctions range from 10-1,000 USD. Other supplementary sanctions such as withdrawing fishing license and restoring the origin situation may also be imposed depending on the violation.

Clearly, the fisheries management rules and legislation of Vietnam are integrated common management principles of the international fisheries. However, its effectiveness has limited due to the specific characteristics of the small-scale fisheries. The fisheries management system in Vietnam has slowly adapted international practice and rules. For instance, the management system of the clam production in Ben Tre was modified to obtain the Marine Stewardship Council (MSC) certification, a management plan for tuna fishery was made to meet the requirements of the *Western and Central Pacific Fisheries Commission and the swimming crab fishery in Kien Giang are in the process of being MSC certificated.*

4.4.3.3 Enforcement and compliance

Surveillance and enforcement of the fisheries legislation at the local communities are mainly mandated to the fisheries inspection force[11] at the provincial level. Each province is employing 1-2 inspectors on the fisheries and 1-2 fisheries patrol vessels to enforce and surveil the fisheries legislation within the provincial territories as investigated in Quang Ninh, Hai Phong, Thanh Hoa, Nghe An, Thua Thien- Hue, Da Nang, Binh Dinh, Khanh Hoa, Binh Thuan, Ba Ria-Vung Tau, Ben Tre, Soc Trang, Ca Mau, Bac Lieu and Kien Giang. This means that each fisheries inspector is in charge of surveillance for approx. 2,000 fishing vessels operating in a wide range of fishing grounds. This means that the fisheries inspection force was very weak and could not enforce the fisheries legislation in Vietnam (Vinh, 2009).

In addition, the compliance with fisheries regulations of the local fishers has been very poor. As investigation in eight provinces in 2009-2011 shows that 100% of the local fishers interviewed just heard about fisheries regulations issued by the fisheries authorities (e.g. banning gears and methods, mesh size, fish size, restricted or closed areas). But they did not know thoroughly and did not care about these regulations because they did not believe that the regulations of the government would maintain their livelihoods. Therefore, they were following the traditional customs and indigenous knowledge tested in practice to maintain their business. As a consequence, approx. 70.4 % fishers utilized gears with under mesh size (Lung, 2010). In fact, the mesh size of the trawl nets for finfish is required to be no smaller than 28 mm, but it ranges from 15-20 mm in practice; the minimum size of squid *(L. chinensis)* allowed to fish is 20 cm in length, but smaller sizes are landed commonly. In addition, using destructive fishing methods took place commonly in many

[11] In addition to this force, the fisheries surveillance at the national and regional levels, coastal guard and other public security forces also participate in the supervision of fishing activities in line with other regulations or suppression of illegal fishing practice.

provinces as reported in Quang Ninh, Hai Phong, Nam Dinh, Thanh Hoa, Nghe An, Ha Tinh, Quang Ngai, Binh Thuan, Ca Mau, Kien Giang in 2009. The infringement of the fisheries regulations had increased in the recent years (DECAFIREP, 2010b). This may be addressed more effectively if the co-management arrangement are introduced (FAO, 2005a; Douglas Clyde Wilson et al., 2003). However, implementing this arrangement in the Vietnamese fisheries has encountered obstacles (see further in chapter 8).

4.4.4 RESEARCH AND DATA COLLECTION

The fisheries data in Vietnam are collected and stored in separate systems. The GSO system collects fisheries data to estimate development indexes of the fisheries such as total landings, fishing vessels, and other general indexes (e.g. incomes, genders, anthropology, etc.). The data published by GSO are considered as the official information of the government. They are the official basis for evaluating, planning the fisheries. The other system, the fisheries research collects specialized data in fisheries (e.g. fish stock assessments, socio-economic information, analyses on fishing fleets, behaviour and livelihoods in local fishing communities). It also collects the same data with the GSO, but irregularly. These data and information provided by the research system are just used as a reference; they are not accepted as the official basis for evaluating and planning the fisheries.

4.4.4.1 Statistical data collected by GSO

The total landings are presented in a combination figure for all fisheries and all species in specific administrative territories (i.e. commune, district, province, and the whole country) that fishing vessels registered as the home port. The estimations of total landings are conducted with the sampling method and published regularly (see further in chapter 6). For instance, the GSO provided the estimation of total landings of Nghe An province in 2012 were 55,891 tons, of Kien Giang in 2015 was 463,370 tons, and of the whole country in 2015 was 2.840 million tons (GSO, 2016). The fish landings are not classified by fisheries, or by species/species groups, by fish size to provide understanding about the fishing mortality in detail of fish stocks. In addition, they are also not classified by fishing grounds or regions as defined in the fish stock assessments. Therefore, these data do not reflect the fishing pressure on the specific regions. This means that the data in the fish landings presented by GSO do not provide the thorough understanding about the effects of the human system on the natural system. Therefore, managers may not intervene correctly to maintain the sustainability of the fisheries system in Vietnam.

Similarly, the data on the fishing vessels are also reported in fishing fleets (i.e. by fisheries and by engine capacity) by administrative territories. These data are provided by the fishing vessel registration agencies and published in the yearly basis. In fact, the fishing fleets often fluctuate monthly and change year by year as observed in Quang Ninh, Thanh Hoa, Binh Dinh and Ben Tre in 2010-2012. Fishers often change their gears and methods to get better catches as analyzed in section 4.3.1.2. Furthermore, the data on the fishing trips of the individual vessels have not been collected. Therefore, the real fishing effort (e.g. fishing days, number of hauls) pushing on the specific regions/fishing grounds has not been known in Vietnam, and managers would not regulate the fishing effort in the place to ensure that the fish stocks not being overexploited.

4.4.4.2 Fisheries research

The fisheries research has received less attention than other sub-sectors within MARD. The annual budget allocated to the fisheries research was approx. 13% of the total budget for the scientific research of MARD in 2008-2013. It was less than agricultural research (32%), animal research (23%), forestry research (17%) and irrigation research (15%); meanwhile, the fisheries sector provided a contribution of nearly 30% to the GDP of the agriculture sector. The scientific research on the fisheries focused on improving the fishing technologies and fishing patterns. Just a few researches were conducted to provide knowledge for restructuring the fishing fleets, dynamics of fish population. The research on fisheries biology and ecosystem structures have been implemented rarely in the last five decades.

The fish stock assessments have not been conducted regularly in Vietnam, but implemented in the survey programs (box 4.1). Such surveys are often implemented by trawl net for demersal fish, by gill net and long line for large pelagic fish and by acoustic equipment for small pelagic fish. The main data (e.g. species composition, density distribution and length size distribution) are collected to estimate the standing biomass and exploitable potential yield in the regions in question. Under this model only aggregated figures of the standing biomass and exploitable potential yield in the specific regions are estimated and presented in the stock assessment reports. The biological population parameters (e.g. age structure, maturity state, mortality rate and productivity of individual fish stocks) are not presented in the stock assessment reports.

Box 4.1: Fish stock assessments in Vietnamese sea waters since the 1990s

1992-1993: A survey on high economic value species conducted by RIMF.

1992-1995: Investigation of the tuna resources in Vietnamese sea waters conducted by RIMF and the Halong Fisheries Corporation.

1993-1997: Integrated survey on fisheries resources and environment of Truong Sa archipelago conducted by RIMF.

1995-1997: Assessment of large pelagic fish stocks in Vietnamese EEZ conducted by RIMF with assistance of Japan.

1996-1998: Assessment of fish stocks in Vietnamese sea waters within the assessment of living marine resources in Vietnam – ALMRV/DANIDA.

1997-2003: Basic survey on fisheries resources and environment of the key coastal areas for sustainable development conducted by RIMF.

1998-2001: Exploration of the marine fisheries resources in the offshore areas conducted by RIMF.

2000-2003: Assessment of oceanic large pelagic fishes in Vietnamese EEZ conducted by RIMF.

2003-2005: Assessment of fish stocks by long line and gill net gears conducted by RIMF within the ALMRV II/DANIDA.

2003-2005: Stock assessment of small pelagic fishes in Vietnamese waters conducted by RIMF.

2010-2020: An integrated marine survey program has been conducted by the Vietnam Academy of Science and Technology (RIMF carries out the package of fish stock assessments).

This stock assessment model has been used to provide information for planning the Vietnamese fisheries, albeit it is not suitable for the tropical fisheries and cannot help the sustainability of fisheries (Raakjær, 2004; Thia-Eng & Pauly, 1989). It is unable to provide knowledge for managing the fisheries according to the ecosystem based approach (FAO, 2004b). In addition, this approach is not suited for the Vietnamese fish stocks because all fish stocks have been exploited at a certain level (Sparre & Venema, 1998). Therefore, this approach was criticized by the fisheries managers as its transparency and usefulness for planning the fisheries as observed at the MOFI in 2004. The fisheries managers suspected the estimation of biomass and exploitable potential yields and called for an alternative approach that would be more visible and easier to verify. However, such an approach has not been introduced into Vietnam so far. It may be due to the fact that this is not in line with the statistical indexes in the Vietnamese fisheries as argued by a planner.

In addition to stock assessments, researches on economic and socio-economic aspects of fisheries have also been conducted to provide insight into the socio-economic system of the fisheries and fishing communities. However, the multidisciplinary researches, which produce more comprehensive advice for the fisheries management, have not been conducted in Vietnam. In 2003, under assistance of the DANIDA project, the Marine Fisheries Specialist Team was established to provide multidisciplinary advice for the fisheries management in Vietnam. However, it collapsed because it did not receive any advice request from the fisheries management authorities (see further in chapter 8).

Generally, fisheries research and data collection have been conducted by the state institutions within the state budget or in collaboration between the state agencies and international donors. The private sector and local fishers just take part as owners of the equipment or vessels in order to perform the survey cruises at seas or as interviewees. It seems that the indigenous knowledge has not been used in the fisheries decision-making process in Vietnam. The marine habitats and ecosystems have been known initially and qualitatively in Vietnam. The intrinsic nature and causal relationship of the aquatic systems have just been described as phenomena. Understandings about the marine ecosystems are still limited (Thanh, 2009).

4.5. CONCLUSIONS

Traditionally, Vietnamese fisheries have been described by statistics in three areas: total landings, number of fishing vessels published regularly by the GSO and the total biomass of fisheries resources produced irregularly by RIMF. These data are neither specific nor comprehensive enough for accurate analysis in light of the common analytical frameworks for the fisheries in the world. This research points out evidence that these data are uncertain. Therefore, these data should be debated and validated transparently and scientifically.

This research shows that the production of knowledge for planning fisheries is influenced by the mandatory growth rate that is decided by politicians. This indicates that management of the natural system (i.e. fisheries resources and marine ecosystems) is influenced primarily by needs/views of the human system: the economic, social and socio-economic aspects, as well as political, cultural aspects, rather than ecological one.

The Vietnamese fisheries are in a crisis because of having a big gap between the planning system and practice. The fisheries planning documents do not reflect the real state of the fisheries and do not follow a consistent direction on one hand, and the development of the fisheries has not been controlled by the government on the other hand. Fisheries managers are in a deadlock situation with dilemmas about how to restructure their fisheries effectively and efficiently. The fisheries management system is facing the following issues:

The fisheries resources are treated as a common pool property and fishing activities happen freely as open access throughout the common waters in Vietnam. There is no limitation on the volume of fish allocated to fishing entities, though the total allowable catches are determined in the state planning system. The local fishers have been encouraged to catch as much as they can.

There is a lack of a thorough and comprehensive understanding about the real status of the fisheries system including the management, the natural and the human systems in Vietnam. The available data and information in the Vietnamese fisheries provide a confused understanding about the fisheries. The fishing capacity would be enlarged if taking the estimations of total landings and of the biomass and exploitable yields as the basis. Conversely, the fishing capacity should be reduced immediately if taking the estimations of the CPUE of the fishing fleets and the catch rate of the scientific surveys. This situation has been effecting on the planning fisheries in Vietnam by creating conflicting policy decisions.

The sectoral planning system (e.g. fisheries) are governed within a dual planning system. It provides foundation for the general socio-economic planning system, and then the general socio-economic planning system directs and provides official development points of views for the sectoral planning system. This arrangement produces complexity and overlaps between two systems. It may waste the government resources and generate contradictions in development. Moreover, this system is operated in a centralized and bureaucratically top-down paradigm within the government system with little legitimacy at the local levels. The fisheries planning system is a diminutive part in a complicated planning system in Vietnam. The linkages among components within the fisheries planning system and between the fisheries planning system and the general socio-economic planning system are incoherent. The Vietnamese fisheries are planned in the same approach and context as other sectors and industries, and thus their intrinsic features, e.g. diversity, complexity, dynamics and multi-scales are not taken into account sufficiently in the planning and approving processes.

The fisheries management decisions and regulations are not enforced efficiently in both the governmental agencies and local communities. Regulations on catch control and fishing effort control have not been implemented in practice. The fisheries regulations are mainly enforced by the governmental agencies leading to a poor compliance with the legal regulations at the local fishing communities. Fishers behave accordingly to traditional customs rather than legal regulations.

A majority of the local fishers are honorary members of the associations established by the government. But all of them are engaging in a traditional group of fishers. The local fishers have limited education and operate their business according to hereditary experience. They respect and behave in accordance with their own traditionally informal rules and religious beliefs sometimes rather than following the legal regulations of the government.

Finally, one of the key take-away messages for the fisheries management system involves the statistical indexes used in management: the collective number in fish landings and number of vessels registered by administrative territories is unable to provide a sufficient understanding about the effects of the human system on the natural system. Similarly, fish stock assessments are implemented irregularly and incomprehensively in Vietnam, thus they cannot provide the real state of fisheries resources stocks and fisheries in practice. Thus, the most primary and basic data used in fisheries management around the world (e.g. statistics on fish landings and fishing vessels) are uncertain in the Vietnam case.

CHAPTER 5: AN ANALYSIS ON A MASTER PLAN AS A PLANNING TOOL OF THE FISHERIES IN VIETNAM

5.1 INTRODUCTION

As described in chapter 4, the total landings and fishing capacity (published by GSO) of Vietnamese fisheries have grown impressively over the last two decades. In this period, a more than tenfold increase in fishing effort in term of engine capacity, and a more than fourfold increase in total landings could be observed in Vietnamese fisheries (D-Fish, 2017a; GSO, 1996, 2001, 2006, 2016). This resulted from a range of the subsidy programs and investment projects to implement a political goal of modernization and development fisheries by 2020. There are, however, indications showing depletion of fish stocks, degradation of marine ecosystems and a decline in economic returns of fishing fleets. A departure point for this research is the growing evidence of failure of the long-term management plan in the 2000s. It has been argued that the fisheries policies in Vietnam have performed poorly (Tuan, 2013), and that none of the management objectives of the 2010 master plan adopted at decision No. 10/2006/QD-TTg were achieved (MARD, 2011; Prime Minister, 2006).

This failure may be due to unrealistic objectives of the 2010 fisheries master plan (Quyen, 2012). To understand about the logics of planning fisheries, this chapter employs the paradigm triangle framework (Charles, 1992) to investigate the development objectives planned in the 2010 fisheries master plan of Vietnam. It will address the following questions: i) What was background to the formulation of the 2010 fisheries master plan? and ii) How did fisheries policy discourses emerge and institutionalize into the 2010 fisheries master plan in Vietnam? The chapter proceeds as follows. Firstly, the chapter analyses the context of formulating the 2010 fisheries master plan to identify the core discourses in the Vietnamese fisheries, and roles of actors involving in fisheries planning processes to understand their power in deciding the management objectives. Secondly, it structures story lines and analyses the discourse coalitions mobilized in fisheries planning processes. Thirdly, it examines how story lines are manifested in the master plan to learn rationalities of the Vietnamese fisheries master plan by 2010. Finally, it concludes with the key points related to the logics of the management objectives of the 2010 fisheries master plan in Vietnam.

5.2 THE CONTEXT OF MAKING THE 2010 FISHERIES MASTER PLAN IN VIETNAM

5.2.1 LEGAL FRAMEWORK FOR THE STATE PLANNING SYSTEM

In 1998, the Prime Minister of Vietnam signed a directive to introduce a new kind of plan – the master plan into the state planning system. This directive defines *"a master plan for socio-economic development is a crucial step in the whole process of planning the national economy. It should be linked to the socio-economic development strategy and be used as basis for elaborating the five-year plan"* (Prime Minister, 1998 p.1). It provides foundations, orientations, spatial organization and allocation of resources for developing socio-economic development in a circle of ten years and visions to the next 10-20 years. The directive required all sectors to develop their own master plan. A process for making a master plan should follow three primary principles: i) clarify potentials, conditions, points of view, objectives, development directions and implementation mechanism, ii) assess sufficiently the reform policy, development strategy in 1990-2000 and five-year plan 1995-2000 to provide bases for planning in 2001-2010 under guidance of the steering committee established by the Central Government, and iii) emphasize marketing, internationalization, promotion of the internal resources and maximization of the external resources. The sector is actively required to develop efficiently and sustainably according to the overall strategies (Prime Minister, 1998). It also required to follow a process of ten stages as illustrated in the figure 5.1.

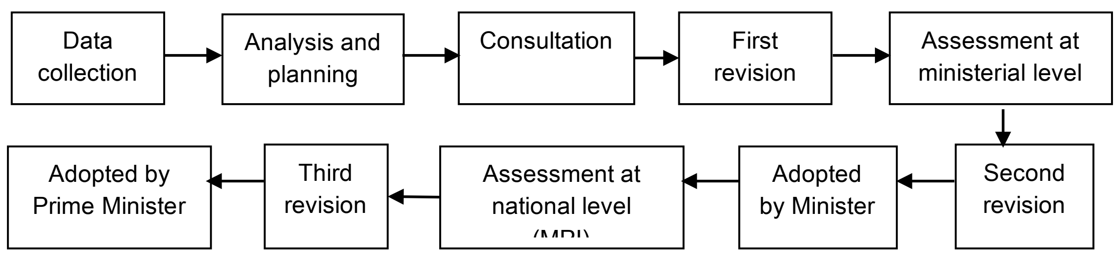

Figure 5.1: The processes of making a master plan for socio-economic development in Vietnam.

In this process, there are four key steps added into the conventional planning process. The master plan would be established based on a sufficient and specific knowledge base which published officially by GSO and relevant scientific institutions. Relevant sectors and civil organizations will be consulted during the preparation of the plan. Importantly, the plan will be scrutinized by Minister of Planning and Investment (MPI) to provide evaluations of feasibility in terms of the state resources and avoid conflicts with the development orientations of the general socio-economic plans as well as with other sectors. Finally, it will be adopted by the Prime Minister, based on his assumption that the master plan addressed all comments and requirements provided by MPI. This may challenge sectors in developing master plan in terms of using knowledge inputs and debating policy discourses in a context of the dual planning system analyzed in chapter 4.

5.2.2 BACKGROUND OF MAKING THE 2010 FISHERIES MASTER PLAN

As the first decade of economic transition from the centralized planning economy with dependence of Soviet Union and Eastern European countries, the National Party Congress term VII (National Party Congress VII, 1991) adopted the 1991-2000 general socio-economic development strategy emphasized on the stabilization of national economy and liberating Vietnam from the political crisis in Soviet Union and Eastern European countries. In which, the growth rate in total fish landings for the period set to 3-4% per annum. In fact, the total landings and number of fishing vessels for the period 1991-1995 increased by 6.7% and 10.7% per annum respectively (GSO, 1996). This achievement was highly appreciated by the political system and the fisheries sector was seen as a sector with high development potential by the National Party Congress support term VIII (National Party Congress VIII, 1996). This Congress, therefore, in the mainstream of development of the national economy and industrialization and modernization of the country, put the fisheries as one of three largest sectors and assigned the fisheries a growth rate of total landings at 4.5-5% per year in period of 1996-2000. The same for the period of 1991-1995, the total landings and number of fishing vessels in 1996-2000 increased by over 6.7% and 3.3% per annum respectively (GSO, 2001). In addition to this, fisheries biologists at RIMF (Chung, 1997c) provided figures of biomass (3.5 million tons) and EPY (1.7 million tons) higher than those estimated in 1993 (Thuoc, 1993). This indicated that the Vietnamese fisheries were developing in a sustainable manner, as the total landings during the period 1991-2000 were below the EPY estimation. It was, therefore, decided to maintain the growth rate of total catches as set for the period 2001-2010.

At the same time, there was a paradox that MOFI conflicted itself to argue that destructive fishing methods (e.g. fishing with explosion, poisons) were commonly seen throughout the fishing grounds (MOFI, 1996). This was a reason leading to disappearance of some species and a dramatic reduction in the catch rate of the coastal fishing fleets as reported by MOFI in 1992-1994 (MOFI, 1992, 1993, 1994, 1995a). In addition, a decreasing trend in catch rate of fishing fleets was continuously documented in the annual reports of MOFI in 1996-2000 (MOFI, 2001). Along this finding, Thong[12] demonstrated a decline in catch rate and incomes of fishing fleets, especially of the small-scale and artisanal vessels operating at the traditional fishing grounds (Thong, 1998). Based on these available data, he intended to plan the fisheries towards the conservation of the fisheries resources. Therefore, there were conflicting perspectives about planning the Vietnamese fisheries by 2010. One perspective to maintain the growth rate of catches supported by data provided by GSO and RIMF, the other follow the conservation objective to reduce fishing effort and increase the total catches in a precautionary manner supported by findings provided by VIFEP. In other words, the 2010 fisheries master plan of Vietnam may be made in two conflicting paradigms: the production-based growth paradigm or the conservation paradigm, dependently on perspectives of politicians and actors involving into planning fisheries. One more thing may disturb actors in using knowledge for planning fisheries was reliability of the statistics of GSO. Indeed, the total landings in 1997 estimated by GSO was 1.08 million tons. It only equals to 75.5% of estimation (1.47 million tons) by ALMRV project[13].

In addition, illegal foreign fishing vessels came increasingly into the Vietnamese waters (MOFI, 1996). This has caused conflicts between Vietnamese and foreign vessels and jeopardized sustainability of fisheries resources in the Vietnamese waters. In addition to

[12] Thong was a former director of VIFEP. He was the head of the team making the 2010 fisheries master plan in 1997-2004.

[13] This was estimated by DANIDA project based on the fisheries enumerator program conducted in 11coastal provinces: Ca Mau, Bac Lieu, Kien Giang, Ba Ria-Vung Tau, Binh Thuan, Khanh Hoa, Quang Nam, Da Nang, Nghe An, Hai Phong and Quang Ninh.

this, the political resolution for the industrialization and modernization of the country provided a basis for developing large-scale and industries vessels in Vietnam. Therefore, an argument of building more fishing fleets, especially the bigger vessels operating in the offshore waters would be accepted in this situation. At the same time, with assistance from DANIDA, a series of investigations on fish stocks as well as fisheries socio-economic were conducted in 1995-1997. They provide new knowledge and new approach for planning fisheries which follow the precautionary principles rather than support for the production-based growth paradigm of the existing management regime in Vietnam (VIFEP, 1997).

In conclusion, the Vietnamese fisheries in this period were faced with four main pressures/issues: i) mainstream of a high growth rate of production; ii) overfishing in coastal waters; iii) poor livelihoods of the small-scale fishers; iv) popularity of destructive fishing practice in coastal waters; and v) illegal fishing in the off-shore waters. This means that the master plan in 2001-2010 for the Vietnamese fisheries should address the above issues which is summarized into three management paradigms: rationalization, conservation, and social/community (Charles, 1992).

This caused difficulties for formulating a proper policy for the Vietnamese fisheries. To meet the production growth objectives, the sector needed to enhance fishing capacity to catch more fish and provide more jobs. This storyline was supported by politicians. This would put more pressure on the resource base resulting in aggravating depletion of the fisheries resources. The conservation objectives are only achieved if the fishing effort was remained at a proper level, which is believed one of the third lower than the existing level and/or technical measures to protect fish stocks and marine habitats are complied with adequately. Doing so, a number of fishing vessels and fishers would get out of fishing industry. It would cause substantial economic and job losses for fishing communities. This is championed by environmentalists, but may be opposed by politicians who decide policies. Balancing these conflicting objectives is still a challenge for any fishery over the world (Cochrane, 2009). It would be more problematic for fisheries which lacked reliable time-series data as the Vietnamese fisheries. This caused conflicting arguments among actors in planning the 2010 objectives of fisheries development in Vietnam. It resulted in a paradox that taking more ten years from 1996 to 2006 to make the 2010 fisheries master plan in Vietnam.

5.2.3 CHANGING IN FISHERIES PLANNING SYSTEM: THE NEW WINE IN THE OLD BOTTLE

5.2.3.1 A fisheries planning system in the centrally planned economy

The Vietnamese economy was operationalized within the centrally planned economy until 1981. As a sector in the centrally planned economy, the fisheries planning system defines the target of total fish landings and demands for allocating the state resource from the central government. Under this regime, the fisheries sector was annually given a volume of total fish landings, called as the mandatory target, to meet demands for fish of the domestic consumption and export. In order to achieve this target, the sector was allocated a correspondent amount of resources. Subsequently, state-ownership fishing companies and collective cooperatives were given a targeting volume of catches and allocated an amount of resources (e.g. fuel, equipment, workers, materials, etc.) to produce the volume of catches given. In term of business, MOFI played roles as a fishing enterprise. All catches landed by fishing vessels were controlled strictly and then they are also distributed by the state agents (Prime Minister, 1960). For instance, in an annual plan in 1978 articulated that *"function mandates at local communities (i.e. militia, night-watch) have to work intensively to make ensure that all catches landed at their communities must be sold to the state agents*" (MOFI, 1979 p.14). It must be ensured that the operation of fishing business (e.g. purchasing and consuming fishing production, providing fishing costs, managing fishers) were executed by the state agents. A mission that *"being determined to abolish the clique of middlemen in local communities"* was assigned to the local government (MOFI, 1979 p.9).

In this regime, the state planning system played a critical role for governing the national economy in general and the Vietnamese fisheries sector in particular. The fisheries sector was linked with the national economy through development directions and mandatory production targets (i.e. total landings and GDP contribution). Based on these targets fishery managers from MOFI planned the resources allocation including number of vessels, workers, amount of fishing costs (fuel, nets, foods, equipment…) to obtain the targets given. For instance, the 1975 fisheries plan set out mandatory targets as follows:

- Total catches: 120,000 tons,

- Fish sauces: 38 million litters,

- Providing 5,000 tons fresh fish for Hanoi citizens,

- Export value: 4 million VND.

Based on these mandatory targets, MOFI suggested a corresponding amount of variable costs and other fixed costs as follows:

- Building more 20,000 fishing vessels,

- Repairing for 13,000 fishing vessels,

- Installing more 10,680 horse power for fishing vessels,

- Making 1,500 trawl nets, 300 purse seine nets and lift nets,

- Wood for building and repairing vessels: 30,000 m^3

- Variable costs/banking loans: 25 million VND.

After the approval by the central government, the mandatory targets of the sector would be allocated to fishing entities as shown in figure 5.2.

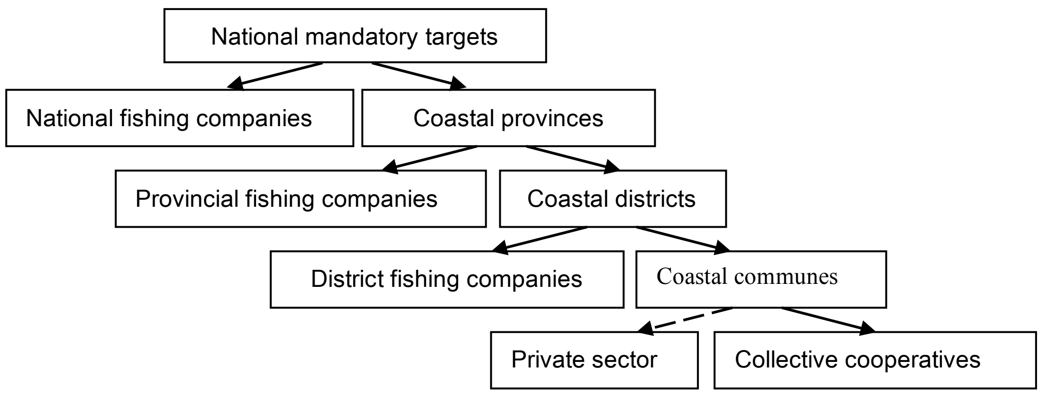

Figure 5.2: A mechanism for allocating the mandatory targets: catch target and fishing costs of the Vietnamese fisheries before 1981.

As shown in figure 5.2, the mandatory targets of the fisheries were allocated at four levels: national, provincial, district and commune levels. In this mechanism, MOFI and lower levels connected hierarchically through the mandatory targets: the volume of catches and amount of fishing costs. Consequently, these two figures became the cornerstone of the fisheries planning system as well as were used to measure performance of the fishing entities. The higher administration level allocated the catch target and fishing costs for the lower one. At the communal level, most volume of the catch target and fishing costs are allocated to fishing cooperatives, some of catches are allocated to private vessels (a number of vessels in the south region had still not collectivized into cooperatives). In this regime, the government commonly planned a maximum catch target as they desire to cover demands for fish of the domestic consumption and to export. In fact, the total annual catches were set increasingly around 7.0% per year in 1961-1980 (MOFI, 1981) to meet increase in population and demands for fish. Fishers, are state workers paid by government, are encouraged to catch as much as possible and rewarded if their catches exceeded the volume given and vice versa.

5.2.3.2 A fisheries planning system in a market-oriented based economy

The Vietnamese fisheries sector fell into a hardship by the end of 1970s that the planning objectives were not fulfilled at all in 1976-1980 (MOFI, 1981). This was due to the volume of catch target was set highly compared to available fishing capacity on one hand, and the government could not afford to provide enough fishing costs and facilities for the fisheries sector (MOFI, 1980). Thong, a former director of VIFEP argued that this failure of fisheries was because of deficiency of the centrally planned economy. He stated that this system did not encourage fishers to improve fishing efficiency, fishers – the state workers just worked reluctantly to get egalitarian benefit. This was a problem of the centrally planned economy (Sloman, 2000). Subsequently, the Vietnamese fisheries sector was piloted with the policy which allowed fishers/fishing entities to sell their products to cover fishing costs themselves (The State Planning Committee of Vietnam, 1981). From that point, the volume of catches was no longer allocated to the fishing entities in practice. Fishers were allowed, even were encouraged to catch as much as they could. They were also given rights to land and sell their catches freely to markets.

By the 1980s, the state-owned and collective-owned fishing vessels operated ineffectively and almost all collapsed and were privatized by the end of the decade (MOFI, 1993). From that point, it could be said that the Vietnamese fisheries are a private sector. In fact, the fishing decisions were made by individual fishers, no longer decided by the fisheries authorities as under the centrally planned economy. In other words, government no longer controlled the fisheries sector through the mandatory catch targets. Instead, fisheries authorities intervened in the fishing industry by management measures as analyzed in chapter 7. Besides, the government also encouraged and provided subsidies to enhance fishing capacity with focusing on the offshore fishing fleets. This brought tremendous growth in both the total landings and fishing capacity of the Vietnamese fisheries in 1986-1995 (MOFI, 1990b, 1995b).

However, the state planning system has still remained the same approach over the general socio-economic and the sectoral systems as analyzed in the chapter 4. The fisheries sector at various levels (i.e. national, provincial, district and communal levels) has still planned symbolically an annual volume of catches as the management target. However, no agents were obliged to enforce or control fishing entities fishing at the level set in the fisheries planning documents of government. In fact, the volume of catches was not recorded by fishers or enumerated by fisheries authorities. All fishers asked could not remember the volume of catches they landed monthly/yearly and could not estimate their catches for the next fishing seasons because it depends on dynamics of fish stocks and weather. This means that the total landings of the fisheries have not been controlled in practice, but the total catches of fisheries still have been planned based on the total landings provided by GSO in Vietnam.

Clearly, there was a difference in nature between two the fisheries planning regimes in Vietnam. In the centrally planned economy regime, the government (i.e. MOFI) played the role as a big fishing company. It planned the annual total catches, divided into catch quotas and allocated to fishing entities. It provided all fishing costs for fishing vessels and also strictly controlled and distributed all fish landings in the country. Whereas, in the market-oriented based regime, individual fishers were free to decide what species, how many, when and how they do fishing to maximize their catches and profits. Their catches were not influenced by the state planning system. Two management objectives (e.g. total catches and number of vessels) have been planned in the state fisheries planning documents and self-assigned symbolically to the collective entities e.g. country, regions, provinces, districts, communes, but are not divided into quotas and allocated to concrete fishing entities (e.g. vessels, fishers). This means that the current fisheries planning system in Vietnam does not intervene the fishing industry, instead of measuring the growth of the fisheries sector (Government of Vietnam, 2004). It has no longer provided fishing costs as in the centrally planned economy regime, but provided basis for investment projects and development programs to the sector (Prime Minister, 1998).

A manager from MOFI, who participated directly in the making the fisheries master plan by 2010 argued that the current fisheries planning system in Vietnam is still operated as the centrally planned economy regime, not suited for the current market-oriented fisheries. He supplemented that the current planning system requires sectors in general and the fisheries in particular to make their development plans, albeit it is believed that these plans would not be followed by sectors in practice. As a result, *"although a huge number of fisheries plans have been made in various scales in the last twenty years, but development of the fisheries in practice has not been related to the planning system"* (Tuan, 2013 p.47). According to him, this was a main reason for Vietnamese government to reject the master strategy for the Vietnamese fisheries developed by DANIDA experts in 1997, although this strategy was highly appreciated by fisheries stakeholders (e.g. scientists, managers, NGOs).

5.3 POLICY DISCOURSES AND ACTORS INVOLVED IN PLANNING FISHERIES IN 2001-2010 IN VIETNAM

5.3.1 PLANNING THE VIETNAMESE FISHERIES IN 2001-2010

In 1996, VIFEP was assigned to develop the fisheries strategy of Vietnam in 2001-2010. This project was supported by DANIDA in 1996-1997. However, this strategy was not approved and changed to the fisheries master plan in 2001-2010. The 2010 fisheries master plan was adopted by the January 2006. The process of making this master plan is summarized as follows:

5.3.1.1 Collecting data

Three sources of knowledge were used in this project: i) statistics (e.g. total landings, vessels, production value, export value etc.in 1990-1995 published by GSO; ii) fish stock assessments provided by RIMF; and fisheries socio-economic investigation conducted in 1995-1996 by VIFEP. However, these data were presented collectively and insufficiently for understanding thoroughly the real state of fisheries resources as well as the fishing communities. For instance, there were not data on fishing effort and number of fish caught by areas. There has not been a system to record and monitor the catches of individual vessels. In addition, fish stock assessments were not conducted regularly and separately by species or group of species, but collectively for all species in specific areas. These data are not useful for planning fisheries (Zwieten, Densen, & Thi, 2002). In general, the fisheries data in Vietnam seem to be presented in a gradually increasing trend agreeing with the politicians' aspiration. The planners who made the strategy for fisheries development by 2010 named the data used as the magic numbers. In nature, the planning system in Vietnam was still following the central planned economy system used in communist countries e.g. Soviet Union and Eastern European countries. In this system, planners have used the information passed up through the state agencies from the managers. This system encouraged managers to lie. As a result, this planning system based on the woefully inadequate information and plans were inconsistent with the facts (Sloman, 2000). In addition, the planners also took the political points of view as a basis for establishing development objectives. The knowledge base used for making this master plan is discussed furthermore in chapter 6.

5.3.1.2 Establishing the management objectives

Traditionally, the development of fisheries in Vietnam is measured by two main indexes: total annual fish landings and total number of fishing vessels. Therefore, these two figures are always established apparently in the fisheries planning documents. The planners suggest the catch target of the fisheries based on the growth rate of total landings in the previous periods, the growth rate assigned to the fisheries sector in the period in question, and state of fisheries resources. Based on the catch target, other social and economic data on fishing fleets (e.g. catch rate, incomes, profit), and political points of view for developing the fisheries in the period (e.g. enhancing fishing in off-shore waters, limiting fishing in coastal waters) the planners determined the structure of fishing fleets (i.e. number of vessels by gears, by engine capacity and by regions). They also elaborated plans and solutions to achieve the targets planned including a list of investment projects, solutions on legislation and policy, finance, investment, science and technology, education and training, fisheries extension programs, international cooperation etc. In order to archive these targets, the sector would be allocated the correspondent budgets and resources from the central government.

However, this master plan did not provide management objectives of the fisheries by 2010 in concrete figures (i.e. volume of catches, number of vessels). Instead, it just provided management orientations for the fisheries such as reduction in fishing effort, rationalization of the offshore fishing fleets, creating alternative livelihoods for local fishing communities. This was one reason leading to the master plan was not approved by MOFI.

5.3.1.3 Consulting with relevant groups/stakeholders and revising documents

In 1998, planners conducted consultations with scientists and managers through seminars and workshops on planning scenarios, management objectives and other contents of the master plan. By that time, the master plan was also consulted with relevant agencies including ministries and provincial government. Based on these comments, the planners made the first revision of the master plan. One of the most important comments is to define clearly the catch target and number of fishing vessels of the Vietnamese fisheries by 2010. This was then submitted to MOFI for evaluation. MOFI organized an assessment committee including relevant scientists and experts e.g. fisheries biologists, economists, planning and financial experts to evaluate the master plan. Based on the evaluation reports, the planners made the second revision of the master plan. This version was adopted by MOFI and submitted to MPI. MPI established the national assessment committee to evaluate the master plan of fisheries prepared by MOFI. MPI made an assessment report and sent it to MOFI for considering and revising the master plan. MPI evaluated that the master plan's objectives were not reflected the development orientations of the national economy in terms of growth rate and modernization requirements of fisheries. Based on this report, MOFI (planners and managers) made the third revision on the planning report and made a report on accounting for their acquisition of comments provided by MPI and other agencies. A set of documents (i.e. the final planning report, explanation report for making the policy, draft of decision on approving the master plan, the report on accounting for their acquisition of comments, and comments provided by relevant agencies) was submitted to Prime Minister for approve. However, planners were dismissive of and did not reflect the stakeholders' comments into the planning documents. They believed that the stakeholders just provided abstract and invalid arguments because they did not possess specific knowledge. For instance, the planners did not make an increase in the catch objective or ignored a clear explain on realism of downsizing the fishing fleets as some stakeholders suggested. They were conservative and believed that the size of the fisheries resources in the Vietnamese waters could not be more than 1.4 million tons as proposed in the master plan.

5.3.1.4 Making decisions

Officials working in the Government Cabinet scrutinized the planning documents submitted by MOFI. The master plan had not been accepted until 2004 because it was not supported by MPI as a former director of VIFEP – a key planner told. MPI did not agree with mandatory targets in numeric e.g. annual total landings, fishing fleets, suggestion on the budget allocation, and other instructions of the master plan. Subsequently, MOFI had to revise their plan accordingly to the MPI's comments by setting the higher level of the annual total landings by 2010 to 1.8 million tons and removing the list of investment project attached with the decision adopted the master plan. Finally, MPI agreed with the revised version of the 2010 fisheries master plan and advised Prime Minister to sign on the decision adopted this master plan by the January 2006.

5.3.2 POLICY DISCOURCES

As the above described, there were three main storylines engaging actors emerged during the planning the fisheries in 2001-2010 in Vietnam: the production-based growth storyline, the conservation storyline and the community storyline. These storylines were associated with the production-based growth coalition, the conservation coalition and the community coalition respectively. They cover over narratives and discourses relevant with the above five pressures/issues facing the fisheries policy in question. The production-based growth storyline focuses on the developing the offshore fishing to remain the economic growth of the sector and ensure the national sovereign at seas. The conservation storyline emphasizes reduction in fishing effort in the coastal waters and enforces fisheries regulations. The community storyline is interested in stabilization of the coastal fisheries and welfare of the small-scale fishers. Theses discourses involve various actors.

5.3.3 INVOLVEMENT OF ACTORS IN THE PLANNING PROCESS

Ministry of Fisheries (MOFI) was in charge of making the 2010 fisheries master plan. It was composed on agencies (i.e. competent departments) and institutions as illustrated in figure

5.3. In this system, ministerial is composed of minister and deputy ministers to lead over the system of two parts. The first part comprises of competent agencies/departments implement management tasks (e.g. making, enforcing the fisheries strategies, plans, regulations; monitoring and surveilling implementation of strategies, plans, regulations of institutions and at the local levels). The second part includes institutions implementing specific mandates and providing service such as research, education, training, information, publishing, technology transfer, etc. The agencies, on behalf of the ministerial, may direct the institutions to provide consultation and advisory services for their tasks such as preparing the fisheries plans, providing estimations of fish stocks, etc.

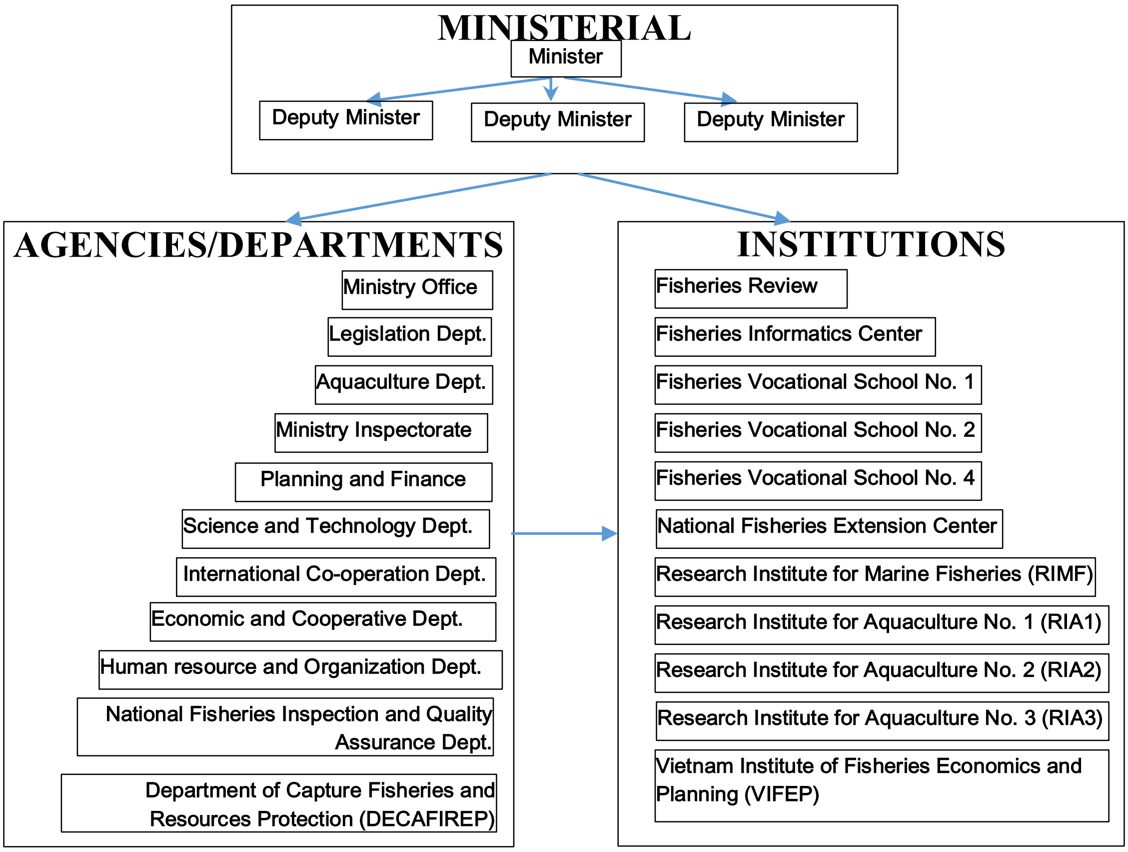

Figure 5.3: The structure of Ministry of Fisheries of Vietnam before October 2007

Some of departments and institutions of MOFI were involved in making the 2010 fisheries master plan as actors and stakeholders (figure 5.4). This research distinguished two relevant groups participating into the planning processes: actors and stakeholders. The actors were the agencies/departments taking roles of drafting, evaluating and deciding the master plan including: planners, managers, minister of fisheries, Minister of Planning and Investment (MPI), and the Prime Minister. They performed their tasks – planning steps according to their mandate given. For instance, planners were obliged to formulate the master plan qualified for Prime Minister approve, MPI was responsible to provide the evaluation report for Prime Minister approve or reject the plan.

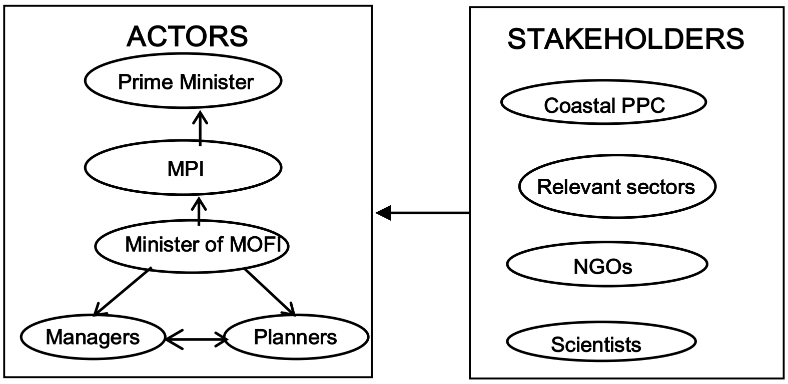

Figure 5.4: Involvement of actors and stakeholders in planning fisheries in 2001-2010 in Vietnam.

The stakeholders included persons, institutions, and organizations related to the fisheries (including: Provincial People Committee (PPC) of 28 coastal provinces exception of the Ninh Binh province; relevant sectors/ministries of agriculture and rural development, finance, education and training, defence, science and technology, labour – invalids and social affair, traffic and transportation, and justice; NGOs: Vietnam Fisheries Association (VINAFIS), Vietnam Association of Seafood Exporters and Producers (VASEP), World Wildlife Funds (WWF), Food and Agriculture Organization of the United Nations (FAO); and scientists retired or working in RIMF, VIFEP). They were invited to provide consultations and comments on the draft of the planning report by attending workshops organized by planners and/or by official writing as requested by MOFI. The stakeholders' comments would be accepted by actors into the planning report.

Planners – a group of scientists from VIFEP contracted with the managers in MOFI to prepare a set of the 2010 fisheries master plan (including: planning report; explanation report for making the master plan; draft of decision on approving the master plan; the report on accounting for their acquisition of comments and comments provided by actors and stakeholders). They worked as a key actor who calculated and proposed the management objectives and targets (e.g. growth rate, total catch, number of fishing vessels). They carried out gathering, analyzing data, projecting development scenarios and drafting the planning report. They also hosted consultation meetings with other actors and stakeholders to get comments on the development scenarios and the planning report. In addition, planners also laid the groundwork for throughout the planning processes (e.g. acceptance by minister of MOFI, adoption by MPI, and decision by the Prime Minister).

Managers – representatives for the Planning and Finance Department and DECAFIREP under MOFI took a role of supervising the planning processes conducted by planners. They, on behalf of minister of MOFI, provided budget, legal provisions, planning ideologies, political orientations, and available data for planners to plan the fisheries. In the planning process, managers supervised the core elements of the master plan (e.g. the development directions; growth rates in catches, employment and number of fishing vessels; and investment projects). For instance, a former director of the Planning and Finance Department under MOFI required planners from VIFEP adjusting the total catches of the fisheries by 2010 to 1.8 million tons and putting the growth targets into the master plan. They also provided development ideas for the offshore fishing including investment projects on infrastructure. Their comments stemmed from the political orientations articulated in the general socio-economic development strategy adopted by the National Party Congress. They also collaborated with planners to get consultation comments with other actors and stakeholders on the planning report and lay the groundwork for adoption by minister of MOFI and MPI, and decision by Prime Minister.

Minister of MOFI took a role of directing the political strategies of the master plan. He influenced mainly on the development directions of the plan such as balancing the offshore and coastal fisheries development; setting the growth trends of the total catches, of fishing capacity, of employments; and the public investment projects. He influenced the development targets and management objectives of the master plan directly to planners or through his advisers (i.e. managers from Planning and Finance Department of DECAFIREP). He asked planners and managers having to establish targets agreeing with the development orientations of the general socio-economic plans and keeping the growth rates of the previous periods (i.e. in 1996-2005). He requested the growth rate of the total catches at around 2.5 – 3.0% per annum in 2006-2010. He checked the development directions and targets according to the general socio-economic development plans, and then passed to MPI for evaluation and to PM for decision; or rejected it if it was not fitted to the conventional planning system as the case of the master strategy prepared under assistance of the DANIDA experts in 1997.

MPI took a role of making an evaluation report on the master plan prepared by MOFI. A planner evaluated that this step was the most important, complicated and sensitive in the planning process because this report was the basis for Prime Minister to adopt or refuse decision. He argued that getting a favourable evaluation from MPI was difficult, but it was easy also. It was difficult because he could not provide scientific evidences fitted to arguments on the development directions and targets. As he told, two their versions of plan were not accepted in 2001 and 2003 because the development directions[14]; growth rates[15] and investment projects[16] were not agreed with the development directions and growth targets established in the general socio-economic strategies and plans; and the master plan's requested budget was beyond the resources capability of the country. Unfortunately, the author was not able to access these MPI's evaluation reports because the planners who laid groundwork for that plans no longer worked for VIFEP on one hand, and no current staffs in VIFEP knew where or who stored these documents on the other hand. At the same time, he argued that getting a favourable evaluation from MPI might be easier if its officials were invited to participate into the planning processes and all requests from MPI would be satisfied as the case of making the 2005 version of the master plan. MPI officials followed closely on revising the 2005 version of fisheries master plan, and then they provided a favourable evaluation report quickly.

Prime Minister signed on the decision approving the fisheries master plan by 2010 prepared by MOFI in January 2006. In this step, officials from the Government Cabinet checked the

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[14] Planners intended to develop the offshore fishing fleets in some key provinces having favourable conditions in professional fishers, fishing grounds and infrastructure, but MPI intended to develop the fishing spread over all coastal provinces.

[15] The catch targets by 2010 set by MOFI did not reflect the growth, so it contradicted with the development directions of the general socio-economic development strategy adopted by the National Party Congress.

[16] The planners proposed a plan to reduce fishing effort by scrapping and buying back the small-scale vessels and by creating alternative livelihoods for local fishers. This was not accepted by MPI officials.

procedure of the planning process and looked through the final set of the planning documents attached by the MPI's evaluation report and comments of other actors and stakeholders. This step was performed quickly because these officials connected closely with planners and managers in MOFI during revision of the 2005 version of the fisheries master plan.

The local fishers, who would be influenced by the policies of the master plan, were not involved directly in the planning processes. However, their interests were supposed to be integrated into the master plan indirectly through their delegates: government officials and representatives from VINAFIS.

5.4 STORYLINES AND DISCOURSE COALITIONS IN PLANNING THE VIETNAMESE FISHERIES

This section analyzes storylines within discourse coalitions emerged in the planning fisheries in 2001-2010 in Vietnam. It summarizes arguments of discourse coalitions, identifies actors and develops storylines to understand conflicts among actors in planning the Vietnamese fisheries in 2001-2010.

5.4.1 THE PRODUCTION-BASED GROWTH DISCOURSE

This follows the argument of developing the offshore fishing to maintain the growth rate of catches and contribute to security of the national sovereign at seas.

5.4.1.1 The growth storyline

Any Vietnamese people have been familiar with a movement of '*emulation of production'* to produce more commodities for constructing and protecting the nation. This implied that producing the more commodities would provide more contribution to the nation. For the fisheries, harvesting the more catches was the better. Therefore, the growth in total catches had been an overarching objective of the fisheries. The government mobilized all means to maximize the total catches of the fisheries. The annual growth rate of catches was planned for every five-year plan in 1991-2005. It was at around 3% per year in 1991-1995, at 5% per year in 1996-2000 (MOFI, 1995b, 2000). Obviously, this influenced on planning the catch target for 2001-2010. In the first draft of the fisheries master plan for 2001-2010 submitted 2001, the planners proposed the catch target by 2010 at 1.4 million tons (VIFEP, 2001); equally the growth rate in catch was about 2.5% compared to 2000. Meanwhile, managers in MOFI suggested the total catches by 2010 at 1.8 million tons; equally the average growth rate of catches in the period of 1996-2000.

At the time, a fish stock assessment (Chung, 1997b) reported that the fish stocks were exploited below the EPY estimated in 1997. In addition, the previous estimations of fisheries resources (Chung, 1990; Phan, 1988) guessed that there may be a potential for catching the unfished fish stocks in the offshore waters. This argument was supported by the observation in the offshore waters that foreign vessels increasingly were fishing illegally in Vietnamese waters (MOFI, 1991b). Since after that, the growth storyline was underpinned by the offshore fishing discourse. The government provided incentives (e.g. credit and subsidy programs) for enhancing the fishing capacity in the offshore waters. For instance, the credit program for developing the fisheries in 1993 (Government of Vietnam, 1993), exempting tax for the offshore fishing practice since 1993[17], and other investment programs such as the Island and East Sea program, building fishing harbours funded by Asian Development Bank (MOFI, 1994, 1995a) contributed to an increase of 400 offshore vessels per annum in 1992-1995. Continuously, a credit program[18] with the low interest was launched in 1997 to build up the offshore fishing vessels. In which, 1,345 new offshore fishing vessels powered with the engine capacity of greater than 90 HP were entered into the fisheries in 1997-2001 (MOFI, 2003). Unfortunately, the efficiency of this program was low and the objectives was not accomplished, an inspection report concluded that *"a majority of these vessels make low economic profits, a number of vessels could not afford fishing or operated in the traditionally coastal waters instead of fishing in the off-shore waters. Among 1,345 vessels built within this program, 390 vessels getting economic profit, 520 vessels getting economic loss, 250 vessels could not operate and the rest vessels were sunk or disappeared…"* (Government Inspectorate of Vietnam, 2005 p.8).

[17] The Vietnamese government have adopted the tax-exemption policy for fishing at the decision No. 400/TTg dated the September 7th 1993, the decision No. 358/TTg dated the May 29th 1997 and the circular No. 105/2010/TT-BTC dated the July 23rd 2010.

[18] This program was decided by Prime Minister at decision No. 393/TTg dated on the June 9th, 1997. This provided around 103 million USD for building up the new vessels.

5.4.1.2 Competing discourse coalitions around the storyline of enhancing the offshore fishing capacity

This storyline was closely connected with the political perspectives in the general socio-economic development strategies that *"... enhance the socio-economic development, connect the economic growth with sustainable development, environment protection and national security assurance... speed up the growth rate to modernize and industrialize the economy and take the country out of the poor country...*" (National Party Congress IX, 2001 p.12; National Party Congress VII, 1991 P.11). Therefore, the growth coalition included influential actors and stakeholders who are membership of the Party and must follow the resolutions adopted by the National Party Congress. For instance, in a speech at MOFI in 1997, the Prime Minister Vo Van Kiet said that *"Our sea is so huge, we will harvest more catches if we have more capital to invest in building vessels and fisheries infrastructure. Therefore, fishing is a potential industry to develop"* as told by a former chief of a Ministry Office. This created an opportunity for the Vietnamese fisheries to develop and was the most important basis for planning fisheries in 2001-2010 as told by minister of MOFI.

These actors – the dominant coalition subscribed the discourse on enhancing fishing capacity because this perspective agreed with the political points of view on one hand, and it also would deal with almost all the temporary pressures/issues related with the fisheries in Vietnam on the other hand. Indeed, managers and officials working in MOFI believed that if a high growth rate of the sector would be achieved, then the sector would have a bigger allocation of the state resources and vice versa. The bigger allocation of the state budgets to the sector would induce enhancing the fishing capacity of the nation. Moreover, investment on developing the offshore fishing vessels would accomplish the development goals of modernization and industrialization of the fisheries by 2020. Enhancing the offshore fishing would provide more employment opportunities and improve social welfare of the coastal communities on one hand; it also would contribute to protection of the national sovereign at seas on the other hand. In addition, development of offshore fishing would attract labour and investment on this, so fishing pressures on the coastal waters would be reduced leading to restoration of the fish stocks and marine habitats naturally. More importantly, the economic growth relates closely with the state investment and the political power of minister and government officials in Vietnam. In fact, the political power of a minister would be strengthened if his/her sector had grown, and then his/her actor would be more invested. Therefore, ministers and their juniors desire to get as much investment as possible, and the investment was proportional to the growth rate that the sector achieved as told by a planner.

The argument for the growth in total catches was strengthened by the officially statistical data. As published by GSO, the annual average growth rate of the total landings and the number of fishing vessels were over 6.7% per year and 7.0% per year respectively in 1991-2000 (GSO, 1996, 2001). In addition, the value of the total landings also grew at an average rate of over 7.0% per annum in 1996-2000 (GSO, 2001). Importantly, the total landings of the Vietnamese fisheries had grown steadily as the rate planned in the fisheries planning system. Based on this, bureaucrats believed that fisheries resources were under-exploited, although these data may not reflect the real state of the fisheries as analyzed in chapter 6. However, the statistics published by GSO are considered as official data used for planning sectors in Vietnam.

This argument was supported by other stakeholders (e.g. relevant sectors, coastal provinces) as their written comments on the planning report stored in VIFEP and directly observed by author at consultation meetings in 2003-2005. They agreed with enhancing the offshore fishing capacity and suggested MOFI to implement investigation of fisheries resources to locate potential fishing grounds, then they would guide their local fishers fish effectively. Other stakeholders such as military forces, banking service justified strongly development of the offshore fishing because it would strengthen capacity of the sovereign protection at seas and increase demands for credit and other banking services. Some scientists became important allies in this coalition. They supported development of the offshore fishing because it would create more research opportunities for them. In fact, some marine biologists argued that the marine fisheries resources in general were not over-exploited, and the fish stocks in the offshore waters may be a promised potential (Chung, 1997b; Phan, 1988). In order to enhance the knowledge basis for planning fisheries in 2001-2010, MOFI asked biologists from RIMF estimating the state of the fisheries resources. Consequently, Chung (Chung, 1997b) proposed the EPY of fisheries resources in Vietnamese waters was approx. 1.7 million tons, and in 2001 was over 2.1 million tons (D. M. Son, 2001). This storyline was strengthened in 2005 when the tuna stocks in the offshore waters were evaluated as a potential resources with the EPY of 170,000 toms (D. M. Son, 2005). This supported strongly for the argument of developing the offshore fishing fleets.

However, this discourse was disagreed by some actors (i.e. planners, managers) and some stakeholders (i.e. scientists, experts, fishers) in practice. A planner[19] who assigned to head making the fisheries master plan criticized strongly perspectives of enhancing fishing capacity and growth in catches. He criticized biologists that providing unrealistic figure of EPY to meet the growth objectives of bureaucrats. He argued that the estimations of EPY produced by RIMF were not meaningful for planning the fisheries because of the three following reasons: i) data used for estimating the EPY were not updated and incomprehensive because some of them were collected in the 1970s and 1980s; ii) the figure of EPY seemed to be distorted accordingly to the politicians' perspective; iii) the methodologies and protocols used for fish stock assessments were not suited for the Vietnamese waters, and the coverage of surveys in both temporal and spatial aspects was not able to produce credible estimations. He demonstrated that fisheries resources were overexploited by providing indications such as reduction of CPUE, decrease in the economic performance of fishing fleets, the more the vessels anchored at their home port due to economic losses, failure of the offshore fishing programs, the large-scale vessels illegally fishing in the coastal waters. In addition, he also distrusted the statistics published by GSO. He stated that these data were politically artificial data; they were adjusted by political wills. Therefore, they did not reflect the real figures of total landings in practice. However, he could not provide solid evidence for this argument.

In addition, other authors demonstrated that the fisheries resources in Vietnamese waters were overexploited (Hai, 2003; Long, 2002). Based on the surplus modellings, a MSY estimation in 2003 was 1.3-1.4 million tons (Hai, 2003). This was trusted by the planner who submitted the final master plan of fisheries by 2010 to Prime Minister for approve in 2005. In fact, the EPY estimation was suspected by actors and stakeholders. For instance,

[19] He is a former director of VIFEP who assigned to planning the fisheries from 1996 to 2004 when he retired. But the master plan was not adopted. In 2004, a new director of VIFEP was appointed and he took the task to finalize and submit the fisheries master plan to Prime Minister for approve.

in 2004 a Vice Minister of MOFI distrusted estimations of B and EPY provided by RIMF and asked their advisers to find the ways to validate and verify the findings of fish stock assessments in Vietnam. Again, in 2014, another Vice Minister of MARD criticized that stock assessments were unrealistic because investigation methodologies and protocols used were biased. In addition, some scientists and experts from NGOs such as FAO, WWF disagreed with figures of catches and vessels due to lacking a sufficiently scientific knowledge basis. Experts from WWF and FAO proved a depletion of the marine habitats, increase in endanger species and threats to livelihoods of poor local fishers. This is an indication for overexploitation of fisheries resources and marine ecosystems. In addition, a fisheries manager from Bac Lieu province complained that the B and EPY estimations were unrealistic. He argued that the catch rate of Bac Lieu fishing fleets decreased gradually, did not increase as estimated by scientists from RIMF.

All local fishers (54) interviewed during 2009-2012 complained that there were too many vessels fishing in the coastal waters. They disagreed with policies to build more new vessels, but a majority (72%) of them subscribed to subsidy programs for building larger vessels operating in the offshore waters replacing the existing small-scale vessels. By that time, all of them expected the government to subsidize fishing costs (e.g. fuel costs, insurance fees, trading tax etc.). However, 15/54 (28%) fishers asked opposed perspective of building more offshore vessels. They argued that the existing crew members were unable to manage modern and large-scale vessels effectively in the offshore waters, thus they would go fishing in the traditional coastal fishing grounds and conflicts with the traditional small-scale vessels would escalate.

5.4.1.3 The institutionalization of the growth discourse

After ten years of debating policy discourses of fisheries, in order to finalize the work, a new head of planning team accepted politicians' perspectives to set a higher catch target by 2010 at 1.5-1.8 million tons with arguments that the extra catches would be contributed by fishing in the international waters. The objective of growth in employment and the objective of reduction of fishing vessels were remained. However, the objective of reduction of fishing capacity was not corrected. Finally, the 2010 fisheries master plan was adopted by January 2006 with an overarching objective of the growth for the Vietnamese fisheries as follows (Prime Minister, 2006):

+ The development goals:

- The growth rate in total catches is 3.8% per annum,

- The growth rate in export value is 10.6% per annum,

- The growth rate in labour is 3.0% per annum.

+ The operational objectives:

- Annual total catches in 2006-2010: 1.5-1.8 million tons (the total landings in 2005 was 1.5 million tons).

- Reduction of approx. 40,000 fishing vessels (from 90,000 vessels in 2005 to 50,000 vessels by 2010),

- Increase more 80,000 fishing employment (from 420,000 fishers in 2004 to 500,000 fishers by 2010).

Clearly, the growth objectives of the fisheries were remained in the period of 2006-2010. This aligned with the objectives of the general socio-economic development strategy in 2001-2010 adopted by the National Party Congress (National Party Congress IX, 2001b). In addition, this growth rates were also in line with the statistics in 1996-2005 published by the GSO.

Moreover, the discourse of enhancing the offshore fishing fleets was legalized in the fisheries laws in 2003, which stipulated that the government provides incentives and favourable policies to facilitate developing fishing capacity in the offshore waters. The article 12 of the fisheries law articulated that *"the state provides comprehensive policies on investment, training, information, fishing infrastructure and logistics to encourage individuals and organizations to enhance the offshore fishing"* (National Assembly, 2003 p.6). This was also resonated with policies on national security and sovereign in the Vietnamese EEZ. The article 4 of the fisheries law specifies that *"fishing activities have to operate in combination with ensuring the notational security and protecting the national sovereigns at seas"* (National Assembly, 2003 p.2). Therefore, increasing the offshore fishing capacity has been advocated in Vietnam. It was evident that the perspective of dominant discourse coalition composed of the state actors influenced strongly on the fisheries policy decisions. This discourse coalition contradicted the conservation and the community coalitions around the issues of overexploitation and conflicting with small-scale fishing vessels.

Following this discourse, the government has provided subsidies for the fisheries in 2008 to remain fishing at seas (Prime Minister, 2008). In this program, government provided 87 million USD to subsidize fuel costs and insurance fees for 99,601 vessels in 2008 (DECAFIREP, 2008). The government has subsidized fuel costs and insurance fees for offshore fishing since 2010 (Prime Minister, 2010b), and provided credit for building more vessels with priority for steel vessels (Government of Vietnam, 2014). This program provided approx. 447 million USD to build 1,005 offshore vessels (MARD, 2017). Furthermore, the government also provided incentives and favourable policies to improve efficiency of the fishing fleets such as delivering freely forecasts of fishing grounds, fisheries extension programs on fishing equipment and nets, free to do fishing in the offshore waters etc. By these efforts, the fishing capacity of the Vietnamese fisheries has developed impressively in term of the statistical index in the last two decades from 41,266vessels in 1990 to 110,950 vessels in 2016.

5.4.2 THE CONSERVATION DISCOURSE

5.4.2.1 Development of the conservation storyline

Conservation of fisheries resources encompasses limitation on total catches and fishing capacity, and reduction of harmful impacts of fishing activities. By the end of 1980s, indications of depleting fisheries resources, especially shrimp, squid and high value fish (e.g. snappers, groupers, mackerel) were seen apparently in Vietnam. Juveniles of shrimp and fish were caught commonly in trawl fishery. This leaded to a reduction of the catch rate of fishing fleets (MOFI, 1988). In order to address this problem, technical measures (e.g. fishing gears and methods prohibited to use, species prohibited to catch, closed areas and seasons, size of fish to be caught) to protect fisheries resources were introduced in the Vietnamese fisheries in 1989 (Government of Vietnam, 1990; National Assembly, 1989). As a result, the fisheries surveillance system was established over 28 coastal provinces.

This system operated 62 fisheries patrol vessels to prevent, deter and eliminate fishers from employing destructive fishing gears and methods throughout the national waters. In addition, government also did not encourage development of the small-scale fishing fleets operating in the coastal waters since 1993 (MOFI, 1994).

However, this could not help stopping depletion of the harvested fish stocks such as shrimps, squids, groupers etc., even became more and more serious in 1990s (MOFI, 1996). MOFI acknowledged that the marine fisheries resources in the coastal waters were overfished seriously inducing fishers applying destructive fishing methods to increase their catches and incomes (MOFI, 1995b, 2000). In 2000, MOFI intended to reduce gradually the fishing capacity in the coastal waters during the period of 2001-2006 (MOFI, 2000). However, a concrete plan of reducing vessels (i.e. number of fishing vessels, timeframe) was not defined clearly, so the number of fishing vessel did not decrease in practice. In addition, some scientists documented a decline trend of fisheries resources and suggested measures to protect and recover fish stocks in Vietnamese waters. For instance, Thuoc proved that shrimps in coastal waters along the coast of Quang Ninh – Hai Phong and Minh Hai – Kien Giang were depleted seriously and needed to be protected immediately (Thuoc, 1995). Hai suggested that keeping the fishing level equals to level in 2001: the total catches of 1.35 million tons; fishing effort of 79,000 vessels/3.7 million horse powers (Hai, 2003).

In addition, restoration of fisheries resources had been conducted regularly in Vietnamese waters. Fisheries authorities and other organizations had released million seeds of fish and shrimp into the sea every year. A number of marine protected areas (MPAs) such as Hon Mun, Cu Lao Cham, Ran Trao, Hon Thom etc. were established in Vietnam to protect marine habitats, ecosystems, and fisheries resources.

5.4.2.2 Competing discourse coalitions around the storyline of fisheries resources conservation

In general, this storyline was promoted by all actors and stakeholders participating into planning the Vietnamese fisheries in 2001-2010. The conservation perspective was one of three primary goals (i.e. high economic growth, social equity, and environmental protection) of the general socio-economic development strategy adopted by the National Party Congress (National Party Congress IX, 2001b) and strategy for sustainable development in Vietnam - Agenda 21 for Vietnam (Prime Minister, 2004). Fisheries managers in both national and provincial levels acknowledged that the fisheries resources in coastal waters had been depleting due to rapid increase in fishing vessels, and using destructive fishing gears and methods (MOFI, 1985, 1990b, 1995b).

As mentioned in the growth storyline, fisheries managers (i.e. policy-makers) at the national level believed that fisheries resources in the offshore waters are still abundant, and using bigger vessels fishing there would reduce fishing pressure in the coastal waters. This is a way to recover and protect the fisheries resources in the coastal waters. They were reluctant to introduce direct management tools (e.g. reduction in fishing vessels or fishers, limitation of fishing days at sea, limitation of catches) in practice. This is because of implementing these tools would require high costs and cause economic waste for society on one hand, and cause politically sensitive issues as well as disturbance if local fishing communities on the other hand as told by a manager in MOFI.

In addition, fisheries managers at the national level acknowledged that using explosion, poison and electricity to fish had been widespread over provinces leading to rapid depletion of fisheries resources in over the country such as shrimp in the south regions, squids in the Tonkin gulf, coral reef fish in the central region etc. They intended to remain and improve the productivity of fish stocks by enforcement of the technical measures (e.g. banning destructive fishing gear and methods, minimum mesh size, fish size to be caught, closed areas and seasons, releasing seeds of fish and shrimp). They believed that adequate enforcement of the technical measures would restore gradually and sustain the fisheries resources for a long time. At the same time, the local fisheries managers suspected effectiveness of the technical measures to protect fisheries resources. They explained that the existing regulations were unable to stop unregulated fishing (e.g. wrong zoning, using the banned fishing gears and methods). In fact, 13/14 local fisheries managers evaluated that the existing sanctions for violation were not serious enough severe for fishers to stop unregulated fishing. Meanwhile, 3/14 of them agreed with this, but supplemented that small-scale and artisanal fishers were so poor, who did not have alternative livelihoods and did not have enough money to pay the fine. Therefore, they did not punish such poor local fishers in practice.

In 1997, a strategy master plan for the Vietnamese fisheries was drafted by a group of planners in VIFEP under assistance of DANIDA. According to a fisheries manager in MOFI, this master strategy introduced a new approach to plan fisheries into Vietnam, which emphasizes on sustainable utilization of fisheries resources. It set objectives of maintaining the long-term productivity of fisheries resources and controlling the fishing level that producing the MSY of fish stocks. However, it did not quantify its objectives (e.g. concrete figures of total catches and fishing vessels) as the conventional way of planning fisheries in Vietnam. Planners explained that the government just control biological indexes of fish stocks (i.e. CPUE, catch rate of fishing fleets) and other socio-economic indexes of fisheries (e.g. incomes, profit, labours, etc.), then they would take management actions adaptively to the trend of fish stocks. In this approach, the total catches would be fluctuated accordingly with the intrinsic nature of fisheries resources. This was somewhat called as the adaptive approach to fisheries management. It is advocated by majority of fisheries scientists and managers. However, this was disagreed by conservative managers in MOFI and conflicted with traditional procedures for planning economics and sectors in Vietnam. Therefore, this master strategy was not adopted and required to revise as the conventional approach to planning sectors in Vietnam.

In 2001, based on forecast of the state of the fisheries resources by 2010, planners in VIFEP (VIFEP, 2001) proposed a fishing level for the Vietnamese fisheries by 2010 at 1.4 million tons (0.6 million tons of fishing in the coastal waters, 0.8 million tons of fishing in the offshore waters). They supposed that this fishing level equals to level in 1986, then they suggested just remaining 50,000 fishing vessels (30,000 small-scale vessels, and 20,000 offshore vessels). These objectives met sustainable development of fisheries (remaining fishing level below MSY), but also met the growth objective of the sector (total catches by 2010 increase 9.3% compared to 2000).

Basically, most fisheries scientists and experts from NGOs justified the planners' views on conservation perspectives articulated in the draft of the 2010 fisheries master plan. Some biologists from RIMF agreed with the fishing level and number of vessels as proposed by planners, because they saw the catch rate (kg/hour) of trawl surveys declined apparently in 1997-2000 (D. M. Son, 2001). Similarly, experts from SEFDEC and FAO also showed indications of overfishing in the East Sea (Anon, 2001). However, they were not convinced with the concrete figures of total catches and vessels because there were no scientific explanations for these figures. Moreover, scientists and managers suspected feasibility of the plan to reduce number of vessels proposed by planners because it would be impossible for fisheries authorities to implement a dual task either stopping a rapid trend of increase in number of vessels (about 7% per annum in 1991-2000), and scrapping approx. 3,000 vessels per year. International NGOs justified the conservation perspectives. 1n 1995-1999, they assisted fisheries authorities to establish MPAs such as Cu Lao Cham, Hon Mun, Ran Trao, etc. to protect fish stocks and marine habitats and ecosystems. They also trained the local fishers on protecting fish stocks and conserving marine habitats and ecosystems, and assisted them to get entering non-fishing livelihoods in provinces of Quang Nam and Khanh Hoa.

The local managers believed that dramatic development of fishing capacity exceeded the productivity of the fisheries resources in the traditional fishing grounds. Therefore, they agreed with the perspective of reduction in small-scale vessels as proposed by planners. They acknowledged there were too many vessels, especially the small-scale vessels operating in the coastal waters, thus conflicts among fishers and fisheries became increasing in practice. They suggested the planners to define clearly the number and types of vessels would be scrapped for each province on one hand, and suggested MOFI to assist them implementing fish stocks assessments and planning their fisheries on the other hand; so that they so that they could define the concrete number of vessels should be scrapped.

Based on official data (e.g. statistics published by GSO and EPY provided by RIMF), managers in MOFI disagreed with the total catches proposed by planners. They suggested the total catches by 2010 should be 1.8 million tons which either agree with EPY estimation (approx. 1.7 million tons) provided by RIMF (Chung, 1997c) and follow the growth rate (approx. 4.0% per year) given the sector in period of 2001-2010 (National Assembly, 2001; National Party Congress IX, 2001a). Planners disagreed with this suggestion with the arguments as above illustrated in the growth storyline, then they did not revise the plan accordingly to the perspectives of managers in MOFI.

In 2004, the head of planning team in VIFEP retired and a new director appointed and assigned heading the team to finalize the fisheries master plan by 2010. The planning team, in collaboration with managers in MOFI and officials in MPI and Government Cabinet, updated statistics and EPY and revised the planning report. Consequently, comments and development perspectives of fisheries managers in MOFI and official in in MPI and Government Cabinet were integrated into the planning documents in 2005 (VIFEP, 2005).

5.4.2.3 The institutionalization of the conservation discourse

As above analyzed, concerns about depletion of the fisheries resources emerged in Vietnam at the end of 1980s. This was legalized in the ordinance on the fisheries resources protection and development in 1989 (National Assembly, 1989). This ordinance stipulates measures and tools to protect fisheries resources (e.g. closed areas and seasons, gears and fishing methods are not allowed to use, species are not allowed to fish, zoning etc.). In addition to this, the fisheries law 2003 provides supplementary provisions on fisheries resources conservation (National Assembly, 2003). For instance, the article 4 stipulates that *"ensuring economic efficiency of fishing activities in combination with protection, restoration and sustainable development of fisheries resources and bio-diversity..."* (National Assembly, 2003 p.2) and the article 8 articulates that "*individuals and organizations are responsible for protecting, conserving, restoring, and developing the fisheries resources*" (National Assembly, 2003 p.2). Also, the law requires "*the government to provide policies to ensure sustainable utilization of the fisheries resources"* as articulated in the article 5 (National Assembly, 2003 p.2), and *"to establish marine protected areas to conserve and protect fisheries resources"* as illustrated in the article 9 (National Assembly, 2003 p.5). This law also introduces the tool of annual allowable catch in article 11 *"… fishing operations must not lead to depletion of fisheries resources; shall be done in compliance with regulations of annual allowable catch …"* (National Assembly, 2003 p.6).

In 2006, the 2010 fisheries master plan (Prime Minister, 2006) set up a limitation of total catches at 1.5-1.8 million tons by 2010 which is commensurate with EPY of fisheries resources, and made plan to remove about 40,000 vessels in 2006-2010 (8,000 vessels per year). In this master plan, although the objective of growth in total catches was still remained, but its magnitude (< 3.8% per annum compared to 5.5% in period of 2001-2005) was the first time less than the previous periods (MOFI, 2006a). It reflected that the conservation discourse was more influential on planning fisheries in Vietnam. By that time, MOFI enacted a circular to ban development of fishing vessels powered with engine capacity less than 30HP and the trawlers powered with engine capacity less than 90HP since 2006 (MOFI, 2006b). However, these targets were not achieved by 2010. In fact, the total landings and number of vessels by 2010 were nearly 1.2 times and 2.6 times respectively higher than the targets planned in the master plan. Based on this experience, the view on the conservation paradigm was reflected in the fisheries policies in 2011-2020 (Prime Minister, 2010a, 2013a). In these, the growth in total catches was remained at low rate of approx. 0.7% per year, and reduction of nearly 2,000 vessels per year.

In addition to this, a plan to establish 16 MPAs was adopted in 2010 to protect fisheries resources and marine habitats in general and conserve species in danger in particular (Prime Minister, 2010c). According to this plan, 0.24% of the sea area would be in the MPAs by 2015. So far, 15 MPAs were established and run effectively as observed at the annual workshop on Vietnamese MPAs network held in Da Nang on July 14th 2017.

5.4.3 THE COMMUNITY DISCOURSE

In this study, the community concept encompasses sustainability and social welfare of the fishing communities, who are owners and crew members and live dependently on fishing in coastal waters by the artisanal boats and the small-scale vessels powered less than 90HP. This is important for the Vietnamese fisheries because it accounted for approx. 80% of total fishing vessels in Vietnam (MOFI, 1998; Thong, 1998). The small-scale fishing communities not only had fewer opportunities to access to the public resources, but also were vulnerable from depletion of fish stocks and climate change (Thong, 1998, 2003). Therefore, sustainable development of these communities was both the objective and also the driving force for the Vietnamese fisheries policies (MOFI, 1995b). Alleviation of poverty and improvement of living standard of the local fishing communities were always the ultimate objectives of the Vietnamese public policies (Tuan, 2013).

5.4.3.1 Development of the community storyline

Social welfare of the local fishing communities has become a policy discourse in Vietnam since the early of the 1980s (MOFI, 1980), when the market-oriented economy regime was introduced into the Vietnamese fisheries. The fisheries moved from the centrally planned economy to the market-oriented economy where fishers are allowed to decide on their fishing business. This lead to a gap between small-scale fishers and large-scale fishers. The former ones operate small-scale vessels (i.e. artisanal boats and motorized vessels of <90 HP) fishing in coastal waters, the later ones operate larger-scale vessels fishing in deeper waters. By that time, government the larger fishing fleets to catch fish for export, but also advocated small-scale fishing fleets to fish in shallow waters for daily food and domestic consumption.

By 1990s, the small-scale fisheries were discouraged in Vietnam because they were accused of causing deletion of fisheries resources by using destructive fishing methods (MOFI, 1990). MOFI evaluated that there were excess of fishing capacity in the coastal waters in comparison to the size of the fish stocks; therefore, the number of the small-scale fishing vessels should be reduced. As a result, discourse on downsizing small-scale fisheries emerged at the end of 1990s (MOFI, 1995b). In order to reduce the number of the small-scale fishing vessels, the solution of developing larger-scale vessels was selected by the national policy-makers. The policy-makers explained that building more offshore vessels, then creating more employment for small-scale fishers. The small-scale fishers would move out the small-scale fisheries. Therefore, the number of small-scale vessels would reduce on one hand, and the incomes and social welfare of the fishing communities would be improved. Consequently, subsidy programs to enhance offshore fishing and change livelihoods for small-scale fishers were considered a proper solution to improve the social welfare of the local fishing communities. It becomes more necessary for poor small-scale fishing communities such in Vietnam (Tuan, 2013).

At that time, another discourse on changing livelihoods for the small-scale fishers emerged. The small-scale fishers were encouraged to change their business to go fishing in the offshore waters or move to other non-fishing livelihoods (Government of Vietnam, 2014; Prime Minister, 1997, 2008, 2010b). These programs provide credit for fishers build new offshore vessels, replace with bigger engine, and change to the more selective gears or non-fishing livelihoods.

However, attempts of the Vietnamese fisheries authorities to reduce the small-scale fishing vessels had achieved limited outcomes and implications in 1996-2010. The number of the small-scale vessels have not reduced as planned in the state fisheries planning documents. They still accounted for a majority (nearly 80% of total fishing vessels) in the Vietnamese fishing fleets by 2010. Therefore, the discourse of stabilizing the small-scale fisheries in the coastal waters was emerged in the course of planning the Vietnamese fisheries in 2011-2020 because actors acknowledged that the small-scale fisheries taking a central role as an intrinsic characteristic of the Vietnamese fisheries. However, the discourse of downsizing of the small-scale fishing fleets was still integrated into the fisheries policies of Vietnam in 2010-2020 (Prime Minister, 2010a, 2013a).

5.4.3.2 Competing discourse coalition around the storyline of maintaining the small-scale fisheries

As above analyzed, depletion of fisheries resources in the coastal waters of Vietnam was seen at the end of 1980s. The critical reason for this is the fishing practice of the small-scale vessels including artisanal boats and motorized vessels less than 90 HP. These vessels not only fished juveniles and breeding fish in spawning grounds, but also employed destructive fishing gears and methods. Since after that, discourse of downsizing the small-scale fisheries was debated in planning fisheries. MOFI, in its planning system, shows a clear strategy of freezing the number of the small-scale fishing vessels during the course of 1991-2000 (MOFI, 1990b, 1995b, 1996, 2001). In order to prevent negative impacts of this fishing fleets, technical measures were applied (Government of Vietnam, 1990; National Assembly, 1989), but there was no policies to reduce number of vessels or fishers implemented.

This was strongly supported by planners in VIFEP who planned the fisheries in 2001-2010. The planners not only agreed with these arguments, but they also proposed an objective of reduction of a haft (approx. 40,000 vessels) of the existing small-scale fishing vessels in Vietnam (VIFEP, 2001). They argued that, toward a sustainable and effective fisheries sector should remain the productivity of fisheries in the coastal waters. They said *"all fish* *stocks originate from the shore"*, thus they make a plan to protect the fisheries resources and marine habitats and ecosystem in the coastal waters. For this purpose, the best way to shrink the small-scale fisheries, according to them. They believed that the living standard and social welfare of the local fishing communities would be improved if the size of the small-scale fisheries had been downsized, and a number of the small-scale fishers should be moved out of the fisheries and could live on non-fishing livelihoods.

In other views, a fisheries policy-maker in MOFI did not distinguish clearly between the community storyline and the other storylines in debating policy discourses. He explained that the social welfare of the fishing communities is either the objectives and consequences of enhancing offshore fishing and conservation of fisheries resources. He meant that enhancing offshore fishing would provide more livelihoods and employment for fishing communities in general and the small-scale fishing communities in particular. Conservation of fisheries resources and marine ecosystem would maintain the productivity of fish stocks, then the catch rates and incomes of fishing fleets would be maintained. This argument was supported by most actors and stakeholders involving in planning fisheries. Officials in MPI and Government Cabinet supported this because it was agreed with the political views of modernization and industrialization of fisheries and would contribute to improvement of living standard and social welfare of the coastal communities.

This was also advocated by local fisheries managers. The local fisheries managers believed that development of the offshore fishing, and changing livelihoods for local fishers would reduce number of the small-scale fishers and fishing pressure in the coastal waters, and then fisheries resources there would be restored gradually. A fisheries manager from Ben Tre province agreed to reduce the number of small-scale vessels with planners, but he suggested planners to define concrete number for each province and polices to buyback these vessels as well as provide alternative livelihoods for influenced fishers.

For scientist and experts from NGOs, they supported for this argument in particular aspects. For instance, international NGOs supported establishing MPAs to conserve fisheries resources and marine habitats and ecosystems. They argued that this is a way to contribute to sustainability and improvement of living standard and livelihoods of the local fishers. Therefore, they assisted in planning 16 MPAs and funded establishment of MPAs such as Cu Lao Cham, Hon Mun, Ran Trao, Nui Chua, Ho Bay Canh, etc. along the coast of Vietnam.

However, actors and stakeholders used conflicting arguments to frame their discourses overtime. This is perhaps due to there was no clear way to distinguish the small-scale fisheries from the larger-scale fisheries in Vietnam. Therefore, there have been specific policies for small-scale fisheries, but general polices for both ones in practice. All these policies have the same objectives of improving living standard and social welfare of the coastal communities in Vietnam (Tuan, 2013). Indeed, they provided credit and incentives for coastal fishing communities in general to improve their income and living standard and change livelihoods (e.g., tax exemption, credit with low interest, cash, training service). Consequently, objectives of policies and management strategies sometimes conflicted each other. For instance, MOFI planned to reduce small-scale fishing effort in 1991-2000 (MOFI, 1990b, 1995b), but government provided incentives for remaining fishing by launching a policy on eliminating natural taxes for fishing was adopted in 1993 (Government of Vietnam, 1993). Prime Minister decided downsizing small-scale fisheries in 2006-2010 on one hand (Prime Minister, 2006), but he also subsidized small-scale fisheries to enhance fishing capacity in 2008 (Prime Minister, 2008). In addition to this, government has continuously launched subsidy programs on the fisheries to enhance the offshore fishing, change livelihoods (Government of Vietnam, 2014, Prime Minister, 1997, 2008, 2010).

However, these programs have a low effectiveness because the conditions for access to the credit were beyond the capability of the small-scale fishers as argued by fisheries managers in 2009-2012 on one hand, and small-scale fishers lack skills to operate larger-scale vessels on the other hand. This resulted in many of the offshore fishing vessels built under these programs operating at on economic loses (Government Inspectorate of Vietnam, 2005). In addition, subsidy programs for changing livelihoods of the small-scale fishers were also unsuccessful. Most of fishers supported to change livelihoods returned the fisheries due to their inability to adapt to the new careers (La, 2010).

This argument was criticized by planners and scientists. Planners in VIFEP explained that enhancing the offshore fishing will narrow down resources in both human and finance to develop the small-scale fisheries. Simultaneously, the space (i.e. fishing grounds) of the small-scale fisheries would be shrunk for the offshore vessels. This was supported by local fishers interviewed in 2009-2012, who complained that many offshore vessels went into the coastal waters to fish. This was also acknowledged by 14 provincial fisheries managers interviewed in 2009-2012. Fisheries scientists in RIMF and experts from WWF argued that regulations on conservation of fisheries resources have negative impacts on small-scale fishers in some extents, especially for the small-scale fishers because most closed areas and MPAs located in the coastal waters. For instance, establishment of closed areas and MPAs would prevent fishers catching in traditionally productive fishing grounds; or using the fine size of mesh size for purse seining, trawling makes catch rates reduced. This was agreed by fishers interviewed in 2009-2012.

5.4.3.3 The institutionalization of the community discourse

Development of the discourse on the small-scale fisheries has been controversial in Vietnam. It has been institutionalized contradictorily in fisheries legislation, policies and management plans over the last twenty years. The overarching objective of fisheries policies intended to discourage development of the small-scale fisheries, but few specific cases, government still subsidized them for short-term purpose of remaining fishing at seas and creating incomes for the fishing communities in general.

In fact, the discourse on downsizing the small-scale fisheries was legalized in fisheries law (National Assembly, 2003). The article 13 of the fisheries law articulates that *"government will provide incentives for small-scale fishers by training and capital support to change their business to offshore fishing, or by training, capital support and allocation of land/seas to change their business to aquaculture"* (National Assembly, 2003 p.7). In addition, the circular No. 02/2006/TT-BTS enacted in 2006 bans development of fishing vessels powered with engine capacity of less than 30 HP and trawlers powered with engine capacity of less than 90 HP.

This discourse was also institutionalized in the 2010 fisheries master plan which nearly 40,000 small-scale fishing vessels were planned to scrap in 2006-2010. It was also reflected partly in other policies such as remaining fishing at seas (Prime Minister, 2008), changing to offshore vessels (Government of Vietnam, 2014; Prime Minister, 2010b). It was institutionalized in the fisheries master plan by 2020 of Vietnam as “reduction of the small-scale vessels from proportion of 82% in 2013 to <70% in 2020 (Prime Minister, 2013a).

5.5. CONFLICTS AMONG DISCOURSE COALITIONS IN TRANSITION ECONOMY

5.5.1 IS IT A CONSERVATIVE MANAGEMENT SYSTEM?

As above analyzed, a new approach to planning fisheries was introduced into Vietnamese fisheries. This approach follows the conservation paradigm based on multi-disciplinary assessments and the best knowledge base rather than the production-based growth paradigm and provides general orientations for developing the fisheries at the macro policy. But this was not accepted in reality of the Vietnamese context. This may be due to the divergence in development perspectives or somethings beyond that such as applicability of the approach, etc.

In 1995-1997, under an analytical framework provided by this approach, planners in VIFEP investigated the fishing communities in some coastal provinces of Vietnam and concluded that:

i) The fisheries resources in the coastal waters were overfished, thus increase in fishing pressure would impact negatively on bio-diversity, the size of fish stocks and their reproduction in future;
ii) Fishing efficiency of fishing fleets decreased due to over-investment into fishing capacity;
iii) There was a lack of sufficiently scientific bases for sustainable development the offshore fisheries;
iv) The available information and scientific data were insufficient for making informed management decisions;
v) The objective of growth in catches would be beyond the control of the management authorities and spend a considerable amount of social and economic costs.

In this context, a master strategy for the Vietnamese fisheries was formulated with emphasis on the conservation of fish stocks and ecosystems to ensure sustainability of fisheries resources and optimize socio-economic profits (VIFEP, 1997), with two pillars:

appropriate development of the offshore fishing and reduction of the coastal fishing. This master strategy proposed plans to implement:

i) Ensure that fish stocks remained at the above level providing the MSY. Therefore, MOFI needs to develop a mechanism for collecting, analyzing data on fisheries and fisheries resources to provide scientific advice for making policies and management decisions; to define a reference point system for managing fish stocks, fisheries and marine ecosystem health; and to establish a fisheries management structure based on the adaptive indicator-based regime connected various management levels (i.e. national, provincial, district levels);
ii) Establish a fisheries management regime based on the fishing rights and obligations given to the local fishers. This regime would end up the open-access fisheries and move to the regulated fisheries based on the fishing rights, catch quotas and obligations of resource fishers.
iii) Introduce an alternative management approach to the Vietnamese fisheries, which emphasizes on the fisheries management plans at local scales and involvement of the local communities into management processes.

In fact, this strategy was welcomed and highly appreciated by many scientists and fisheries managers. The contemporary director of the Planning and Finance Department of MOFI evaluated that *"The master strategy was made based on advanced ideologies and the best scientific arguments I have ever read"*. He believed that this strategy would enable the Vietnamese fisheries to develop sustainably if MOFI had been provided enough resources to implement. For me, it integrated innovative fisheries management approaches. It also met requirements and principles for sustainable management of fisheries resources and fisheries adopted by United Nation and FAO. For instance, fishing at the catch level to ensure the long-term sustainability of fish stocks – MSY (United Nations, 1982), making fisheries management decisions based on the best available information in a precautionary approach (Cochrane, 2009; Garcia, 1995; United Nations, 1992), and implementation of the responsible fisheries (FAO, 1995).

As other developing countries, Vietnam should follow the production-based growth paradigm to develop the nation. Furthermore, its fisheries resources in the offshore waters had been almost unexploited. In addition to this, the statistics implies a promising growth rate of the catches for the coming years. At the same time, fish stock assessments and fisheries socio-economic investigations had not been implemented regularly. Therefore, there was no solid evidence showing the real state of the fisheries resources as well as socio-economic performance of fishing fleets in the Vietnamese waters. In this context, a development plan for the Vietnamese fisheries should be made to show clearly quantitative and measureable objectives according to the development indexes of the sector (e.g. total catches, fishing vessels, labours) as told by the contemporary director of Planning and Finance Department of MOFI. This was the same with the arguments of the officials in MPI as told by a planner who prepared the draft of this strategy.

Consequently, the master strategy for the Vietnamese fisheries by 2010 prepared under the new approach imported from western experts was rejected by government of Vietnam. Clearly, this was due to the divergence in development perspectives and protocols for planning fisheries between the existing management system in Vietnam and western fisheries planning system. But, it seems to be also due to somewhat importing developed fisheries into developing fisheries. The developed fisheries were often evaluated as single species fisheries with a smaller number of large-scale industrialization vessels. By contrast, the developing fisheries were often characterized with multi-species species fisheries with a greater number of small-scale and artisanal vessels. This caused a reluctant thought to apply models and approaches originated from the developed fisheries to the developing fisheries at least for the Vietnamese context. As observation in 2003-2005, memberships of MFST often debated methodology to define indicators if they made sense of showing the state of fish stocks and of fishing fleets or did not. In nature, the existing fisheries planning system was based on the EPY (the Vietnamese way to interpret the MSY) which was also imported from the developed fisheries (Degnbol, 2004). This was conceptualized in the Vietnamese fisheries in the early of 1990s, behind the developed fisheries around 20 years (Larkin, 1977). Perhaps, it takes a certain delay for implementing an approach imported such as the MSY approach.

5.5.2 EMERGENCE OF A NEW CONFLICT IN PLANNING FISHERIES

In terms of fisheries management, various types of conflicts were documented by Charles (Charles, 1992) and Muawanah (Muawanah et al., 2012) as illustrated in chapter 2. Different from these conflicts, a kind of conflict between the actors (i.e. the planner who planning fisheries and manager who deciding fisheries plans) in planning fisheries was documented in the case of Vietnam. Tangibly, the planner strongly opposed the fishing level suggested by the manager and vice versa. The planner proposed a figure based on projection of the state of the fish stocks which was considered with much uncertainty. This projection was made based on the out pf dated data which were collected in 1978-1980 and a Phan's speculation in fish stocks by 1988 (Phan, 1988). At the same time, the manager suggested another figure based on the official statistics of total ladings and the EPY estimation of fisheries resources which were considered as magic and distorted data. This conflict was not addressed for a long time, around 5 years from 2001-2006.

This may be due to various reasons such as personal perception, perspectives, institutional arrangements, academic culture, etc. Two main reasons could be observed that: i) different perspectives for planning fisheries, and ii) there is a lack of reliable available data. For the former one, the managers still seemed to follow the planning principles of the centrally planned regime which prioritizes the growth objective and set the mandatory targets for the next period based on the growth rates of the previous periods. They expected to enhance fishing capacity to catch more fish. In this system, all objectives must be quantified and controlled by the government. At the same time, the planners followed the free market-oriented economy with emphasis on sustainable utilization of fisheries resources and advocated the adaptive management regime. They intended to remain the existing fishing level and monitor further the state of fishing fleets, fisheries resources and socio-economic conditions of the fishing communities, then make management decisions adaptively with the actual state of the fisheries and fish stocks. They also intended changing the structure of fisheries from the sector of many small-scale vessels owned by separate household to the sector of less vessels managed by less skilled owners. This made them conservative in setting a low growth rate of catches and reduction of a half of the existing number of fishing vessels. For the second reason, both of them knew very well about the nature of knowledge they used for making the numbers. They understood their uncertainty, but they could not find a reliable knowledge basis in that context.

The conflict was only addressed when the planner retired and left the work for another planner. The new one wanted to end up all existing projects in VIFEP including the project of making the fisheries master plan by 2010. Therefore, he accepted revised the planning report according to perspectives and comments of managers. Finally, the master plan was adopted by January in 2006. However, the objectives of this master plan were not achieved in practice. This may be connected with the conflict in planning fisheries between planner and manager. This conflict was not seen in the course of planning the Vietnamese fisheries in 2010-2020. Therefore, the conflict between planner and manager in planning fisheries may emerge in an economy in transition or in a context of lacking reliable knowledge basis for planning fisheries.

5.6 CONCLUSIONS

The 2010 fisheries master plan of Vietnam was made in the transition period from the centrally planned economy to the market-oriented based economy. In the planning process, innovative fisheries management approach (i.e. the multi-disciplinary approach based on the best knowledge base) was introduced into the Vietnamese fisheries. This was highly appreciated by progressive perspectives and could help fisheries authorities control effectively and efficiently their fisheries towards the sustainable development (Raakjær, 2009). This was endorsed by minister of fisheries in 2001 by establishing a consultation structure to providing scientific advices for management decisions. However, this approach was not accepted in practice. As a result, the 2010 fisheries master plan of Vietnam was still made following conventional approach which was used within the centrally planned system, where the planning targets are set in the centralized and government-based paradigm. This leads to conclusion that it was hardly for the multi-disciplinary perspective based on the knowledge base to stay within the centralized and government-based management system such as in Vietnam.

In a situation of lacking a line of the knowledge bases for planning fisheries and insufficient involvement of interested groups into planning processes, debates and conflicts would be associated with the political power and personal interests. The views of the coalition having the strongest political power will dominate the policies, and policy decisions will be bypassed scientific and practical arguments. These implications, in combination with the poor academic publication as the case of Vietnamese fisheries may appear the conflict between planner and manager. This conflict may aggravate in a system in transition, even create personal enmity among scientists and scientists with other actors involving in planning fisheries.

The 2010 fisheries master plan of Vietnam was made within a context of a lack of reliable data and without involvement of fishers who decide their catches and fishing capacity. The knowledge used for debating was provided by scientists and bureaucrats, and the fishers' knowledge was not discussed in making the 2010 fisheries master plan in Vietnam. This resulted in contradictions among development orientations and operational targets of the master plan. And, the legitimacy of the policy decision was low in practice. This shows a gap between the rhetoric plan and realistic action in a transition economy regime.

Paradoxically, the 2010 fisheries master plan was not implemented at all in Vietnam. The management objectives (i.e. total catches, number of vessels) were not enforced through deciding management measures in practice (see chapter 7). Similarly, no monitoring and reviewing programs were not implemented to provide feedbacks from reality of the fisheries. This would be a limitation of the existing system in providing opportunities for improving the fisheries planning system in Vietnam. It was also a critical reason for the Government of Vietnam to refuse the innovative fisheries planning approached introduced by the DANIDA project. This may be a typical example for the ineffectiveness of the fisheries management system based on the government-based and centrally planned regime. It also exposed obstacles in the way of introducing innovative fisheries management approaches and implementing the conservation objectives of the fisheries. As a result, the fisheries have been seen as a big development project without proper acknowledge and concerns to the fact, that the fish resources actually are exhaustible as similar understanding was dominating in Europe in the late 1800's when Huxley proclaimed that *"… probably all the great sea fisheries are inexhaustible; that is to say that nothing we do seriously affects the number of fish…"* (Huxley, 1883 p.8).

CHAPTER 6: KNOWLEDGE INPUTS TO DEFINE THE TOTAL CATCHES

6.1 INTRODUCTION

The concept of maximum sustainable yield (MSY) for managing fisheries has increasingly gained popularity since 1930s by theory of Russell (Russell, 1931), by the surplus-production models (Schaefer, 1991) due to its simplicity, understandability and direction of management activities (Kesteven, 1997). One of the MSY definition widely used in the world is that "*MSY is the largest average catch or yield that can be continuously taken from a stock under existing environmental conditions"* (Ricker, 1975 p.4). Although, the MSY concept was refined in comparison with the original meaning (Larkin, 1977), it has still remained uncertainties and limitations in sustaining the population of the exploited fish stocks. Therefore, the management approach of TAC-based which based on the MSY has not help to remain sustainability of fish socks (FAO, 2004; Raakjær, 2009). In 2002, the world leaders acknowledged the vital role of the fisheries to economic viability, food security and biodiversity, and made a call for maintaining and restoring fish stocks that can produce MSY with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not latter 2015 (United Nations, 2002). Evidence that the meaning of the MSY was refined towards conservation rather than the potential yield to catch one. In other words, fishing at MSY is to ensure the long-term productivity of exploited fish stocks, and MSY has commonly used as a tool for managing fisheries in the world (Cochrane, 2009).

In the Vietnamese fisheries, exploitable potential yield (EPY) interpreted as the MSY and standing biomass (B) were used as indicators to assess the health of the fisheries resources, and total catches (TC), are the volume of fish to be fished in a specific time, was used as a tool (i.e. fishing level) for planning the fisheries. In addition, total fish landings (TL), are the volume of fishing production landed at shore, was used as an index to measure development of the fisheries. In fact, the figure of TC is the most important element of the fisheries planning documents in Vietnam as analyzed in chapter 5. It takes a role of the total allowable catch (TAC) used in the management plan of the TAC-based management regime as in developed fisheries. The figure of TC is articulated clearly in any fisheries plans and administration reports of the fisheries sector in various levels (i.e.

communal, district, provincial, and national levels). To define the figure of TC in a fisheries master plan, the knowledge inputs should be used including socio-economic development strategies, official statistics, fish stock assessments and the relevant available information (Government of Vietnam, 2006; Prime Minister, 1998). However, there was no standardized frameworks or protocols for defining TC in Vietnam. This chapter examines the knowledge inputs for setting the TC in the Vietnamese fisheries plans with emphasis on the case of the 2010 fisheries master plan approved by the Prime Minister at the decision No. 10/2006/QD-TTg (Prime Minister, 2006). Two main questions raised in this chapter are: i) how was the TC-based management approach conceptualized in the Vietnamese fisheries? and ii) what and how knowledge inputs were used to define TC in Vietnam?

6.2 CONCEPTUALIZATION OF THE TC-BASED MANAGEMENT IN THE VIETNAMESE FISHERIES

6.2.1 WHAT IS THE TC?

FAO and other fisheries management system distinguished the TL concept from the TC concept. FAO defined the TC includes all living biological materials retained or captured by fishing gears (including corals, jellyfish, tunicates, sponges and other non-commercial organisms) whether brought on board the vessel or not (FAO, 1996b). The TL is defined as the portion of the TC brought ashore or transshipped from fishing vessels (Kelleher, 2005). Based on these definitions, in terms of the weight, the TC reflects the real impacts of fishing activities on the resources base and marine ecosystems. It is not less than the TL landed at shore after discarding illegal and invaluable productions. Generally, TC is interpreted as the TAC in measuring the fishing level of the specific fish stocks in other fisheries in Vietnam. The TAC is applied as a tool for managing the exploited fish stocks in fisheries called as the output control fisheries management system widespread introduced in the global fisheries (Pope, 2009). However, European fishers were for many years, not allowed to land undersized fish or species for which they did not have quotas. This lead to a large volume of discards in the region (European Commission, 2007). This means that the TC would be much higher than TL in practice. This fact would influence the accuracy of setting the TAC (European Paliament, 2013).

In Vietnamese fisheries, two concepts of the TC and the TL were named the same as *"Tổng sản lượng"*. They were understood in the same meaning as the total productions of the fisheries in common contexts. They were either interpreted as the management objective or development target in the planning system, and also used as an index to measure the performance of the sector. This understanding resulted from the fact that there were almost no discards in the Vietnamese fisheries. Though, there has been no systematic investigation on discards in the Vietnamese fisheries, one study evaluated that the Vietnamese fisheries had insignificant discards (Kelleher, 2004). In addition, though investigation (2009-2012) and observations over than 20 years, the Vietnamese fishers often landed almost all useable and profitable things remained in their fishing gears. However, all fishers interviewed acknowledged that they sometime discard a volume of the low value fish. For instance, a purse seine fisher in Khanh Hoa discarded more than three tons of the red big-eye fish in a trip, because it was uneconomical to preserve this catch onboard in a couple of days. For bottom trawling fishery, fishers assumed that they discard a rate of catches mixing into rubbish and waste. Therefore, the volume of the TC must be higher than the TL in practice of the Vietnamese fisheries. This means that the real mortality rate of fish stocks due to fishing is higher than the TL statistics published by GSO as well as in other fisheries documents in Vietnam.

In an academic context, the TC was sometimes interpreted as the limitation reference point in Vietnam. For instance, the head of a planning team argued that he planned the 2010 TC of 1.4 million tons was to limit the fishing level for conservation purpose. According to him, this level was below the EPY of fisheries resources, but was the maximum economic yield of the fisheries. Some other scientists also agreed with this and explained that the TC was defined based on the EPY. They believed that fishing at TC, then EPY of the fisheries resources would be remained for a long time. In other words, the sustainability of fisheries resources would be achieved if the fishing mortality (i.e. TC) was kept not higher than the EPY.

6.2.2 ADOPTION OF THE TC-BASED APPROACH FOR PLANNING FISHERIES IN VIETNAM

The concept of TC has been used for planning the Vietnamese fisheries for a long time, at least since 1960 as the 1960 annual plan stored in VIFEP. Although, the interpretation of TC has modified in accordance with changes in the planning system in Vietnam, the TC has been the critical element of the fisheries planning system in Vietnam.

6.2.2.1 The TC-based under the centrally planned regime

In this period, the TC estimate was set a mandatory target given to the fisheries sector (i.e. MOFI) should accomplish in a specific planning period (i.e. yearly, five-year). This was defined based on estimation of the total consumption demands for fisheries products and the available fishing capacity of the fleets. In this system, government assumed that the potential yields of fisheries resources are far from its limitation (Tuan, 2013), hence the fishing effort should be enhanced as much as possible to maximize catches. The TC estimation was defined in a bottom-up process within the national economy planning system from the commune, district, province, to the whole nation. Based on the demand for fish of the population in the commune, estimation of demands for fisheries production of the commune in the next planning period is defined, then it would be submitted to and added up the demands for fisheries production of the district. This is implemented similarly for estimating demands for fisheries production of the province and nation level. Based on this the central government defines the TC in metric ton for the next planning period.

This TC is divided into the catch mandatory targets and hierarchically allocated in a top-down process within the national economy planning system from the nation, province, district, to commune as illustrated in chapter 5. The fishing vessels or fishing entities e.g. cooperatives, companies, communes, districts, provinces, MOFI have obligations to accomplish the catch mandatory targets given by higher management level. They were supported and encouraged to maximize and exceed the catch mandatory targets given. For instance, MOFI explained that a high rate (17.6% compared to 1974) of increase in TL in 1975 was due to the appropriate policy to enhance fishing effort of decree No. 93 regarding to collectivization of fisheries. Two provinces: Thuan Hai and Kien Giang were highly appreciated and rewarded for gaining the highest growth rate of TL. They were praised for their outstanding leadership to achieve the highest TL at the annual meeting of the fisheries sector in 1975 (MOFI, 1976). In addition, the 1979 fisheries plan stated that the fisheries sector had to mobilize all available resources and work harder to obtain a high growth in TL at the rate of 15.5% compared to 1978 (MOFI, 1979). As a result, a growth in TC was always set as an overwhelming objective of the fisheries planning system in this regime. The TC for the next period was always set higher than the TC as well as TL of the previous period to meet increasing demands for fish productions of society as illustrated in the annual plan of MOFI in 1960-1980 (MOFI, 1981). Since 1981, the However, the annually planned TC was almost not obtained in practice (MOFI, 1990a). This means that the annual TL was always lower than the TC planned in the annual fisheries plans. MOFI explained that this was due to deficiencies of the existing management system (i.e. collectivization of fishing throughout the country) which was unable to mobilize resources and operate fishing business effectively (MOFI, 1990a).

In terms of fisheries research, researches to improve fishing effectiveness were prioritized in this period. For instance, researches on implication of electric lamps and fish finders, technical improvement of fishing gear system, etc. were carried out. Fisheries resources surveys were also conducted in this period, but they were implemented to understand distribution patterns and locate potential fishing grounds to guide fishing fleets to come and fish. Fish stock assessments to estimate MSY and population dynamics for proper utilization of fisheries resources were less prioritized. The fisheries management regime in this period may be categorized as the open-access regime leaded by the government.

6.2.2.2 TC-based in the market-oriented based regime

As ineffectiveness of the fishing fleets under management of the centrally planned economy in 1960-1980, the government piloted a policy on the self-balancing mechanism to fishing companies and fishing co-operatives since 1981 (The State Planning Committee of Vietnam, 1981). In this policy, fishing fleets were no longer operated by government, but do business themselves. This means that government would not provide fishing costs and consume the catches; fishers had to make themselves fishing decisions (e.g. what, how, when and where to fish) to maximize their benefits. As a result, all fishing vessels were privatized and operated by share-stock companies or individual households. Despite, this has remained in practice. The TC has still been defined accordingly to the same procedures in the fisheries planning system of the government, but it was no longer divided in to the catch mandatory targets and allocated to fishing entities as done before. Instead, individual fishers were allowed to decide their volume of catches, and choose agents to sell their catches (Tuan, 2013). Also, the TL has no longer controlled strictly as in the centrally planned regime, but it is regularly estimated by the GSO to measure the development performance (i.e. a statistic index) of the fisheries. This was used as an official knowledge basis for evaluating and planning the fisheries.

In this regime, the fisheries planning system in general and the TC in particular are operated within the government system, they do not influence on the fishing industry as the centrally planned regime. By official statistics of TC, government may image the development and scale of fisheries and allocate the state resources (e.g. budgets, human, institutional arrangements, etc.) to the fisheries authorities at various levels (e.g. MARD at national level, DARD at provincial level). In addition, it was not divided into the catch mandatory targets as the centrally planned regime, or into the catch quotas as the TAC-based management system in other fisheries (e.g. EU, USA, Canada, New Zealand etc.). Clearly, the TC used in the Vietnamese fisheries planning system is a tool for planning the state budgets rather than a tool for managing the fisheries.

6.2.3 INTEGRATION OF THE MSY CONCEPT INTO THE VIETNAMESE FISHERIES

Conservation of fisheries resources became a policy discourse in the Vietnamese fisheries at the end of 1980s when indications of overfishing were documented (Chung, 1998; MOFI, 1990b; Thong, 1998; Thuoc, 1995; Thuoc & Long, 1997). A gradual decline in catch rate of surveys, changes in species composition and disappearance of species were observed in scientific surveys in 1990-1998 (Chung, 1998; Thuoc, 1995; Thuoc & Long, 1997). In addition, the CPUE of fishing fleets and incomes of fishing communities decreased year by year (MOFI, 1990b; Thong, 1998; Thuoc & Long, 1997). Therefore, the MSY concept was discussed and introduced into the Vietnamese fisheries, and it was used as a limitation reference point for planning the fishing level for the Vietnamese fisheries in 2001-2010.

However, the MSY is interpreted as the EPY which is understood as the potential yield of the fisheries resources as explained in chapter 4. In the Vietnamese context, the EPY is used as the MSY in planning the fisheries. The fishery law (National Assembly, 2003) defines the TC as the volume of catches being allowed to catch in specific areas. This means that the TC concept being used in the Vietnamese fisheries is interpreted as the concept of TAC used under the output control regime (i.e. the TC-based management system) being widespread used in the world fisheries (Pomeroy, Anh, & Thong, 2009). Similar to the TAC-based system, based on the EPY estimation of fisheries resources, annual TL and other considerations, the TC is planned in the fisheries planning system in Vietnam. It is believed that fishing at the TC, the fisheries resources would be maintained in a long term.

However, the TC is collectively estimated for all species in specific areas, not for separate species as done in the TAC-based management system used in other fisheries. In addition, it is not divided into catch quotas and allocated to fishing vessels, and TL of fishing vessels is not enumerated in practice of Vietnam. This is named as the TC-based management system for the Vietnamese fisheries. It is still fit for the conventional approach to planning the fisheries due to taking the development rate of the TL as a basis on one hand, it also is suited with the conservation paradigm which based on the MSY on the other hand.

6.3 THE KNOWLEDGE INPUTS FOR PLANNING THE TC

As mentioned above, the fisheries planning process relies on the four main inputs as follows: i) official statistics; ii) fish stock assessments; iii) socio-economic development strategies; and iv) other relevant available information published by the mandate institutions (Government of Vietnam, 2006; Prime Minister, 1998). The official statistics are composed of annual TL and other statistical data related to fisheries such as fishing vessels, fisheries labour, fisheries households, etc. published regularly by GSO. The fish stock assessments are often conducted by RIMF to provide estimations of B and EPY for planning the TC. The economic development strategies provide political development views and orientations such as growth rates in TC, income and employment. The other relevant information includes a range of information such as export rate, climate change, urbanization, security at seas, etc. However, as illustrated in the chapter 4, the TC is defined primarily based on the official statistics of TL and the EPY estimation, and chapter 5 presents a general procedure for making the 2010 fisheries master plan including arguments for planning the

TC. Therefore, this chapter goes further into the concrete steps of producing knowledge (i.e. TL and EPY) for planning TC with emphasis on the TC of the 2010 fisheries master plan in Vietnam.

The investigation shows that the annual TL from 1996-2004 and EPY estimated in 1997 and in 2003 were used as the knowledge inputs for planning TC of the 2010 fisheries master plan. These knowledge inputs were produced and validated internally by the governmental institutions and agencies (i.e. RIMF for EPY, and GSO for TL). Figure 6.1 shows the interaction and process for producing the knowledge inputs (i.e. TL, EPY) to plan the TC of the 2010 fisheries master plan in Vietnam.

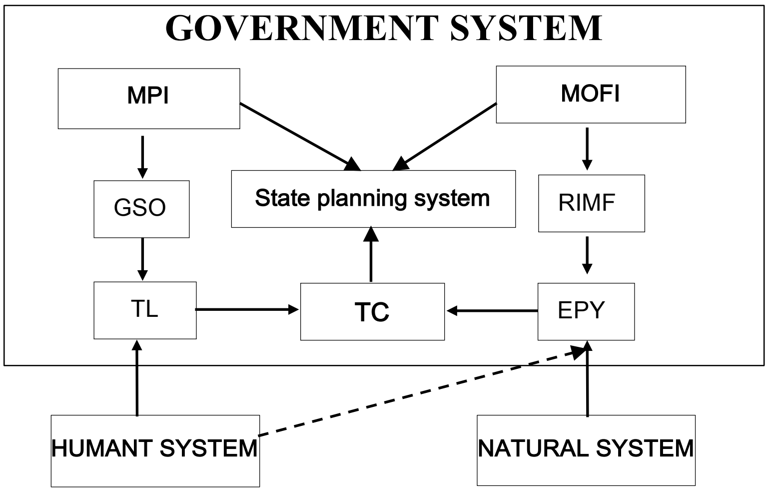

Figure 6.1: Producing knowledge used for planning TC of the 2010 Vietnamese fisheries master plan.

As shown in figure 6.1, the TC and its knowledge bases were just interplay within the government system. The GSO (a competent department of MPI) and RIMF (a research institution of MOFI) are mandated to produce knowledge inputs: the TL of the fisheries and EPY of fisheries resources for planning the TC of the fisheries planning system. As a routine work, GSO conducted and publicized the TL figure twice a year (i.e. the first 6-month, the second 6-month as well as the whole year). The knowledge inputs and methodology for estimating TL are analyzed in detail in the next paragraphs. Meanwhile, the EPY was estimated by RIMF as irregular projects assigned by MOFI or contracted with other governmental agencies. This process presented clearly that the TC did not influence the human and the natural systems as shown in figure 6.1.

6.3.1 ESTIMATION OF THE TL

6.3.1.1 estimation of TL at provincial level

Legally, the TL estimation is conducted and published officially for each 6-month and for the whole year by the GSO system in two scales: the provincial and the national scales (Government of Vietnam, 2004). The TL estimation at the provincial scale is implemented firstly. The TL of the whole country is then calculated by summing up all the provincial TL figures. Although, the TL estimation of the district and commune scales is not required, but it is implemented in fact for evaluating the production of these scale[20]. The provincial TL is estimated by the sampling-based method and calculated by the equation 6.1. As illustrated in equation 6.1, the accuracy of TL estimation depends on the CPUE estimation of fishing fleets and defining the number of vessels by fishing fleets.

$$\mathrm{TL} = \sum(\overline{\mathrm{C_i}} * \mathrm{N_i}) \qquad (6.1)$$

$$\overline{\mathrm{C_i}} = \frac{\sum_1^n \mathrm{C_i}}{\mathrm{n}} \qquad (6.2)$$

Where, $\overline{C_i}$ is the mean CPUE of the sampling vessels of the gear i, calculated as by the equation 6.2, C_i is the landing of vessel i, n is the number vessels sampled; N_i is the number of fishing vessels of the gear i registered in the province.

As investigation, although the CPUE is estimated by the random sampling method, but the number and the protocol for selecting the landing samples are not specified explicitly throughout the system. According to FAO, the accuracy of TL estimation depends on the size of sample (Stamatopoulos, 2002). The sample size is defined by on the population size for landings in a month. This was not implemented in Vietnam. Instead, the number of landing samples was decided dependently on the annual budget allocated to the provincial GSO. It was taken at 7.0-7.5% of the total vessels registered in each province as investigated in Quang Ninh, Binh Dinh, Thanh Hoa and Kien Giang provinces. This size was much lower than the size to achieve the accuracy or 90% as the FAO's guidebook.

[20] The TL statistics at the district scale are estimated by the provincial GSO staffs and the TL statistics of the commune scale are estimated by the district GSO staffs as told by GSO staff in 4 provinces under investigation.

For instance, according to FAO's guidebook, in order to achieve the accuracy of TL estimation at 90% in Binh Dinh province by 2012, the size of landing samples was 9,600[21], but just only 1,100 landing samples were taken to calculate CPUE in practice. This means that the size of landing samples for estimating CPUE was not at the safe level to achieve a desired accuracy.

In terms of sample distribution, in sampling principles, landing samples should be taken representatively from all landings of various fishing fleets in all landing sites in specific time. In fact, the landing samples was personally decided by the GSO individual staffs. The GSO staffs intend to sample landings with the bigger and accessible vessels in concentration landing sites, with vessels having good catches, rather than sample at smaller landing sites with vessels having less landings. In addition to this, the landing samples were not taken with the coverage of all fishing fleets in both dimensions: the engine power segments and specific fisheries. The fishing vessels were not stratified into specific fleets such as trawl net for fish, trawl net for shrimp, gill net for squid, gill net for mackerels, instead into collective trawl net, gill net. But, their landings differed considerably from each other. For instance, the average CPUE of the 20-89HP drift gill netters was 259.0kg/100m/day, 12.7 times higher than that of 20-89HP bottom gill netters (20.4kg/100m/day) as the estimation of the landing enumerator program conducted in 2001-2003 in Da Nang landing sites.

They were also not stratified into segments of different engine capacity such as trawl net of <30HP, of 30-89HP, of 90-149HP, etc. The investigation shows that around 10% of landing samples were taken with the fishing fleet of engine power <30HP, whereas, this fleet accounted for approx. 80% of fishing vessels in Vietnam. In fact, the landings of smaller vessels are often lower than that of the bigger vessels in the same fishery. For instance, the CPUE of the trawl net fleet with engine capacity >90HP was 6.6 times higher than that of the 20-50HP trawl net fleet. Meanwhile, the number of the trawlers with engine power of >90HP was 5.3 times less than that of the 20-50HP trawlers as investigated in Quang Ninh province in 2009.

[21] In 2012 there was approx. 8,000 fishing vessels registered in Binh Dinh, equally 25 fishing fleets. Each fleet took more than 2,000 fishing trips in a year.

In terms of sampling time, FAO suggests landings should be sampled monthly with coverage of fluctuation of landings according to natural characteristics of fish stocks (e.g. the moon phases). The TL is estimated twice a year by the first six-month and the second six-month, then the landings were sampled twice a year in May and November in practice. The GSO staffs sampled landings by interviewing fishers on their volume of landings in each month. However, fishers often did not record their landings monthly, but accounted for every fishing trip in practice. Therefore, they were unable to remember landings they landed in each month as told by fishers in provinces under investigation. In fact, fishers implemented a couple of fishing trips in each month depending on gear used and the size of vessels. Normally, the small-scale vessels operating in the coastal waters landed their catches at least 4 times in a month, even they landed their catches every day, and the larger vessels landed their catches 1-2 times in a month. At the same time, many bigger vessels made a fishing trip with a couple of months. In addition, fishers told that they were reluctant to tell their real volume of landings because they did not want people knowing their business on one hand, and avoid from paying more fees and taxes on the other hand. This means that, the accuracy of CPUE estimation for calculating TL was problematic, it would be verified and validated scientifically to provide more realistic estimation of impacts on fishing communities on the fish stocks.

For the number of fishing vessels, this should be defined in each period of time that reflects fishing patterns of fishing fleets (i.e. changes in gears used, in targeting species, in fishing grounds). Record of fishing vessels should be provided by the fame surveys before implementing the landings surveys (Stamatopoulos, 2002). However, the record of fishing vessels for the TL estimation by GSO is the record of fishing vessels provided by the fishing vessels registration presented collectively in the 5 main groups of fisheries (i.e. trawl fishery, purse seine fishery, gill net fishery, hook and line fishery and other fisheries). It is reported yearly, not monthly or six-month, albeit the fishing fleets are changeable in fact in Vietnam as analyzed in chapter 4 and chapter 7.

Furthermore, the number of fishing vessels registered or licensed is often less than the number vessels operating in practice because the motorized vessels of <20 HP are not required to register at the fisheries authorities. For instance, the number of fishing vessels reported in the vessel registration system and in the licensing system was 113,724 and

117,345 respectively in 2014 (D-Fish, 2015). In addition, the number of vessels licensed is lower than the number of fishing vessels operating in practice. For instance, the number of vessels licensed in 2011 only accounted for 70.5% of the total number of vessels fishing in practice (D-Fish, 2011). At the provincial level, the proportion of vessels licensed is often low in some provinces. For instance, there was 6,727 fishing vessels in Ba Ria – Vung Tau province in 2011, but only about 2.0% of fishing vessels were licensed (Department of Agriculture and Rural Development of Baria-Vungtau, 2011). This means that there are three different number of fishing vessels available to use in the fisheries system of Vietnam. But, there is no standardized guidance on using which number to estimate the TL by the equation 6.1. In fact, the provincial GSO staffs told that they used the number of vessels provided by the provincial fisheries authority to calculate the TL, but they did not show these numbers in detailed. This may leave a room for the provincial GSO to choose the most optimum one to produce the TL estimation which supportive the political wills. This may be the main reason causing controversial figures of TL estimations between GSO and fisheries authorities as observed in 4 provinces of investigation.

In addition, under assumption that there are no changes in the structure of the fishing fleets year by year, the record of fishing vessels reported in the previous year is used to calculate the TL of the next year. However, there are considerable changes in the fishing fleet structure in practice depending on individual fishers' experience. For instance, as investigation in 2012, nearly 240 squid stick-falling netters in Thanh Hoa province transferred to the hand line fishery catching large-head hair-tail fish; nearly two of the third gill netters in Binh Dinh province changed to the tuna hand line fishery.

Besides, it also assumes that all vessels are active and having a volume of landings in every month of a year. As illustrated in equation 6.1, the active possibility (boat active coefficient) of all vessels is the same in any month. However, many vessels are not active for a couple of months or do not have landings due to private reasons (e.g. breaking down engine or fishing equipment, lacking crew members or variable costs). In fact, approx. 5% of the total fishing vessels did not fish in the whole year of 2009 as investigated in Bac Lieu and Quang Ninh. In addition, the active coefficient is also different among fishing vessels. A survey shows that the boat active coefficient of fishing fleets in 2003-2004 was from 0.3-

0.6 (Hai, 2004). This reflects that only 30-60% of total vessels do fishing on any day during a month.

At the same time, the provincial TL was also estimated by the fishery authority – Sub-DECAFIREP at the provincial level. Some provinces apply the equation 6.3 to estimate the TL. This methodology is advised to be used in small-scale and dispersed fisheries such the Vietnamese fisheries (Stamatopoulos, 2002)

$$\mathrm{TL} = \sum(\overline{\mathrm{CPUE}_i} * \mathrm{F_i} * \mathrm{A} * \mathrm{BAC}) \qquad (6.3)$$

Where, $\overline{CPUE_i}$ is the mean CPUE of the sampling vessels of the fleet i in a moth; F_i is the potential number of fishing vessels of the fleet i to operate in a month; A is the potential days in a month that any individual vessels of the fleet are able to do fishing; BAC is the probability that a fishing vessel of a given fleet will be active on any day during a month.

Within this methodology, the fisheries data (i.e. catch rate, fishing effort, number of potential days to fish and active possibility of each fishing fleets) are collected monthly. This methodology developed by FAO (Stamatopoulos, 2002) was introduced into and carried out in Vietnamese fisheries from 1996-2005 under a project funded by DANIDA. It is more advanced than the conventional methodologies used to estimate TL in Vietnam as told by a senior official working in the GSO of Vietnam. Application of this methodology, the provincial Sub-DECAFIREPs provided different figures of TL estimation in comparison with figures produced by the GSO system at the same scales (see chapter 4). However, the figures provided by the provincial Sub-DECAFIREP were not accepted as the official knowledge for planning the fisheries in Vietnam. In fact, they were just used as a reference to verify the figures of TL estimated by GSO before the Chairman of the PPC approving the official TL figures in some the provinces.

6.3.1.2 Decision of TL at provincial level

The Chairman of the Provincial People Committee (PPC) is in charge of deciding the TL estimation of the province. As investigation in 14 provinces, he/she relied on the growth rate of ladings adopted in the general socio-economic development plan of the province and other consideration to decide the TL figure submitted by the provincial GSO. In fact, figure of TL estimation was set no less than to the growth rate of landings planned in the general socio-economic development plans of the province. The GSO staffs and fisheries managers shared the same explanation that this is to demonstrate efficiency of the administration system and support political power for local fisheries managers as well as the provincial politicians. This figure reflects capability of the administration system in terms of planning and controlling the fisheries development under the plan of the government.

Adoption of the statistics in general and the TL estimation in particular is implemented within a strict and systematic, but sensitive process as told by GSO staffs interviewed. It is either required to meet a proper rate of growth, and also to follow the statistical principles. The GSO staffs in Quang Ninh, Thanh Hoa and Kien Giang provinces told that, the statistical indexes should be varied in a range of ± 7% compared to the previous year figures. If the growth rate was set out of this range, then an inspection of collecting and analyzing data may be implemented. If do this, the situation would be complicated and concerned with many staffs, officials, institutions, even politicians. Therefore, figures of the statistical indexes are normally decided in an acceptable range to avoid complications. Consequently, the existing management system seemed to accept living with the distorted figures for manage their business and sector. For instance, the case of the rice field area in the My An commune - An Giang province in 2011, the provincial GSO estimated a figure of 280 hectares by conventional method, meanwhile a scientist[22] estimated a figure of only 30 hectares by the remote sensing system. The provincial GSO staffs recognized their systematic mistakes, but they refused the figure measured by the scientist. One GSO staff in An Giang explained that the procedure for verifying the statistical data is very complicated, so he and his system just received the scientist's comments and would address the problem if there would be convenient conditions. Similarly, the Thanh Hoa GSO was unwilling to decide the area of the tiger shrimp ponds (200 hectares) in 2012 although they believed that the real figure (estimated about 20 hectares) as told by a fisheries manager in Thanh Hoa.

However, some exceptions were observed in the estimation of annual TL at some provinces to pursuit other purposes. For instance, the TL of Thai Binh province and the

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[22]Dr. Nguyen Dang Vi used the remote sensing techniques to measure the real-time figure of the area of the rice field in My An – An Giang in 2011.

tuna TL of Khanh Hoa province were estimated extremely high in 2014. The fisheries managers there explained that they did so because they need official basis for facilitating the projects of building up the regional fishing ports and fisheries infrastructure in their provinces. In another case of Quang Ninh province in 2009, the growth rate of TL seems to be relevant with the political agenda. The TL of was set near 30% higher than the figure suggested by the provincial GSO to strengthen the political power of a fisheries manager as explained by a fisheries staff in Quang Ninh. Similarly, the growth rate of TL in Thanh Hoa province in 2009 was also set 14% (nearly twice) higher than the rate adopted in the general socio-economic development plan to advocate political influence of a fisheries manager. The head of the Thanh Hoa Sub-DECAFIREP told that the leadership pf province suspected this suddenly increase in TL on one hand, and wondered that estimating such a high TL would damage the provincial economic balances, especially overloading the fisheries infrastructure. Then he suggested a rate equal to the one adopted in the general socio-economic development plan. However, he accepted the rate of 14% when his junior staff advised that the real TL must be higher than that rate in practice. This high rate of TL contributed partly to the promotion of a fisheries manager as told by a fisheries manager in Thanh Hoa province. It is evident that the TL estimation at the provincial level is influenced by human interests. This makes TL estimation distorted accordingly to political interests leading to a continuously steady trend of increase in TL regardless fluctuation of the fishing effort and fish stocks in Vietnam since 1980 (D-Fish, 2017a; GSO, 2016; Tuan, 2013).

It is evident the credibility of the TL estimation is problematic. Dr. Vinh, a former deputy director of Directorate of Fisheries named the TL estimations by GSO as the “magic numbers”. He claimed that these numbers were artificially made according to political interests. The GSO staffs in Thanh Hoa and Kien Giang provinces believed that their real TL figures would be much higher, at least double the figures published by GSO. They argued that fishing at the TL estimation by GSO would see fishing fleets operating at economic losses and would be unable to remain fishing ongoing as in reality in Vietnam. They believed that the TL estimation by DANIDA project in 2003 that the TL estimation of 3.3 million (Marine Fisheries Specialist Team, 2004), 2.3 time higher than the estimation by GSO (only 1.43 million tons) was more accurate.

Moreover, the TL estimation is calculated for aggregation groups (i.e. fish, squid, shrimp and others), not classified by species or by categories of fisheries. It is also calculated by administration territories i.e. commune, district, province and the whole nation, not by fishing grounds/regions. In fact, fishing vessels are allowed to fish and land their catches in any provinces, but they are considered as a component to calculate the TL of its home province. In other words, fishing vessels do not fish in their provincial waters, but their landings are calculated inclusively into the TL of their home province. This means that the figures of the TL estimation of a province does not reflect the fishing pressure on the provincial waters. In conclusion, the current methodology used by the GSO system in Vietnam to produce inaccurate and incompatible estimations of TL for fisheries management. These estimations do not reflect the real fishing mortality of fish stocks in specific waters on one hand, they also not presented in suitable forms for assessing and projecting dynamics of fish stocks on the other hand. Based on these estimations, fisheries managers do not know where and what species being overexploited or underexploited, thus they cannot decide informed management actions to utilize the fisheries resources effectively and sustainably.

6.3.2 ESTIMATION OF THE EXPLOITATABLE POTENTIAL YIELD

According to FAO, the main purpose of fish stock assessments is to predict what will happen to state of the fish stocks (e.g. level of yields and biomass) in the future (Sparre & Venema, 1998). From this, the maximum sustainable yield and other factors associated with it (e.g. spawning stock biomass (SSB), fishing mortality) are estimated to provide knowledge for making fisheries management decisions (Caddy & Mahone, 1995). MSY estimation of fish stocks can be conducted by holistic models or analytical models (Sparre & Venema, 1998).

The holistic models may provide standing biomass and potential yield of demersal and pelagic fish stocks by using the bottom trawling or the acoustic techniques. Among of these models, some scholars such as Gulland, Cadima proposed empirical formulas to estimate the MSY of specific species or for a whole stock unit. When time-series data on the landings and fishing effort are available, then the MSY may be estimated by the surplus production models (e.g. Schaefer model, Fox model). According to Sparre and Venema (Sparre &

Venema, 1998), the holistic models need generic and less complex data of fish stocks and fisheries. They do not take the biological parameters of landings such as age and length structure into account; hence they are often applied in poor data fisheries where fisheries data collection system is often not established systematically.

For analytical models, they may provide fairly reliable assessments of fish stocks. They, therefore, require more specific and sophisticated data (e.g. age-based, length-based data) of landings. For instance, the Beverton and Holt model requires data on age structure of specific species; their mean weight, annual catch, total mortality by the age groups in a time-series manner to predict MSY, spawning stock biomass (SSB) and other biological parameters for managing the exploited fish stocks (Sparre & Venema, 1998).

The fisheries resources surveys have been conducted in Vietnamese since 1960s with assistance from the Soviet Union, Germany, China to locate fishing grounds and understand distribution patterns for improving the fishing efficiency of fishing fleets. But, from the beginning of 1990s, fish stock assessments have been taken into account in Vietnam to estimate the size of fisheries resources (i.e. standing biomass, exploitable potential yield) for the purpose of proper exploitation and conservation of fisheries resources. These have been conducted by using the swept area method (i.e. bottom trawling) and by the acoustic method to estimate B and EPY of demersal and pelagic fish in specific areas. Sparre and Venema advised that the swept area method should be applied for cases of the virgin stocks and hitherto unexploited resources. It is not suited for exploited fish stocks (Sparre & Venema, 1998). This method can tell fisheries managers about distribution pattern and density of fisheries resources for estimating the B and EPY of fisheries resources. Based on these outcomes managers would make fishing plans to maximize the catches. It seems to be suited for the Vietnamese fisheries before 1990s when fish stocks distributed in offshore waters were not exploited. Thanks to policies of developing the offshore fishing since 1992[23], most fish stocks in Vietnamese waters have been exploited, even overexploited in many cases (e.g. snappers, groupers, slender shad,

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[23] When fishers in central provinces e.g. Khanh Hoa, Ninh Thuan, Binh Thuan were encouraged to build larger vessels to fish in the offshore waters. Since after, some new species e.g. oceanic tuna, deep sea snappers became the targets of fishing fleets.

silver pomfret, etc.). Theoretically, the swept area method, therefore, is no longer suited for the fish stocks in the Vietnamese waters. However, it has still been employed to estimate the EPY of fisheries resources in reality of Vietnam. As mentioned above, this EPY concept is understood as the MSY and used as a knowledge input for estimating the TC in the fisheries plans of Vietnam.

Consequently, application of the swept area method has been obviously accepted as a standardized method to estimate EPY of fisheries resources in Vietnam. The EPY is often estimated by the swept area method as the Gulland's formula 6.4 below (Gulland, 1983).

$$EPY = 0.5 * M * Bv \qquad (6.4)$$

Where, M is the natural mortality rate of fish stocks, Bv is the virgin biomass of fish stocks.

$$\mathrm{Bv} = \frac{(\mathrm{Cw/a}) * \mathrm{A}}{\mathrm{X1}} \qquad (6.5)$$

*Where, Cw is the mean catch in weight of a haul (kg), a is the swept area of the gear (km^2); a = v * t * D; v is the velocity of the trawl over the ground when trawling, t is the time spent trawling, D is the 'wing spread' of the trawl when trawling (D = h*X2, h is the length of the head-rope and X2 is the empirical coefficient), A is the total size of the area under investigation (km^2), and X1 is the catchability coefficient of the gear (fraction of the biomass is retained by trawl).*

In principle, EPY should be estimated by species based on its natural mortality rate (M) and virgin biomass. In order to estimate EPY, estimations of M and Bv for specific species are needed. This requires a lot of information and data. However, estimations of M and Bv by individual were not conducted in Vietnam, and the standing biomass (B) was used instead of the virgin biomass (Bv). This assumption is not the case for fish stocks in the Vietnamese waters because most fish stocks were exploited.

In addition, B was estimated collectively for all species in the area under investigation. Similarly, EPY was also calculated in the same manner with B. This means that the M estimation of a combination of many species living in the area under investigation needs to be defined. Unfortunately, there were no available method for such estimation in fisheries science. In fact, natural mortality rate differs species from species dependently on biological characteristics of the species and its environment. In order to address this, Vietnamese biologists took a collective value of M for all species based on their own experience. This estimation was not relied on a standardized method and there is no reference point for verifying and validating the estimation of M in the Vietnamese fisheries. As a result, the M estimation for calculating EPY was manipulated differently among biologists. For instance, the M was taken at 0.65 (Phan, 1988), at 0.8 (Chung, 1991, 1997), or at 1.0 (Duong, 2012). As a result, using the same B estimation, then EPY estimation may be manipulated at different values according to equation 6.4 to meet various interests of the biologists. If taking M equals to 0.65-1.0, then the fishing level (according to formula 6.4) would be 0.33-0.5. This is much higher than level (0.15) which ICES advised for the herring fisheries in European waters (ICES, 2017).

Moreover, for the swept area method, biologists rely on the density called as the catch per unit of area (CPUA) measured in kg/km^2 to calculate the B by multiplying CPUA with the area of the water under investigation. The CPUA is estimated by the bottom trawl surveys. Due to limitation of budgets, the bottom trawl surveys have not been conducted regularly (personal interview with a former director of RIMF). Normally, one or two surveys were conducted in April and/or October[24] in specific areas designed by specific projects. Moreover, the estimations of B and EPY were made in a particular time. They reflect the state of fisheries resources in the past, but they have been used for planning fisheries in the future. Even, estimation of EPY is sometimes used data collected in a long time ago. For instance, the EPY used for planning the TC in the 2010 fisheries master plan (VIFEP, 2005) was estimated based on some data collected in1978-1980 (see table 6.1). Similarly, the TC in the 2020 fisheries master plan was also planned based on the EPY estimation calculated from data collected in 2000-2006 (VIFEP, 2013). These knowledge inputs are uncertain and cause high risk for the fisheries resources.

[24] Bottom trawl surveys are often conducted in April and/or October because the weather is good for working at sea in these months.

Apart from the swept area method, the surplus production model (the Schaefer and Fox surplus production models) illustrated in equations 6.6 and 6.7 (Sparre & Venema, 1998) was also applied to estimate MSY of fisheries resources in Vietnam (Hai, 2003; Son, 2011).

$$Y(i)/f(i) = a + b*f(i) \qquad (6.6)$$

$$Y(i)/f(i) = \exp(c + d*f(i)) \qquad (6.7)$$

Where, Y(i) is the yield (catch in weight) in year i,f(i) is the effort in year i, i = 1,2,...,n

Table 6.1: Estimations of B and EPY used for planning the TC by 2010 (VIFEP, 2005).

Regions	Fish stocks	B (Tons)	EPY (Tons)	Notices
Gulf of Tonkin	Small pelagic fish	390,000	156,000	Based on the acoustic surveys in 1978-1980
	Demersal fish	291,166	116,467	Based on the bottom trawl survey in 1996-1997
	Total	**681,166**	**272,467**	
Central region	Small pelagic fish	500,000	200,000	Based on the acoustic surveys in 1978-1980
	Demersal fish	106,399	42,560	Based on the bottom trawl survey in 1996-1997
	Total	**606,399**	**242,560**	
Southeast region	Small pelagic fish	524,000	209,600	Based on the acoustic surveys in 1978-1980
	Demersal fish	1,551,889	620,856	Based on the bottom trawl survey in 1996-1997
	Total	**2,075,889**	**830,456**	
Southwest region	Small pelagic fish	316,000	126,000	Based on the acoustic surveys in 1978-1980
	Demersal fish	190,670	76,272	Based on the bottom trawl survey in 1996-1997

Regions	Fish stocks	B (Tons)	EPY (Tons)	Notices
	Total	**506,679**	**202,272**	
Submerge knolls	Small pelagic fish	10,000	2,500	Based on the acoustic surveys in 1978-1980
All regions	**Small pelagic fish**	**1,740,000**	**694,100**	
	Demersal fish	**2,140,133**	**855,885**	
	Oceanic pelagic fish	**300,000**	**120,000**	Based on fish landings of neighbour countries
Gross total		**4,180,133**	**1,669,985**	

This method requires the time-series data on TL and fishing effort in a long enough period. However, this system is not available in Vietnam. Instead, only the number of fishing vessels is collectively reported in the administration system. It does not provide in detail of number of fishing days, fishing trips, number of fishing hours. Similarly, as above analyzed, the TL estimation by GSO is incredible and unspecific for these models. When discussing on the MSY estimation made in 2003, a former director of DECAFREP stated that those MSY estimation was not believable because it relied on the distorted data. Therefore, this estimation has not been accepted officially for planning the fisheries in Vietnam. However, this method has been advocated by planners and scientists because it is able to provide the figure of fishing effort that cannot be provided by the swept area method. The question for establishing a fisheries data collection system has been raised continuously since the end of 1990s when a new approach to planning fisheries introduced into Vietnam (see chapter 5).

In order to address this issue, an alternative approach was discussed in Vietnamese fisheries management system in the beginning of the 2000s – the adaptive indicators-based management (Anon, 2001; Management, 2004; Raakjær, 2004; Raakjær et al., 2007). A management structure for marine capture fisheries was endorsed by a Minister of MARD's decision establishing a specialist team to support the new management structure (MARD, 2007). In addition, a comprehensive program of collecting fisheries data to run this management structure was designed. However, the fisheries data collection program has not been implemented and therefore the management structure has been also not put into effect.

Clearly, the estimations of B and EPY to provide knowledge inputs for planning fisheries is problematic in Vietnam. Deficiencies of the swept area method were documented and this method provides the EPY estimations distrusted commonly as analyzed in chapter 5. However, it has been still employed in the Vietnamese fisheries. This paradox may be explained by three reasons according to a former vice director of Directorate of fisheries as follows: i) the swept area method can provide figures of B and EPY that are easy to understand, then are accepted by senior fisheries managers and politicians; ii) the traditional thoughts that fish stocks are the common pool resources, so these resources should be harvested before they move to other countries' waters. Therefore, the validity of fish stock assessments for sustainable management was not taken into account; and iii) the new management approach may require high human and financial costs. In addition, the fisheries data collection (i.e. estimation of total fish landings) is mandated to the GSO system. It is beyond the capability of MOFI to change.

For me, through direct observation in managing projects of fish stock assessments in Vietnam, there are three main thoughts supporting for the conventional approach to assessing the fish stocks as follows:

i) The legitimacy of the fisheries planning system is low. There is no mechanism to enforce the fisheries planning documents in fishing communities. In fact, the catch landed by individual vessels are not defined and controlled in practice, albeit the TC is planned in the fisheries planning documents. Therefore, the magnitude of the TC in fisheries plans is not meaningful for regulating fishing practice. In other words, the management decisions on TC do not influence on the fishing practice if the stock assessments would be conducted more systematically, comprehensively and expensively. This reflects bureaucracy of the current fisheries management system in Vietnam.
ii) The current institutional arrangements may not be suited for a new approach supporting for adaptive learning by doing. It seems to have a normatively fixed

biomass of the fish stocks in Vietnamese waters of around 4.0-4.5 million tons. Estimations differing from this figure are hardly accepted. Indeed, a biomass estimation made by RIMF in 2005 was not accepted because it provided a figure that higher than the normative figure. This estimation, then, had to be revised to a figure close to the normative figure (Nghia, 2007). In another case, the catch rate of research vessel by 2011 (RIMF, 2014b) remarkably declined compared to 2005 (Ha et al., 2005), but the biomass and EPY was estimated nearly the same. This means that variation in the biomass and EPY estimations of fish stocks should be kept in a acceptable range defined empirically.

iii) The swept area method seems to support for the current bureaucrat management system. Indeed, this method may leave a room for manipulating the figure of biomass and EPY estimations accordingly to political interests. In fact, the volumes of B and EPY would be adjusted if empirical coefficients used to calculate the B and EPY are selected properly in equations of 6.4 and 6.5[25]. For instance, a fish stock assessment conducted in 2011-2014 provided B estimation of 4.25 million tons and EPY estimation of 1.75 million tons (RIMF, 2014a). This was assessed by a committee but was not accepted by MARD due to the EPY estimation was incredible (i.e. this was less than the TL in 2014). It then revised in 2017 (D-Fish, 2017b) with B estimation of 4.36 million tons and EPY estimation of 2.45 million tons.

In summary, the swept area method is employed to estimate the state (i.e. B and EPY) of the fisheries resources in Vietnam, albeit it is not suited for exploited fish stocks as in the Vietnamese waters. This just provides the standing state of B and EPY in a particular time, it cannot inform the state of fish stocks in the future. In addition to this, they are estimated by the specific areas/fishing grounds (see chapter 4); meanwhile the TL estimation is conducted by the administration territories (e.g. provincial, district). Therefore, these data are not compatible for assessing the fishing pressure on the fisheries resources in specific

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[25] In fact, biologists calculate the biomass with using different values of X1 and X2 to meet the normative preferences. In fact, X1 may be ranged from 0.5 to 1.0 depending on the biological features of the species under investigation and the biologists' experience, and X2 may be ranged from 0.4 to 0.66 depending on the biologists' experience.

areas. In other words, they are not useful for making informed fisheries management decisions.

6.4 CONCLUSION

Exploitation of fisheries resources in Vietnamese waters is planned based on the TC-based approach. This has originated in the centrally planned regime taking growth in catches as the overwhelming objective of the fisheries. It is connected with the exploitable potential yield (EPY) estimation of fisheries resources which was interpreted as the MSY in recent years to imply the conservation purpose of the fisheries plans in Vietnam. In terms of the concept, the TC-based approach was modified compared to the centrally planned regime, but its nature and knowledge inputs used for planning are still the same. Though it may be easier to be accepted by stakeholders, it requires a lot of data and information due to it manage the fisheries through manage fisheries resources. This is not suited for the small-scale and coastal fisheries in the tropical waters on one hand (Kato, 2012), but also requires high costs for collecting data, monitoring and enforcing in practice on the other hand (Raakjær, 2004; Wilson et al., 1994).

Planning total catches of the Vietnamese fisheries relied on the knowledge inputs of estimations of annual total fish landings and exploitable potential yield of fisheries resources. This research argued that these estimations were poor accuracy. They did not reflect the real volume of the total fish landings as well as the state of the exploited fish stocks. This was clearly seen through the methodologies employed and the data collection system conducted. The methodology for estimating total fish landings is not compatible with the small-scale fisheries as advised by FAO, and the sampling protocols were not coverage over the spectrum of fishing fleets and fisheries. Similarly, the methodology for fish stock assessments was employed incorrectly. It is just used for the unexploited fish stocks, whereas almost fish stocks in the Vietnamese fisheries were exploited and overexploited. The empirical coefficients for estimate standing biomass and exploitable potential yield were also not defined with a scientific manner. In addition, the data collection programs for fish stock assessments were not conducted systematically in a time-series manner.

This research also found that collecting fisheries data in Vietnam was not connected with implementing the fisheries plans. It is conducted as a mandate of competent institutions given by government, and no data collection programs were conducted to monitor and review the effects of the fisheries plans on reality of the fishing fleets as well as the state of fisheries resources. Actually, these data are very useful for reviewing and adjusting the management plans to adapt to changes of the system being managed. Unfortunately, the fisheries plan has not implemented in practice as argued in chapter 7.

To some extent the MSY-based fisheries management approach, in the case the EPY interpreted as the MSY, is well supporting the production-based growth paradigm of fisheries management. In this paradigm, the EPY may be manipulated accordingly to the dominant actors' interests. The interpretation of the EPY as the MSY seems to be championed by politicians and senior fisheries managers. In order to operate this paradigm, empirical formulas and distorted data were used to produce knowledge inputs within the internal processes for planning the fisheries. These knowledge inputs reflected the political wills rather than the dynamics of the exploited fish stocks and fisheries. This may undermine legitimacy of the fisheries plans as well as the effectiveness of the management system. The TC-based fisheries planning approach was operationalized rhetorically within the government system, did not intend to control fishing practices in Vietnam.

This research found that the knowledge inputs (i.e. TL and EPY) used for planning total catches (TC) of the 2010 fisheries master plan was incredible. The EPY estimation relied on data collected in nearly 30 years before. Similarly, the total fish landings (TL) estimations were conducted by improper methodology, so these estimations are unrealistic and do not reflect the real fishing mortality of fish stocks in specific areas. Therefore, the TC made in the 2010 fisheries master plan are much uncertain and causes high risk for managing fisheries resources in Vietnam.

CHAPTER 7: CHALLENGES TO FIT FISHERIES PLANS INTO THE REALITY OF FISHERIES

7.1 INTRODUCTION

As analyzed in chapter 4, the Vietnamese fisheries are managed under a hierarchical fisheries planning system (i.e. strategy, master plan, five-year plan, annual plan) within an administration mechanism of four levels (i.e. national, provincial, district, and communal levels). The fisheries strategies and master plans are made at the national and provincial levels to manage their fisheries in the long-term, then they are implemented by the five-year and annual plans at four administration levels. In this system, the lowest administration level is the communal one which connects and executes fisheries management decisions at the local fishing communities. This means that, the annual plan of the coastal communes is a tool of the management system influencing the fishing behaviour of the local fishing communities in Vietnam.

As analyzed in chapter 5, the Vietnamese fisheries planning fisheries system relies on two pillars: total catches (TC) and number of fishing vessels. Therefore, these figures of TC and number of fishing vessels are always defined clearly as the management objectives of the fisheries plans. Chapter 4 demonstrates that development of fisheries in the last three decades, especially in 2006-2010 have been out of control of the fisheries planning system of the government in practice. This means that the existing fisheries management system in Vietnam was ineffective, it was unable to control its fisheries toward the desired outcomes. One reason for this may be a gap between the management decisions of government and fishing decisions of local fishers. In fact, the local fishers make decisions to increase their catches and also find ways to bypass the management regulations to maximize their profits (Charles, 1995; Raakjær & Mathiesen, 2003). Therefore, understanding fishers' behaviour would improve effectiveness of the fisheries management decisions (Salas & Gaertner, 2004).

The Vietnamese fisheries are characterized with complicated attributes of the small-scale, multi-species and multi-gears fisheries (see chapter 4). Their fishing patterns are diverse and changeable depending on fisheries, targeted species and customs of the fishing communities. This chapter takes two cases of communal fisheries (the trawl net fishery in Quynh Lap commune of Nghe An province and the tuna line fishery in Tam Quan Bac commune of Binh Dinh province) to understand intervention of fisheries planning system of government in the fishing communities. It answers three following questions: i) How was the 2010 fisheries master plan implemented at the local level? ii) What are the preferences and interests of the local fishers? and iii) What factors and how are they influencing fishing behaviour of the local fishers?

This chapter explains intervention of fisheries planning system of government in the fishing communities. It, firstly, introduces two selected cases of communal fisheries. Secondly, it examines implementation of the 2010 fisheries master plan at the communal level to understand the ways that the fisheries planning system influences on the fishing communities in practice. Thirdly, it identifies preferences and interests of the local fishers to understand their dynamics and motivations in fishing business. Fourthly, it analyses factors that influence on the local fishers' fishing decisions to understand the impacts of the fisheries management decisions on the fishers' fishing decisions. Finally, the chapter points out the gaps between the fisheries planning system government and the local fishers' fishing decisions in practice to understand ineffectiveness of the fisheries planning system in Vietnam.

7.2 TWO CASE STUDIES OF FISHERIES

Two communal fisheries are in Quynh Lap commune in the north and Tam Quan Bac in the south of Vietnam are selected as case studies. Their location is shown in Figure 7.1.

7.2.1 THE TRAWL FISHERY IN QUYNH LAP

7.2.1.1 General information of Quynh Lap commune

Quynh Lap is a coastal commune of Hoang Mai town, Nghe An province with a coastline of 12km. Its area is about 2,208 hectares and situated at 8.3km from the town centre and 7.5 km from the 1A national highway. It is bordered by Thanh Hoa province in the north, by the Hoang Mai river in the south, by Quynh Phuong commune and Hoang Mai town in the west, and by the East Sea in the east (figure 7.1).

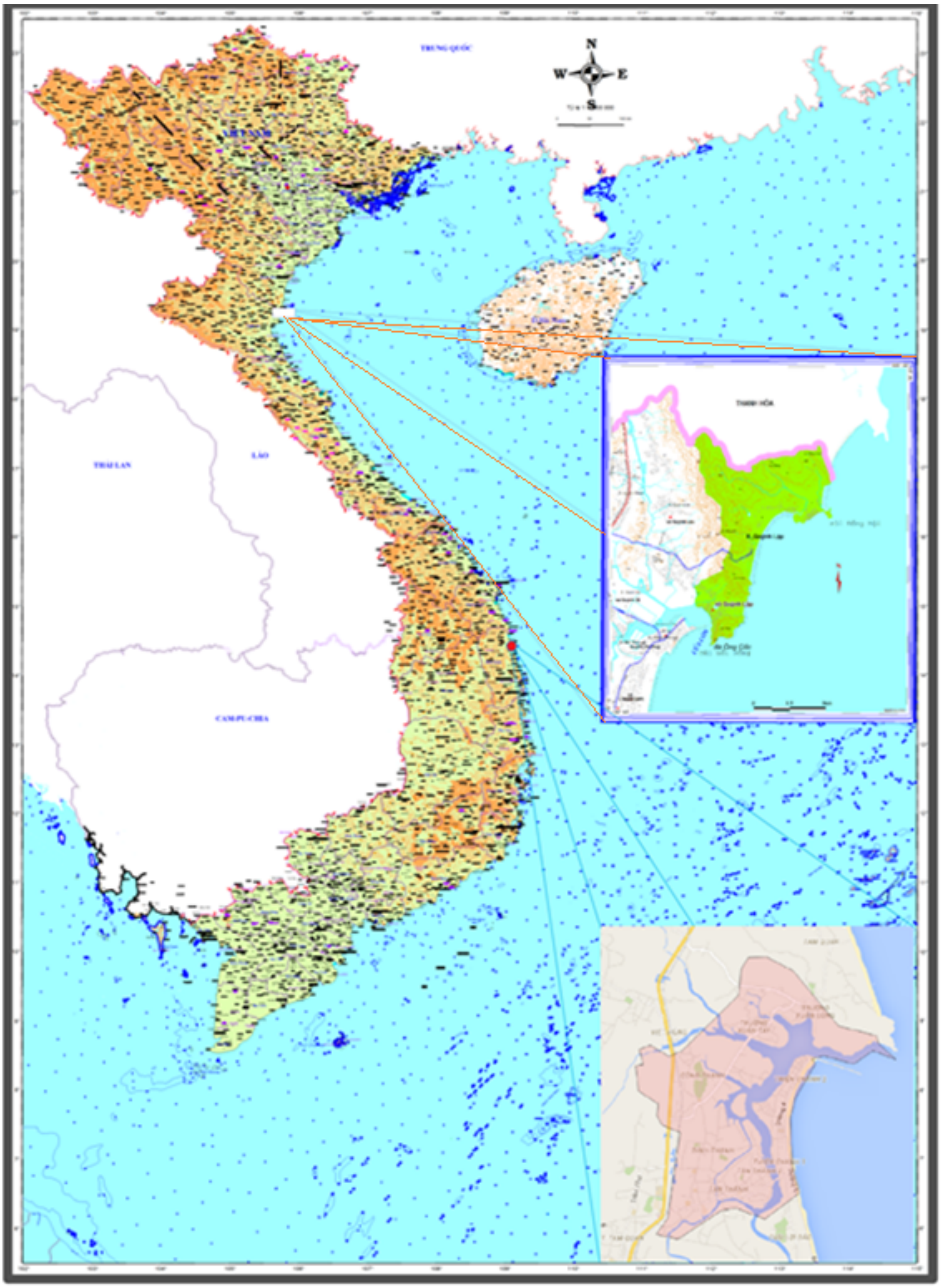

Figure 7.1: Location of Quynh Lap and Tam Quan Bac communes

According to the 2014 yearbook (Hoang Mai Sub-GSO, 2014), the income per capita reached 1.658 million VND (approx. 80 USD) per month. There were 2,377 households with a total of 10,667 people living in Quynh Lap. Among them, there were 826 households living on the capture fisheries, 702 households doing other fisheries service (middlemen/middlewomen, seafood processing, net weaving and mending), and the rest living on other industries and services such as forestry, agriculture, livestock, aquaculture, etc. There were 225 vessels registered in Quynh Lap, and the total landings of the commune fisheries was 20,500 tons in 2014.

7.2.1.2 The trawl fishery profile

Fisheries resources

The coastal water of Quynh Lap commune is defined in an area of approx. 115 square kilometers, along the coast of 12 km and the width of 18 km from the shore. Quynh Lap waters located in the coastal waters of Nghe An province where were composed of 121 species including 20 species of pelagic fish and 101 species of demersal fish, crustacean and mollusks (Vinh University, 2014). It is also located in the shrimp ground of Lach Bang – Lach Quen with the standing biomass estimation of nearly 300 tons[26] with 20 species of high valued shrimp such as prawns, lobsters, yellow shrimp, iron shrimp, giant tiger shrimp, etc. (Vinh, 2006). In addition, there are coral reefs distributed along the coast. These provide good habitat for many of valuable species (e.g. groupers, snappers, threadfin breams, shrimps, snails, squids, etc.). There are also pelagic fish migrating through Quynh Lap waters between January and April.

The fishing community

In 2014, there were 140/225 small-scale fishing vessels (62.2% of total vessels) powered engine of less than 50HP. They employ trawl fishery targeting demersal fish and shrimps as the main fishery and also use concurrently other gears such as gill nets, traps, beach seine nets, push nets in other seasons depending on the targeting species appeared in their fishing grounds. These vessels provide employment for 422 people and livelihoods for 678 people in 136 households in three villages of Tan Minh, Dong Minh, Dong Thanh of the commune. Of these, there were 19 households living solely on fishing. The rest of

[26] This figure was estimated by empirical formulas using the bottom trawling method (chapter 6). This was made in a contract between RIMF and Nghe An province to provide knowledge base for planning fisheries in Nghe An waters.

households (i.e. 117 households), in addition to receiving their main income from fishing, also got income from agriculture. The average household income of a household was 1,100 USD per year (Hoang Mai Sub-GSO, 2014). As investigation in 2014, the investment capital for each vessel was about 1,000-4,000 USD and total variable cost for each trip of 1-2 days was 50-100 USD. The average turnover of a vessel was around 80 USD per day and the average salary of a crew member was around 10 USD per day. The catches were landed in local landing sites and mainly sold at local markets as daily food. A part of landings was also processed into various products such as dried fish, boiled fish, grilled, fish sauce, etc. These productions may be sold in neighbouring communes, districts, provinces, even exported to Laos, Thailand, and China.

Fisheries management arrangements

Legally, the small-scale trawl fishery of Quynh Lap commune is managed by the fisheries planning documents and fisheries regulations issued by the government. The fishing behaviours are also impacted by the informal norms identified traditionally by the local fishing communities. The fisheries development orientations of the commune are established in the annual and the five-year plans based on the development orientations adopted by the higher fisheries authorities (i.e. the district and provincial levels). The core elements of these plans are the estimations of the TC and number of fishing vessels for the coming year based on their growth rates of the TL of previous years.

In terms of administration, the Communal People Committee (CPC) is not authorized to implement fisheries management within the communal territories. It is just suggested to support and facilitate the higher fisheries authorities to execute fisheries management in its territories. One staff who is the chairman of the Communal Farmer Union was appointed to take care the fisheries management in the commune. The main task of him was to collect information and produce reports on total landings, number of vessels, number of fishers, conflicts among fishers, etc. He also executed some other services and contracts such as registration and licensing for local vessels, collecting data for statistics, insurance, facilitators for implementing fisheries projects in the commune. He was also the head of the fishery co-management board supported by external sponsors (e.g. DANIDA, World Bank). A fishery co-management structure joined by the head of villages and local fishers since

2008 was established in 2008 and funded by a DANIDA project to improve effectiveness of the fisheries management in the commune in terms of enforcing fisheries regulations and eliminating destructive fishing methods in the communal waters.

The co-management structure was established jointly with three fishing villages of the commune. A core group composed of 31 members (7 staff of communal government; 03 head of 03 villages; and 21 fishers of 03 villages) was established to execute action plan. The project funded for core group to help local fishers to change into marine aquaculture on one hand, and to protect fisheries resources on the other. Two fishing households were equipped with the cases for farming cobia and groupers in 2009. These farms disappeared in 2013 due to economic losses. Their products were sold with so low price that their revenue was below the farming costs as these farmers told in 2014. In addition, the natural conditions of the local waters were not suited for marine culture due to pollution by fishing activities and very rough in the southeast monsoon as told by three informants in Quynh Lap in 2014.

For protecting fisheries resources in the local waters, project funded for campaign programs of protecting fisheries resources (e.g. promulgation of fisheries regulations, propagation of harmful effects of destructive fishing practices; etc.) at the local communities. The core group was also equipped with a canoe to patrol the local waters to prevent destructive fishing practice over the communal waters. This group no longer worked in 2011 when project ended funding. In 2013, this group was re-established within a project funded by World Bank. As the chairman related, the co-management model was designed nearly the same with the one designed by DANIDA project. He guessed this model would achieve limitation results as the model implemented by DANIDA project. He explained that this limitation was due to the low legitimacy of the co-management structure and a lack of necessary means of operation. It faced many difficulties once external funding ended.

7.2.2 THE TUNA LINE FISHERY IN TAM QUAN BAC

The tuna line fishery was imported into Binh Dinh at beginning of 2000s behind in Phu Yen and Khanh Hoa. But it has developed dramatically in recent years and become the most important fishery of the province and the largest fishery in the region.

7.2.2.1 General information of Tam Quan Bac commune

Tam Quan Bac is a coastal commune of Hoai Nhon district, Binh Dinh province with the coastline of about 3.0 km. Its area is around 100 hectares and situated at 60 km from the provincial centre. It is bordered by Quang Ngai province and Hoai Chau commune in the north, by the Tam Quan Nam commune in the south, by the 1A national highway in the west, and by the East Sea in the east (see figure 7.1).

According to the 2014 yearbook (Hoai Nhon Sub-GSO, 2014), there were 4,360 households with a total of 18,500 people, nearly 60% of them live dependently on marine fishing in Tam Quan Bac commune. The fisheries of Tam Quan Bac were composed of 896 vessels and of 9,500 professional fishers in 2014. The total landings in 2014 was 9,950 tons equivalent of 34.7 million USD. There were 22 bases of trading and processing fisheries products such as tuna, dried squids, fish sauce; 27 bases of producing ice for fishing industry, 7 shipyards and other bases of providing nets, fishing materials, fuels, and other services for fishing.

7.2.2.2 The tuna line fishery profile

The tuna resources

The main targets of the tuna liners in Tam Quan Bac are oceanic tunas (i.e. big-eye tuna and yellow-fin tuna) distributed in the Oceanic region (see figure 4.2). According to local fishers' experience, oceanic tunas appear in the Vietnamese waters from October to May. They are schooled and move from the north to the southward during the time they appear in Vietnamese waters. The exploitable potential yield of the oceanic tunas in this region was estimated (2002-2004) to about 17,000 tons (Son, 2005). Marlin, shark, sword, and mackerel are also caught by the tuna long-liners of Tam Quan Bac.

The fishing community

By 2014, there were 584 tuna liners accounting for over 65% of total fishing vessels registered in Tam Quan Bac. These vessels were powered engine with capacity of 150-750 HP per vessel. They equipped the long-line to catch the oceanic tunas as the main fishing gear. Each vessel may carry out 5-7 fishing trips with long-line or hand-line for catching the tuna from the October of the previous year to the May of the next year. The rest time, many fishers change gears and migrate fishing grounds to catch other species by seasonally. For instance, some fishers employed hand-line for catching the squids in south regions; others used gillnet catching the flying fish; others used hand-line for catching the oceanic tunas dependently on their own experience. In recent years, fishers tended using the hand-line for catching tuna rather than the long-line to increase fishing effort and catch rate of the vessels. However, the quality and price of tuna caught by the hand-liners were lower than those of the long-liners. Therefore, a part (25% of vessel's owners interviewed) of tuna long-liners were still reluctant to change to the hand-line fishery for catching tuna to remain the high-ranking products in the high-end markets of tuna such as fresh tuna for sashimi in Japan.

The tuna fishery of the commune provided employment for about 4,700 professional fishers and more 10,000 of labours working in fishing service bases such as processing, trading, making ice, repairing the gear and vessels. Most vessel owners only live on the fishing, and some of them have additional incomes from providing services for fishing vessels such as selling fishing equipment, trading fishing products, etc. A part of the crew members working on vessels come from inland communes whose family have other livelihoods such as agriculture, livestock, construction, etc.

As investigation on the tuna line fishery in 2014, the investment capital for each vessel varied by the size of vessels and capacity of engine ranging from 35,000-350,000 USD per vessel. A fishing trip lasted from 20-30 days. The total variable cost for each trip was from 5,000-7,000 USD. The average landing of a vessel was from 2-3 tons per trip with the turnover was from 1,000-1,200 USD per trip and the average salary of a crew member was around 200 USD per month. For months of operating the squid hand-line fishery or gill net for flying fish, the income of fishers was less than the tuna fishery as told by fishers interviewed. The total landings of tuna of the commune in 2014 was estimated over 5,850 tons.

Caught tuna are often preserved with ice on board. They are often landed at the home ports and sold to companies for fresh tuna, and processing as canned and frozen tuna and other products. Just around 10% of tuna met the fresh standard for sashimi, sushi of the Japanese market as told by a tuna exporter in 2014. Majority of tuna products were exported to international markets such as USA, EU, Japan, etc. Unlike tuna products, other productions of this fleets were processed by the traditional ways and consumed in domestic markets or exported to international markets such as China, Laos, Thailand, Cambodia, etc. For instance, squids were often dried by the sun on board, and landed, sold in southern provinces such as: Ba Ria – Vung Tau, Tien Giang, Ca Mau, etc.; flying fish and other fish were preserved with ice for consumers in local markets.

Fisheries management arrangements

Although the tuna line fishery in Tam Quan Bac is larger compared to the trawl fishery in Quynh Lap, it is also managed under the same regime as the trawl fishery in Quynh Lap. Traditionally, fishers are grouped into fishing groups or fishing guilds. They share and exchange information and experience on fishing operations. They also collaborate during fishing at sea in terms of security, catch transshipment, exchange information on the fishing grounds, fish price, etc. to improve their fishing effectiveness and secure safety at seas. They respect and behave according to the informal norms and rules identified traditionally by their own local communities.

7.3 IMPLEMENTATION OF FISHERIES MANAGEMENT AT LOCAL LEVELS

The fisheries law (National Assembly, 2003) recognizes that the Vietnamese fisheries are regulated by limiting the TC, number of vessels, and technical measures to protect fisheries resources. Therefore, the TC and number of fishing vessels are defined annually in the fisheries planning system in the fisheries administration system; and the technical measures are formulated in the legislation system such as law, decrees, circular management decisions of the government at national and provincial levels. At the same time, the local fishers in the fishing communities are organized traditionally into fishing groups or fishing guilds. In such organizations, local fishers commit themselves to following the informal rules accepted commonly and traditionally as the ethnic norms. The contents of rules and norms may vary by local communities, fishing patterns, fishing customs, fisheries and vessel scales. Therefore, the fishing behaviour of fishers is often influenced by both the formal regulations of the management authorities and the informal rules of the fishing communities. This chapter explores how the fishing practices are managed at local levels through looking at the management of the trawl fishery in Quynh Lap commune and the tuna line fishery in Tam Quan Bac commune.

The fisheries law (National Assembly, 2003) requires fisheries management authorities, based on the available knowledge, to define the level of TC and number of vessels allowed to fish in specific areas to ensure fish stocks are not overfished. According to decree No. 33/2010/ND-CP (Government of Vietnam, 2010), the provincial government (PPC) is empowered to manage the fisheries within the coastal waters including the inshore and coastal routes (see figure 4.1). They are allowed to empower their lower government levels (i.e. district, communal levels) to manage fisheries in particular waters. But, the coastal waters were just demarcated by provincial level, and demarcation of the seas among districts and communes were not conducted as discussion in the meeting of fisheries held in Binh Dinh October 2015. This means that the district and communal governments are not empowered to manage the fisheries in concrete waters, instead they are invited to manage fisheries in term of monitoring and enforcement of fisheries management and development decisions of the higher fisheries authorities.

7.3.1 IMPLEMENTATION OF MANAGING THE TC

As investigation in two communal fisheries in 2014, the TC was planned in the bottom-up mechanism in the annual plans of the local fisheries management plans. This means that the annual TC at the communal level was defined first, then the district level was summed up by the communal TC under of the district, and the provincial level was summed by district TC of the province. However, the growth rate of TC was decided in the top-down mechanism. Fisheries staffs interviewed in Binh Dinh and Nghe An explained that based on fishing fleets and development of the national level (e.g. fisheries master plan, management directives), the provincial authorities suggested the growth rate of TC for specific district fisheries. For instance, the TL by 2010 of Tam Quan Bac was 9,320 tons, and it was planned at 9,700 ton by 2011 with the growth rate of approx. 4% per year given by higher authorities as told by the fisheries staff in Tam Quan Bac commune (CPC of Tam Quan Bac, 2011). This was also implemented in Quynh Lap fisheries, its TL by 2010 was 19,140 tons, and was planned at 19,720 ton by 2011 with the growth rate of approx. 3% per year given by higher authorities as told by the fisheries staff in Quynh Lap commune

(CPC of Quynh Lap, 2011). This procedure of planning the annual TC at the communal level was the conventional approach in Tam Quan Bac and Quynh Lap communes as told by their fisheries staffs in 2014. Based on this, the TC at the higher levels (i.e. district and provincial levels) were defined in their annual plans.

Aside to the annual TL, the TC for the next year was also defined in the annual fisheries plans by administration territories (i.e. communal, district, provincial levels), but not planned by fishing grounds or specific waters. It was also not divided and allocated to the higher levels as the mandatory targets in the centrally planned system or as catch quotas in the TAC-based management regime in other developed fisheries. At the lowest level (i.e. communal level), the TC was planned for the fisheries of the commune in the planning system of the government. It was not divided into catch quotas and allocated to concrete vessels or fishing guilds. The volume of catches of vessels was not limited by the fisheries planning plans or management regulations of the government in practice. The local fishers are allowed to catch as much as possible provided that they comply with technical measures adopted by the fisheries authorities as told by all fisheries managers interviewed. When ending a year, the TC planned in the previous year was evaluated by comparing the difference between the TL estimation by the GSO and TC planned by the fisheries management system. Clearly, the TC-based management regime was just operated in the planning system of government, it was not enforced in reality at the local fishing communities in Vietnam. In other words, the fishing level (i.e. total catches) objective of the fisheries plans was not controlled in practice. The volume of catches of fishers or vessels was not controlled and enumerated by the fisheries authorities in reality of Vietnam.

According to fisheries regulations (MARD, 2013), fishers are required to submit logbook/fishing report to the fisheries authorities, so that local fisheries managers can estimate the TL within their administration territories. However, no fishers in these communal fisheries complied with this regulation. Fishers in Quynh Lap argued that they did not receive any requirements and guidance about writing and submitting fishing logbook and reports from the government. For tuna line fishers in Tam Quan Bac, they were not required to submit the fishing logbook to the fisheries authorities, but they were encouraged to contract with research programs[27] to provide their fishing logbook as told by tuna fishers in Tam Quan Bac. Furthermore, local fishers are not required to land their catches at any particular ports. They are allowed to land and sell their catches anywhere, and no agents enumerated their volume of catches as investigation in 2014. This means that the TL of fisheries at the communal levels was also not monitored in practice.

7.3.2 CONTROL OF FISHING EFFORT

Similar to the TC management, the number of fishing vessels is required to define congruently with the size of fish stocks in the fisheries annual plans (National Assembly, 2003). However, the number of vessels was planned differently from the TC. The higher authorities did not influence on planning the number of vessels in detail (i.e. giving the growth rate) at the communal levels, but gave the general development trend (e.g. increase or decrease of specific fleets) as argued by the fisheries staffs in Quynh Lap and Tam Quan Bac communes. For instance, there was 688 vessels in Tam Quan Bac in 2010, and the plan by 2011 was to increase 8-10 offshore vessels as well as advise and warn fishers not to build more fishing vessels (CPC of Tam Quan Bac, 2011). Unlike to Tam Quan Bac, Quynh Lap had 274 vessels in 2010 and the plan by 2011 was to remain this number and advise fishers not to build or purchase more vessels to protect fisheries resources in the local waters[28] (CPC of Quynh Lap, 2011). However, they did not provide a detail and concrete plan for controlling the number of fishing vessels within their fishing communities. As a result, their fishing vessels increased gradually as argued by the fisheries staffs in these communes. The number of fishing vessels of Tam Quan Bac and Quynh Lap was 705 vessels and 293 vessels respectively in 2012 (CPC of Quynh Lap, 2013; CPC of Tam Quan Bac, 2013).

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[27] The tuna fishers in Tam Quan Bac and other communities contracted with research programs to collect fisheries data (e.g. fishing logbook, accepted for fisheries observers, providing environmental data). They may be paid for this work.

[28] Quynh Lap commune was empowered to surveil fishing activities in the local waters by the PPC at the decision No. 63/2010/QD-UBND of the chairman of the Provincial People Committee in 2010

According to decree No. 66/2005/ND-CP (Government of Vietnam, 2005), building and modifying fishing vessels are the mandate of the provincial fisheries authority Department of Fisheries (DARD). Any fisher must get permission from DARD before building up a new vessel or modifying an old vessel. This means that communal government is not authorized to control the number of fishing vessels in its territories, albeit it plans the number of vessels in its fisheries plan. Getting a permission for building or modifying fishing vessels from DARD is easy. The fisheries staff in Tam Quan Bac told that all applications for building or modifying the tuna liners vessels were approved by DARD. He explained that this is because the tuna liners are considered as offshore vessels which are encouraged to develop. At the same time, the fisheries staff in Quynh Lap argued that all applications for building new trawlers of less than 90 HP in engine capacity were rejected since 2006 when MOFI issued the circular No.02/2006/TT-BTS (MOFI, 2006b). However, the number of trawlers in the commune increased gradually from 87 vessels in 2006 to 140 vessels in 2014. This is, according to the local informants, because of two main reasons: i) fishers applied for other fisheries such as gill net, lift net, falling net; then they use trawl net concurrently, ii) a number of the trawlers installing engine capacity of less than 90 HP were built without permission. Consequently, the trawlers had increased gradually in Quynh Lap in practice. Clearly, the number of fishing vessels is also not under control of the fisheries planning system of government.

7.3.3 IMPLEMENTATION OF THE TECHNICAL MEASURES

The circular No.02/2006/TT-BTS (MOFI, 2006b) and decree No. 33/2010/ND-CP (Government of Vietnam, 2010) recognizes technical measures (e.g. mesh size, zoning, closed areas and time, species and size of fish to be allowed to catch, destructive gears and fishing methods banned to use) to protect fisheries resources. They assign provincial fisheries authorities (i.e. fisheries inspection department, sub-department of capture fisheries and aquatic resources protection) to enforce these regulations in the waters they are empowered to manage. This means that the communal government is not authorized to enforce the technical measures within their fishing communities. They are just required to collaborate with the competent authorities of the provincial government to propagandize regulations, to patrol at seas and inspect violations of the fisheries regulations within their territories.

Investigation in Quynh Lap in 2014 show that 100% trawlers used the mesh size at the cod end of 10-15mm less than the fine one (20mm); 40% of them used electric fishing method; and all of them operated year around, albeit their fishing grounds are closed from the first of March to thirty of April. The volume of undersized fish took a considerable proportion, for instance, 60% of squids caught (from 12-17cm in length) was undersized (20cm in length as regulated in circular No. 02/2006/TT-BTS). Moreover, the local informants argued that violations of technical measures such as dynamite and electric fishing, and fishing at wrong zones were commonly observed in the local fishing communities. The offshore vessels fishing in the coastal zone were commonly seen as told by the local fishers. For tuna liners in Tam Quan Bac, fishers are not required to comply with any technical measures to protect the oceanic tunas. They just caught the undersized squids with the length of <20cm when they used the hand line alternatively. However, this volume was very small, just <1% of the total landings as told local fishers.

In terms of the traditional communities, the informal rules are recognized and enforced by the fishing communities such as: access right to fishing spots, ethical and religious values. As investigation in two communal fisheries, fishers in both communes agreed that the fishing spots belong to the fisher coming first and the fishers coming later are not allowed to set their gears in the front of the coming first fishers' gears. The coming later fishers also have to set their gears far enough to the gear of the coming first fishers. For instance, the coming later trawlers are required to set their nets not crossing and greater than >300 meters from the towing direction of the coming first trawlers; the coming later tuna liners should set their gears greater than >30 miles from the coming first ones and not crossing their drifting ways. Both small-scale and larger-scale fishers were committed and willing to follow these rules as a religious and ethical values as told by local informants and local fishers. In addition, the local fishers recognized that employing destructive fishing gears and methods (e.g. harvesting juvenile fish, catching whale, fishing with electricity and explosives) is unrighteous and unethical. All fishing villages in two communes having their own temples to worship the Whale God called as *'Ong Nam Hai'*. All the local informants interviewed told that local fishers bring sacrifices to the Whale God temples to show their loyalty and honesty once or twice in a year. They supplemented that in front of the God, the local fishers pray and aspire to safety at seas and getting more catches. The local fishers also swear that they would not do unrighteous and unethical things to the marine creatures and fisheries resources as told by the local informants.

The six informants and all fishers asked in Quynh Lap and Tam Quan Bac communes acknowledged that the informal rules and traditional norms used to be strongly influential on the fishers' behavior, even more than the formal regulations enacted by the fisheries authorities. They explained that these traditionally informal rules and norms are complied with among fishing communities because they were made up from traditional experience of many generations. These rules provide realistic bases and ethical principles to address disputes and conflicts among fishers in their communities. However, these rules and norms have been undermined; even some of informal rules were no longer in effect such as definition of fishing territories among communities, allocation of fishing rights and fishing spots, taxation of volume of catches etc. as illustrated by scholars (Nguyen & Ruddle, 2010). The six local informants and fishers argued that this is due to introduction of the market-oriented based economy and privatization of the fisheries in Vietnam. In addition, the government policies for encouraging the offshore fishing also erode the traditional rules. In this process, fishers have invested more in their business and ignored informal rules to maximize their share of catches as observe by three informants in Quynh Lap. This is a reason for degrading the social and moral sanctions, and as a result, the mechanism for enforcing fisheries regulations and eliminating violations at the local fishing communities has become less effective as argued by three informants in Quynh Lap. Two of three local informants in Tam Quan Bac argued that introduction of informal rules would improve effectiveness and efficiency of fisheries management system.

7.3.4 PREFERENCES AND INTERESTS OF THE LOCAL FISHERS

7.3.4.1 Preference of the local fishers

La argued that most fishing vessel owners are unable or do not want to give up their fishing business in order to change to a new job (La, 2010). He pointed out that all fishers were subsidized to move to other non-fishing jobs returned to the fishing. As investigation in 2014 in Tam Quan Bac and Quynh Lap communes, all fishing vessel owners asked said that they preferred the fishing job to other jobs because it was easy to get on one hand, and provided higher income compared to other available jobs at their local communities (e.g.

construction, fisheries logistics, small retailers, agriculture, etc.). Answering to the question that what will they do if they have more money? 148/154 (96%) vessel owners in Tam Quan Bac wanted to remain and enhance their fishing business because they did not have property and capital on one hand, and they did not have experience as well skills for doing other businesses on the other hand. In Quynh Lap commune, 72/88 (approx. 82%) vessel owners said that they would upgrade their vessels and business to be able to operate at farther waters with longer fishing trips, and the rest answered that they would build more vessels to enlarge their business. For 242 crew members asked in two communes in 2012, 177 crew members (73%) said that they would possess or purchase shares in a vessel to go fishing as the vessel owners. They believed that fishing not only feed their family, but also enrich themselves and make their life wealthier. This type of fishers was born in the fishing families or lived in fishing communities and on fishing from their childhood. They had almost no skills and education for non-fishing jobs. 22% of crew members stated they would start up a non-fishing business such as retailers, farming, motorbike transportation, etc. These fishers originate from non-fishing families and their families had the main income from the non-fishing livelihoods. In general, they intended to enlarge their current business. The rest of crew members (5%) wanted to repair their house and continue with fishing job to feed their family, to give their children to high schools and universities, to go abroad for working. Most of these fishers want to change to the non-fishing livelihoods.

7.3.4.2 Interests of the local fishers

All fishers interviewed in two communes have been striving to enhance and improve fishing business to maximize their benefits. In fact, local fishers allied each other to learn and share experience, provided mutual assistance to upgrade vessels and fishing gears and methods as well as other businesses. They also sought for the subsidy programs of government for fisheries such as credit for building and upgrading vessels, subsidies on fishing costs and installing fishing equipment in order to upgrade and enlarge their business for getting more profits. It was evident that the most important interest of fishers in two communal fisheries under investigation was the maximization of the catches and profits. In order to obtain this, vessel owners were interested in modernizing their business (i.e. vessel, gears, equipment); managing better skippers and crew members; reducing fishing costs; and selling their catches with the highest fish price.

As a traditional pattern in the Vietnamese fishing communities, fishing vessels were maintained, upgraded periodically and left for the next generation as the inheritance. As observation of the Vietnamese fisheries over the last twenty years and as told by six local informants in two communes, the local fishers began their own business with a small-scale vessel or shared with others. They then would enlarge their business gradually by upgrading their vessel or getting more shares of a vessel. These fishers' families live dependently on the fishing and are referred to as fishers of *"fishing to live"*. They have intended to invest more in fishing to get better business, so they possess the large-scale vessels that can make longer fishing trips in the offshore waters. They possess around 32,000 offshore vessels accounting for approx. 29% of total fishing vessel owners of Vietnam.

Another type of fisher is dominating in the fishing communities of Vietnam: small-scale fishers. They have got involved in fishing industry for a long time ago and worked as vessel owners, skippers, and also crew members. These fishers possess a small-scale vessel or share a vessel with others operating in the coastal waters with short fishing trips <10 days at sea. Most (82%) of them intended to expand their business to be fishers of the *"fishing to live"*. The others, whose family has incomes from non-fishing business, just remain the small-scale vessels to get supplementary incomes for covering their family's daily costs and preparing the non-fishing livelihoods for their children. They have an overarching objective to get out of the small-scale fisheries to be the large-scale fishers or to be no longer a professional fisher. I name them as the fishers of *"fishing for changing life".* This type of fishers accounted for about 68% of total fishing vessel owners of Vietnam.

The other type of fisher has just appeared since the government launched its subsidy programs for developing the offshore fishing. They do not have much experience in the fishing business, but they entered the fishing industry to achieve subsidies from the government and do business with fishing. These fishers just invested their business (i.e. vessel, gear, fishing equipment) as the template terms approved by the local government (i.e. Provincial People Committee), but did not intend to enlarge their business as the professional fishers of the *"fishing to live"*. I name them as the fishers of *"fishing of opportunists"*. This type of fisher accounts for a very small proportion in the Vietnamese fishing communities.

Although all Vietnamese fishers share the same interest of maximizing their benefits, but they pursuit different tactics and strategies for their business. Based on actual conditions of weather, finance, experience, markets, fish stocks, etc., individual fishers may behave differently from each other in the long-term as well as in the short-term decisions. For instance, fishers of "*fishing to live*" may invest in cooling system to reduce loss of post-harvest for long fishing trips, meanwhile the others may not because their catches are fine by preserving with ice in short fishing trips. Similarly, the fishers of "*fishing to live*" would not go fishing if the weather would be bad, but fishers of *"fishing for changing life"* and *"fishing of opportunists"* would go because they often operate in coastal fishing grounds, then they come back their homeport easily. The fishers of *"fishing of opportunists"* would not go fishing because of lacking crew members, but the others do not get that trouble because they often provide stable salary and working conditions for crew members.

7.4 FACTORS INFLUENCING FISHING DECISIONS OF THE LOCAL FISHERS

As analysis in chapter 3, the fishing behaviours of the local fishers are presented into the strategic decisions and tactical decisions. In general, the strategic decisions are usually made by the vessel owners related to long-term investments in building and repairing vessels, installing electronic and mechanical equipment, and fish preservation systems. The tactical decisions are often made in short-term by skippers to define fishing positions, fishing time, gears used, number of days at sea, etc. to maximize their catches.

7.4.1 STRATEGIC DECISIONS

A fishing vessel is means providing livelihoods for fishers and their family. It is often used over several generations. As an obligation, previous generations preserve and upgrade their fishing business for the next generations as told by six local informants in Quynh Lap and Tam Quan Bac communes. Vessel owners may replace bigger engine, install more fishing and preservation equipment, or build new vessels to improve fishing effectiveness and maximize their profits. Often, they will leave their business for their children when they get old and cannot manage their business. They only stop fishing and sell their vessels if they and their children would not manage their fishing business effectively in cases of lacking people managing daily fishing business, impossibility to upgrade or repair vessel and fishing equipment.

This research found seven factors influencing and driving the local fishers' strategic decisions including i) fisheries management regulations; ii) subsidy policies; iii) the financial status of family; iv) management capacity; v) the livelihood opportunity of the coming generation; vi) labour availability; and vii) individual experience. The influence degree of these factors varies by the types of fishers and the practical situations.

7.4.1.1 Type 1: fishers of *"fishing to live"*

Most (145/148) of these fishers were born in a professional fishing household and have been familiar with fishing business since their childhoods as investigation in Tam Quan Bac tuna line fishery in 2014. Their family life depends totally on the fishing. They got a low education and often stopped going to school and entering the fishing business at age of 15-18 years old. They started their fishing job by working as crew members in their vessels and gradually accumulated experience in managing fishing business and skills for operating fishing vessel as a skipper under supervision of their farther or brother. They would become a skipper when their family having a new fishing vessel or their farther, brother no longer working onboard.

These fishers worked for the objective to make money to feed and enrich their family, and facilitate their children's life. They possess larger scale vessels called as the offshore vessels operating widely in the offshore waters far from the homeports. They were willing to make long fishing trips to harvest as many catches as possible. They spent over 200 days for fishing at seas in a year, more than the other fishers. They were often gathered into groups of skippers and vessel owners to share information about fishing business such as fishing grounds, security at seas, weather, post-harvest technologies, installing and operating electronic and mechanical equipment, fish price and landing sites, etc.

This type of fisher was often imitated by and competed with other fishers to get higher profitability. They are innovative, learning and developing new fishing technologies, methods of catch handling and preservation systems to reduce loss of post-harvest and to improve economic efficiency. They often moved in a huge range of fishing grounds and change fishing gears and methods accordingly to characteristics of the target species (e.g. long line, hand line for catching tuna, gill net for flying fish, etc.). Their fishing grounds are the offshore waters; thus, these fishers have been encouraged and subsidized for stronger development to contribute to the growth rate of the sector as well as protection of the national sovereign at seas. In addition, the offshore fishing activities in general and tuna line fishery in particular, are not restricted much by fisheries regulations. This means that the tuna line fishery in Vietnam is regulated neither by limitation of catches nor in number of vessels, it just is not allowed to catch dolphins and the narrow-barred Spanish mackerel of <730cm in length as regulated by circular No.62/2008/TT-BNNPTNT. Therefore, this type of fisher would be a big threat to the oceanic tuna stocks and marine ecosystem in the offshore waters of Vietnam. All fishers interviewed told that they have intended to make more investments to increase fishing capacity (i.e. catch rate, catches) and reduce the post-harvest losses. Of these, 27/148 (18%) of fishers would enlarge their business with building more modern and bigger vessels. They believed that the available fisheries resources are still abundant to ensure the viability of their fishing business. The other 121/148 (82%) fishers want to upgrade their fishing business. Among them, 44/121 (36%) of fishers intended to replace with a bigger engine, 58/121 (48%) of them intended to improve the fish preservation and handling systems, and 19/121 (16%) of them intended to replace the current vessel by a bigger and more modern vessel respectively.

The investigation shows that most 78/148 (53%) fishers argued that the subsidy programs were an important factor stimulating them investing on building more new vessels, upgrading the existing vessels, replacing bigger engine, replacing fishing gears, improving fish preservation onboard. In fact, the subsidy programs of the government provided credit for building and upgrading vessels resulting in a dramatic increase in fishing effort in the last five years, especially in the offshore waters (from 23,445 vessels in 2011 to 35,009 vessels in 2016) on one hand. These programs also provided subsidies for fishing costs for fishers remaining fishing activities at seas, especially at the overlap and disputed waters between Vietnam and other neighbouring countries on the other hand. This was evaluated as the most important successfulness of the Vietnamese fisheries policies; the subsidy programs were the trigger for increasing in fishing capacity as evaluated by Directorate of Fisheries *"…in the last five years, government just provided around 123 million USD subsidizing for vessels, then fishers were stimulated to invest themselves much bigger (about 2,045 million USD) into building new vessels and upgrading fishing vessels and handling technologies…"* (D-Fish, 2016a p.4). However, 63.7% fishers interviewed in Tam

Quan Bac argued that the offshore fishing fleets were overcapitalized due to subsidy programs of the government. They believed that the existing fishing effort was over the size and productivity of the tuna stocks and 22.4% of them claimed that their economic performance was so low that they would cease their fishing business if government stopped subsidies on fishing costs. By that time, 100% fishers and three local informants interviewed in Quynh Lap argued that the subsidy programs are necessary for developing the offshore fisheries, but many of vessel owners were selected wrongly with less experience and fishing skills in offshore waters. This was the main reason for the low efficiency of the offshore vessels as well as common operation of the offshore vessels in the coastal waters as explained by fishers in Quynh Lap.

The investigation also shows that 32.2% of fishers considered their financial status as the first priority factor influencing on their investment decisions. Over than 9% of them took their coming generation's livelihood as the first priority factor; 5.0% of them evaluated the management capacity is the most priority factor; and only 0.8% of them considered the fisheries resource (i.e. individual experience) as the most important factor influencing on their investment decisions. Meanwhile, most fishers (96.3%) did not care or considered the fisheries management regulations as the less important factor. Only 11/148 fishers asked mentioned about regulations on the mesh size to be used having influence on their decision in buying the nets. These fishers told that they just asked the retailer that whether the nets were compatible with the regulations or not, but they bought because many neighbours also these nets for fishing in practice.

In terms of fisheries management, there have been contradictory policies for developing the fisheries in Vietnam as analyzed in chapter 5. Both the 2010 fisheries master plan and the 2020 fisheries master plan intend to reduce fishing vessels, meanwhile subsidy programs encourage fishers to build more bigger vessels and enhance fishing capacity have been also implemented in last twenty years. In fact, measures and plans to reduce fishing vessels were not made and enforced in practice because of lacking resources on one hand, and also due to a lack of support by the existing management system as thought by a former deputy director of D-Fish. He explained that fisheries managers have no valid and credible evidence for making a convincingly informed plan to reduce fishing vessels (i.e. how many vessels, what gears, how to address livelihoods for fishers, etc.). By contrast, he argued that proposals and implementation of subsidy programs for fishing vessels were widely supported by policy-makers and politicians in both national and provincial levels. According to him, the subsidy programs bought happiness and benefits for all concerned parties. For instance, bureaucrats (i.e. politicians and managers) would be evaluated as facilitators of developing fisheries and of improving fishing communities; fishers would have more resources to enlarge and enhance fishing capacity. However, the disadvantages of these programs were commonly ignored or not documented convincingly. For instance, depletion of fisheries resources, decrease in catch rates and economic viability of fishing fleets, invasion of offshore vessels in the coastal waters, etc. were demonstrated in the Vietnamese fisheries as analyzed in chapter 4 and chapter 5. This would have negative implications of the fisheries resources and of the following generations of fishers on one hand (FAO, 1995), and also waste financial and social resources of the existing generation.

7.4.1.2 Type 2: fishers of *"fishing of opportunists"*

This type of fisher has appeared since the end 1990s when the government's subsidy programs were launched to encourage the off-shore fishing development. From observations in Vietnamese fisheries over the last twenty years, these fishers were not professional fishers and did not originate in fishing households, but they are inhabited or relatively connected with the fishing communities. They were retailers, retired officials, fisheries traders or non-professional fishers before becoming fishers, but they had good relationship with the governmental agencies or familiar with the procedures for accessing to the governmental policies. They also had higher graduation rates than the professional fishers. This may make them easier to get the loan credit from government's subsidy programs to build a new vessel as argued by six local informants in two communes.

The government subsidy programs provided the opportunity for these people to become fishers. They entered into the fishing because they were attracted by the credit with low interest and other favours from the government's subsidy programs as told by 10/14 local fisheries managers. As told by two tuna line fishers in Tam Quan Bac and three fishers in Khanh Hoa and one fisher in Thanh Hoa 2014, they believed that they would get higher benefits from fishing business the local fishers got because they would manage fishing business better than the lower education fishers. In addition, the subsidy programs also offered favourable conditions to get credit from the bank. Off these, fishers were not required to provide a deposit, and were allowed to use the vessel built collateral for the mortgage at the bank. This was understood commonly that fishers would operate a new vessel to get profits from fishing, and they would return the vessel to the bank if they failed to earn profits and wanted to leave fishing industry. In fact, these fishers did not take care their vessels and fishing business in comparison to the other types of fisher. This was a reason for the failure of the offshore fishing program by the decision No. 393/TTg in 1997-2001 as argued by a former director of Planning Department of MOFI.

Unlike to professional fishers, the fishers of *"fishing of opportunists"* did not possess much knowledge or skills about fishing vessels, gear system, and fishing technologies onboard. Therefore, they intended to minimize their investments and costs on their fishing business. Consequently, their fishing business (i.e. vessel, fishing equipment and gear systems) were invested as the template designed by the government agencies within the protocol of the subsidy programs. This template was not qualified for effectiveness and safety of fishing at seas in practice as argued by three skippers, used to work on these vessels, interviewed in Khanh Hoa in 2014. According to these skippers, this type of fishers also often ignored the skipper's proposals on installing the new fishing technologies and equipment; on repairing and maintaining vessel, engine, gears, equipment; and improving the working conditions onboard. They intended to use concurrently the other gears with the main gears to maximize productivity of crew members hired onboard. For instance, crew members were required to use hand line on the long liners for catching tuna in the spare time as told by two crew members interviewed in Tam Quan Bac in 2014.

In addition, in order to minimize costs, these fishers often required the hired skipper and crew members taking care carefully their vessel and fishing equipment, but with lower bonus than that of the type 1 of fishers. This lead to failure of this type of fisher in Vietnam. In fact, 4/6 fishers went bankrupt and returned the vessels to the bank due to economic losses; and 2/6 fishers still operated their fishing business because they had to change to better relationships and behaviours with the skipper and crew members hired. These two fishers had closely connected with skippers to manage their fishing business. They were willing to invest to upgrade their vessels, fishing equipment, gears and handling system as suggested by skippers to improve their catch rates and reduce the post-harvest losses as observed in Tam Quan Bac in 2014. These fishers would become the professional fishers of *"fishing to live"*. However, they did not want to invest in building more vessels, just try to operate the existing vessel effectively by upgrading fishing gears and handling systems, equipment. These two fishers took their financial status as the most important factor influencing on their investment decisions. They argued that the government's subsidy programs are very important to them, but they would not be allowed to get more because they got already and remained in debt to the bank. The second important factor influencing their strategic decisions were their own experience and consultation with their skipper. They observed their neighbouring fishers' business (e.g. preservation system, fishing gears and handling systems), then they consulted with their skipper to invest. The third one was the labour available. These fishers argued that the crew members for tuna line fishery were scarce in Binh Dinh, so contracting with skilled crew members is hard for the tuna liner owners in general, but is harder for them because they did not have close relationships with the local fishing communities as the fishers of type 1 – *"fishing to live"* as explained by these two fishers. These other factors did not influence on their strategic fishing decisions in practice.

In term of fisheries management, the number of the fishers of *"fishing of opportunists"* was very small compared to the other type of fishers in Vietnam. They just existed along with the government's subsidy programs on fisheries, and may move to the community of the professional fishers as the type 1 of "*fishing to live*". The added fishing pressure from these fishers were not much, unless these fishers become the type 1 of fishers. This means that theses fishers would cause depletion of fish stocks, even more than the fishers of type 1 because they fished in the coastal waters rather than fishers of type 1 did as told by informants in Quynh Lap. These fishers would be reduced if government would remove their subsidy programs or would implement a fair process of choosing borrowers at the local communities. Getting these fishers out of fisheries may be easier than other fishers because they have other livelihoods and incomes to live.

In addition, appearance of these fishers in local fishing communities has caused negative thoughts that erode the trust of fishing communities to the government as claimed by traditional fishers (i.e. type 1 - *"fishing to live",* and type 3 - *"fishing for changing life"*) in

Quynh Lap and Tam Quan Bac. The fishers of type 3 claimed that these fishers - *"fishing of opportunists"* had exacerbated the overexploitation of fisheries resources and they have been treated unfairly as fishers of type 2 – "*fishing of opportunists"*. They asked themselves that why government provided subsidies for building more vessels while there have been so many vessels chasing depleting fish stocks in their traditional fishing grounds. They expected that government should subsidy them with a small amount of money to upgrade their vessels, engine, fishing equipment, fish handling system, etc. to improve the catch rates of the existing fishing fleets.

7.4.1.3 Type 3: fishers of *"fishing for changing life"*

This type of fisher accounted for the largest proportion in the Vietnamese fishing communities. These fishers were the core element of the fisheries development policies in Vietnam. They provide social welfares (e.g. employment, incomes, culture) for the coastal communities. They also were the key producers of the marine fish for domestic consumption and export. They lived dependently on the fisheries sources and their livelihoods vulnerable to climate change, natural disasters; but they were also known as a cause of depleting fisheries resources and degrading marine ecosystems in the coastal waters of Vietnam. These fishers have lived within the fishing communities for many of generations. They coexisted with and are precursors of the fishers of type 1, but they were also poor in comparison to the fishers of type 1 – fishers of *"fishing to live"*. Therefore, they tried to work hard and fish as much as possible to get the highest profits. Their objective was to seek for opportunities to change their life as fishers of type 1 or getting non-fishing careers as told by most of fishers interviewed in Quynh Lap in 2014.

These fishers have intended to keep fishing costs at the lowest level and expected the highest economic efficiency. Therefore, they have to come up with solutions to save investment costs and to maximize landings of having good price as argued by all fishers asked in Quynh Lap in 2014. In fact, they just operated fishing within the traditional fishing grounds and use a wide range of fishing gears and methods to catch any species coming seasonably based on their experience. They did not pay for services, but did the works of assembling and repairing fishing gears, maintenance of vessel and fishing equipment by themselves to minimize their costs. They considered deliberately and carefully about application and installment of new technologies and equipment. They often waited and observed their neighbors doing first in couple of fishing seasons, and then they would imitate if the efficiency of the new technologies was seen clearly.

As this type of fishers want to change their life, most of them (73/88 fishers approx. 83%) asked in Quynh Lap wanted upgrading their existing fishing business to improve their catches and economic efficiency. Of these, 66.2% of them want to build a more modern and bigger vessel to become the fisher of type 1; 24.3% of them wanted to replace a new and bigger engine so that they could sail faster from homeport to fishing grounds and do fishing more easily; and 9.5% of them wanted to make their gears bigger and improve fish handling system such as keeping their catches (i.e. fish, crabs, snails, etc.) live or at good quality to sell with the higher price. All of them agreed that they needed government's subsidy to invest in their business, but they just borrow a small amount (e.g. around 100,000 USD for building new offshore vessels, 35,000 USD for replacing bigger engine, 15,000 for investing fishing gears and handling systems), not as big as the template package offered by the government. The second factor influencing on their investment decisions were the fishers' financial status. They explained that they would not borrow all capital to invest in their business, but just around 50-70% of the property. The remaining part would be contributed by themselves or by co-owners of vessels. The most third factor influencing on their investment decisions was the livelihoods for their children as ranked by 37 (50.7%) fishers. They explained that getting non-fishing jobs for their children would be difficult because their children did not get good education on one hand, and they seemed to be familiar with fishing job. Some other fishers (23/73) evaluated the labour available was the most third factor effecting on their investment decisions, and the rest (13/73) argued that their own experience was the most third factor they would rely on to decide investments on their fishing business. The most fourth factor influencing on the investment decisions of 48/73 fishers were the fisheries regulations. These fishers explained that they would not invest in electric system or strong light for fishing because these are banned by the fisheries regulations. At the same time, 25/73 fishers took the management capacity as the most fourth factor impacting on their investment. They explained that they would not invest in their fishing business if they and crew members would not use and operate the property effectively.

Meanwhile, only 15/88 (17%) fishers would remain at their current level of fishing business. These fishers explained that they did not want to expand their business because the two following reasons: i) the fisheries resources in the traditional waters had become more and more scarce, ii) economic pressure on fishing had no longer been urgent because their children had their own career and other incomes from non-fishing business had been better and more stable. They told that they would get out of fishing when they got old or their vessel was sold at a reasonable price.

In term of fisheries management, the objective of the fisheries management plans is to reduce the number of these fishers, who operate the small-scale fisheries in the coastal waters, for conservation of fish stocks. However, this type of fisher has still developed dominantly in Vietnam in the last three decades. This was explained by two main reasons according to this type of fishers – the fishers of *"fishing to changing life"* as follows:

i) They (i.e. fishers of type 3) could not jump immediately from operating the current small-scale vessels fishing in coastal waters to the bigger vessels in the offshore waters as offered in the government's subsidy programs. They just wanted to upgrade their existing business gradually, but they could not because their business efficiency had become lower and lower on a hand, this strategy had not supported by the subsidy programs of government on the other hand.
ii) Although government had provided credit and offered training for setting up the alternative livelihoods, this was difficult for them to access and not enough for them to settle in a new career feeding their family. Therefore, the solution would be to launch policies to provide education and non-fishing job opportunities for their children, so that the number of this type of fishers would decrease gradually.

7.4.2 TACTICAL DECISIONS

As analyzed in section of 7.3, the Vietnamese fishers are not limited by catch quotas or number of fishing days. Therefore, they are allowed to catch as much as they can at any time of the year. Fishers including vessel owners, skippers and crew members are not graduated in the fisheries schools, but skippers are required to take part a short course of 2-3 days on basic knowledge about safety at seas, operating fishing vessels, and fisheries regulations. In fact, skippers have got immense experience and knowledge of operating the fishing business from previous generations and their neighbours. They were innovative in modifying and changing gears and fishing methods to improve their catches and economic efficiency adapting to the practical situations (e.g. fluctuation of market, distribution patterns of fish, weather, fishing ground conditions, etc.). This study pointed out eight factors influencing on the tactical decisions as illustrated in table 7.1. Fishers make themselves tactical decisions daily based on their own experience and practical conditions at seas or consultation with the vessel owners and/or skippers. The importance of factors influencing on the tactical decisions varies by type of fishers (table 7.1 and figure 7.1).

Table 7.1: The importance of factors influencing on the fishers' tactical decisions

Fishers	Season	Market	Weather	Experie-nce	Informa-tion	Inform al rules	Labour	Regula -tions
Type 1: Fishers of *"Fishing to live"* N = 148	3.94	3.08	3.53	2.98	2.02	1.93	1.02	0.24
Type 2: Fishers of *"Fishing of opportunists"* N = 06	3.50	3.33	2.83	3.17	1.67	1.33	1.33	0.33
Type 3: Fishers of *"Fishing for changing life"* N = 88	3.66	3.15	2.19	2.18	2.36	2.22	0.80	0.58

Investigation on three types of fishers in Quynh Lap and Tam Quan Bac shows that 5/8 factors influence on the tactical decisions of all 242 fishers interviewed, the factor of informal rules are not taken into account by two fishers of type 1; and 2/8 factors (i.e. labour and regulations) are not cared by many fishers when they decide daily fishing activities.

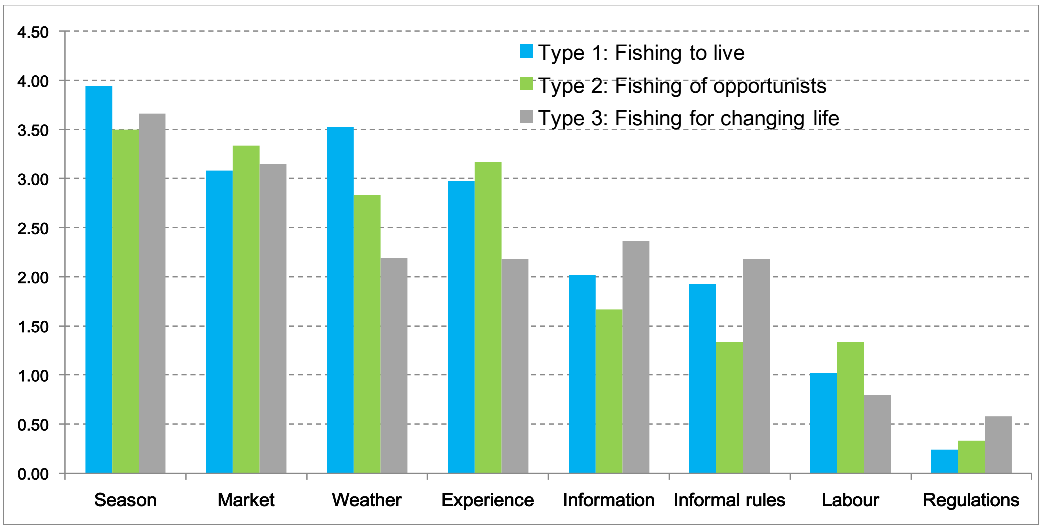

Figure 7.2: The importance of factors influencing on the fishers' tactical decisions

As shown in figure 7.2, the season is the most important factor for all types of fishers to make their tactical decisions. Fishers interviewed argued that the distribution patterns of the targeting species adapt to the two prevailing monsoons: the Southwest and the Northeast in the year. In each season, the specific species appear dominantly in the traditional fishing grounds. Based on this immense experience and the previous trips, fishers would forecast the distribution patterns of fish (e.g. where they school, what direction they migrate, when they sleep, etc.), then they decide which gears to be used and when they set nets to harvest the biggest volume of catches. For instance, in months of October to May, the type 1 and type 2 of fishers often use the long line and hand line for catching oceanic tunas; in the other months, they often use gill net for catching flying fish, or for tuna and mackerel, or use hand line for squids depending on personal experience and market condition as told by fishers in Tam Quan Bac. For the fishers of type 3, who is less moved to outside their provincially traditional waters, change their tactical decisions more flexibly and frequently than the other types of fishers. For instance, in the winter time (from October to the March), most targeted species (e.g. groupers, shrimps, squids, demersal fish, etc.) tend to migrate to the bottom then fishers use the bottom trawl nets or push nets; they change to use the traps to harvest snails in April and May; from June to September when squids, small pelagic fish, swimming crabs, etc. appear in the surface layers, fishers may change to use gill nets, lift nets, hand line, falling nets to minimize the fishing costs. They also use seine nets or push nets some time to harvest *Acetes spp.* in nearshore waters in the summer time. This reflects that the Vietnamese fishers understand very well about the distribution patterns of targeting species. They know clearly what species appear when and where, even the life cycle of the targeting species.

The second most important factor influencing on the fishers' tactical decisions is not the same among types of fishers. Weather is the second most important factor for the fishers of type 1 – fishers of *"fishing to live"*. Most (98/148) of these fishers acknowledged the weather is the critical factor for them to decide whether to go fishing or not. They argued that the bad weather conditions of rough seas may make their catch rate lower and cause high risks for their property and crew members. Based on this, vessel owners and skippers often stayed at shore until it has improved. At the same time, the type 2 of fishers – *"fishing of opportunists"* took experience of skippers as the second most important factor for deciding where to go fishing. In a certain season, the vessel owners decided what gears to be used, but the skippers decided where to go to fish. Based on the immense experience, the skippers often fished in the fishing grounds where the non-targeting species inhabit to increase income of individuals of crew members. This was because of the informal rules that crew members were allowed to used their own gears (e.g. hand line) to fish, and these catches belong to them. In fact, there have been cases that the income of crew members from their own catches was greater than the salary paid by the vessel owner. For the type 3 of fishers – *"fishing for changing life"*, they took the market as the second most important factor to make their static decisions. Based on the price and consumption demands, these fishers would decide what species they should prioritize to catch to maximize their economic efficiency. The fishers in Quynh Lap argued that they would not go fishing, if they imaged that they would have catches of so low quality (e.g. dominance of trash fish and juvenile) that the revenue could not cover their fishing costs. This suggests the introduction of the financial tools for managing the fishing activities so that fishers should stop fishing at the time of appearance of juvenile for conservation objectives.

There was the same choice for the third most important factor for the fishers of type 1 and type 2 to make the tactical decisions. They based on the market situation to decide using the long line or hand line for catching the oceanic tunas. They also based on consumption demands to decide which species they would catch in the months beyond the season for catching oceanic tunas (i.e. from May to September). Meanwhile, the type 3 of fishers considered the information from other fishers as the third most important factor when making decisions where to fish, what species to catch and which gears should be used. They believed that the appearance of targeting species is uncertain factor. In addition, the price of fish has been fluctuated depend on the available of production and local consumption. Therefore, they often got information on fishing grounds and market from other fishers to decide which species to target and when to fish. They also imitated others to maximize their economic efficiency. This was a typical character of the type 3 of fishers.

There was a difference among three types of fishers to rank the fourth most important factor influencing on their tactical decisions. The fishers of *"fishing to live"* took the experience as the fourth most important factor influencing on their tactical decisions. They thought this factor is not important as factors of season, market and weather because most of them understood very well about distribution patterns of the targeting species, exception of the younger fishers. Furthermore, because they often went fishing in the offshore waters which are very far from their homeports, so they should go together in a group. They then can help each other to make tactic decisions at sea. At the same time, the type 2 of fishers – *"fishing of opportunists"* took the weather as the fourth most important factor impacting on their tactic decisions. They argued that they went fishing unless there is storm coming. They should stay at sea and stop fishing for the very rough days to minimize fuel costs, and continue to catch fish before others coming to fish. By that time, the type 3 of fishers – *"fishing for changing life"* took the informal rules into account as the fourth most important when they decided where to fish. They respected implicit rules that who come first have all rights to fish. When they fish in the same fishing grounds, the coming later fishers should set their nets under the current to the coming first ones. They acknowledged that the informal rules impact on their decisions stronger than the formal regulations enforced by fisheries authorities.

The factor of information from other fishers was used as the fifth most important one for deciding daily fishing tactics by the type 1 and type 2 of fishers. This was important for them because the skippers often shared information (e.g. fish grounds, kinds of species, size of fish, fish behaviours, market, currents, security at sea) with other skippers and vessel owners. At the same time, the type 3 of fishers used the weather as the fifth most important factor to decide fishing or not fishing. They told that the weather is not very important to them because they just operated in the coastal areas that were close to their homeport. They just stopped fishing in days of the storms, heavy rain, and very rough sea.

The fishers of type 1 and type 2 were the same interested in the informal rules in the process of the tactical decision-making. They used this factor as the sixth priority basis for deciding where they should set their nets and hooks. They should set their hooks and nets at a place that do not harm property and catch rate of the fishers coming first. At the same time, experience was used as the fifth most important factor by the type 3 of fishers. These fishers explained that this is not very important for them because they have known very well about their business and natural conditions of their traditional fishing grounds. In fact, they have just caught the same species in the same fishing spots for long time because the traditional fishing spots have been nearly the implicit ownership of the defined fishers as told by fishers in Quynh Lap. This suggests the application of the fishing rights regime for this type of fishers to reduce overfishing and conflicts among the local fishers should improve effectiveness of the existing fisheries management system in Vietnam.

In recent years, due to a dramatic increase in number of fishing vessels in combination with industrialization and urbanization of coastal areas, the labour entering the fishing industry has been less and less. The local people have tended to work in the factories and get other non-fishing jobs. Consequently, the number of fishing vessels having to cease fishing due to lacking crew members have become more and more throughout the country as observation in 2009-2014 at local fishing communities of Vietnam. Therefore, most of fishers took the labour into account when making their tactical decisions, although it was not very much important – the seventh priority among eight factors influencing on their decisions. But, this factor seemed to become more and more important for fishers to make both the strategic and tactical decisions on fishing business. Except a part of the type 3 of fishers who hold stakes of fishing vessels – the co-owners of vessels. They often worked stably together onboard as crew members and shared their fishing costs and incomes. In the fisheries management perspective, reduction in fishing labour is a promising tendency for reducing pressure on the natural resources and is a good opportunity for restructuring the fisheries towards avoiding overcapacity of fishing fleets.

It was a worse situation for the Vietnamese fisheries because all fishers do not care about or disregard the management regulations when they make daily fishing decisions on where, when to go fishing and what species to target. In fact, 19% of fishers did not take regulations into account when making their tactical decisions. They explained that they did not understand well about the fisheries regulations enacted by government. These regulations were unrealistic and may impact negatively on their catches and incomes as told by fishers in Quynh Lap. For instance, fishers could not use the mesh size of trawl net cod-end of 30mm because most of fish would be gilled in the net. This would cause difficulty for collect them and reduce the fishing efficiency. They argued that they imitated the fishing techniques of other fishers to increase the efficiency of their business, even that techniques are prohibited by management regulations. These fishers also explained that their catches and incomes would be less than whose use the destructive methods. They also concerned that in the trend of depletion of fisheries resources, they have been intensively trapped in a race for employing destructive methods to catch the last fish. This has become more and more serious because there has nearly no competent authorities enforcing regulations and fisheries surveillance at sea as observation in the Vietnamese fisheries since 2005 when the fisheries inspection replaced the fisheries surveillance. Usage of destructive methods (e.g. fishing with electricity, dynamite, undersized mesh size, etc.) has been so common in the communal waters that the local fishers have to stop fishing at days the fisheries inspection force appear in the local waters as told by three informants in Quynh Lap. This implies that fishers did not dare to violate regulations if competent authorities perform their missions adequately at the local waters.

Besides the above eight factors, the fishing tactics of many fishers were also impacted by the government's subsidies. At the time of investigation, government was running a subsidy program that each offshore vessel may be subsidized the fuel costs for four fishing trips per year. Approx. 22.5% of the fishers of type 1 – *"fishing to live"* and type 2 – *"fishing of opportunists"* acknowledged that they would not go fishing if they had not been provided subsidies on fuel costs from the government. They explained that the increase in fuel price and decrease in catch rate made their fishing costs higher than their revenue, so they had to consider whether cease to fishing. In fact, a majority of vessels were unable to remain in business when fuel price increased and the government subsidy on fuel costs was not delivered as told by three local informants in Tam Quan Bac in 2014. This would make it seem that then fishing business was only viable when it was subsidized by the government. It seems to be the Vietnamese fisheries were in the vicious cycle that government subsidize fisheries, then fisheries are viable, and government subsidize fisheries again.

7.5 CONCLUSION

This search argued that the management tools (e.g. limitation of TC and reduction of fishing vessels) planned in the 2010 fisheries master plan were not enforced in reality of the Vietnamese fisheries. They not only were not implemented at the fishing communities, but also not followed by the lower planning system at the provincial, district and communal levels. The TC and number of fishing vessels at the communal level were just articulated symbolically in the state planning system of the government, but not used to control the fishing activities in the reality of fishing communities. This reconfirmed that the fisheries planning system was just operationalized within the government system, it was not used to manage the fisheries in Vietnam. In other words, the Vietnamese fisheries are under a ‘open-access’ regime. This resulted in a recommendation from the European Commission that *“i) The draft fisheries law submitted by Vietnam in April present significant loopholes and fails to incorporate basic principles and elements of the International Law of the Sea; ii) It will likely require urgent measures to address overcapacity (i.e. adopting a new strategy within the national plan of action with clear targets at short-term for reduction of the number of fishing vessels, with focus on the offshore fleets; iii) ….that monitoring, control and surveillance tools developed by Vietnam continue to be insufficient to ensure flag State responsibility over a fleet of more than 100,000 fishing vessels.….”* (European Commission, 2017 p.2-3). Based on this, the European Commission warned the Vietnamese fisheries authorities formally by the ‘yellow card’ on the 23 October 2017.

The research also shows that the communal government, who is the closest with the fishing communities, was not empowered to manage and to enforce management decisions in Vietnam. There is no authority at local level which ensure the fisheries master plan (i.e. management tools) is implemented at fishing communities. This may be a critical reason for ineffectiveness of the existing fisheries management in Vietnam in which no one is responsible for overcapacity of fishing fleets as well as overexploitation of fisheries resources.

The study distinguishes three types of fishers according to their preferences and interests: i) fishers of "*fishing to live*"; ii) fishers of *fishing for changing life";* and iii) fishers of *"fishing of opportunists"*. In general, all types of fishers kept tendency to expand and upgrade their fishing business in the long-term investment strategies. They were, under the open-access fisheries with no limitations of fishing effort and catch quotas, also in a race of developing the fishing tactics to maximize their individual catches and fishing efficiency. However, each type of fishers followed their own strategies in fact. The first type of fisher followed the goal of living and enriching by fishing through enhancing gradually their fishing capacity. The second one entered the fishing industry as an opportunity to get benefits from the government's subsidy policies. And the last type of fisher was the traditional fishers who dominate in the fishing communities of Vietnam. They either have tried to increase their catches to upgrade their business as big as the one of the first type of fishers on one hand, or to get out fishing industry when they have sustainably alternative livelihoods on the other hand.

This research found seven factors influencing on the long-term (i.e. investment) decisions of the Vietnamese fishers: i) fisheries management regulations; ii) subsidy programs; iii) the financial status of family; iv) management capacity; v) the livelihood opportunity of the coming generation; vi) labour availability; and vii) individual experience. Of these, the government's subsidy programs were taken as the most important basis for making the long-term decisions of a majority of the Vietnamese fishers. This may provide the short-term economic profits for individual fishers (Duy, 2016), but it would cause overcapacity of fishing fleets and depletion of fish stocks in the long-term for the whole fisheries (Raakjær, 2009). As a consequence, the vicious cycle has clearly seen since the end of 2000s in Vietnam. The most second important factor influencing the investment decisions of most fishers was their own financial status. The others were changeably ranked by individual fishers.

This research also pointed out eight factors influencing on the short-term (i.e. daily tactics) decisions of the Vietnamese fishers: i) season; ii) market; iii) weather; iv) experience; v) information; vi) informal rules; vii) labour; and viii) regulations. Among them, the season factor (i.e. fishing time in specific months in a year) was the most important factor for all fishers to decide their daily fishing tactics (e.g. where, when, how to fish). The other factors were evaluated differently by type of fishers and even by fishers in the same type. The factor of fisheries regulations was ignored or less considered by all fishers asked in Quynh Lap and Tam Quan Bac communes in 2014.

In addition, subsidy programs were also a factor influencing on the tactical decisions of the fishers of type 1 (i.e. fishers of *"fishing to live"*) and type 2 of fisher (i.e. fishers of *"fishing of opportunists"*). It is evident that the financial factors (i.e. credit, fuel costs, insurance fees in subsidy programs and fish price) were the most important drives influencing on the fisher's fishing behaviours (e.g. investment and tactical decisions). This implies that the financial policy would be an effective tool for managing the fisheries in Vietnam. For instance, government would remove subsidy programs, then fishers would have to rationalize their investment decisions and fishing tactics to optimize their capitals. This would result in removing type 2 of fisher, reduction of fishers of type 1, and lessening type 3 of fishers (i.e. fishers of *"fishing for changing life"*).

This research also identified two intrinsic characteristics of the Vietnamese fishers: i) local fishers are grouped into fishing groups or fishing guilds to share social values and fishing information; and ii) respect to the traditionally informal norms. Therefore, in order to improve compliance with fisheries regulations, this research suggests an alternative management regime which involves the communal government and local fishers in planning fisheries as well as in enforcing management plans within their local waters.

CHAPTER 8: THE LESSONS TO BE LEARNED FROM THE VIETNAMESE FISHERIES

8.1 INTRODUCTION

Sustainable utilization of fisheries resources has been in the policy discourse of the Vietnamese fisheries since the beginning of the 1990s. By that time, the introduction of alternative approaches to improve effectiveness of the fisheries management system in Vietnam was highlighted by the government as well as international sponsors. Consequently, the co-management and adaptive indicator-based management structures (AIBM) were introduced into the Vietnamese fisheries. From that point, these structures have been implemented in to enhance conservation of fisheries in parallel with the conventional paradigm which follows production-based growth perspective in the Vietnamese fisheries. This clash of perspectives may result in implications and effects of the co-management approach have been limited (Anon, 2009), and the AIBM structure never really took off in managing fisheries in Vietnam.

This chapter explores implications of implementing the co-management and AIBM structures to explain their failures in the Vietnamese fisheries. It addresses three following research questions: i) How the innovative management approaches were implemented in the Vietnamese fisheries? ii) Do they improve the effectiveness of the existing fisheries management system in Vietnam? and iii) What are obstacles to implementation of these approaches in the Vietnamese fisheries context? This chapter is composed of two main parts. Firstly, it analyzes implementation of the co-management structure in the Vietnamese fisheries in four main aspects: i) the background of introduction; ii) results of implementing fisheries co-management models; iii) obstacles to implementation of the fisheries co-management models; and iv) conditions for successful implementation of the fisheries co-management models in Vietnam. Secondly, this chapter explores implementation of the AIBM structure in the Vietnamese fisheries in two main aspects: i) analyzing application of the AIBM structure; and ii) explaining reasons leading to its failures.

8.2 IMPLEMENTATION OF FISHERIES CO-MANAGEMENT IN VIETNAM

8.2.1 INTRODUCTION OF FISHERIES CO-MANAGEMENT INTO VIETNAM

The traditionally informal rules used to play an important role in the Vietnamese fisheries management process before 1945 (Nguyen & Ruddle, 2010; Ruddle, 1998). They were adopted to regulate fishing rights, fishing spots, fishing time and gears used to fish within their waters given by the dynasty. They were also used to solve conflicts among fishers within their communities and address the external relationships with the dynasty and other fishing communities. Under that fisheries management regime, all fishing practices are controlled by the management council elected by the local communities as told by Dr. Binh[29] in an interview conducted in 2011. He considered this is somewhat of the community-based fisheries management. However, this regime was replaced by the centrally planned regime when collectivization was implemented in Vietnam. In this regime, all fishing vessels are grouped into the state-owned fishing co-operatives and companies. These co-operatives and companies are hierarchically managed by government through the mandatory target of catches. This regime seemed to take place the end of 1950s and beginning of 1960s in the North and in 1976 in the South of Vietnam. Under this system, the fishing communities are a management object rather than a subject of the management process as they were before 1945 when many communities were empowered to manage fishing activities within their local waters as told by Dr. Binh in 2012.

The concept of co-management was firstly introduced into the Vietnamese fisheries in 1994 along with the mainstream of the fisheries management in the world, by an international project implemented in Vietnam by the International Centre for Living Aquatic Resources Management (ICLARM) (now World Fish). This project was to explore the prospects for successful implementation of fisheries co-management strategy in several Asian and African countries (Pomeroy et al., 1996). This was the first study making use of the co-management approach to look at the fisheries and fishing communities in Vietnam. It demonstrated that there were favourable conditions in political, cultural, social and

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[29] Dr. Nguyen Quang Vinh Binh is the director of the Sub-department of Capture Fisheries and Fisheries Resources Protection of Thua Thien – Hue province who conducted researches and promoted the fisheries co-management in his province.

biological aspects to implement the fisheries co-management structure in Vietnam (Pomeroy, 1995; Pomeroy et al., 1996). Based on this research, the former minister of MOFI endorsed the concept of co-management and supported its introduction into the Vietnamese fisheries. He argued that the local fishing communities having a long traditional history of the autonomous fisheries as the *'vạn chài'*[30]. Moreover, the political system also advocated the participatory approach to manage natural resources in general and fisheries resources in particular. He acknowledged that *"The co-management approach involves the local fishers in fisheries management process, and then the fisheries development policies and regulations would be enforced more effectively in practice"*[31]. This was considered as a valid foundation and political commitment of the Vietnamese government, so that international sponsors have continued to provide financial and technical assistances for implementing the co-management structure in the Vietnamese fisheries.

Since 1994, about 40 fisheries co-management models were piloted in Vietnam. All of them were supported and funded by international sponsors (Anon, 2009; VIFEP, 2014). Of these, there were 22 models of marine capture fisheries, thus this research only focuses on these 22 models (appendix 4). Besides implementation of the co-management models at pilot sites, international sponsors also have supported research activities, capacity building, and policy-making for the Vietnamese fishery sector. For instance, one DANIDA project conducted training on making policies to promote and apply the co-management approach into the Vietnamese fisheries and supported for operation of the Task Force for fisheries co-management in 2005-2010. The Coastal Resources for Sustainable Development Project funded by World Bank has promoted implementation of the co-management to help enforce regulations and improve sustainability of nearshore fisheries in eight pilot provinces (i.e. Thanh Hoa, Nghe An, Ha Tinh, Binh Dinh, Phu Yen, Khanh Hoa, Soc Trang, and Ca Mau) since 2012.

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[30] 'Vạn chài' means a fishing village interpreted from the Ancient Vietnamese script. It is often used in the ancient documents written before 1945. It is not used nowadys in Vietnam.

[31] The minister of MOFI said at the final assessment of the project in 1996 as told by a researcher in VIFEP who conducted the first project on fisheries co-management in Vietnam

8.2.2 ACHIVEMENTS OF IMPLEMENTING THE FISHERIES CO-MANAGEMENT IN VIETNAM

After more than twenty years of implementation, with assistance from the international sponsors, the fisheries co-management arrangement in Vietnam has achieved significant progress in various aspects, especially in institutional arrangements and human resources. The legal framework supporting the fisheries co-management was formulated in the decree No. 33/2010/ND-CP. The article 12 of this decree promoted Provincial People Committee developing management models of fisheries resources with participation of the local communities: *"Provincial People Committee is in charge of managing fishing activities in coastal and inshore areas, decentralization and guiding management of coastal areas for district and communal levels, and develop models for the fisheries resources management with participation of local communities in coastal areas"* (Government of Vietnam, 2010 p. 9). In addition to this, a handbook on implementing the fisheries co-management was also published to guide managing the fisheries co-management models. A large number of governmental officials at various levels, representatives of NGOs, local fishers and other relevant stakeholders have been educated and trained on knowledge and skills to implement the fisheries co-management models in the last two decades.

In terms of practical implications, some fisheries co-management models have obtained positive results. They remain functioning even after external assistance ended (e.g. the fisheries co-management models in Tam Giang lagoon – Thua Thien – Hue province, the fisheries resources protection model at the Ran Trao – Khanh Khoa province). Others have remained symbolically after external support ended. This means that the management board established by local government is still in effect, but its mechanism no longer works (e.g. Thanh Phong in Ben Tre province, Quynh Lap in Nghe An province). The others were dismissed soon after the external supports ended such as Phu Long in Hai Phong, and Khanh Hoi in Ca Mau. Based on the investigation of 22 fisheries co-management in 2009, three main results of the fisheries co-management models in Vietnam are summarized as follows:

Firstly, the co-management approach has been applied into the Vietnamese fisheries at instructive or consultative levels (Sen & Raakjaer, 1996). Investigation of 22 fisheries co-management models in Vietnam shows that 16/22 models are categorized at the instructive stage where the local fishing communities were informed policies and regulations by the governmental agencies; 6/22 models (i.e. Vinh Giang, Quang Thai, Dien Hai in Thua Thien Hue, Cu Lao Cham in Quang Nam, Nhon Hai in Binh Dinh, and Ran Trao in Khanh Hoa) are categorized as the consultative stage where government agencies consult local fishers before making management decisions. However, these decisions were not in regards to the legal regulations nor the state planning system, just action plans to solve particular issues such as establishment of conservation areas for stone crab in Cu Lao Cham, enlarging the area of the Ran Trao protected area, coercing exceed set nets in waters given to fishing communities in Vinh Giang. The interviewees argued that the management board, which is composed of representative of communal government, leadership of village, and selected fishers, established in the fisheries co-management models was considered as a means supporting for the fisheries authorities to enforce and surveil fisheries regulations at the traditional local waters.

Secondly, the fisheries co-management models have created positive impacts in political, cultural, social, ecological and economic aspects at the local communities where the models were applied. This is clearly seen in the four consultative fisheries co-management models. The fisheries management process was implemented more transparently and democratically. For instance, the fishers in Vinh Giang suggested the number of set nets being allowed to operate in the local waters to the district government; fishers in Nhon Hai recommended the number of traps for catching lobster fingerlings within the waters given to the communal government. According to representatives of these models interviewed, the fishing communities became more unified, organized and responsive than before the establishment of co-management. The harmful and destructive fishing practices, degradation of marine habitats and conflicts among local fishers within the local communities were reduced gradually. Therefore, livelihoods and living standard of the local communities had been somewhat improved.

Thirdly, the social values had been mobilized effectively. Four interviewees acknowledged that traditionally informal norms, religious and cultural values of the families and of the local communities have oriented the fishing behaviours of the local fishers toward more responsible manner. For instance, local fishers in Nhon Hai and Ran Trao did not trap the lobster fingerlings at the early stages when they are still so small as explained by interviewees in Nhon Hai and Ran Trao in 2009. Moreover, the participatory approach had been made use popularly to address management issues and make collective decisions in the governmental agencies where the fisheries co-management concept introduced as observation in D-Fish, provincial level and communal level in recent years.

Based on practical observation of implementing the fisheries co-management models in Tam Giang lagoon, Dr. Binh argued that the co-management arrangement had contributed to improvement of the effectiveness and efficiency of the fisheries management system in Thua Thien – Hue province, especially in eliminating the destructive fishing methods in the lagoon waters. He explained that the management board of the fisheries co-management in collaboration with the local police more effectively controlled fishing with explosives in local community waters than the expenditure for fisheries surveillance and inspection of the provincial fisheries authorities. He believed that this approach would be a means for closing the current open-access fisheries in Vietnam in the future.

8.2.3 OBSTACLES TO IMPLEMENTING FISHERIES CO-MANAGEMENT IN VIETNAM

Most (15/22) of the fisheries co-management models collapsed or remained symbolically only, not working in practice after the external supports ended. According to representatives of these models, the co-management board no longer worked because they did not have budgets and means to perform action plans. In addition, they also were not required to do anything form the local government, thus the management board were not necessary anymore. Participants attended workshop on assessment of the coastal fisheries management and implementation of fisheries co-management organized by Directorate of Fisheries in Hanoi in December 2014 identified three critical obstacles to implementing the co-management in the Vietnamese fisheries as follows:

Firstly, there was a lack of a valid legal framework promoting the co-management arrangement in the Vietnamese fisheries. Sen and Raakjaer argued that the bottom line of the co-management arrangement is sharing powers and responsibilities between government and resources users to implement the fisheries management process including: policy formulation, resources assessment, access rights, harvesting regulations, monitoring and surveillance, control and enforcement (Sen & Raakjaer, 1996). However, the fisheries regulations and fisheries planning system are decided within the government system. The local fishers did not participate in formulating legal regulations adopted by decision makers as analyzed in chapter 4 and in planning fisheries as illustrated in chapter 5. In fact, fisheries co-management models had their own action plan to achieve objectives suggested and suited with the resources provided by external sponsors. These plans often focused on protecting fisheries resources and marine habitats; combating illegal and destructives fishing; reduction of social conflicts among fishers and fishers with other industries; providing alternative livelihoods and career training (e.g. establishment of Ran Trao marine protected area to protect marine habitats for lobster, coral reefs; increasing surveillance over the waters given to reduce destructive fishing practice in Quynh Lap, in Vinh Giang; communication programs to raise awareness of fisheries resources protection, creating alternative livelihoods in Cu Lao Cham, Hon Mun, Nhon Hai, My Thang, etc.). The objectives of the fisheries co-management models were often aligned with strategies, thus were supported by fisheries authorities. Therefore, the fisheries authorities usually collaborated with the fisheries co-management models to enforce the fisheries management plans and regulations at the local communities by carrying out communication programs to raise awareness of fisheries resources protection and implementing petrol and inspection over the local waters. For instance, the management board of all models was invited to perform the patrol and inspection over the waters given to deter the illegal and destructive fishing practices in My Thang, Nhon Hai in Binh Dinh, Vinh Giang in Thua Thien – Hue, and Quynh Lap in Nghe An. However, they were not invited to plan their fisheries to determine the total catches and number of fishing vessels allowed to operate in their local waters. Indeed, all (11) representatives of the fisheries co-management interviewed in 2014 told that they were not invited to plan the total catches and number of fishing vessels (i.e. making annual fisheries plans) of the commune, district or province. This means that the memberships of the fisheries co-management models at the local communities were not involved in planning their fisheries, but the government did it for them. The action plan of the fisheries co-management models was just a tool supporting fisheries authorities in the enforcement of fisheries regulations, but not in managing the local fisheries in terms of controlling the total catches or fishing capacity.

Secondly, there was a lack of the legitimacy of the co-management arrangement in Vietnam. Pomeroy and Williams described that the enabling legislation to define and clarify responsibility and authority of the local communities is a key condition for successful implementation of the fisheries co-management (Pomeroy & Williams, 1994). The national constitution of Vietnam, at article 28, articulates that *“Citizens have rights to participate in the management process, discuss and make recommendations to government agencies on the management issues at local and national levels. The government shall provide favourable conditions for citizens to participate in the management process, and make public and transparent in receiving and response to comments and suggestions by citizens”* (National Assemply, 2013 p.11). However, a fisheries co-management structure or its management board was not considered as an official actor to perform fisheries management process in Vietnam in practice. Indeed, a management board (some cases named as a core group) was established by the communal government to implement action plan of the fisheries co-management model. It was not given powers and rights to make or execute fisheries management decisions in practice. For instance, in terms of planning fisheries, the management board of fisheries co-management models were not given powers to decide the number of fishing units adaptive in their waters given as told by the head of the Vinh Giang Fisheries Association, instead they just recommended to the government agencies for consideration. In terms of enforcement, the management board had not authorized to extract the external fishers fishing in their waters given. It also had no rights to impose a sanction on the violations of fisheries regulations and rules within their waters, instead it had to report to the competent agent of the government for further prosecution. The management board was requested to collaborate with the local fisheries in implementing management tasks such as collecting data, promulgation and enforcement of fisheries regulations at the local communities as observed in all 22 fisheries co-management under investigation.

Thirdly, there was a lack of resources to coordinate activities in the fisheries co-management models. Although the management board, who takes the leadership responsibility for fisheries co-management models, was established by the government agencies, but it was not considered as an agency of the administrative system. Therefore, it was not provided or allocated financial and human resources and equipped with necessary means to perform action plans. In fact, all (22) fisheries co-management models were funded by international sponsors during the course of implementing projects in 2-3 years. This fund would be ended when the projects finished. In some specific models (e.g. Phu Long, Quynh Lap and Nhon Ly models), the management board were paid allowance for the days of conducting patrol at sea and enforcing fisheries regulations in the local communities organized by the competent authorities. For the Vinh Giang, Quang Thai, Dien Hai models in Thua Thien-Hue province, the management board was the committee of the Local Fisheries Association. Therefore, they have a stable budget from the annual membership fee. This was the critical factor enabling remain the contribution of fisheries co-management models as personally interviewed with 11 representatives in 2014.

8.2.4 REFLECTING CONDITIONS FOR SUCCESSFUL IMPLEMENTATION OF THE FISHERIES COM-MANAGEMENT IN VIETNAM

Investigation of 22 fisheries co-management models in Vietnam shows that the structure and objectives were set up differently among fisheries co-management models. Therefore, their outcomes were also at different magnitude of success. Some models were successful, other were limited, and the others were failed in practice. This research made use of 11 key conditions for viable self-managed, community-based management institutions and co-management (Ostrom, 1990, 1992; Pinkerton, 1989) to look at six fisheries co-management models (i.e. Phu Long in Hai Phong, Quynh Lap in Nghe An, Vinh Giang in Thua Thien-Hue, Nhon Hai in Binh Dinh, Ran Trao in Khanh Hoa, and Thanh Phong in Ben Tre) which achieved different level of success.

i) **Clearly defined boundaries.** The boundaries of the area to be managed should be distinct so that the fishers can have accurate knowledge of them. The research found that clear definition of the waters' boundaries to be managed is the highly important to success of the fisheries co-management models. For instance, the Vinh Giang model's area is bordered by the concrete piles, and the Ran Trao model's area is bordered by buoys as the fence preventing outsiders from entering to harvest without permission of the management board. The fence also allows community members to monitor their waters more easily. This was more successful in comparison with the other models of whose boundaries were not defined clearly (e.g. Phu Long in

Hai Phong, Thanh Phu in Ben Tre; Nhon Hai in Binh Dinh). This means that the clear definition of boundaries is the reason leading to success of the fisheries co-management models in Vietnam and vice versa.

ii) **Clearly defined membership**. The individuals or groups of local fishers keeping rights to fish in and having management responsibility for the waters of model should be defined clearly and transparently. This was well done in Vinh Giang model. They are the residence living in the commune. Therefore, disputes and conflicts in fishing spots is minimized and addressed easily. Meanwhile, the rest models could not define clearly who have rights to fish and to enforce management measures in the waters mandated. The clear definition of membership is highly important and is a key factor leading to successful implementation of the fisheries co-management models and vice versa.

iii) **Group cohesion**. There is a high degree of homogeneity, in terms of kinship, ethnicity, religion or fishing gear type, among the local fisher groups and relevant stakeholders. This research found that the fishing behaviours of local fishers were not much influenced by ethnicity, religion and kinship. The local fishers, regardless of ethnicity and religion argued that the homogeneity of fishing gears used to fish was a favourable condition for implementing co-management successfully such as in Vinh Giang, Nhon Ly and Ran Trao models; but was not leading to success such as in Thanh Phong, Quynh Lap models. Conversely, the heterogeneity of fishing gears used contributed to the failure of implementing the fisheries co-management model such as in Phu Long.

iv) **Existing organization**. The local fishers have some prior experience with traditional community-based systems and with organizations, where they are representatives of all resource users and stakeholders interested in fisheries management. This is important for the successful implementation in terms of setting up management objectives and compliance with collective decisions. Most fishers living in Vinh Giang commune were taught or experienced the community-based management regime in the past, so they participated into the co-management arrangement more easily and effectively rather than the rest models. And they also made their co-management model more effective and successful in practice.

v) **Benefits exceed costs**. Individuals have an expectation that the benefits to be derived from participation in and compliance with co-management model will exceed the costs of investments in such activities. This is highly important to the success of the model. For instance, fisher participating in Vinh Giang co-management model told that their benefits exceeded the membership fee that they had to pay, thus they were willing to be a membership of the fisheries co-management model. They believed that the fisheries co-management would maintain the productivity of fish stocks and remain their fishing rights in their local waters. For the other models, local fishers, who were familiar with the free access regime, did not believe their benefits would be higher if they would participate in and comply with the co-management arrangement rules. In fact, they did not have to pay any fees for catching. Therefore, they distrusted the co-management arrangement and did not support this institution. This lead to unsuccessfulness of models such as in Phu Long, Thanh Phong, and Quynh Lap.

vi) **Participation by those affected**. Most individuals affected by the management arrangements are included in the group that makes and can change the arrangements. The same people that collect information on the fisheries make decisions about management arrangements. This contributes to sustainability of the fisheries co-management models. For instance, the voice of all members was heard equally such as in the Vinh Giang model. In fact, all fishers had the equal rights to vote in making decisions on collective issues of the community. However, the voice of the fisheries co-management was not as much power as expectation in the fisheries management process headed by government. Therefore, this condition was not very important to success of the fisheries co-management models such as at the beginning stages (i.e. instructive and consultative) in Vietnam.

vii) **Management rules enforced**. The management rules are simple. Monitoring and enforcement are able to be affected and shared by all fishers. The fishers participating in the Vinh Giang and Ran Trao models, acknowledged that enforcement of management rules was very important for their success. All of them participated in making management decisions and had equal responsibility for enforcing the management measures agreed within the community. They monitored effects of management actions on fisheries resources and habitats, and asked competent agencies to enforce the management decisions and regulations within their local waters. This was a very important condition leading success and sustainability of the fisheries co-management models such as in Vinh Giang and Ran Trao models.

viii) **Legal rights to organize**. The fisher groups or organizations have the legal rights to organize and make arrangements related to their needs. There is enabling legislation from the government defining and clarifying local responsibility and authority. This is not relevant with the Vietnamese case. All organizations or groups must be accepted by the state competent authorities. NGOs are only allowed to assist fisher groups or organizations if they are approved by the competent agencies. This may be a factor causing failure of some fisheries co-management models as told by a consultant conducting an assessment of the fisheries co-management models in Vietnam in 2009. This was reflected clearly in all fisheries co-management models in Vietnam. Though, the management board was established by the local government, they had not authorized to enforce fisheries regulations and rules in their local waters.

ix) **Cooperation and leadership at community level**. There is an incentive and willingness on the part of fishers to actively participate, with time, effort and money, in fisheries management. There is an individual or core group who takes responsibility for the management process. This research found that the local leadership was the critical condition for success of the fisheries co-management models. For instance, the Vinh Giang and Ran Trao models achieved success in implementing management tasks because they had been led by exemplary, prestigious and influential individuals as told by local fishers. These individuals not only had much experience and knowledge of fishing business within the local waters, but also understood profoundly fishing behaviours of the local fishers. For other models, the management board was nominated by the communal government with some individuals were not respected by the local fishers. Therefore, they were constrained in coordination of their action plans in their local communities. This was a condition leading to failure of the fisheries co-management models as argued by representative of Thanh Phong, Phu Long models.

x) **Decentralization and delegation of authority**. The government has established formal policy and/or laws for decentralization of administrative functions and delegation of management responsibility and/or authority to local government and local group organization levels. This was very important for success of the fisheries co-management models in Vietnam. Indeed, in Thua Thien-Hue province, the district government has been decentralized to manage fishing activities taking place in the district waters as told by a provincial fisheries manager. This made the Vinh Giang co-management model more successful and more sustainable than others where authority was mandated at the provincial level, not decentralized to the lower levels. The authority for the Vietnamese fisheries management has not delegated to local communities yet. This was a reason leading to all fisheries co-management in Vietnam just were at the instructive or consultative degree.

xi) **Coordination between government and community**. A coordinating body is established, external to the local group or organization and with representation from the fisher groups or organizations and government, to monitor the local management arrangements, resolve conflicts, and reinforce local rule enforcement. This was important for sustainability of the fisheries co-management models in Vietnam. A management board composed of government staffs and local fishers, was established for all fisheries co-management in Vietnam. It coordinated to implement action plans adopted by sponsors as well as management tasks of the fisheries authorities at the local levels.

This research concludes that six of eleven key conditions were highly important (i.e. conditions of the clearly defined boundaries, of the clearly defined membership, of the decentralization and delegation of authority, of the cooperation and leadership at community level, of the management rules enforced, and of the benefits exceed costs); three of them were important (i.e. conditions of the coordination between government and community, of the participation by those affected, and of the existing organization); one of them was low important (i.e. condition of the group cohesion); and one of them was not relevant (i.e. condition of the legal rights to organize) to success of the fisheries co-management models in Vietnam. This research also found three key conditions (i.e. conditions of cooperation and leadership at community level, of the legal rights to organize, and of the benefits exceed costs) causing failure of the co-management arrangement in a centralized institutions and government-based management regime such as in the Vietnamese fisheries. This research also concludes that all fisheries co-management in Vietnam were initiated and funded by international sponsors. In fact, fisheries co-management models in Quynh Lap, Nhon Hai, Nhon Ly stopped working when DANIDA ended funding in 2010, and worked again in 2013 when they were funded by World Bank project. This means that the international fund was the key condition for sustainability of the fisheries co-management in Vietnam.

8.3 IMPLEMENTATION OF THE ADAPTIVE INDICATORS-BASED MANAGEENT STRUCTURE IN VIETNAM

The adaptive indicators-based management (AIBM) structure was introduced into the Vietnamese fisheries in 2003 by a project funded by DANIDA. Technical advisers developed a framework of indicators and structure to provide multi-disciplinary assessments and advice for making management decisions in Ministry of Fisheries of Vietnam. This structure was operationalized during the pilot phase of the project and was not in use after the project ended in 2012. The following sections will explain the context that the structure was introduced into the Vietnamese fisheries and uncover reasons leading to the failure of the structure.

8.3.1 INTRODUCTION OF THE AIBM STRUCTURE INTO VIETNAM

Theoretically, the Vietnamese fisheries are managed based on the estimations of the fisheries resources (i.e. the standing biomass and the potential exploitable yield of fisheries resources as analyzed in chapter 6). It is underpinned by the total catches (TC), which is somewhat the same with the total allowable catches (TAC) in the developed fisheries. The process of estimating the TC based on the models for single species as used in the temperate fisheries. This approach is not suited and ineffective for the tropical developing fisheries due to complexity of the resource base and small-scale fisheries (Kato, 2001; Thia-Eng & Pauly, 1989). In addition, a fisheries management regime relied on the stock assessment-driven (i.e. based on the resource management) may require a high-cost administration for the management system (Raakjær et al., 2001). Therefore, there were demands for introducing an alternative management approach which is suited with the multi-species, multi-gears and multi-fleets fisheries and limited resources of the management system into the Vietnamese fisheries.

Raakjær et al. identified the objectives of fisheries management in the world have changed emphasis on from the optimization based on single species indicators to the risk management and hazard control based on precautionary approach and maintenance of healthy ecosystems (Raakjær et al., 2001). The Regional Technical Consultation (RTC) on Indicators for Sustainable Fisheries Management in ASEAN Region was held in Haiphong, Vietnam in 2001 agreed to call for follow-up activities on the application of indicators to the regional fisheries management program. This provided favourable conditions to apply the AIBM structure into the Vietnamese fisheries.

Consequently, 18 researchers from RIMF and VIFEP were grouped the Marine Fisheries Specialists Team (MFST) working within a project funded by DANIDA in 2003. The MFST's terms of reference were to provide multi-disciplinary assessments and make recommendations for sustainable management and development of marine capture fisheries based on requests of Ministry of Fisheries (MOFI) at the national level and Department of Fisheries (DOFI) at provincial level (Management, 2004). In order to institutionalize the multi-disciplinary approach into Vietnam, a seminar participated by very experienced experts involved in high level management decision-making in EU, ICES, Danish fisheries authorities, leaderships of MOFI and some key DOFI of Vietnam. At this seminar, the high-ranking decision-makers of the Vietnamese fisheries were taught the way to operationalize the multi-disciplinary approach and the AIBM structure (figure 8.1).

The MFST is the core element of the structure. It is in charge of; i) analyzing commercial catch data, resources data, biological indicators, fishery fleet data and economical and socio-economic data, ii) giving recommendations on sampling programs necessary for assessment reports of resources and commercial catch, iii) providing multi-disciplinary assessments on fisheries based on sustainable fishery indicators, and iv) giving assessments and recommendations on fisheries on ad hoc requests from MOFI (Management, 2004). This structure assumed that: i) all data on fisheries and fish stocks must be available, ii) there are enough resources for MFST to work, iii) the fisheries managers (i.e. MOFI, DOFI) make requests for consultation to MFST. These conditions were provided sufficiently within the project funded by DANIDA.

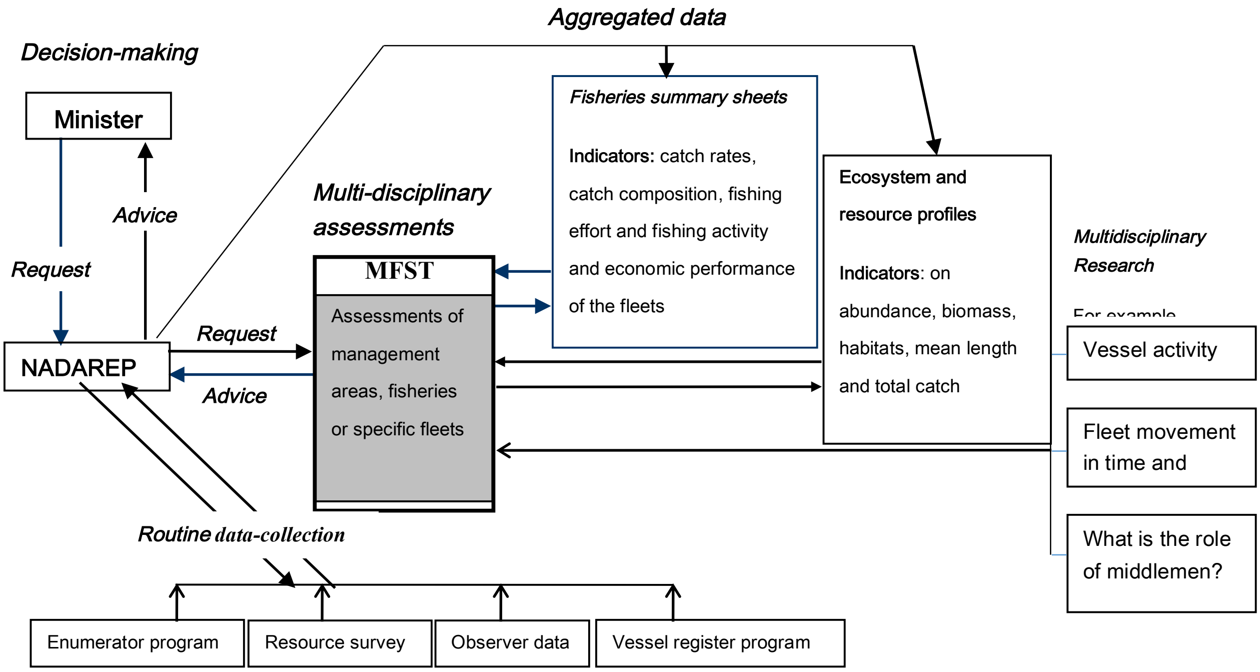

Figure 8.1: The AIBM structure for the Vietnamese fisheries (Raakjær et al., 2007).

In order to enable MFST to perform its tasks, the project conducted a series of training courses on information technology, statistical analysis, fisheries assessment methodologies, specialized courses on specific expertise (e.g. fisheries social and economic science, fisheries biology and marine ecology, etc.) and skills in language, scientific presentation, reporting, publishing, etc. Furthermore, the MFST members were also coached by experienced experts in computerized techniques, data analysis, estimating and interpreting indicators, making assessment reports and presenting research results. Therefore, research capacity and skills of the MFST members were improved remarkably. They were able to provide the multi-disciplinary assessments and recommendations for fisheries management. Based on the available data, the MFST produced a series of multi-disciplinary assessments and advice for fisheries management according to general perspectives rather than specific requests from MOFI or DOFI in the pilot phase 2003-2005 of the project.

In 2005, Minister of MOFI issued a directive No. 08/2005/CT-BTS to institutionalize the AIBM structure into the MOFI administration (MOFI, 2005a). This assigned the National Department of Aquatic Resources Exploitation and Protection (NADAREP) receiving and maintaining the AIBM structure including the data collecting system and the management structure for the Vietnamese fisheries. It also assigned DOFI of 28 coastal provinces carrying out the routine data collection programs. Until 2007 when Ministry of Fisheries merged with Ministry of Agriculture and Rural Development (MARD), the MFST was consolidated and endorsed by Minister of MARD. Accordingly, the MFST was composed of 14 members who from NADAREP, RIMF, VIFEP and other relevant departments of MARD.

In 2006, the DANIDA project ended funding for collecting data in provinces. Most provinces stopped collecting data because of lacking human and financial resources on one hand, and its efficiency was not demonstrated clearly on the other hand. Only 6 provinces: Binh Dinh, Tien Giang, Tra Vinh, Soc Trang, Ben Tre, Bac Lieu had still remained collecting data until 2007. As a component of the project, the MFST was supposed to meet twice a year to implement analysis on the fisheries and fish stocks based on the available data collected by provinces. However, the MFST nearly disbanded itself in 2009 because the available data become poorer and poorer on one hand, and because they did not receive any requests for advice from NADAREP or Minister of MARD on the other. Until 2010, the project received a request from DOFI of Nghe An to assist them in developing a fisheries data collection project and of Ben Tre to assist them in analyzing the data collected. The MFST funded by DANIDA sent experts to Nghe An and Ben Tre provinces to provide advice in 2010. After that, the MFST did not work and the AIBM structure was not in use in the Vietnamese fisheries.

8.3.2 AN EXPLANATION OF THE FAILURE OF THE AIBM STRUCTURE IN VIETNAM

As analyzed in chapter 4, the Vietnamese fisheries are managed by the fisheries planning system (i.e. strategy, master plan, five-year plan and annual plan). In which, the master plan is considered as a tool of planning the fisheries in Vietnam because it provides management objectives of fishing level and fishing capacity in the five-years and ten-years cycles. Theoretically, this should rely on the multi-disciplinary assessments provided by the

MFST. As analyzed in chapter 5, the multi-disciplinary approach to plan the fisheries was highly appreciated by many scientists and planners. In this agenda, not only conventional knowledge base (i.e. statistics on fish landings; exploitable potential yield estimation) was used, but other data were also referred to plan the fisheries 2001-2010. These data include socio-economic investigation of the fishing fleets and fishing communities (e.g. incomes, profits, catch rates, employment, livelihoods, etc.) and abundance of fisheries resources (e.g. catches per experiment fishing hour, species composition, etc.) collected by surveys in 1995-1997 funded by DANIDA. These data indicate a depletion of fisheries resources in comparison to previous surveys, and a decrease in catch rates as well as in revenue of fishing fleets. This created a new perspective in planning the fisheries in Vietnam.

In addition, four data collection programs were conducted in the Vietnamese fisheries within projects funded by DANIDA in 1996-2005. The first program was scientific surveys with research vessels for assessing the state of fisheries resources at experiment fishing stations throughout the Vietnamese waters. This program provided data on biological aspects of fish stocks (e.g. density, catch rates, and distribution patterns by species; species composition; size structure by species; etc.) for stock assessments. The second program was fisheries enumeration at landing sites. This program provided data on fish landings and fishing operation of fleets (e.g. landing by species/groups of species; value of fish landings; fishing costs; gears used; fishing grounds; number of fishing days; crew members; etc.) for estimating total landings and socio-economic aspects of fishing fleets. The third program was to estimate the fishing effort. This program provided updated data on number of fishing vessels by gear categories at provinces for estimating the total landings as well as fishing pressure on fisheries resources at specific waters. The fourth program was observation on the fishing vessels. This program provided data on fisheries resources as well as on fishing operations (e.g. density, catch rates, and distribution patterns by species; species composition; size structure by species; discards, number of fishing days; landings, value of landings; fishing costs; etc.) to cross check and supplement data for stock assessment and socio-economic research. These data were evaluated as the best set of fisheries data in Vietnam. They were also analyzed and interpreted into management advice by the best experts by the time of making the 2010 fisheries master plan. However, this was not used as a knowledge base for planning the Vietnamese fisheries in 2001-2010, instead the official statistics on total fish landings estimated by GSO and exploitable potential yield provided officially by RIMF were used as knowledge base for planning the Vietnamese fisheries in 2001-2010 as the conventional approach. This was a paradox of the fisheries planning system in Vietnam. The following sections try to explain this paradox.

8.3.2.1 Is the AIBM structure feasible for the Vietnamese fisheries context?

The feasibility of a management approach is influenced by two key factors (Rist et al., 2013): i) compatibility with the existing system (e.g. the complexity of the social, political and institutional context of management encompasses stakeholder engagement, institutional arrangement, management paradigm and relevance with management objectives). Issues such as institutional fragmentation, lack of leadership or conflict between stakeholders may make adaptive management infeasible; and ii) management resource availability includes finance to support system, expertise and capacity for analysis and monitoring. The adaptive management may be possible to reduce uncertainty, the benefit of doing so may be outweighed by the cost of performing the required experiments or may be unrealistic given the resources at a manager's disposal.

Based on the direct observation of operationalizing the MFST in 2003-2012, the application of the AIBM structure seemed to be not feasible for the existing context of the Vietnamese fisheries due to incompatibility with the existing institutional arrangements and without the management resource availability as analyzed below.

Compatibility with the existing system

The AIBM structure was infeasible for the Vietnamese fisheries because of conflicting with the existing institutional arrangements. The existing institutional arrangements caused three main constraints on implementing the AIBM structure in the Vietnamese fisheries. Firstly, the existing fisheries management in Vietnam followed the production-based growth paradigm as analyzed in chapter 5. It employed the TC-based approach to plan its fisheries. This approach took the estimations of total landings and exploitable potential yield as the knowledge inputs. These knowledge inputs were estimated by empirical formulas, they thus were easily manipulated to meet political preferences by changing the value of empirical coefficients as analyzed in chapter 6. By using these empirical formulas, specific figures (i.e. total landings, and exploitable potential yield) used for planning fisheries were calculated simply and easily. However, this was much uncertain and high risk for sustainable utilization of fisheries resources as analyzed in chapter 6. It was commonly said that *"birds in the sky, fish in the water"* in Vietnam. This means that the fish would be never depleted, as they recruit naturally. Agreed with this, a former director of RIMF acknowledged that they did not know the recruitments of fish stocks, but let fishers fish as long as their business remained viable. In line with this perspective, a deputy director of RIMF also added that they could be allowed to fish at a level of catches higher than the standing biomass estimation. This means that the existing management system accepted uncertainties in assessing the fish stocks and fisheries to plan a desirable growth rate of catches.

Clearly, the existing fisheries management system in Vietnam followed the production-based growth paradigm rather than the conservation one. It was favoring short-term economic growth at the expense of long-term sustainability. It was a paradox that managers endorsed application of the AIBM to reduce uncertainties in assessing the state of fish stocks, fisheries ecosystem, and fishing fleets. The AIBM structure is broader and more comprehensive than the TC-based approach. It advocates the conservation perspective and sustainable utilization of fisheries resources rather than the production-based growth paradigm. It takes into account the state and changes of core components in a whole ecosystem and their interactions through a set of indicators to understand best about the system being managed. Based on this, in combination with the precautionary principles, managers decide management measures with the lowest level of uncertainties and risks for the fisheries resources and ecosystem. Clearly, the AIBM structure did not support for the existing approach to management of the Vietnamese fisheries.

Secondly, in terms of engaging stakeholders, the AIBM structure provides platform for fisheries stakeholders to interact and share information in an agreed format – the indicators. The indicators present the links between visions and objectives and actions in the management process (FAO, 2003). In this structure, fisheries stakeholders are invited to share information and experience to reduce uncertainties. Fishers often see ecosystem changes and follow interests different from scientists and managers. Therefore, they are required to share understanding of the system and translate their knowledge into mutually agreed indicators to establish collective actions (Degnbol, 2005). Meanwhile, the knowledge inputs for planning the fisheries were estimations of total landings and exploitation potential yield produced implicitly as mandate by the government institutions (see chapter 6). The other stakeholders' knowledge was just considered as reference according legal regulations (Government of Vietnam, 2006; Prime Minister, 1998), and most of them did not have any specific knowledge to share and debate in planning fisheries because they did not have a data collection system or relevant information as the personal observation in planning the fisheries in Vietnam. They are volunteer organizations and not allocated resources nor mandated any fisheries management related tasks. This meant that the existing system did not provide favourable conditions for stakeholders to involve in the fisheries management process in Vietnam. This would reduce effectiveness of the AIBM structure.

Thirdly, the existing organizational arrangements were also an obstacle to implementing the AIBM structure in Vietnam. Actually, any fisheries management related tasks (e.g. routine works, projects, management tasks, research services, etc.) were assigned to institutions accordingly to their functions and responsibilities adopted by the government. An institution was allowed to provide services (i.e. fisheries research, education and training, consultation, management advice, investigation, etc.) if it had legal status, bank account and seal. For instance, the project of making the 2010 fisheries master plan was assigned to VIFEP, but not allowed to give the MFST because MFST was not recognized as a legally official body in practice. This meant that the MFST – a core element of the AIBM structure was not a legal body to provide any fisheries management related tasks as other institutions of MOFI on one hand, it was also not provided any budgets to work on the other since after the DANIDA project ended funding. Consequently, it had never been asked for advice by minister or managers of MOFI. In addition, MFST was not an official body, it just worked with support and used data collected from DANIDA project. It was not allowed to access to data collected from other sources (i.e. anchovies stock assessment project; small pelagic fish stock assessment project; fleet data from provincial fisheries; etc.). It may be different from other fisheries that data and information related to fisheries management such as stock assessments, scientific surveys, fishing effort, socio-economic information of fishing fleets, etc. seem to be private assets in Vietnam, they are not shared widely within the fisheries communities as in EU fisheries. This means that the MFST did not have recourses as well as mandate to work after DANINA ended funding.

Management resource availability

In terms of the financial costs to the AIBM structure, fisheries management in Vietnam relied on two knowledge inputs of the fish stock assessments and the total fish landings (see chapter 6). The government gave a mandate to RIMF to provide the stock assessments and to GSO to conduct statistics of total fish landings. The costs for this structure was not evaluated, but they were annually allocated as the administration costs based on the number of staffs and funded by specific projects. In fact, managers thought that for the operationalization of the AIBM structure, the government would pay an annual additional budget equal to the amount of money funded by DANIDA to maintain the data enumerator programs. This was not possible for the Vietnamese government as argued by the former of Department of Planning and Financial of MOFI. MOFI was also unable to convince the Prime Minister to disband the GSO and establish the fisheries data collection system at the local level. This was proved by the failure of the directive No.08/2005/CT-BTS on request the provincial government to maintaining the fisheries data collection system established and funded by the DANIDA project in 1996-2005. In fact, all (28) coastal provinces stopped fisheries data collection in 2007 because the financial and human resources were not allocated. The fisheries data were collected by the GSO to estimate the conventional indexes of total landings and number of vessels. Therefore, the fisheries data collection system of the AIBM structure was not maintained when DANIDA ended funding in 2005.

In terms of expertise, all Vietnamese fisheries researchers and managers were educated in fisheries management based on the stock assessment models (i.e. mathematic models to estimate standing biomass, exploitable potential yield, MSY, recruitment yield). This was suited with the conventional approach, in which managers need estimations of the standing biomass and the exploitable potential yield to plan their fisheries. Therefore, fisheries researchers used the stock assessment models to answer the questions asked often by the fisheries managers (i.e. how many fish we have in the seas, and how many fish we can catch from the seas). Any approach that did not answer these questions would not be accepted by the existing fisheries managers. In fact, a Vice Minister (at a meeting in 2016) refused a report of a stock assessment provided by RIMF because it did not provide the estimation of the exploitable potential yield of the fisheries resources in the Vietnamese waters. This was an obstacle to implementing the AIBM structure because this structure based on the adaptive indicators rather than the projection of the state of the fish stocks in the future used in the conventional approach.

In addition, the AIBM structure recognizes the realistic fluctuations of the fish stocks and fisheries to make adaptive management actions in response to changes of the system under management. It was absolutely new to the fisheries researchers and managers in Vietnam. This was such a complicated process and requires much more data than the empirical formulas as evaluated by the head of the MFST. Indeed, interpretation of indicators into the fisheries management plans were so complicated and hard for the Vietnamese fisheries scientists as observation in 2003-2005. The MFST were unable to define the fishing mortality of fish stocks as well as the fishing effort for a fisheries management plan. This made managers susceptible of the feasibility of the AIBM structure would help them managing their fisheries better.

Another reason leading to impossibility of AIBM structure in Vietnam may be the scientific reputation of the MFST. Though most of them were young and have good skills in computer and language, but with less practical experience in doing research. A former vice director of NADAREP evaluated that the MFST members were just suited for working as the project staff rather than scientists to provide management advice. In addition, the existing management system were not capable to implement policy experiments and learning process because all fisheries planning decisions were not implemented as analyzed in chapter 7. A monitoring and analysis system to evaluate and review the indicators was also not available in Vietnam.

8.3.2.2 Is the AIBM structure appropriate to Vietnamese fisheries?

In the conventional approach to planning fisheries in Vietnam, the numeric objectives (i.e. total catches, number of fishing vessels) by specific year must be determined clearly. This approach took the estimation of exploitable potential yield as a knowledge input, which is obvious intuition, and more easily accepted by managers and other stakeholders. Furthermore, the exploitable potential yield is calculated clearly by empirical formulas (see chapter 6) which was popularly used as told by scientists from RIMF. A former director of RIMF believed that the ecological uncertainties were addressed in empirical coefficients. Therefore, managers also believed this was the case. They were also convinced with clear number which made them easier to communicate as well to calculate other resources allocations within the planning system of the government as told by a former director of Planning and Financial Department of MOFI in 2012. However, it is not the case in fact. The empirical formulas to assess fish stock assessments were almost not used in global fisheries because it is not suited with the exploited fish stocks (Sparre & Venema, 1998) on one hand, and is highly uncertain as a single species approach (Kesteven, 1997; Larkin, 1977, 1996; Sissenwine, 1978).

Meanwhile, the adaptive management acknowledges uncertainty and in which managers may make decisions as experiments within appropriate scales to probe responses of ecosystem changes, even in cases of poor information (Lee, 2004; Raakjær et al., 2007; Walters, 1986). This was strange concept to the Vietnamese fisheries managers and researchers as observed at the MFST discussions in 2003-2005. Decision-makers are not allowed to experiment with a national policy and livelihoods of millions of people as noticed by a former director of Planning and Finance Department of MOFI. He argued that the government should not change its policies adaptively in a short time. For instance, the property of fishers (e.g. vessels, gears, fishing equipment, etc.) would be wasteful if the government decided to reduce fishing effort for conservation purpose. Therefore, the adaptive management was not appropriate to the existing perception of majority of the Vietnamese fisheries managers and scientists who seemed to accept the uncertain numbers, but clear rather than the unquantified objectives, but within a precautionary manner as my personal observation in the Vietnamese fisheries.

In addition, it is almost impossible to define appropriate scales to apply the adaptive management in the Vietnamese fisheries. In fact, the Vietnamese fisheries were complicated, characterized with multi-species, multi-gears and multi-fleets. Characteristics of resource base and fisheries were seasonally changeable. Most pelagic fish stocks (accounted for 70% total fish biomass) migrated from the shore to deeper waters and from the north to the south between the Southeast monsoon to the Northeast monsoon and vice versa (Chung, 1997a). Accordingly, the fishing fleets were also movable or changed the gears to maximize their catches (see chapter 7). In addition to this, the coastal waters were divided into 28 sections under authority of 28 coastal provinces. Therefore, it was almost impossible to define a scale where its dimensions were nearly the same so that design an appropriate monitoring plan to evaluate impacts of the management decisions in reality of the Vietnamese fisheries as argued by Mr. Dinh - a very experienced scientist from RIMF in 2005.

8.4 IMPLICATIONS OF INNOVATIVE MANAGEMENT APPROACHES IN THE VIETNAMESE FISHERIES

As analyzed above, both the co-management and adaptive indicators-based management structures were welcomed and endorsed by high-ranking leaderships of the Vietnamese Ministry of Fisheries. This was really curious for international sponsors to assist the Vietnamese fisheries to improve. An apparent evidence for that is the World Bank project which has supported the fisheries co-management arrangement in 8 pilot coastal provinces in 2012-2018. As personal observation, the most important result of introducing the co-management arrangement into Vietnam was the improved perception of the Vietnamese fisheries stakeholders on the importance of conservation of the fisheries resources and marine habitats, especially the local communities. Similarly, for the AIBM structure, perception and understanding about using knowledge bases for assessing, planning fisheries of the fisheries managers and scientists were enhanced. These should be a solid foundation for the Vietnamese fisheries to move forwards to the better regulated fisheries if obstacles in the institutional arrangements are addressed accordingly. In a system where the fisheries management plans are implemented to control the fishing activities in practice, then these structures would be useful.

For the co-management arrangement, investigation in three models (i.e. Quang Thai, Vinh Giang, and Dien Hai) in province of Thua Thien Hue shows that they were very close to the community-based management as done in Japan as illustrated by Yamamoto (Yamamoto, 2000). These models were under management of the Fisheries Association (FA) is the same with the Fisheries Cooperative Association (FCA) in the Japanese models. The difference was the body decided fisheries management plan is the district government, was not the Fisheries Coordination Committee (FCC) who is legally established the fisheries law in Japan, is not a part of prefecture government and work on behalf of the local fishers (Yamamoto, 2000). The fishing licenses was used as a management tool in these models. Only fishers were given a fishing license were allowed to fish in the local waters. Although, the FAs were not authorized to extract non-licensing fishers or punish sanctions with illegal fishers, but violations of the fisheries regulation in these communities have reduced apparently as argued by the head of the provincial fisheries authorities. He believed that effectiveness of fisheries management would be better if the government shared power in deciding management plans and enforcing fisheries regulations with the fishing communities as the FCC and FCA established in Japan. This should be further examined to understand the profound constraints in sharing power and responsibilities for managing fisheries to enhance the effectiveness and efficiency of the fisheries management system in Vietnam.

The failure of the adaptive indicators-based management structure introduced by DANIDA was just a special context where its institutional arrangements and human capacity did not enable the structure to work properly. In fact, this structure was revisited in recent years in Vietnam when managers were confronted with the question of how many vessels would be reduced in the waters of the Vietnam-China Fishery Agreement and other specific waters. Many fisheries managers and scientists were convinced by the AIBM structure. Actually, the AIBM structure was interpreted as a system having two elements: i) a monitoring system to measure fishing effort and landings to estimate the current status of the fish stocks and its underlying production relationships; and ii) a response system that enables managers to increase or decrease fishing effort as required to track the moving biological indicators and economic variables (Hilborn & Sibert, 1988). Therefore, the fisheries data collection programs (i.e. scientific survey program, onboard observer program, landings enumerator program, and fishing effort program) were implemented systematically in 22/28 coastal provinces since the end of 2016 within the project of comprehensive investigation of the marine environment and resources in 2011-2020. Moreover, in a personal discussion with a deputy director of RIMF and director of Conservation of Fisheries Resources – D-

Fish[32], both of them acknowledged that the AIBM structure introduced by DANIDA project (Management, 2004) would be re-introduced into the Vietnamese fisheries and they advocated the MFST to work again to provide multi-disciplinary assessments and management advice for D-Fish. However, operationalization of the structure is still moving forward. It may be successful or may not as it was in the DANIDA project in 2003-2012. It is evident that acceptance of a new management approach from the developed fisheries to developing fisheries took a certain delay, nearly 20 years. This is nearly the same with the introduction of the MSY concept to the Vietnamese fisheries. This concept was used commonly in the world in 1970s, but it was just conceptualized in the Vietnamese fisheries in 1990s.

8.5 CONCLUSIONS

In the 1990s, indications of a depletion of fisheries resources and reduction of viability of the fishing fleets became apparent in the Vietnam. This was valued as a result from the open-access regime and development policies of the production-based growth paradigm in the past. This situation, in combination with the context of international integration policy, created favourable conditions to introduce alternative fisheries management approaches into Vietnam. Alignment with the mainstream of the global fisheries management, the co-management and the adaptive indicators-based management approaches were introduced into Vietnam by that time. These approaches were evaluated appropriately with the Vietnamese fisheries and welcomed and endorsed by the high-ranking leadership of the Vietnamese Ministry of Fisheries. Therefore, they were applied in Vietnamese fisheries as the pilot projects funded by foreign sponsors. However, policy-makers still remained the conventional approach which prioritize the high growth rates of catches and fishing capacity rather than the conservation of fisheries resources for sustainable development of the fisheries. This was the biggest constraint on successful implication of the co-management and the adaptive indicators-based management structures in the Vietnamese fisheries.

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[32] The former one is conducting fisheries data collection programs; and the later one decides research design, provides budgets and use the data for managing fisheries. Both of them used to be a membership of MFST who were trained to operate the AIBM structure.

Although implementation of these approaches was not very successful, it resulted in certain implications for the Vietnamese fisheries. The perception of the Vietnamese fisheries stakeholders was improved in terms of using knowledge bases for assessing and planning fisheries, and participatory mechanism to enforce fisheries management actions at the local communities. By participating in the fisheries co-management models, awareness of the local fishers on the conservation of fisheries resources and marine habitats was enhanced. Therefore, compliance with fisheries regulations of the local fishers was improved, using destructive fishing gears and methods was also reduced in many coastal waters.

This research argues that the fisheries co-management arrangement in Vietnam was at the early stages (i.e. instructive, consultative stages) of the spectrum of the co-management arrangements defined by Sen & Raakjaer (Sen & Raakjaer, 1996). Most of fisheries co-management models (16/22) implemented in Vietnam were classified as the instructive level of the co-management where the government informs regulations and policies, and local communities participate in enforcing the regulations and policies within their communities. Only 6/22 models were classified as the consultative level of co-management where the local communities are consulted before government deciding management measures. Implementation of the fisheries co-management models contributed to enhancement of compliance with the fisheries regulations of the local fishing communities and reduction of management costs of the fisheries authorities. This research also found that the community-based management seemed to be suited for managing the coastal fisheries in Vietnam, if the government shared management authorities with the fishing communities.

The adaptive indicators-based management structure never moved from a pilot project to implementation in Vietnam due to a lack of supportive institutional arrangements in the existing management system in 2003-2012. This structure was refined and re-introduced into the Vietnamese fisheries to design the fisheries data collection programs (i.e. scientific surveys of fisheries resources; fisheries enumeration at landing sites; structure of fishing fleets at provinces; and observer program on fishing vessels) and to provide multi-disciplinary assessments of the fish stocks as well as socio-economic aspects of fishing fleets in period 2016-2020.

This research found two key constraints on supporting alternative approaches to fisheries management in Vietnam: i) the existing institutional arrangements; and ii) a fisheries management framework. The existing institutional arrangements are designed to implement the centrally planned regime which the government control management authorities with little rooms for the NGOs and local fishers to share power in deciding fisheries management measures. The existing institutions were also inflexible to promote changes and innovation. It took a delay time of around 20 years to adapt to the innovation. The existing management framework in the Vietnamese fisheries just emphasized the stage of making plans. The other stages of the management process (e.g. implementing management plan, monitoring effects, responding to changes, etc.) were ignored or less taken into account. This was the main reason leading to unsuccessful implementation of the co-management and adaptive indicators-based management structures in Vietnam.

This research also found that the international sponsors took the critical role in initiating and remaining the models of application of new approaches (i.e. co-management, AIBM structures). Most of models would collapse if the international sponsors ended their funding. This research also pointed out a paradox that the competent agencies of the government advocated introduction of new approaches, but they were reluctant to change and promote implementation of these approaches in practice. This attitude would change if the fisheries management plans are enforced in practice under the pressure of the international relationships such as implementing the fisheries management plans in the waters of the Vietnam - China Fishery Agreement or the formal warn of the European Commission of the illegal, unreported and unregulated (IUU) fishing. The Vietnam-China Fishery Agreement requires to determine the number of fishing vessels of each side are licensed to fish in the agreement waters. This pushed the Vietnamese government to implement the agreed management plans and monitor their outcomes for negotiating with China to make management plans to control fishing activities in the agreement waters. The European Commission warned officially the government of Vietnam for its ineffectiveness to combat IUU in 23 October 2017. This causes difficulties for exporting the Vietnamese fisheries products into the European markets. In order to remove this, the Vietnamese fisheries authorities should implement their management plans to control fishing activities effectively as advised by the European Commission. Not only European Commission, but also other markets such as United State coerce Vietnam into the conservation paradigm, if Vietnam would remain access to important export markets.

CHAPTER 9: DISCUSSION AND CONCLUSIONS

This research examines the effectiveness of a fisheries management system in a developing context as the Vietnamese fisheries. It reveals that a symbolic planning system underpinned by an economic growth-based regime makes the management system ineffective and leads to the fisheries in a crisis. In this regime, a fisheries system is presented in a contradictory manner which creates ambiguous backgrounds for making inconsistent policies. Its findings contribute to understanding about ineffectiveness of a fisheries management system in the developing context like Vietnam. It also provides implications and lessons learnt for implementing innovative management approaches to improve effectiveness of a fisheries management system.

Following the research questions, below sections reflect the main findings and theoretical reflections related to five research questions asked in chapter 1. Finally, it suggests future researches to improve effectiveness of a fisheries management system Vietnam.

9.1 RESEARCH QUESTION 1: What are challenges facing the fisheries management system in Vietnam?

i) What is the situation of the natural system (fish stocks and marine biodiversity?

ii) What is the situation of the fishing industry and the local fishing communities?

iii) How is the fisheries management system organized?

This research shows that the fisheries system of Vietnam is in a crisis and reflected in three facets: i) these available data provide a contradictory understanding about fish stocks and their ecosystems; ii) fishing is considered as a means for providing livelihoods and employment for coastal communities and for ensuring national security at sea; and iii) management tools are established in the planning system of government, but not enforced in practice. These facets of a fisheries system are coexisted and closely associated with each other. They are both a cause, but also is a consequence of each other and vice versa.

This research confirms that the fisheries system approach enables managers to understand the dialectical relationship among three components of a fishery system in general and the small-scale fisheries in developing fisheries like Vietnam: i) the management system; ii) the human system; and iii) the natural system. Base on this approach, this is the first time that the Vietnamese fisheries are analyzed comprehensively and inclusively. This reflects that the fisheries system approach is suited for analyzing the small-scale and dispersed fisheries in tropical waters like Vietnam.

The natural system (i.e. fish stocks and marine biodiversity) in the Vietnamese fisheries context is reflected through collective numbers of the standing biomass and exploitable potential yield estimated by mandated research. Accordingly, the volume of these numbers seemed to increase in the last two decades from 3.1 million tons of standing biomass and 1.3 million tons of exploitable potential yield in 1993 to 4.4 million tons to 2.5 million ton in 2015. These numbers do not tell anything about the state of the fisheries resources because they hid the actual facts such as the area and time of investigation, data sources and methodology used to calculate, etc. However, they were accepted and guaranteed as an official knowledge base for assessing and planning the fisheries in Vietnam. At the same time, a depletion trend of fisheries resources was documented by a decline in catch rates of experiment fishing in scientific surveys as well as of commercial fishing fleets in the same course. In addition, ecological changes were also observed in recent years. Many species disappeared, the proportion of long-lived fish in total landings became less and less, whereas the ratio of trash fish became more and more. Clearly, these data provide a contradictory understanding about the fisheries resources and marine biology in Vietnam. Based on this, the state of fisheries resources can be interpreted into different portraits to guide policy accordingly to political aspirations. This is strongly supported by a government-based management regime which the knowledge base for managing fisheries was constructed by mandate researches. It is connected with a management system which follows the short-term economic growth paradigm over the sustainable utilization of fisheries resources one.

Recent research investigation shows that incomes of local fishers have increased and living standard of fishing communities have improved. However, some other researches provided the total fish landings estimation which much higher than that published by GSO. They also documented that many fishing vessels in some provinces did not maintain fishing operation due to economic loss, this pushed government launching subsidy programs. It is evident that these available data also provided confusing understanding about situation of the fishing industry and fishing communities in Vietnam. In one way, policies to encourage fishing communities to enhance fishing capacity would be made if policy-makers take official statistics as a knowledge basis. This way was adopted for the Vietnamese fisheries and government have subsidized fisheries since beginning of the 1990s. This is a cause resulting in overcapitalization and overcapacity of fishing fleets and put the fisheries in a vicious cycle (Raakjær, 2009). Overcapitalization of fishing fleets was a reason leading to collapse fisheyes in the world (Charles, 2001; Raakjær, 2009). In order to address this issue, government may introduce precautionary principles into its policy that freeze the existing fishing effort until having more knowledge in fisheries system (FAO, 1996a; González-Laxe, 2005).

In the management facet, the fisheries law 2003 assigned the central government (Ministry of Fisheries, nowadays Ministry of Agriculture and Rural Development) manage fishing activities at the offshore waters (i.e. beyond the line 24 miles far from the shore to the limitation of the Vietnamese EEZ), and the provincial manage fishing activities at the coastal waters (i.e. within the shore to the line 24 miles far from the shore). It also states that fishing activities are managed by a combination regime of limitation of total catches that ensure sustainability of fisheries resources (outputs control), of limitation of fishing effort that commensurate with productivity of fisheries resources (inputs control), and compliance with technical measures. The first two tools are established in a dual planning system nested by the general socio-economic planning system and the fisheries planning system the fisheries planning system operated in four levels of the government (i.e. national, provincial, district, and communal levels). However, there is a lack of mechanism to implement these management tools in practice of the Vietnamese fisheries. The technical measures such as mesh size, gear categories, fish size to be caught, fishing zones, etc. are regulated in decrees, directives and decisions adopted by the Prime Minister; circulars, directives and decisions of Minister of Fisheries; decisions and directives of Chairman/Chairwoman of the Provincial People Committee. This system is supported by mandate research and management tasks such as fish stock assessments and fish landings statistics. This research reconfirmed that the existing fisheries management system is not effective due to a weakness of the formal institutions (Dang et al., 2017) and poor compliance with the fisheries law (Pomeroy et al., 2009), but also found that it is a lack of mechanism to enforce the management tools established in the fisheries planning system of the government.

This research argued that the government (i.e. Ministry of Fisheries) stay in a paradox. On one hand, it tried to show a growth in total fish landings to prove its achievements. It also presented indications of overexploitation of fisheries resources and unstainable development of fisheries. This resulted in a contradictory understanding about the existing state of fisheries and confusing polices for the coming planning periods.

9.2 RESEARCH QUESTION 2: How the fisheries master plan deals with the issues of the fisheries in Vietnam?

i) What is background (i.e. issues facing fisheries management system) to formulating the 2010 fisheries master plan?
ii) How are fisheries discourses emerged and institutionalized into the 2010 fisheries master plan?

A master plan was introduced into the planning system of the government in 1998 for planning economy and sectors. It takes a role of connections between political strategies and operational plans (i.e. the five-year plan, and the annual plan) in the planning system of the government. The master plan provides development and management objectives of economy or sectors by the coming five or ten years. By this time, the national economy in general and fisheries in particular were implementing the reform policy. This means that the fisheries master plan in 2001-2010 was developed in a transition from the centrally planned regime to the market-oriented based regime. It was, therefore, strongly influenced by the production-based growth paradigm in the centrally planned regime on one hand; but also, by demands for conservation of fisheries resources to deal with depletion of many fish stocks in traditional waters and sustainable development perspective of the international fisheries management mainstream.

This research found that there were three fisheries discourses debated during the course (1997-2005) of making the 2010 fisheries master plan in Vietnam. The government (i.e. Ministry of Fisheries) contradicted themselves to advocate the production-based growth paradigm on one hand, but also to support conservation perspective on the other. In annual reports, MOFI presented its achievements of steady increase in total fish landings and fishing capacity in 1990-2005. This was a basis advocating the production-based growth paradigm. In those reports, MOFI also stated the fisheries resources were overfished and destructive fishing methods were employed commonly. This suggested to plan fisheries toward conservation paradigm. Whereas, the scientists who were contracted to make the 2010 fisheries master plan consisted with conservation paradigm. The policy-makers view the fisheries as other sectors which make a contribution to the growth rate of the national economy, and disagreed the conservation perspective of the planners. This category of conflict may emerge in a context of poor fisheries data and of knowledge communication in an implicit manner. In such a context, policies may be decided consistently. As a consequence, the 2010 fisheries master plan of Vietnam was decided contrastingly. The total catches by 2010 was set increasingly and higher than the exploitable potential yield, but the fishing vessels were planned to reduce by nearly 50% of the figure in 2005. And there were no action plans nor programs to implement this master plan in Vietnam.

The research adds a new type of conflict among actors – conflict between planners and policy-makers in planning fisheries to a range of fisheries conflicts identified by previous researches (Charles, 1992; Muawanah et al., 2012; Salayo et al., 2006). This type of conflict may emerge in a context of the fisheries: i) in transition period between the centrally planned economy and the market-oriented based economy; and ii) of poor available fisheries data and less explicit mechanism to validate and communicate knowledge in planning fisheries.

9.3 RESEARCH QUESTION 3: How uncertain are the objectives of the fisheries master plan?

i) How was the TC-based management approach conceptualized in the Vietnamese fisheries?

ii) What and how knowledge inputs were used to define total catches (TC) in Vietnam?

Although the fisheries planning system was changed from the centrally planned regime to the market-oriented based regime, the TC-based approach has been used for planning the fisheries in Vietnam. The TC-based approach takes the volume of total catches as the overarching objective. In nature, this approach is to draw out a promising potential for enlarging the fisheries to meet increasing demands of people. Therefore, this used to support well the production-based growth paradigm under the centrally planned fisheries of Vietnam. This approach created an open-assess fisheries regime in Vietnam and resulted in overexploitation of fisheries resources in the 1990s. In order to address this issue, concept of TC was re-defined as the total allowable catch in the fisheries law 2013. The TC, therefore, should be established based on the stock assessments to ensure sustainability of the fisheries resources on one hand, but it also should be compatible with the growth rate of total fish landings of the previous periods.

This research recognized that the TC-based (i.e. output control) approach which based on the exploitable potential yield (EPY) interpreted as the MSY and the statistics of fish landings support well the production-based growth paradigm which follows the objective of increase in catches. In this approach, the EPY may be estimated by empirical formulas using empirical coefficients and statistics of fish landings which may be easily manipulated to meet political interests. Therefore, the EPY estimations and statistics of fish landings are often adjusted toward a figure that guarantees the growth rate of catches would be acceptable.

The TC-based approach takes the outcomes of fish stock assessments and statistics in fish landings as the knowledge base. Fish stock assessments provided a death figure of total exploitable potential yield (EPY) of all species in specific waters. Statistics also present a death figure of total fish landings of all species and of all fishing fleets in administrational territories of the whole country and of the province. These figures do not reflect the real state of the exploited fish stocks in terms of the biomass, age structure, recruitments, natural mortality, etc.; nor the fishing pressure on the fisheries resources and ecosystem in terms of fishing mortality by species in specific areas, changes in species composition, the size of caught fish, etc. Clearly, these data are unspecific to draw out an informed and meaningful understanding about the state of fisheries resources and fisheries.

Furthermore, this research argued that the estimations of EPY and total fish landings used for planning the TC of the 2010 fisheries master plan are incredible. The EPY was estimated based on the out of date data on one hand, and by incompatible method on the other. The total fish landings were estimated influentially by the political perspective and controlled within a limitation range. It seemed to be manipulated to fit to the growth rates adopted by political solutions and a normative rate of less than 5% in comparison to the previous year. In addition, the methodologies used for these estimations are empirical formulas which use empirical coefficients. The validation and communication of these estimations are also conducted implicitly within normative protocols adopted by competent institutions of the government. By this way, it is easier to adjust to meet the political aspirations. Therefore, the TC-based approach has still been use to plan the fisheries in Vietnam and also in other fisheries in the world (which called as the TAC-based approach). This approach support and is associated with the production-based growth paradigm.

In terms of knowledge base used for managing fisheries, this research goes further previous researches (Haggan et al., 2007; Motos & Wilson, 2006) to conclude that the fishers' knowledge is not used for planning the fisheries and making fisheries regulations in a government-based fisheries management system like Vietnam. This research also identified a new type of knowledge – the statistics of fish landings which is not the scientific knowledge produced by scientists nor indigenous knowledge produced by fishers as defined by previous research (Degnbol, 2005; Haggan et al., 2007; Motos & Wilson, 2006). This knowledge produced by government officials in a hierarchically administrational system of the General Statistics Office which is not an expertise institution of fisheries. It may be distorted and adjusted to meet political interests. This may undermine the trust of local fishers to the fisheries management system operated by the government. As a result, the gap between the state planning system within the government system and reality of fishing communities is deepened. The legitimacy and compliance of the local fishing communities with fisheries management decisions become lower and lower. Ultimately, this type of fisheries management is not implemented effectively as clearly seen in the Vietnamese fisheries.

This research argued that the government-based planning system originated from the centrally planned fisheries no longer fit with the existing market-oriented based fisheries in Vietnam. In addition, the TC-based planning system was not suited for the small-scale fisheries with dispersed fishing fleets as Vietnam. It failed in Vietnam, albeit it was operated in the centrally planned regime which all fishing vessels are collectivized and possessed by government and all landings are enumerated by state agencies in the 1970s-1980s. In such fisheries, the government could not provide resources to control a huge range of landing sites and all landings of every vessels on one hand. The other hand, the government cannot provide resources to collect data and operate complicated system in assessing and projecting the state of fish sock in the future. Instead, empirical formulas are used to produce incredible knowledge with much uncertainty. This reconfirm arguments of previous researches (Kato, 2001, 2012; Raakjær, 2004; Thia-Eng & Pauly, 1989; Wilson et al., 1994) that the fisheries management approach based on the resources management like the TC-based approach is not suited for the small-scale and dispersed fisheries in the tropical waters.

9.4 RESEARCH QUESTION 4: How the fisheries master plan intervenes the fishing communities in Vietnam?

i) How are the 2010 fisheries master plan was implemented at the local level?
ii) What are preferences and interests of the local fishers?
iii) What and how are factors influencing on the fishing behaviours of the local fishers?

Although the management tools (i.e. total catches and number of fishing vessels) were established in the 2010 fisheries master plan of Vietnam, they were not enforced at the fishing communities in practice. The total catches were not divided into catch quotas and allocated to fishing vessels. As a result, the volume of catches of fishing vessels in Vietnam are not limited, it is decided by fishers in practice. Similarly, the number of fishing vessels was just planned in the master plan at the national level. It was not allocated to lower levels (i.e. provincial, district, communal levels) to control in practice. Consequently, fisheries authorities are free to issue permission to build more fishing vessels. This means that the existing fisheries in Vietnam are under the open-access regime which fishers are free to catch as much as they can.

This research supplemented that the ineffectiveness of the fisheries management system in Vietnam is not only due to the weakness of the informal institutions (Dang et al., 2017), and due to a poor compliance with the fisheries law (Pomeroy et al., 2009); but also due to the management tools planned in the fisheries planning system are not enforced in practice. In fact, the management tools (i.e. total catches, and number of fishing vessels) are decided in the fisheries planning documents of the government in four levels (i.e.

national, provincial, district, and communal levels), but they are not enforced at the fishing communities in practice.

Under this regime, fishers tried to maximize their catches and profits. This research found that a majority of local fishers do not get out fishing industry. Many of them intend to enhance their business to improve the catch rate and the catch quality, the others intend to enlarge their business to increase total catches and profits. The local fishers imitate each other to improve their fishing gears and equipment to increase fishing efficiency, and also collaborate each other to reduce fishing costs and increase profits. All fishers in Vietnam are interested in the subsidy programs of the government. They always call for and expect subsidies from the government to reduce fishing costs and upgrade, enhance their fishing business.

This research identified three categories of fishers who have different fishing behaviour (i.e. making strategic decisions, and tactical decisions). The fishers of "fishing to live" whose family live dependently on the fishing, and they intend to invest more in fishing to enhance and enlarge their business. This type of fisher accounts for around 30% of total fishers, and is increasing in Vietnam. The fishers of "fishing for changing life" who want to change their business to be the large-scale fishers or to be no longer professional fishers. This type of fisher accounts for more than 60% and is decreasing in Vietnam. The other type of fisher is the fishers of "fishing of opportunists" who entered the fishing industry to get subsidies from government. They do not have much experience in fishing and do not intend to live with fishing for a long time. The number of this type of fisher accounts for a very small ratio in comparison to the other types of fishers in Vietnam.

This research identified seven factors influencing the strategic decisions of the Vietnamese fishers, including: i) fisheries regulations; ii) subsidy policies; iii) personal financial status; iv) management capacity; v) livelihoods of fishers' children; vi) labour availability; and vii) individual experience. Among them, the government's subsidies were the most important factor influencing the investment decisions (i.e. strategic decisions) of a majority of the Vietnamese fishers. They were not only the key motivation for all types of fishers to make strategic decisions to change, enlarge and upgrade their fishing business, but also were a motive for the fishers to maintain daily fishing activities at seas. The next factor was their own financial status. The others were ranked changeably by individual fishers.

This research found that there were eight factors influencing the tactical decisions of fishers, including: i) fishing season; ii) market; iii) weather; iv) personal experience; v) information; vi) informal rules; vii) fishing labour/crew members; and viii) fisheries regulations. Of these, the fishing season was the most important factor for all fishers to decide their daily fishing tactics. The other factors were ranked differently fisher by fisher in practice. This research also observed that the government's subsidies also influence the tactical decisions of many fishers of type 1 (i.e. fishers of *"fishing to live"*). Many of them in Tam Quan Bac went fishing to get the subsidies from the government.

This research found that all type of fishers ignored or less referred the fisheries regulations when they make both strategic and tactical decisions. Therefore, it argued that compliance with the fisheries regulations of the Vietnamese fishing communities is very poor.

This research identifies a new factor - the government subsidy influencing strongly and driving the local fishers' fishing behaviours that was not included in previous researches (Christensen & Raakjær, 2006; Salas & Gaertner, 2004). This research identified that the government's subsidy influence most the fishing behaviour of a majority of fishers in Vietnam. It encouraged fishers invest and enhance their fishing capacity in the long-term decisions on one hand, but also encouraged them to go fishing in the short-term decisions. A majority of the Vietnamese fishers enhanced their fishing business and remained their fishing activities thanks to the government's subsidies. This may be an indication of the vicious circle in the fisheries. This suggests that the financial policies would be an effective tool for controlling the fishing behaviour in Vietnam. For instance, government would remove subsidy programs, then fishers would have to rationalize their investment decisions and fishing tactics to optimize their capitals. This would result in removing type 2 of fisher (i.e. fishers of *"fishing of opportunists"*), and reducing number of fishers of type 1 (i.e. fishers of *"Fishing to live"*, and lessening type 3 of fishers (i.e. fishers of *"fishing for changing life"*).

Lessons learnt from subsidies leading to overcapacity were documented in some fisheries in the world (European Parliament, 2013; Gréboval, 1999; Raakjær, 2009). The existing situation of the Vietnamese fisheries seems to be the same fisheries in other countries (e.g.

European Union, Norway, United States, Canada, etc.) in 1970s-1980s. These countries used to subsidize their fisheries to enhance fishing fleets and enlarge fishing business. Consequently, the fish effort exceeded the productivity of fish stocks and fishing fleets were not viable. The government had to launch the buy-back programs. This is a lesson learnt for the Vietnamese fisheries. In fact, the Vietnamese fisheries have got into the vicious cycle where fishers get economic loss, then government subsidize to enhance fishing effort, then the size of fish stocks becomes smaller and smaller, and then the fishers' economic viable would decrease. This cycle has been iterating in the Vietnamese fisheries. This suggests that government should stop subsidy programs to prevent the fishing overcapacity and fisheries collapse as taken place in other countries in the past. If no, the costs for resolving overcapacity and recovering fisheries resources would be much higher than the budget subsidized the fisheries.

9.5 RESEARCH QUESTION 5: Why were innovative approaches not successfully implemented in the Vietnamese fisheries?

i) How the innovative management approaches were implemented in the Vietnamese fisheries?
ii) Do they improve the effectiveness of the existing fisheries management system in Vietnam?
iii) What are obstacles to implementation of these approaches in the Vietnamese fisheries context?

Two innovative management approaches: i) co-management, and ii) adaptive indicators-based management (AIBM) structures were introduced into the Vietnamese fisheries in the 1990s-2000s. Both of them are to improve effectiveness of the fisheries management system toward sustainable utilization of fisheries resources, thus they could help to address the existing issues of the Vietnamese fisheries (i.e. overexploitation of fisheries resources, and commonly using destructive fishing gears and methods). Therefore, these structures were welcomed and endorsed by Minister of Fisheries to implement in Vietnam. Consequently, the co-management structure and the AIBM structure were implemented in pilot projects funded by foreign donors in 1994 and 2003 respectively. These structures were designed, initiated and implemented by international experts within the pilot projects and with involvement of relevant fisheries stakeholders as departments of MOFI, research institutions, local fisheries authorities, and local communities. In general, this research concludes that the concept of the co-management and adaptive indicators-based management were introduced successfully into the Vietnamese fisheries. Most of fisheries managers, staffs, researchers, NGOs, and local fishers have learned about basic understanding about operating structures of co-management and AIBM to manage the fisheries. Perception on fisheries data and scientific knowledge for managing fisheries of fisheries managers in MOFI and local levels, of researchers was improved clearly. Therefore, fisheries data collection programs have been conducted throughout coastal provinces in Vietnam. Enforcement and compliance with fisheries regulations as well as awareness of the local users on fisheries resources protection were improved. Using destructive fishing gears and methods has reduced recent years.

This research found that the co-management structure was implemented in Vietnam at the beginning levels – the instructive and consultative levels which involvement of local fishers in fisheries management is limited. The local fishing communities were not shared management power in making and enforcing management decisions, instead, they were invited to assist local fisheries authorities in enforcing fisheries regulations within the community's waters. Local communities were not authorized to control fishing activities or manage fisheries resources within their local waters. They have also no rights to extract and arrest fishers who fish illegally in their local waters. At this point, this research observed that the international donors emphasized the involvement of local communities in enforcing fisheries regulations rather than building a legal framework supporting collaboration between government and local communities in fisheries management.

This research also observed that fisheries co-management models in the lagoon waters in Thua Thien- Hue province were more sustainable than other models in elsewhere. These models were designed and operated based on the Fisheries Association established by the Provincial Fisheries Association. This type of model is nearly the same with the community-based fisheries management in Japan. In these models, boundaries of the communal waters were defined and marked apparently with other communes and fishing rights were issued and protected by the district government. The local fishers were invited to participate in defining number of gears allowed to operate and in patrol fishing activities over the communal waters. They also submitted an annual fee to be a membership of the Fisheries Association.

This research pointed out two main obstacles: i) lacking the supportive institutional arrangements; and ii) lacking a fisheries management framework to implementation of the co-management and the AIBM structures in the Vietnamese fisheries. Firstly, the existing institutional arrangements have not provided favourable conditions for implementing the co-management and the AIBM structures in Vietnam in terms of legislation and management framework. Both fisheries co-management and the AIBM structure were not codified into fisheries law, then the local fishing communities and the Marine Fisheries Specialists Team (MFST) were not recognized as legal bodies in administration system. Therefore, the they were not protected by laws and allocated resources to work. The local fishing communities were also not authorized to extract fishers who fish illegally within their local waters. The MFST was mandated to implement tasks and assignments related to fisheries management. Secondly, there has been no fisheries management framework adopted in Vietnam. Although the management measures are decided by government in the fisheries planning system, they are not implemented in practice. Therefore, the local fishing communities and MFST could not make their agenda to involve in the process of the fisheries management in Vietnam. This research argued that the existing institutional arrangements were designed to implement the centrally planned regime which the government controls management authorities over the fisheries with no rooms for the NGOs and local fishers to share power in deciding fisheries management measures. The existing institutional arrangements were also inflexible to promote changes and innovation.

The research recognized that the existing fisheries management system in Vietnam emphasized the stage of making plans. It ignored or less taken into account the other stages of the management process (e.g. implementing management plan, monitoring effects, responding to changes, etc.). Therefore, the fisheries authorities have not recognized shortcomings as well as deficiencies of the existing fisheries management system. As a result, they have not identified benefits and advantages of applying of the co-management and the AIBM structures to improve effectiveness and efficiency of fisheries management. This is the critical factor leading to unsuccessful implementation of the co-management and adaptive indicators-based management structures in Vietnam.

Furthermore, these structures are to support the sustainable utilization and conservation of fisheries resources, meanwhile, the existing management system followed the economic growth in short term. This may also be a constraint to implementing the co-management and adaptive indicators-based management structures in Vietnam.

This research argued that the international sponsors took the key role in initiating and remaining operation of the co-management and AIBM structure in the Vietnamese fisheries. Their funding was the critical condition for sustainability of the fisheries co-management models and the AIBM structure. The AIBM and most fisheries co-management models were dysfunctional after the foreign donors ended funding. Therefore, this research adds one more condition – the international sponsors that influences the viability of fisheries self-managed, community-based management institutions and co-management (Ostrom, 1990, 1992; Pinkerton, 1989). The international sponsors took a critical role in implementing the fisheries co-management in Vietnam. They not only funded, initiated, but also remain function of the fisheries co-management models. This also found that the international sponsors intend to implement responsibility of the local fishers in compliance with management measures rather than sharing management power between government and local fishers when they implement fisheries co-management projects in the developing fisheries like Vietnam.

This research presents a paradox in the Vietnamese fisheries that the fisheries authorities advocated introduction of new approaches on one hand, but they were also reluctant to change and support implementation of these approaches in practice. This paradox made its management system ineffective and warned officially by European Commission in 2017. Under this pressure, the fisheries management system in Vietnam is changed towards more sustainable and responsible fisheries to meet the European Commission's requirements, so that it would remain the export markets at least the EU market in the future.

9.6 FUTURE RESEARCH

Based on these findings, this research suggests two following researches should be implemented in future to improve effective of fisheries management in Vietnam:

i) Application of the adaptive indicators-based management structure to plan fisheries and implement management plan in practice in Vietnam based on the data collected in the project of comprehensive investigation of the marine fisheries resources and environment in Vietnam 2011-2020. In this work, multi-disciplinary assessments would be made based on a set of indicators to provide the best understanding about the fish stocks, fisheries, and marine ecosystems. Based on this, a management plan is made with long-term goals of the sustainable utilization of fisheries resources and operational objectives to guide implementation process. An implementation plan with an iterative learning cycle of monitoring, reviewing and assessment, making decisions.

ii) A further research on the community-based fisheries management connected with the Fisheries Association at the local communities should be conducted to understand assets of the local communities in fisheries management and roles of government and scientists enable local communities to manage fisheries within their local waters. In this research, the adaptive indicators-based management structure should be elaborated as the management framework for fisheries management at the local level, so that it can help local communities to adapt to changes in fish stocks and environment.

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APPENDIXES

APPENDIX 1: QUESTIONS ASKED FOR RESEARCH TOPICS

Chapter 4: To understand challenges are facing the management system in Vietnam, the main following questions asked 04 scientists from RIMF and VIFEP; 02 managers from DECAFIREP of MARD; expert from VINAFISH; 14 managers and 56 fishers from 14 selected provinces:

i) How fish stocks and marine ecosystems have changed in recent years? Are they over-utilized or under-utilized?
ii) How fishing effort and fishing fleets have been developed in recent years? Are they over-capacity or not?
iii) Is life standard of fishing communities improved or not? What reasons for that?
iv) Is the existing fisheries management system effective? What challenges facing the existing management system? How does it connect with tendency of fisheries resources, fishing activities, and society of the fishing communities?

Chapter 5: To understand the role of fisheries master plan by 2010 in Vietnam, 22 interviewees (04 scientists from RIMF and VIFEP; 04 managers from DECAFIREP and Planning Department of MARD; 14 managers from 14 selected provinces) were asked with the following questions:

i) Why is the master plan needed for fisheries?
ii) Which and how factors influencing on the goals and objectives when planning the fisheries by 2010?
iii) How are the goals and objectives of the master plan realistic? Why?
iv) What are your perspectives on objectives of fisheries by 2010? Why? And how were they institutionalized into the master plan?

For 56 fishers from 14 selected provinces to be asked with the following questions:

i) Do you know about the fisheries master plan by 2010 or any plan for managing the volume of catches, number of fishing vessels?
ii) For three objectives of fisheries master plan, which do you prioritize? Why?

Chapter 6: To understand the nature of information and data used for planning the fisheries by 2010, 04 scientists from RIMF and VIFEP; 04 staff from GSO of provinces: Quang Ninh, Thanh Hoa, Binh Dinh and Kien Giang; 14 managers from 14 selected provinces were interviewed with the following questions:

For 02 scientists from VIFEP who are the main authors of the fisheries master plan by 2010:

i) Why the TC was selected as the management tool for the Vietnamese fisheries?
ii) What types of knowledge base were used for planning the fisheries by 2010? How did they collect, analyze and incorporate into the plan?
iii) How are they valid and reliable?
iv) Was there any implicitly political will influencing on the planning objectives (e.g. growth rate)?

For 02 scientists from RIMF who participated into planning fisheries by 2010 and provided data on fish stocks i.e. B and EPY for setting TC of the master plan.

i) How stock assessment works have been conducted? What are the main outputs?
ii) How the EPY used for setting TC of master plan by 2010 was produced? How is it valid?

For 04 staff of GSO and 14 fisheries managers who made estimation of the TL of the province

i) What are types of data used to estimate TL?
ii) How is the TL estimated and published?
iii) How is the TL estimation reliable, valid and compared to estimation of DARD/GSO?
iv) What is the TL used for?

Chapter 7: To understand fishing patterns and behaviours of the local fishers, six informants and 12 fishers from two communes of Quynh Lap and Tam Quan Bac, were interviewed with the following questions:

For informants who know best about fishing patterns and behaviours of the fishers in their communities:

i) How long have the fisheries developed in the community?
ii) Are there any traditional values, norms, informal rules, religious that local fishers inspecting to?
iii) What are interests and preferences that the local fishers pursuing?
iv) What are the fishing customs and patterns existing in the community?
v) What and how are factors influencing on the fishing behaviours (long-term and short-term decision) of the local fishers?

For fishers

i) When did you enter the fisheries? Why?
ii) What are your interests and preferences in the fisheries?
iii) What factors/information and how they influence your investment decision in the business?
iv) What factors/information and how they influence your daily decisions to operationalize the fishing business?

Chapter 8: To understand implications of implementing the co-management, 02 experts of the best experience in fisheries co-management in Vietnam and 06 representatives from six fisheries management models in Hai Phong, Nghe An, Thua Thien-Hue, Binh Dinh, Khanh Hoa and Ben Tre were interviewed with the following questions:

For experts:

i) How and when the co-management approach was introduced into the Vietnamese fisheries?
ii) How is it suited for the Vietnamese context? What are advantages and disadvantages?
iii) What factors influencing on the successful implementation and failure of this approach?
iv) What are obstacles to implement this approach in the Vietnamese context?

For representatives from fisheries co-management models:

i) When and why the co-management model was established?

ii) How is it organized and linked with fisheries authorities and other fisheries interest groups?
iii) Does it help to address management issues and problems? What are its achievements and failures
iv) What factors influencing on the successful implementation/failure of the models?
v) What are obstacles to implement the co-management in the local context?

To understand results of implementing the AIBM structure in the Vietnamese fisheries, 08 persons (02 managers from RECAFIREP and 04 scientists from RIMF and VIFEP who are members of MFST, 02 managers from the Planning system who control the fisheries planning system) were interviewed the following questions:

i) When and how the AIBM structure was introduced into the Vietnamese fisheries?
ii) How is it suited for the Vietnamese context? What are advantages and disadvantages?
iii) How is it successful? Why?
iv) What are obstacles to implement this approach in the Vietnamese context?

APPENDIX 2: IDENTIFY AND EVALUATE FACTORS INFLUENCING FISHING BEHAVIOURS

Name of interviewee: date:

Address:

PART I: GENERAL INFORMATION

Person-ality	Age (years):	Experience (years):
	Education (grade):	Marital status (S,M):
	Family members (people):	Property value (Mil.VND):
	Income per month/year (Mil.VND)	Ration from fishing (%):
Vessels	Vessel size (L/HP):	Age (years):
	Crew members (people):	Total capital (Mi. VND):
	Ownership: ☐Shared, ☐Self-owned, ☐Other	
Fishing practice	Duration (days):	Productions (tons):
	Revenue (Mil. VND):	Variable costs (Mil. VND):
	Fishing model: ☐ separate, ☐ in group (……. Boats)	
	Number of days at sea/year:	
	Fisheries: ☐ Single gear: . . . .; . ☐ Multi-gears:	
	Landing sites: ☐ homeport , ☐ changeable, ☐ at sea, ☐ all of above	

PART II: TACTICAL DECISIONS

No.	Factors	Ranking 0 = not related, 1 = less important, 2 = important, 3 = very important, 4 = critical factor
1	Market (e.g. fish price)	0 1 2 3 4
2	Information (e.g. fishing spots, targeting species)	0 1 2 3 4
3	Labours (e.g. enough or not)	0 1 2 3 4
4	Weather (e.g. bed weather, storm, rainy)	0 1 2 3 4
5	Experience (e.g. targeting fish, catch rate, fish size)	0 1 2 3 4
6	Season (e.g. targeting fish, gear used)	0 1 2 3 4
7	Regulations (e.g. zoning, closed areas and seasons, gears banned, mesh size)	0 1 2 3 4
8	Informal rules (e.g. cease fishing, access rights, destructive fishing)	0 1 2 3 4
9	Others:	0 1 2 3 4

PART III: STRATEGICAL DECISIONS

No.	Factors	How important 0 = not related, 1 = less important, 2 = important, 3 = very important, 4 = critical factor

1	Regulations and policies (e.g. gears banned, size of vessels)	0	1	2	3	4
2	Subsidy programs (e.g. credit loans, subsidizing for fuel price, operating offshore waters)	0	1	2	3	4
3	Financial status (e.g. available money)	0	1	2	3	4
4	Management capacity (e.g. managing fishing business and crew members)	0	1	2	3	4
5	Demands of the next generations (e.g. livelihoods and jobs of fishers' children)	0	1	2	3	4
6	Labour availability (e.g. availability of crew members to employ)	0	1	2	3	4
7	Individual experience (e.g. potential of generating profits)	0	1	2	3	4
8	Others:	0	1	2	3	4

Other comments and perspectives:

APPENDIX 3: A BRIEF DEFINITION OF THE LEGAL REGULATIONS IN VIETNAM

The law provides the primary and basic issues in the areas of domestic arrangements, foreign relationships, socio-economic tasks, national defence, national security, the major principles for organization and operation of the state apparatus, social relationships and activities of citizens.

The ordinance provisions on matters assigned by the NA, after a period of implementation, it should submit to the NA to consider and decide to enact into a law.

The decree of the Central Government is promulgated to: 1) guide to implement the law, resolution of the National Assembly as well as ordinance and resolution of the Standing Committee of the National Assembly; 2) regulate strategies and solutions to fulfil policies on economic, society, security, national defence, finance, currency, budget, tax, ethnic group, religion, culture, education, public health care, science, technology, environment, foreign affair, operation and organization of the state mechanism, public service, official, civil servant, rights and obligations of citizen and others which are under the Government authority; 3) stipulate functions and authorities and organization of ministries, ministry-like institutions, institutions being under the Government and Government authority; and 4) regulate necessary matters being not commensurate with formulating laws or ordinances. It must be agreed by the Standing Committee of the National Assembly.

The decision of the Prime Minister is promulgated to regulate: 1) governance and leadership methods of the Government and the state administration system from central to local levels; working regulations with the Governmental Member, The Chairman of the PPC and others being under the Prime Minister authority, and 2) steering measures and collaboration between the Governmental Members, inspection of performance of ministries, ministry-like institutions, institutions being under the Government, People's Committee at various levels of implementing the state strategic policies, laws and regulations.

The Minister promulgates circular to: 1) guide to implement the law, resolution of the National Assembly as well as ordinance and resolution of the Standing Committee of the National Assembly and decree of the Government and the decision of the Prime Minister,

2) stipulate technological processes and regulations, techno-economic norms of sectors mandated, and 3) stipulate regulations to execute management functions and authorities of ministry and others assigned by the government.

The decision of the Provincial People Committee is promulgated to implement policies on economic sectors and services, culture, environment and natural resources, defence, security, ethnic group, religion, education, execution of regulations, development of local governments and management of the provincially administrative border within the province.

The directive of the Provincial People Committee is promulgated to regulate methods of steering, collaboration, supervision and inspection of performance of institutions directly under provincial departments, districts, and implement nationally legal regulations and the same level People's Council and its decisions.

APPENDIX 4: MARINE CAPTURE FISHERIES CO-MANAGEMENT MODELS IMPLEMENTED IN VIETNAM

No.	Models	Address	Time of establishment	Sponsors	Status in 2014
1	Fisheries resources conservation Group in Phu Hai	Phu Hai commune, Hai Ha Dist. - Quang Ninh province	2007	DANIDA	Collapsed
2	Fisheries co-management in Phu Long	Phu Long commune, Cat Hai Dist. – Hai Phong city	1995	German NGO	Collapsed
3	Fisheries co-management in Quynh Lap	Quynh Lap commune, Hoang Mai Dist. – Nghe An province	2007	DANIDA	Funded by World Bank from 2014
4	Fisheries resources management based on the Fisheries Association in Quang Thai	Quang Thai commune, Quang Dien Dist. – Thua Thien-Hue province	1997	FAO	Managed by Fisheries Association
5	Fisheries resources management based on the Fisheries Association in Dien Hai	Dien Hai commune, Phong Dien Dist. – Thua Thien-Hue province	1997	FAO	Managed by Fisheries Association
6	Fisheries resources management based on the Fisheries	Vinh Giang commune, Phong Dien Dist. – Thua	2007	DANIDA	Managed by Fisheries Association

No.	Models	Address	Time of establishment	Sponsors	Status in 2014
	Association in Vinh Giang	Thien-Hue province			
7	Fisheries resources conservation Group in Tho Quang	Tho Quang ward, Son Tra Dist. Da Nang city	2007		Not working
8	Management board of marine protected area in Cu Lao Cham	Tan Hiep commune, Hoi An town – Quang Nam province	2001	DANIDA	Working with funded by GEF
9	Capture fisheries and fisheries resources conservation model in Tam Hai	Tam Hai commune, Nui Thanh Dist. – Quang Nam province	2008	NOAA	Not working
10	Group for fisheries resources conservation in My Thang	My Thang commune, Phu My Dist. – Binh Dinh province	2007	DANIDA	Funded by World bank from 2014
11	Group for fisheries resources conservation in Nhon Hai	Nhon Hai commune, Quy Nhon town – Binh Dinh province	2007	DANIDA	Funded by World bank from 2014
12	Group for fisheries resources conservation in Nhon Ly	Nhon Ly commune, Quy Nhon town – Binh Dinh province	2007	DANIDA	Funded by World bank from 2014

No.	Models	Address	Time of establishment	Sponsors	Status in 2014
13	Co-management board in Ran Trao marine protected area	Van Hung commune, Van Ninh Dist. – Khanh Hoa province	2000	IMA	Funded by IUCN and other sponsors
14	Fisheries resources conservation based on the community in Nha Phu lagoon	Ninh Ich commune, Ninh Hoa Dist. – Khanh Hoa province	2001	GiZ	Not working
15	Co-management board in Hon Mun marine protected area	Tri Nguyen commune, Nha Trang town – Khanh Hoa province	2001	DANIDA	Not working
16	Co-management board of Coral reef protection model in My Hiep	Thanh Hai commune, Ninh Hai Dist. – Ninh Thuan province	2008	NOAA	Not working
17	Capture fisheries and fisheries resources conservation model in Thoi Thuan	Thoi Thuan commune, Binh Dai Dist. – Ben Tre province	2007	DANIDA	Not working
18	Capture fisheries and fisheries resources conservation model in Thanh Phong	Thanh Phong commune, Thanh Phu Dist. – Ben Tre province	2007	DANIDA	Not working

No.	Models	Address	Time of establishment	Sponsors	Status in 2014
19	Fisheries co-management in Au Tho B	Vinh Hai commune, Vinh Chau – Soc Trang province	2001	GiZ	Not working
20	Management of clam ground in Khanh Hoi	Khanh Hoi commune, U Minh Dist. – Ca Mau province	2007	DANIDA	Not working
21	Management of the stow nets in Cai Doi Vam	Cai Doi Vam commune, Phu Tan Dist. – Ca Mau province	2007	DANIDA	Not working
22	Co-management board in Hon Thom marine protected area	Hon Thom commune, Phu Quoc Dist. – Kien Giang province	2001	DANIDA	Not working

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