

**Trade, information and perceptions in Fishery Improvement
Projects: the case of the blue swimming crab fishery in
Betahwalang, Indonesia**



Master thesis

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November 2013, Wageningen University – The Netherlands

Abstract

Fishery Improvement Projects (FIPs) are relatively new governance arrangements for fisheries management. They are market-based initiatives that try to work systematically towards sustainability by creating incentives to change through the value chain. The aim of this master thesis was to examine the capacity of FIPs to lead to improvement through the value chain in the context of production and trade, taking into account the information flow through and the perceptions of actors within the value chain. One of the best known FIPs is the Indonesian blue swimming crab (BSC) FIP. The BSC FIP is the subject of the conducted case study. Two scales of the BSC FIP were studied, being the scale of the fisheries managers or BSC FIP participants and the scale of the local fishers. The design of this study enabled looking both at the definition of measures agreed upon within the FIP at the scale of the BSC FIP participants and at the implementation of the measures at the scale of the BSC fishers. Differences existed in the way actors in the crab value chain captured and processed information and therefore in their perception on the taken measures. Moreover, local trade relations influenced the flow of information through the value chain and the practices of the actors. The BSC FIP could, until now, not change the practices of fishers and therefore not lead to improvement, because the fisheries management was not adjusted to the existing local trade relations and practices and no positive change was incentivised.

Acknowledgements

This research has been enabled by a scholarship from the Marine Stewardship Council (MSC). Their support gave me the chance to conduct this research overseas. I am very grateful for the opportunity they gave me.

My sincere thanks go to Simon Bush and Paul van Zwieten (Wageningen University), who supported me during the entire thesis period. I learnt a lot from their always critical, but enthusiastic comments on the project.

In Indonesia I could enjoy a warm welcome arranged by Pak Ghofar and Bu Jacky (UNDIP). They did incredibly much for me and were always supportive towards anything I needed or asked and did not ask for. I cannot thank these two special persons enough for everything they did for me, ranging from arranging accommodation for me during my stay in Indonesia and helping me learn *Bahasa Indonesia*, until support in the field.

Fitri deserves a special thank you since she was my translator in the field and at the same time a guide through the new culture. She became a dear friend to me and I hope I can once be her guide in the Netherlands.

I am very grateful for all the people that were willing to share their thoughts and experiences with me during conversations and interviews. Their hospitality was always great and I will never forget how open everybody was towards meeting and talking to a complete stranger.

I thank the village of Betahwalang and its inhabitants for allowing me to stay in their village. They gave me insight in both the blue swimming crab fishery and in the Indonesian culture.

'Terima kasih untuk semuanya, Farid'. Farid is the little boy who cheered me up every morning by greeting me with a warm and enthusiastic: *'Hello miss Plor...'*

Last but not least, I thank my parents, Janneke and Paul for their support during my thesis. I was happy I could share so many of my experiences and worries with them, even when I was in Indonesia.

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List of Acronyms

APRI	Indonesia Blue Swimming Crab Producers Association (<i>Asosiasi Pengelolaan Rajungan Indonesia</i>)
BBPPI	Balai Besar Pengembangan Penangkapan Ikan ('centre for the development of fisheries')
BMI	PT Bumi Menara Industri
BSC	blue swimming crab
BSC FIP	blue swimming crab Fishery Improvement Project
CI	Continuous Improvement
FIP	Fishery Improvement Project
IDR	Indonesian Rupiah
ISO	International Organization for Standardization
kg	kilogram
KML	PT Kelola Mina Laut
MMAF	Ministry of Marine Affairs and Fisheries
MSC	Marine Stewardship Council
NFI Crab Council	National Fisheries Institute Crab Council
NGO	non-governmental organization
PACPI	Philippine Association of Crab Processors, Inc.
PDCA	plan-do-check-act
SFP	Sustainable fisheries partnership
UNDIP	Universitas Diponegoro (Diponegoro University)
US	United States
WU	PT Windika Utama
WWF	Worldwide Fund for Nature

1 Introduction

1.1 Problem statement

Sustainably managing natural resources has been a pressing topic on global political agendas. Eco-labels appear to be increasingly important for promoters of sustainability (Bush *et al.*, 2013). A prominent example of eco-labelling in fisheries is the Marine Stewardship Council (MSC) certification (Pauly *et al.*, 2005; Bush *et al.*, 2013). For its establishment in 1997 a new, market-based governance arrangement was created. It was established after Unilever, a market actor, partnered with the WWF, a NGO, in order to impose market pressure on fisheries management regimes. Traditionally, regulations were imposed by the government as top-down regulations without involvement of other actors. However, a shift from government towards governance has taken place over the years. Governance can be seen as a change in governing styles from a style in which the government was a dominant actor to one *“in which boundaries between and within public and private sectors have become blurred”* (Stoker, 1998: p.17). It can be seen as a movement away from the nation-state having the decision making power, towards the involvement of the private sector and the society. Rhodes (1996: p.652) refers to governance as *“self-organizing, interorganizational networks”*, which implies that the government is not involved and that new relations among actors are created, which can be defined as networks of actors. The MSC eco-label is a prominent example of this movement away from the nation-state and the formulation of new network relations.

Not all fisheries can become MSC certified directly, because they do not yet meet the MSC's requirements for certification. These fisheries need to be improved in order to get (more) sustainable and get ready for certification. Fishery Improvement Projects (FIPs) have arisen as new governance arrangements in fisheries management in which the involvement of actors within the fisheries value chain is central as well as a movement towards improvement. A FIP is a step-wise approach that in the end should lead to improvement of the fishery, most often defined as sustainability (Doddema, 2012). According to Doddema (2012), the recently promoted FIPs are often linked to MSC as they are based on the MSC principles. FIPs give fisheries the opportunity to systematically work towards sustainability when certification is not (yet) possible. The establishment of FIPs was a movement away from the state, putting fisheries management in the hands of the private sector. The concept of FIPs does no longer imply the top-down implementation of regulations by the nation-state, but it implies the creation of incentives to change through the value chain by the private sector.

At the basis of a value chain are the principles of production and trade. Practices of local fishermen have increasingly become embedded in global production and trade networks since they have been integrated in global markets. Fishing practices that used to be carried out to provide food for the local communities are now accommodating international demand. Internationally, the demand for sustainably produced seafood is increasing and therefore a change of practices is now required from the local fishers, additional to providing the resource. The local producers act on a different scale than the consumers which makes the relations between supply and demand less clear than what they used to be before the international embeddedness of the fishery. Local fishers have to respond to the demand from consumers they have never met before and with which they do not directly trade. Bush and Oosterveer (2007) have described these relations as the currently misunderstood link between producers and global networks. FIPs have to deal with this often slightly understood

link, because they use the value chain as a means to implement fisheries management. FIP participants are typically chain actors (after Bolwig *et al.*, 2010) and have to use the structure of the value chain to create incentives to change through the value chain. Within FIPs, the connection between the producers and global trade networks are important, since they determine the flow of commodity from the producers to the exporters and retailers, but also the reverse flow of information from the exporters and retailers back to the producers.

When communicating the information through the value chain FIP participants are confronted with different actors that might capture and process information differently. Several studies have shown that fishers can have a different perception on the stock status than scientists due to the sources of information they capture and the way they interpret that information (among others, Neis *et al.*, 1999; Verweij *et al.*, 2010). Perception differences about the status of the stock and which management measures would be effective have hindered multi-actor debates in finding appropriate management (McClanahan *et al.*, 2005; Verweij *et al.*, 2010). Due to the different interpretation of the stock status, actors had differing perceptions on what measures could improve the stock status and whether the stock status had to be improved in the first place. When a management measure is implemented that is not in line with actors' perception on the status of the stock, this might result in non-compliance.

In her study on FIPs, Doddema (2012: p.66) indicated that *"[a]s FIPs are geared towards providing sustainable seafood for the international market, there is a chance that fishermen will not really benefit from being sustainably managed."* It is exactly the response of the fishermen to the FIP management that will be investigated in this study. This will be done by looking at the role of information and perceptions on the implementation of the FIP measures; i.e. on the process of changing practices of actors in the value chain. Since FIPs have to deal with a variety of actors along different scales of the value chain it is deemed important to understand how the flows of information between these actors and perceptions of these actors influence the implementation of the measures. Analysing the actors' responses to the FIP measures and their perceptions on improvement should provide insight in whether they benefit from the FIP management. Additionally, Doddema stated that in order to achieve their objectives, FIPs should consider the pre-existing relations and practices that shape fishers' behaviour. In this study the practices of fishers in the value chain will be mapped out. The flow of information from the global trade network will be analysed as well as the actors' perceptions. These analyses should give insight in determining factors for the practices of the actors. That way, they might contribute to the understanding of the previously introduced link between producers and the global network.

1.2 Background to the Indonesian BSC FIP

In this study, I will look at the implementation of one specific FIP and I will analyse its capacity to lead towards improvement. The case that will be studied is the Indonesian blue swimming crab (BSC, *Portunus pelagicus*) FIP. Indonesia is a country in which many fisheries are embedded in global production and trade networks. These fisheries often fail to meet the MSC principles for certification, because there is no fisheries management system at the level of the fishers, no information about stock statuses and no information about environmental impacts of the fishery. These are three performance indicators defined by the MSC on which a fishery is assessed in order to get MSC certified. Since these performance indicators are not met in Indonesia, the fisheries need to work

towards enabling assessment of the fishery on these indicators if they want to be considered sustainable in accordance with the standards of the MSC. That can be done through FIPs. Examples of FIPs in Indonesia are snapper, Indonesian tuna and the blue swimming crab (BSC) (SFP, 2013). The latter is chosen as a subject of this study. Internationally, the BSC FIP is a praised example of a FIP. It is considered a frontrunner in implementing the FIP guidelines and trying to reach improvement. No previous studies have been conducted on the effectiveness of the BSC FIP. This study will contribute to the knowledge on FIPs, because it will analyse whether the BSC FIP has been able to lead to improvement in practices of actors in the value chain.

The blue swimming crab fishery in Indonesia is a small-scale fishery in which an estimated 65,000 fishermen and 13,000 pickers are directly employed (SFP, 2012a). Next to that, several thousands of other people are involved in the fishery, including middlemen, operators of mini-plants (where initial processing takes place) and final exporters (processors) who export the meat products (SFP, 2012a). There is no governmental regulation of the BSC fishery on national level, which makes it an open-access system and at risk of overexploitation, following Hardin's argumentation about the tragedy of the commons (Hardin, 1968; Feeny *et al.*, 1990). On the one hand the nature of the resource is such that it is difficult to exclude people from using it and therefore it can be commonly accessed. On the other hand, one person or actor group using the resource will always have a negative effect on another actor's ability to exploit the resource (Feeny *et al.*, 1990; Berkes *et al.*, 2001). As will be introduced more extensively later, the BSC FIP participants think the BSC population is being overfished at the moment. They consider this a problem and therefore they wanted to work towards sustainability. They chose the FIP concept as a means to do this, because it provided guidelines for achieving a sustainable state. I will assess if improvement of actors in the crab value chain already took place and what the influence of information and perceptions was on this process.

1.3 Research questions

This thesis aims to examine the capacity of FIPs to lead to improvement via the crab value chain in the context of production and trade, taking into account the flow of information through the value chain and perceptions of actors on different scales of the value chain. At the end of this thesis the following main question will be answered:

To what extent has the Indonesian blue swimming crab Fishery Improvement Project changed the production and trade practices of actors in the crab value chain and what influence does (the availability of) information and the perception of those actors have on this process of change?

The first part of this question regards the achievement of the BSC FIP and is mainly descriptive. It is important to know whether the FIP has resulted in a change of practices of the actors in order to evaluate if improvement took place. The second part of the question is analytical and will provide insight in the role of information and perceptions in defining and implementing the BSC FIP measures. The information about the FIP objectives has to be communicated from the global trade network down to the producers. Since the actors along the value chain have differing ways to capture and process information it is important to study if this influenced the implementation of the FIP. Two sub questions are formulated that together will lead to an answer to the main question. The first question regards the scale of the fisheries managers.

1. What information was used to formulate the objectives of the BSC FIP and why was this specific information used?

This sub-question gives insight in what the BSC FIP is. This includes at first which actors are involved as BSC FIP participants and why, but also why the BSC FIP was established and what guidelines for implementing a FIP were followed. The long-term and short-term objectives and indicators for improvement will be analysed by means of the concept of Continuous Improvement. The definition of two of the short-term objectives or measures will be studied in detail in order to find out what information is used to define the FIP measures. The study of the two specific measures will be continued in the second sub-question, but then on the local scale actors within the fishery.

2. What is the effect of the BSC FIP on the practices of actors in the crab value chain and how can this be explained by the flow of information and the actors' perceptions on these measures?

This sub-question will provide insight in the effectiveness of the BSC FIP measures. First the practices of actors will be indicated and compared with the practices before the start of the FIP. It provides insights to whether the BSC FIP led to changes in the practices of actors in the value chain and the extent to which the practices changed as a result. The explanation for this will be sought in the flow of information and the perception of differing actors along the value chain. At first, the awareness of chain actors about the BSC FIP measures will be analysed. If the actors are not aware of the measures the communication of the FIP measures through the value chain was not effective. This can be an indication that perception differences or existing practices hampered the communication. If it turns out the actors were aware of the measures the communication of the measures through the value chain was effective. Then the perceptions on the measures will be explored. I assume that differing actors can have differing perceptions on a situation and on solutions for a problem. Since FIPs are implemented through the value chain, different actors are confronted with the fisheries management and the perceptions should give insight in the way different actors interpret, appreciate and evaluate the available information on the FIP. The actors' perception on the measures will indicate how they appreciate the measures and can therefore reveal a possible explanation for their practices.

1.4 Thesis outline

This thesis consists of six chapters in which the BSC FIP and the extent to which it can lead towards improvement will be analysed. In chapter 2, the conceptual framework will be presented that will be used to analyse the results of the study. Chapter 3 is the methodology which includes how data for this study was collected. It will describe that the study consisted of two parts which are parallel with the two sub-question of the research and with chapter 4 and 5. In chapter 4, the results of the study to the definition of the BSC FIP objectives will be and analysed. In chapter 5, the implementation of the BSC FIP in a specific fishing village in Indonesia will be analysed. Chapter 6 is the final chapter of this thesis and comprises the discussion and conclusion of the study. Part of the discussion will be linking the findings of chapter 4 and 5 as well as an evaluation of the conceptual framework. Thereafter, the findings of this study will be extended by discussing implications for FIPs in general. The final part of chapter 6 will be the conclusion of this thesis in which the main question will be answered.

2 Conceptual framework

2.1 Introduction

The aim of this study is to analyse the capacity of FIPs to lead to improvement in a fishery. In order to analyse this, a conceptual framework will be built and explained in this chapter which should allow studying this movement towards improvement. The focus will be on how this movement towards improvement is influenced by the mutual relations between actors in the crab value chain. Therefore three different concepts will be combined, being the concepts of value chains, Continuous Improvement (CI) and of the information environment that shapes actors' perceptions. Value chains will be used to define different scales of actors within the fishery. Value chains will be linked to the information environment as the chain relations on the one hand determine the information environment. On the other hand the information environment can identify how actors capture and process information they get and which mutual relations play a role in that. CI is used to show the approach of the FIP towards improvement. This is linked to the information environment and perceptions in order to identify why certain choices are made. Finally, this can be linked to value chains because different actors within the chain might have different perceptions on improvement, which has an influence on the success of the pathway towards achieving improvement. In order to put the analysis in the right context, first the term FIPs requires a more specific introduction than was given in the previous chapter in order to understand the subject of the study.

2.2 Fishery Improvement Projects - FIPs

The term Fishery Improvement Project has been used for quite some time, in different contexts and in numerous variations. While the term has been used before, not much information about FIPs can be found in academic literature and no comprehensive, unambiguous definition of FIPs and what they aim to achieve has been given (Doddema, 2012). However, several definitions of FIPs are circulating. The Marine Stewardship Council (MSC) describes a FIP as:

“A deliberate, managed and sustained effort to improve the environmental performance of a fishery towards sustainability. A FIP is often a partnership effort that can involve number of players and interests.” (MSC, 2012: p.1)

The Conservation Alliance for Seafood Solutions consists of eighteen conservation organizations in Canada and the United States and has formulated a common vision for environmentally sustainable seafood. The seafood industry has showed an increased interest in FIPs. The Alliance explicitly emphasizes the involvement of the private sector in FIPs which should incentivize changes towards more sustainable fisheries. FIPs are defined by the Alliance in their document 'Guidelines for Supporting Fishery Improvement Projects':

“A fishery improvement project is a multistakeholder effort to improve a fishery. These projects are unique because they utilize the power of the private sector to incentivize positive changes toward sustainability in the fishery. Participants may vary depending on the nature of the fishery and the improvement project, and may include stakeholders such as producers, nongovernmental organizations, fishery managers, government and members of the fishery's supply chain”. (Conservation Alliance for Seafood Solutions, date unknown: p.2)

The Sustainable Fisheries Partnership (SFP) is one of the members of the Conservation Alliance for Seafood Solutions and has been strongly involved in the blue swimming crab FIP (BSC FIP). Additional to the previous definitions they describe tasks of the FIP participants:

“an alliance of stakeholders – retailers, processors, producers, and/or catchers – that comes together to resolve problems within a specific fishery or improve some specific aspect of the fishery that requires attention. The FIP works through key organizations and individuals, talking through the management of the fishery and the challenges that it may face, identifying data that needs to be collected, agreeing on a set of priority actions that should be undertaken to improve the fishery, and then overseeing an action plan.” (SFP, 2012b: p.1)

The last definition that is introduced here is that of WWF of which the United States’ (US) and Canadian branch are also member of the Conservation Alliance for Seafood Sustainability. WWF is, like SFP, closely involved in several FIPs worldwide, amongst other countries in Indonesia. They emphasize the systematic, stepwise approach towards improvement. On top of that, they state that multiple actors with differing backgrounds should be involved in a FIP in order to adjust the activities to the local situation.

“a fishery improvement project (FIP) offers a stepwise approach towards achieving more sustainable practices. A FIP brings together multiple stakeholders – including fishers, the private sector, fishery managers, researchers, and NGOs – who collaborate to improve fishing practices and management. The involvement of multiple stakeholders with varying perspectives and backgrounds ensures that the FIP activities are appropriate for the socio-political context of the fishery.” (WWF, date unknown-a: p.1)

While the definitions differ slightly per organization as well as in the FIPs that have been active over the years, common ground has been a movement towards sustainability. The definition of sustainability itself, however, can vary depending on who is defines it (Doddema, 2012). Another recurring aspect in the definitions is that a FIP is a partnership between different actors. Sometimes people refer to FIPs as being Fishery Improvement *Partnerships* which directly implies common effort is made by different actors in order to reach improvement. Another similarity in the definitions of FIPs is that a work-plan or action plan should be put together that shows which steps will be taken towards a more sustainable fishery (SFP, 2012b; Conservation Alliance for Seafood Solutions, date unknown; WWF, date unknown-a and -b). FIP strategies to reach this improvement are most often based on the principles of the MSC (Doddema, 2012; SFP, 2012b; Conservation Alliance for Seafood Solutions, date unknown). The ultimate goal of a FIP can either be MSC certification or to reach a level consistent with an unconditional pass of the MSC standard (Doddema, 2012; SFP, 2012b; Conservation Alliance for Seafood Solutions, date unknown; WWF, date unknown-a).

Another common aspect of FIPs is that the private sector is actively involved; it is a market-based initiative in which market pressure can incentivize change towards (more) sustainable fisheries. An incentive can be defined as *“a thing that motivates or encourages someone to do something”* (Oxford Dictionary, 2013). A positive incentive in the context of a fishery market can then, for instance, be a price stimulus that encourages an actor to act more sustainably or a boycott on purchasing certain sizes of fish so that it is not profitable to catch and sell these anymore. The initiative for a FIP can come from the private sector, for example, from a purchaser who is motivated to buy environmentally responsible seafood. According to the Conservation Alliance (date unknown) a

purchaser can either temporarily stop buying the unsustainable seafood and wait until the required improvements are made, or can engage suppliers, producers and other industry partners in a FIP. Within this FIP, agreements can be made with which the actors engaged should comply and which can create an incentive for positive change towards sustainability for the rest of the value chain through the market forces. Instead of stopping purchasing the seafood and waiting until improvement occurs, the FIP actors can play an active role in establishing the desired improvement by creating an incentive for change within the crab value chain themselves.

2.3 Value chains

Understanding the structure of the value chain is the basis of this study. The subsequent analysis will be regarded in that context. According to Kaplinsky and Morris (2001: p.4) a “value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production [...], delivery to final consumers, and final disposal after use.” Value chains have both vertical and horizontal elements (Bush and Oosterveer, 2007; Bolwig et al., 2010). Part of the vertical chain is the movement of commodity from producers on a local level toward (global) retailers and consumers. This involves flows of information and knowledge, material resources and finance between buyers and suppliers within the chain (Bolwig et al., 2010). Horizontal elements represent how livelihoods are positioned or embedded in a local social and political context (Kaplinsky and Morris, 2001). Bush and Oosterveer (2007: p.388) state that “[b]oth horizontal and vertical aspects of chains and networks are important for fisheries due to the perishability and high value of fish products, the global extent of trade and the range of actors involved: ranging from small-scale producers through to multinational processors, importers and retailers.”

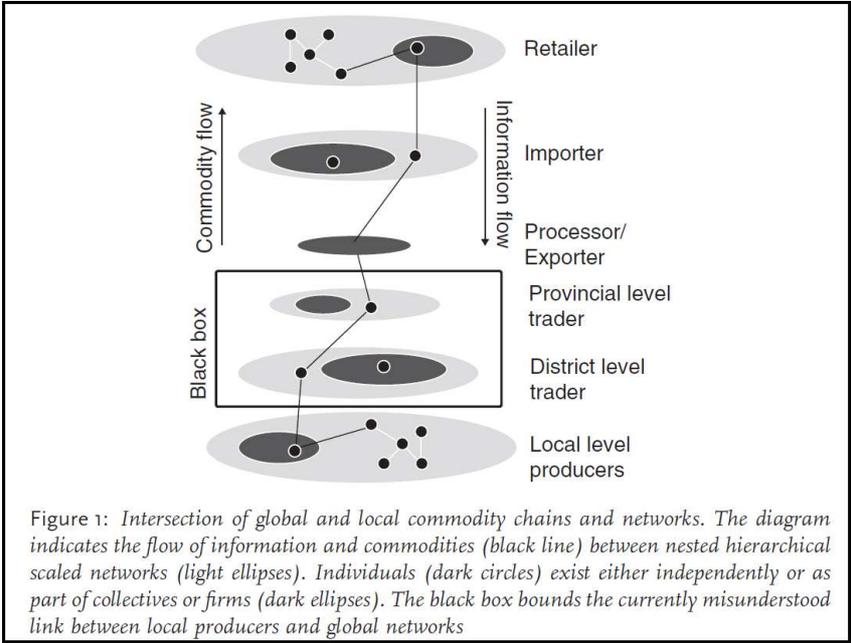


Figure 2.1 Intersection of global and local commodity chains and networks.

This figure illustrates the connection between scales of actors in the vertical chain and the embeddedness of actors within networks on their own level. Source: Bush and Oosterveer (2007: p.388).

This then holds for FIPs as well as they regard fisheries. Since FIPs try to create positive incentives through the value chain, I think it is essential to know what the structure of the value chain is in

order to understand how commodities move through different actors and how information flows back to the producers. According to Bush and Oosterveer (2007), analysis of vertical flows between the production and consumption level and analysis of the influence of horizontal actors and processes at the points where transactions take place are essential to understand these flows (Figure 2.1). The SFP mentions in its document on fisheries that it is necessary to create a FIP that fits the situation; a FIP that is adjusted to the local culture and the needs of the fishery (SFP, 2012b). In the context of value chains this could be translated in the statement that as all fisheries are different. The kind of incentives that can or should be created depends on the fishery and the existing vertical linkages and horizontal elements in the value chain that determine the flows of commodity and information.

Bush and Oosterveer (2007) conclude that “[g]reater awareness of local characteristics and social practices is needed to improve our understanding of locally embedded chains that facilitate commodity and information flows, as well as the wider networks of actors that surround transactions in the space of place.” (p.397). If reflected on FIPs this would mean that more information about the local situation of a fishery would lead to a better understanding of information and commodity flows within the value chain. On top of that it would lead to a better understanding of the way the local actors in the fishery are embedded in the wider network of actors on the global scale. This would increase understanding of the effectiveness of FIPs, their capacity to improve a fishery. Therefore, I consider it important that the structure of the value chain is understood, before the flow of information and the change of practices are analysed.

2.4 Continuous Improvement

Once the representation of actors in the BSC FIP from within and outside the value chain is understood, the approach towards improvement, i.e. goals and objectives that are set, can be analysed in the context of the value chain. This will be done with the notions of Continuous Improvement (CI). The concept of CI originates from business studies, but following Doddema (2012) the use of the concept in the context of FIPs will be explored further in this study. Several divergent descriptions of CI have been given over the years. In their review on CI, Bhuiyan and Baghel (2005) define CI as “a culture of sustained improvement targeting the elimination of waste in all systems and processes of an organization.” (p.761). The International Organization for Standardization (ISO), defines CI broader as a “recurring process of enhancing the **environmental management system** in order to achieve improvements in overall **environmental performance** consistent with the **organization's environmental policy**” (ISO, 2004: p.1; bold is taken over from source). The words in bold are key terms that each have their own definition assigned by ISO. To make the link with FIPs, I translate these terms in bold to their comparable term in FIPs. The definition of CI in a fishery context could then be a recurring process of enhancing the **fishery management system** in order to achieve improvement in overall **practices in the fishery** consistent with the **FIP work plan**. Although MSC uses environmental performance in their definition of a FIP, here is chosen to ‘translate’ that term in ‘practices in the fishery’ in which the fishery is the complete process from catching the resource until packing and exporting the meat. I made this choice, because FIPs do not only aim for environmental improvement, but can also aim to improve the social and economic situation in a fishery. One important difference with (amongst others) the ISO 14001 definition of CI and the application on FIPs is that FIPs regard a complete value chain, while according to ISO 14001 CI is a process that takes

place on the level of and within one company. The application of the definition of CI in a fishery context will be explored when the process of achieving improvement is discussed in this thesis.

Central in CI is continuously trying to improve a situation by step-by-step solving parts of a problem. In business, the term problem can be defined as the gap between the current and the desired situation (Hoppe *et al.*, 2001). Brouwer and Van Koppen (2008) distinguish a tactical and a strategic improvement cycle when they look at the way objectives and targets, which should lead to a desired situation, are included in a management system. The strategic or system improvement cycle concerns meeting long-term objectives, while the tactical or operational improvement cycle concerns meeting short-term objectives (*ibid.*). CI within these cycles means moving towards these objectives (Doddema, 2012). Figure 2.2 shows the starting point of what CI can look like schematically in the context of FIPs. The big black arrow shows the desired continuous movement towards long-term objectives, the system objectives. The distance between the situation at the start of the FIP and the system objectives can be seen as a gap between the current situation and the desired situation. If this problem is addressed the gap between the situation at the start and the system objectives will become smaller. In the model the black arrow will then become smaller (see Figure 2.2, right). Operational objectives serve as goals set that will lead to solving the problem. The difference between the situation at the start and the current situation is then considered to be improvement.

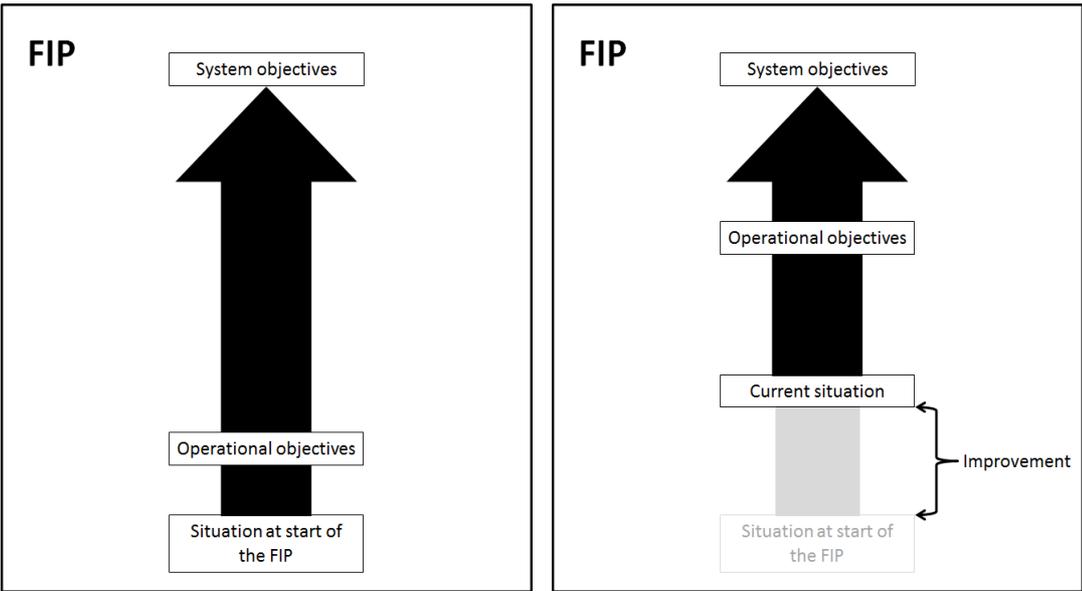


Figure 2.2 Continuous Improvement (CI) in the context of the Fishery Improvement Project (FIP).
 Left: (from bottom to top) the situation at the start of the project with desired goal and interim objectives.
 Right: reproduction of a current situation in which some operational objectives have been met and the gap between the current and desired situation is reduced, improvement took place.

The concept of CI does also take into account improvement through the adjustment of system objectives. When looking at Figure 2.2, this means that the process of CI is not finished when the system objectives in the figure are met. In reality, the system objectives are adjusted and changed along the way into newer, higher goals which means that the improvement process can be continuous indeed. The system objectives would be placed higher and higher when time passes (Figure 2.3). The progress of the process towards improvement depends on the ambition level of the objectives that are defined within a project (Brouwer and Van Koppen, 2008). When the ambition level is not so high in the context of FIPs it could happen that change occurs and improvement takes place, but that no unconditional pass for the MSC certification is guaranteed. While, when an

ambition level is high, the process to reach the improvement can be slow, but eventually a significant improvement can take place and MSC certification can be reached. It is up to the managers how high they set the system objectives and therefore how challenging the goals are and how much improvement can be achieved. How high the objectives are set, but also which objectives are set in the first place, is determined by the perception of the managers on the situation and on improvement.

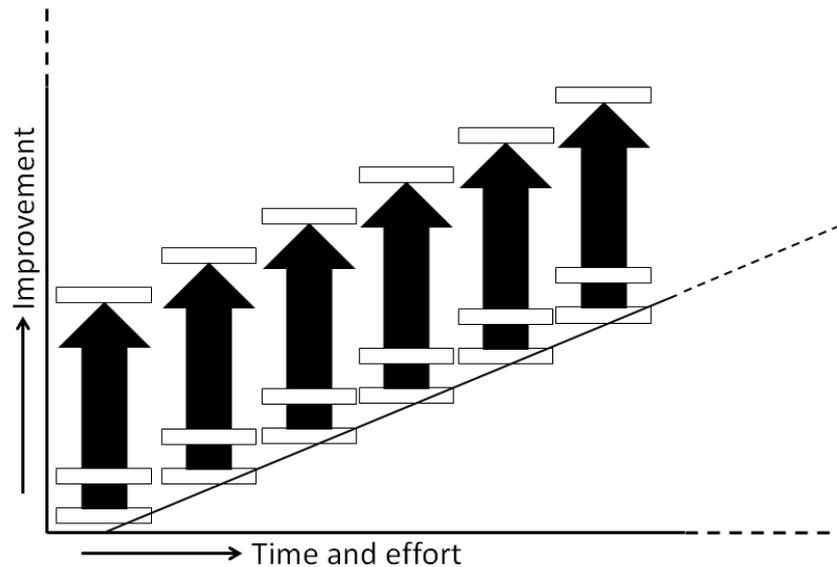


Figure 2.3 Continuous Improvement by adjusting the system objectives repeatedly.

In theory, this graph could be extended endlessly, thereby representing a movement of *continuous* improvement. For the sake of simplicity, all the arrows are drawn the same length, but in practice new system and operational objectives can be placed relatively high or relatively low with respect to the previously set objectives.

2.5 Perception and the information environment

Differing perceptions on a situation can be an explanation for the existence of varying approaches towards addressing a problem. Perception is defined in the dictionary as “*a way of regarding, understanding, or interpreting something*” (Oxford Dictionary, 2013). In scientific literature regarding fisheries the term perception is often used, but not unequivocally and not always explicitly defined. Verweij and Van Densen (2010) define the perceptions on fish stocks as “*understandings of the processes that determine development in fish stocks*” (p.1144). McClanahan *et al.* (2005) do not define the term perception explicitly, but they measure the perceptions of actors on fishing gear by asking them to scale the gear by its ability to maintain catches. This can be seen as scaling the way actors regard the effectiveness of the gear. In his PhD thesis Van Densen (2001) is exploring different definitions of perceptions and he states that “[*t*]he various meanings of this word seem to fall in to two categories: *perception through the senses only, and perception in the wider context of observation and successive evaluation, interpretation and appreciation of all information captured*” (p.10). The second category is most in line with the concept that will be used in this study and is in line with the definition of the dictionary and the other examples as it includes how people interpret and regard (appreciate) something as well as how they understand information because I think understanding follows after successive evaluation. Therefore, the definition of Van Densen (2001) of perception in the wider context will be used. It implies that an actor has to process the information it

receives, like evaluating, interpreting or appreciating it, before that will become part of its perception.

Linking the formulation of goals for improvement to perceptions opens up the possibility to argue that there is not one way of understanding a situation and that choosing certain objectives for solving a problem comes forward from different perceptions. According to Verweij *et al.* (2010), differences in perceptions can be problematic in multi-stakeholder settings. FIPs are typical examples in which multiple actors are involved and therefore it is important to look at perceptions in the FIP context, because differing perceptions can hinder effective fisheries management since disputes can arise about which management measures can be effective (Verweij and Van Densen, 2010; Verweij *et al.*, 2010).

Central in FIPs is the process of change; practices need to be changed in order to improve the fishery. Acknowledging that different actors have differing perceptions is a starting point for finding out what factors hinder and enable the occurrence of change of practices of actors involved in the fishery. Whether the actors will change their practices or not depends on the existence of an incentive for them to change. The incentive will not be the same for the different actors, because they have a different background and daily life and they are confronted with different information: the information environment. Differences in perceptions can be related to differences in the information environment of actors (Verweij *et al.*, 2010). The information environment is defined by Verweij *et al.* (2010) as “the environment where an individual is confronted with information” and “can be seen very literally, as a physical surrounding” (p.523). Figure 2.4 (adapted from Verweij *et al.* (2010)) shows the information environment schematically. The information environment of each actor consists of several elements (Figure 2.4), described below, which together determine the actors’ perception on something. It is assumed that every actor has its own information environment and perception that arises from it. It is possible that elements within the information environments of actors are shared between those actors, but since the information environments as a whole are different for each actor, this leads to different perceptions.

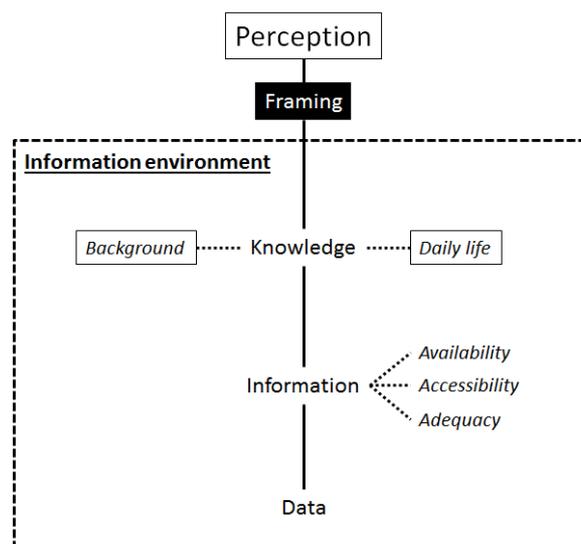


Figure 2.4 Perception shaped by the elements within an actor’s information environment.

Availability, accessibility and adequacy are characteristics of information and are therefore showed in the figure. Background and daily life influence the capturing and processing of information and therefore the creation of knowledge (adapted from Verweij *et al.*, 2010).

In order to use the concept of the information environment, a description of all the elements is required. *Data* are discrete, objective facts about states of the world that may or may not be useful for certain use (Davenport and Prusak, 1998; Van Densen, 2001; Verweij *et al.*, 2010). Data in itself has no inherent meaning and rather provides a description than that it provides judgment or interpretation (Davenport and Prusak, 1998). *Information* does have meaning, also formulated as relevance and purpose, and its form and content are suitable for certain use (Davenport and Prusak, 1998; Van Densen, 2001; Verweij *et al.*, 2010). *Knowledge* is “*valuable information from the human mind*” that develops after repetitive use and processing of information (Van Densen, 2001: p.8; Verweij *et al.*, 2010). The information has been put in a context and is reflected upon (Van Densen, 2001; Verweij *et al.*, 2010). Another, perhaps more tangible, definition of information and knowledge is given by Quigley and Debons (1999). According to them, *information* provides an answer to the questions “{*when/where/who/what*}” while *knowledge* answers questions that ask “{*how/why*}” (p.4). *Data* can then be considered as not providing answers to questions within a problem space (Quigley and Debons, 1999; Stenmark, 2001). In practice this means for example that catches per day (data) can be put next to each other and trends can be observed during a year (information) which can be explained when this pattern occurs every year in combination with other factors like changes in the season (knowledge). Data obtained by an actor will change into information when meaning is given to the data. When this information is being used and processed repeatedly it can turn into knowledge.

Verweij *et al.* (2010) describe that the information by its availability, accessibility and adequacy. Information must be *available* to users in order to capture and process it; “*it must exist*” (Verweij *et al.*, 2010: p.523). It must also be *accessible*, people must be able to obtain the information and they must know where to find it, since otherwise they cannot use the information. *Adequacy* of information refers to if information is manageable for the actors who should use it and to if actors can do something with the information they get. A very simple example of information that is not adequate for fishers in Indonesia would be information that is provided in English. Most fishers in Indonesia do not speak English, so the information is not manageable for them and they cannot do anything with the information even though it is available and accessible, because they do not understand it. Information must be understandable for the actors involved. I interpret the three aspects of information that are discussed as awareness of the information; whether the information has reached the actors – representing the flow of information – and whether they understand what is meant by it. What actors do with this information and whether they are able to act in line with the information is considered a next step. It is worth to mention that I assume that not all the information and knowledge enters the information environment as data gained by the actor itself. Information can also be given by another source and can that way fit directly into the information environment as information or even as knowledge. It is assumed that information about agreements made within FIPs enters the information environment directly as information about practices that are or are not desirable according to the FIP participants.

The way actors capture and process information leads to the creation of knowledge and perceptions. Different ways of capturing information are for example a fisher regarding the day-to-day catch of his own ship or a policy maker considering the aggregated catch data from a complete fishing fleet (Verweij *et al.*, 2010). The capturing and processing of information are determined by several factors that can be considered as personal characteristics of actors: their daily life and their background. The background of the actor is determined by its education and experience. Experience is defined as

“what we have done and what has happened to us in the past” (Davenport and Prusak, 1998: p.7) and can be both professional and personal. Education can be considered the (possible) education at schools but also the parental education which includes the transfer of values and beliefs as well as culture and traditions. This can determine the capacity of actors to understand certain information formats, such as text and graphs (Van Densen *et al.*, 2010). Someone who never learnt to read will have a different perception on the same piece of textual information as someone who can read. The background of an actor determines its capacity to handle certain information, but also the context in which it places new information.

Part of an actor’s daily life are its current activities including its functions, tasks and interests which can also be either professional, personal or both. On the professional level the daily life is determined by what kind of job an actor has and with whom it has contact during the day. On a personal level this regards the responsibilities of an actor beside its job, like maintaining a family. The daily live is greatly determining the information sources with which an actor is confronted and therefore shapes the information environment of an actor. A fisher can, for example, get information from middlemen and may usually not speak to suppliers and processors, while a supplier can get information from both middlemen and processors due to his position in the value chain. Therefore, the structure of the value chain and the established relations between actors within that chain greatly determine what information reaches an actor – what information it can capture –, because these are part of the daily life of an actor. This is especially an important aspect in FIPs since they use the value chain to create incentives to change and therefore they have to deal with these established relations within the value chain that determine the flows of information.

Framing is considered a filter for all the information from the information environment. In this study it is considered a ‘black box’, a given that will not be specifically studied. It is included in the figure as a reminder for taking into account that not all data, information and knowledge from the information environments adds to the perception, because some information is filtered out. All together, the elements of the information environment add to the creation of an actor’s perception. The existing perceptions that are expressed by actors can therefore be studied through analysing their information environments. The position of an actor in the value chain will play an essential role in determining its perception, because it determines with what information an actor is confronted and it influences the way the information is processed.

2.6 Linking the concepts, creating one framework

Choosing certain objectives for solving a problem comes forward from actors’ perceptions. In Figure 2.5, the perception is added to the previously introduced framework of CI (Figure 2.2). Adding the perception to the concept of CI in the context of FIPs allows arguing that CI objectives are not a given, but that they are a choice of the FIP participants. Perception differences can cause difficulties in arriving at a consensus on appropriate management, because actors can have different judgments of the situation and therefore different views on which management measures will be effective (Verweij and Van Densen, 2001; McClanahan *et al.*, 2005). This is especially relevant in multi-actor settings like FIPs. The FIP is implemented by creating incentives through the value chain. FIP participants have to deal with differing perceptions, because the actors involved in the fishery have different positions within the value chain. They will capture and process information differently,

because they have a different background and daily life. Different perceptions exist along the value chain that could hamper achieving an appropriate approach towards achieving improvement.

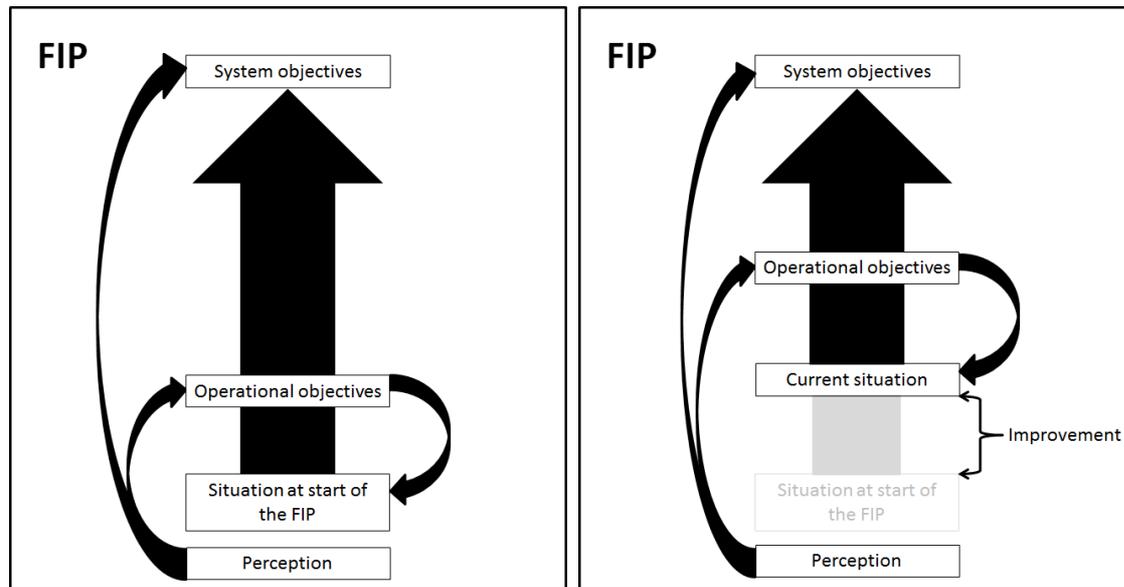


Figure 2.5 Continuous Improvement (CI) in the context of the Fishery Improvement Project (FIP) extended with perception.

The arrows show that the perception determines how an actor defines operational and system objectives and that achieving the operational objectives will influence the situation. Left: situation at the start of the project with desired goal and interim objectives. Right: reproduction of a current situation in which some operational objectives have been met and the gap between current and desired situation is reduced, improvement took place.

Where then in Figure 2.5 can the value chain be integrated? Since perceptions differ for differing actors, a similar figure to Figure 2.5 can in theory be drawn for every actor in the value chain respectively. However, only the BSC FIP participants determine the objectives set within the FIP and therefore the value chain is not represented in Figure 2.5. The link between the value chains and the information environment will be used to analyse the implementation of the BSC FIP. It will help identifying the enabling and constraining factors towards achieving improvement by analysing the awareness of the FIP measures and perception on these measures of actors on different scales of the value chain.

The aim of this thesis is to analyse the capacity of FIPs to lead to improvement via the crab value chain, taking into account the information flow and perceptions of actors. This will be done by combining three theoretical concepts that are relevant to answer the main question: *'to what extent has the Indonesian BSC FIP been able to improve the practices of actors in the crab value chain and what was the influence of information and perceptions on this process?'* Using the terminology of the conceptual framework the question covers the following elements. In the first place, I will analyse what the BSC FIP is by looking at the BSC FIP participants and their position within or outside the crab value chain. CI will help identifying the pathway chosen by these BSC FIP participants in order to achieve improvement by distinguishing system and operational objectives. This will also reveal the perception of the BSC FIP participants on improvement. Studying the definition of two BSC FIP objectives in-depth will give inside in the information that has been used. It will reflect the information environment of the BSC FIP participants. This will later be compared with the way local actors capture and process information. Were they aware of the taken BSC FIP measures? In other words, was the information about the BSC FP available, accessible and adequate for them? What is

their perception on these measures and how can this explain their practices? Comparing the practices of actors with the BSC FIP objectives will in the end allow concluding if improvement took place and how this is influenced by flows of information and actors perceptions on the FIP measures and on improvement along different levels of the value chain.

The conceptual framework will be applied to the case of the BSC FIP. The next chapter will illustrate the methodology that will deliver the results on which the framework will be operationalized. It will divide this study in two parts. The first part is parallel with the first sub question and will consider the scale of fisheries managers; the BSC FIP participants. The second part represents the second sub question and will consider the local actors of the fishery, most prominently being the fishers. The framework will be applied on these two cases in chapter 4 and 5 respectively.

3 Methodology

3.1 Introduction

This thesis is a case study on the BSC FIP in order to examine the capacity of FIPs to lead towards improvement in the context of production and trade. Yin (2009) has described that case studies are used as a research method in many situations to contribute to our knowledge of individual, group, organizational, social, political and related phenomena. In this case study, the focus is on the phenomenon of the BSC FIP in Indonesia – an organizational phenomenon – and its influence on the BSC fishery. The research is split up in two sections in which a different methodological approach is applied. The first section regards the scale of the fisheries managers and how they approach improvement. The second section regards the scale of mainly the fishers but also of the collectors in an Indonesian fishing village and the implementation of the FIP. The data for this study was collected in Indonesia from February until May 2013.

During the complete study a qualitative approach was used. I chose this approach as it allowed describing findings in detail. Denzin and Lincoln (2005: p.3) state that *“qualitative research involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them.”* Since I studied the way actors perceive a situation or a measure and wanted to study relations among actors, the qualitative approach is suitable. On top of that, no resources were available to conduct quantitative research for this study. I preferred a qualitative approach over a quantitative approach since I was the first person who studied the effectiveness of the BSC FIP. Therefore, it was necessary to explore the structure and important relations in the BSC FIP and fishery first before asking more focused and quantifiable questions was possible.

Table 3.1 provides an overview of the number of conducted interviews and with whom they were conducted. In Appendix 1 a more extended overview is given. Interviews were conducted until an apparent ‘saturation point’ was reached after which no new information was collected in additional interviews. This is a common approach when qualitative research is conducted (Guest *et al.*, 2006).

Table 3.1 Overview of interviewees.

	Interviewees	#
The BSC FIP	<i>Total:</i>	7
	Executive director of APRI	(1)
	Asia Liaison of the NFI Crab Council	(1)
	BSC coordinator of the SFP	(1)
	APRI-members	(4)
Betahwalang	<i>Total:</i>	29
	Fishers	(17)
	Collectors	(11)
	Mini-plant representative	(1)
Total		36

In this report I use the first person to describe what I did and to draw conclusions. This corresponds to the highly reflexive character of the research. During the research I explored the situation within

the BSC FIP and fishery in the field, tested hypotheses, started to ask more focused questions, reflected on the outcomes, started again, draw conclusions etcetera. The use of the first person reflects this learning process and allows for self-critical discussion if needed at the end of this report.

3.2 The BSC FIP

In order to be able to analyse the BSC FIP approach towards improvement qualitative research was performed in which semi-structured interviews, direct observations and literature were used as information sources. For this part of the study in total, seven semi-structured interviews (n=7) were conducted which lasted approximately 45 until 90 minutes. The language of communication was English. During the interviews, a topic list was used which indicated objectives that should be reached at the end of the interview. Each objective was subdivided in topics that were part of the objective and that could help probing if necessary. The topic list was adapted to the person that was interviewed and to the organisation he represented. Additionally, the topic list was adapted parallel with my learning process from more general questions about decision making within the BSC FIP and about actors involved in the BSC FIP towards their perception on FIPs, improvement and on the two measures that were studied specifically. The seven interviewees were chronologically the Executive Director of APRI, the Asia Liaison of the National Fisheries Institute Crab Council (NFI Crab Council), the blue swimming crab Coordinator of the SFP, a representative of Blue Stars Group which is an Affiliate Member (one out of two) of APRI and the following APRI-members (three out of seven): PT Bumi Menara Industri (BMI), PT Kelola Mina Laut (KML) and PT Windika Utama (WU).

Direct observations gave insight in the actual practices and activities of the BSC FIP. I visited two processing companies of APRI-members (one in Surabaya and one in Semarang), where I observed the practices in the processing companies. I attended a workshop on stock assessment for the BSC in Jakarta and joined a visit of the Executive Director of APRI and the Asia Liaison of the Crab Council to the BBPPI (*Balai Besar Pengembangan Penangkapan Ikan*, freely translated as the centre for the development of fisheries) in Semarang. On top of that, scientific and grey literature was studied in order to be able to put the BSC FIP approach in a broader context of FIPs and fishery management programs and in order to put the information and measures in a scientific context.

3.3 The implementation of the BSC FIP

For the second part of the case study the scope changed to a different scale. Because it was not possible to analyse the BSC fishery for all fishers in Indonesia, one village was studied in depth in order to understand the situation. This is in line with Yin's remark (2009: p.18) that "*[a] case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context*". The contemporary phenomenon that is studied is the implementation of the BSC FIP while the real-life context is reflected in the situation in the fishing village. According to Yin (2009: p.13) the case study method has a distinct advantage compared to other research methods when "*[a] 'how' or 'why' question is being asked about a contemporary set of events, over which the investigator has little or no control*". This is exactly the case for this research. I looked at events within the BSC fishery and the BSC FIP that take place 'now' and I could not control the situation. Furthermore, the question that I try to answer is to what extent the BSC FIP led to a change of practices of actors in the crab value chain and *how* this could be explained by the flow of information and the actors' perceptions on these measures.

The case study is conducted in the village Betahwalang (*desa Betahwalang, Kecamatan Bonang, Kabupaten Demak*) in the province of Central Java (*Java Tengah*), Java, Indonesia (Figure 3.1). The choice for this village was a guided choice as I was based in Semarang, a city relatively close to the village, and was connected to UNDIP (Indonesian: *Universitas Diponegoro* or Diponegoro University). My supervisor in Indonesia already had contacts in this specific village and the village is known as particularly a BSC fishing village. Approximately 5600 people live in Betahwalang of which about 1073 people are fisherman divided over about 517 fishing boats. All the citizens of Betahwalang are Muslim, which implies for the fishery that they in principle fish every day except for the Fridays, because this is a day of rest. On top of that, fishers need to pay *jimpitan nelayan*, which is a contribution to the construction of the Mosque in Betahwalang.



Figure 3.1 Location of the case study.

Upper right: Indonesia. The black arrow roughly indicates the case study location. Lower left: the village Betahwalang. The white line from the village to the open sea resembles the route fishers take when they leave Betahwalang to go to the fishing grounds (approximately 30 minutes). Collection of the crabs either took place in the village or at bamboo stations in the river mouth. The legend in the lower right corner indicates a distance of 500 metres (adapted from Google Maps).

For this part of the study, semi-structured interviews were conducted, direct observations were made and documents were consulted. The case study is unique compared to other research methods in providing the ability to deal with such a variety of evidence (Yin, 2009). A comparison is made between two measures agreed upon within the BSC FIP that aim to change practices of actors which are the implementation of a minimum size of eight centimetres for landed crabs and the prohibition to purchase egg-bearing females.

The focus of this research was on the fishermen and on the collectors. Fishers are the people who are in direct contact with the wild, living resource while the collectors are in touch with these fishers and were able to give additional information about practices and relations within value chain. The chief of fisheries did not know how many fishers exactly fish with what kind of gear and catch which species. However, the majority of the fishers in Betahwalang fish for BSC and of those people the

majority catches BSC with traps (Indonesian= *jebak*, *bubu* or *wedung*) which normally means there are two people in one boat. Other fishing gear that is used are gillnets (*jaring*) and mini trawls (*alat*).

In order to conduct this research, I came to Indonesia for the first time in my life. My learning process and the insights that I got are parallel with the methods I used to collect data. First, I started to have orienting conversations with the collectors in Betahwalang and with the chief and ex-chief of fisheries in order to find out what the structure of the village and the fishery was. Second, I started to have in-depth interviews with the same collectors and with fishers about their practices, the perception and awareness on the two measures that I focused on and about their vision on improvement. When time passed, I got more insight in the practices and perceptions of both the collectors and the fishers and I was able to specify my questions towards verifying what I heard in other interviews. All the interviews and conversations were conducted in either Indonesian, Java language or in a mix of both with the help of a bachelor of science (BSc) in marine ecology who translated to English. During the interviews with the fishers and collectors, pictures were used as an illustration of the questions and a topic list was used and adapted following my learning process.

Seventeen semi-structured interviews (n=17) were conducted with blue swimming crab fishermen. Preferably, the interviews were conducted with trap fishers who owned a boat. Trap fishers are the only fishers who specifically fish for BSC while for other fishers BSC is one of the species they catch, next to shrimp and fish. Additionally, boat owners are responsible for the catches and equipment. Sixteen of the interviewed fishers fished with traps while one fished with mini-trawl. Fifteen out of seventeen fishers owned the fishing boat themselves, while two were workers on the boat. We contacted most fishers either when they brought their catch to the collector or through a snowball method by inviting fishers for an interview via the collectors. The interviewed fishers on average had about 400 traps, ranging from 330 until 460. The boats were powered by one engine that could range from twelve until about twenty horsepower (hp). No exact data was collected on catch sizes, but catches differed per season. Fishers either went out for one day fishing or for *babangan* which is fishing for two days, one night or for one day and one night depending on the fishers. Catches for one day fishers could range from about five kilograms or less in the low season until about 30 kilograms in the high season (these are estimations). An overview of the fishers can be found in Appendix 1.

Eleven interviews were conducted with the collectors of BSC (n=11) in Betahwalang. Ten BSC collectors were active at the time this research was conducted. We interviewed all of them plus one person who used to collect BSC. The biggest collector bought crabs from about 100 boats, while the smallest collector sourced from about ten boats. Collection of crabs took place at either bamboo stations in the river mouth, owned by the collectors themselves and situated 30 minutes by boat from the village or in the village itself, often close to the houses of the collectors (Figure 3.1). Collectors boil the crabs they buy from the fishers and subsequently sell the boiled crabs to one or several mini-plants. Sometimes collectors went to other areas to collect the crabs, but this did not happen on a large scale. The research only looked at the collection in Betahwalang, so in the bamboo stations and in the village. The collectors could provide valuable information about the general fishing practices.

Additionally, a semi-structured interview was held with an APRI mini-plant representatives (n=1) in the Demak area. At mini-plants the boiled crabs are picked and the crab meat is sorted prior to its

sale to the processors. Conversations were also held with another mini-plant representative in Betahwalang and with the chief- and ex-chief of fisheries in the village.

Direct observations were made during the complete period of field work in Betahwalang which included taking many pictures of events and practices. I joined collectors to the bamboo stations where they collected crabs or they allowed me to have a look when they collected the crabs in the village. One time I joined two fishers on a fishing trip. Additionally, every time I went to the village to conduct field work, I stayed there for a couple of days in order to experience the daily life of the people who lived there.

4 The BSC FIP approach towards improvement

4.1 Introduction

Since every FIP can be different, it is important to know what approach towards achieving improvement is chosen in a FIP in order to understand what they are trying to achieve and why. In this chapter I will analyse what information the BSC FIP have used to define the objectives of the FIP in order to reveal what exactly is the BSC FIP, what they are aiming to do and how they do that. The conceptual framework will be used to create understanding of three different aspects of the BSC FIP, which together should give insight in the approach towards improvement. At first, the structure of the BSC FIP will be analysed. Thereafter, I will explore how BSC FIP participants define improvement. Third, I will look at the formulation of two specific BSC FIP measures – operational objectives – in order to see how the BSC FIP participants are working towards improvement in practice. Central in these three sections will not only be what is happening in the BSC FIP, but also why this is happening. The analyses will be summarized in section 4.5 in which I will conclude that the approach towards improvement is mainly based on global actors, standards, demands and information.

4.2 The BSC FIP

In the conceptual framework (chapter 2) I explained that there is not one clear definition of FIPs and that the concept of FIPs is subject to interpretation by the FIP participants. The SFP (2012b) underlined the importance of adjusting a FIP to the local needs and culture, as well as the fact that fisheries are different and therefore FIP structures may vary for different fisheries. For that reason, I will analyse the BSC FIP in this section. I will argue that the BSC FIP is based on global demands and standards, rather than on local needs and demands based on three arguments. First, the BSC FIP is mainly a global partnership between actors that act on a global level or on national level. Second, the reasons that the BSC FIP partnership came about were based on demands of the international market and on a comparison with another international fishery. Third, standards and norms of the MSC, a global organization, are used to determine the content of the BSC FIP work plan. The question arises whether this global oriented approach fits the local circumstances and needs of the fishery and other actors within the crab value chain.

4.2.1 The BSC FIP partnership

While some of the definitions of FIPs mention that producers can be part of a FIP (Conservation Alliance for Seafood Solutions, date unknown; SFP, 2012b; WWF, date unknown-a), it became clear that the BSC FIP is mainly an internationally oriented partnership. The relation between the BSC FIP participants and the crab value chain is shown in Figure 4.1. The vertical BSC crab value chain includes, starting from the resource level, fishers, collectors, mini-plants and processors in Indonesia (Figure 4.1). Processors are the link between the national and international market, as they export the crab meat to mainly the US where importers buy the meat and finally retailers sell it to the consumers. From this entire value chain, the only ‘chain actors’ (after Bolwig *et al.*, 2010) that are involved in the BSC FIP as participants are a selection of processors (APRI) and importers (NFI Crab Council), while actors that act on lower levels of the value chain, i.e. the fishers, collectors and mini-

plants are not part of the BSC FIP. The SFP is involved as an 'external actor' (after Bolwig *et al.*, 2010), as it is an NGO that does not directly handle in crab meat, but provides support to the FIP.

APRI, the Indonesia Blue Swimming Crab Processing Association (Indonesian: *Asosiasi Pengelolaan Rajungan Indonesia*), is one of the BSC FIP participants. It is an organization which consists of nine Indonesian processor companies (hereafter APRI-members) that pack and export crab meat. As stated by APRI's executive director, the APRI-members make up for about 85 to 90 per cent of the total export of crab meat from Indonesia to the US. Most of the packed crab meat is exported to companies in that country. According to data from the MMAF (Ministry of Marine Affairs and Fisheries) this was more than 50 per cent of the total crab meat export in 2005 (SFP, 2009) while interviewees said it was about 95 or almost 100 per cent. APRI acts on the border of the national and international market, since the processors export packed crab meat.

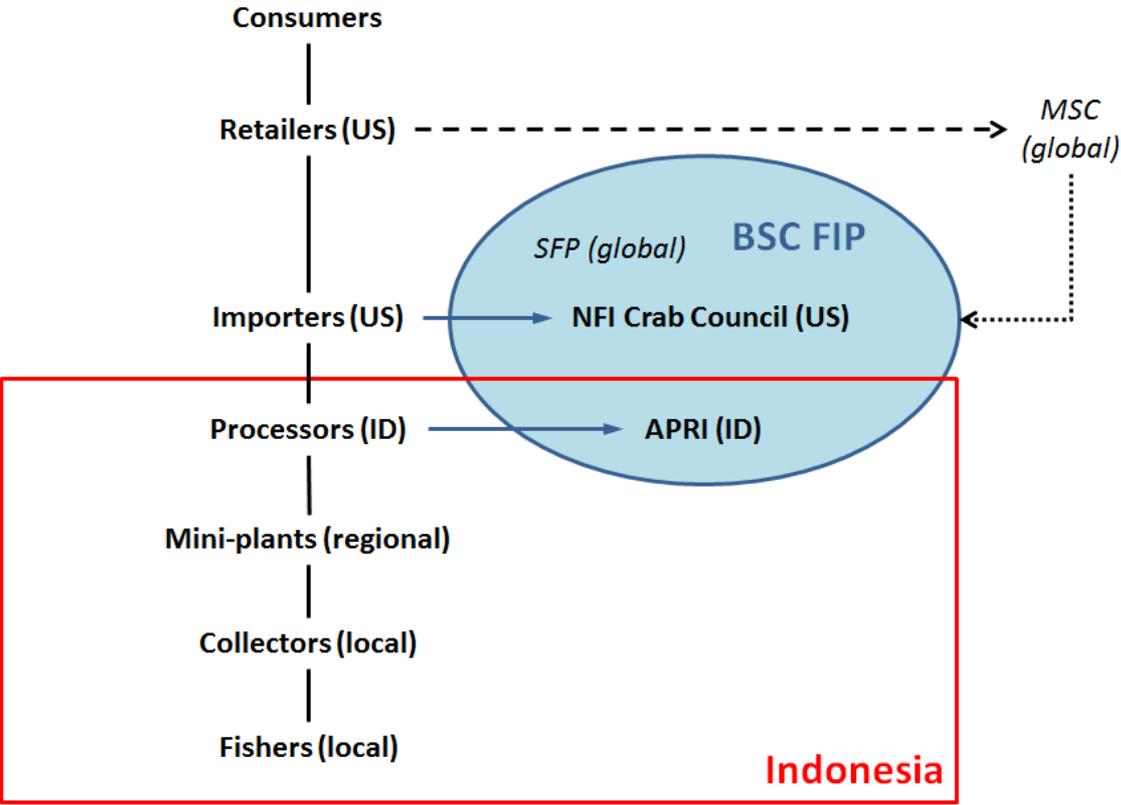


Figure 4.1 Overview of the BSC crab value chain.
 The chain actors are indicated in bold and connected with stripes. The Indonesian crab value chain is indicated by the red box. The BSC FIP participants are shown in the blue oval that represents the BSC FIP. The blue arrows show that a selection of the processors and importers are united within APRI and the NFI Crab Council respectively. The striped arrow from the retailers to the MSC means the retailers are demanding for MSC certified seafood. The dotted arrow pointing from the MSC towards the BSC FIP indicates that the guideline for the BSC FIP are based on the MSC principles. This figure clearly indicates that the BSC FIP participants are part of a network and not of the local scale.

The National Fisheries Institute Crab Council (NFI Crab Council) is another chain actor, albeit outside of Indonesia, that is a BSC FIP participant. It acts on the national level of the US. The Crab Council is founded in 2009 (after APRI) and represents the buyers of the packed crab meat in the US; APRI's customers. At the moment this research was conducted, the NFI Crab Council consisted of seventeen member companies that together represented about 80 per cent of the BSC import to the United States (NFI Crab Council, date unknown). At the start of the FIP the NFI Crab Council, and to a lesser

extent the ALLFISH¹, had to approve the BSC FIP work plan in order to provide funding for its implementation. At the moment this research was conducted, the input of the Crab Council was still the validation of and the funding mechanism for the APRI initiatives. So, the FIP work plan for the Indonesian BSC fishery is validated and funded by the NFI Crab Council which acts on the national level of the US.

As third and last BSC FIP participant, the Sustainable Fisheries Partnership (SFP) has been closely involved in both the establishment of APRI and in writing the FIP work plan. The SFP is trying to work towards sustainability by using the value chain² of APRI since they lack their own. The SFP is a global NGO that works on providing information on fisheries and helps to work towards improvement via FIPs in multiple fisheries in the world (SFP, 2013).

Decisions about the content of the BSC FIP work plan and therefore the BSC FIP are taken by the BSC FIP participants during APRI-meetings. APRI-meetings are the decision making system for APRI and are conducted every two to three months. Next to APRI-members these meetings are attended by representatives of the Crab Council and the SFP who are respectively the Asia Liaison and the BSC coordinator. Decisions are most of the time based on general agreement, but when that is not possible the members will vote. APRI-members³ have a vote during the meetings while the Crab Council and SFP representatives have a guiding and steering role. According to the interviewee of the Crab Council, the role of the Crab Council during APRI-meetings is giving ideas, suggestions and advice which are likely to be followed because the Crab Council needs to approve the budget and the work plan. The SFP interviewee said the SFP has an advisory, supporting and helping role during and in between the meetings. Additionally, SFP helps putting APRI in contact with scientific experts and governmental representatives through their network. Decision making within the BSC FIP is based on the power and knowledge of the SFP and the Crab Council, together with the opinions of the APRI-members while no actors lower in the BSC crab value chain have decision making power.

4.2.2 The establishment of the BSC FIP

Actors on lower levels of the value chain were also not actively involved in the establishment of the BSC FIP. The reasons that the BSC FIP came about were demand from the international market for sustainably produced seafood and concerns about possible overfishing of the resource based on a comparison with an international fishery.

The establishment of APRI was the first step towards the establishment of the BSC FIP. While the APRI partnership exists on the Indonesian national level, APRI was founded in 2007 after an initiative of Phillips Foods to focus more on sustainability within the BSC fishery. Phillips Foods is originally a company from the US with subsidiaries in South-East Asia. As a result of combined effort from APRI and SFP towards sustainability, the BSC FIP was founded in 2009. During the interviews, four reasons came up for why the initiative to establish APRI was undertaken. The first three reasons regard the

¹ ALLFISH is a partnership between the seafood industry that is represented by the International Coalition of Fisheries Associations (ICFA), the World Bank, the Food and Agriculture Organization (FAO) and the Global Environment Facility (GEF). It is mentioned here in order to give a full representation of the situation, but it will not be referred to anymore later in this study.

² The interviewee talked about 'supply' chains, but these were used the same way as value chains are used in this research so further on the term value chain will be used.

³ All regular APRI-members (seven out of nine) have a vote while affiliate APRI-members (two out of nine) do not have a vote.

Indonesian value chain and are a decreasing volume of exported BSC, decreasing sizes of crabs and increased distance to the fishing grounds. The fourth reason regards the demand of the international market for sustainable seafood.

The first reason for the establishment of APRI that I address is that processors saw the total volume of BSC being exported to the US decrease. Interviewees could not clearly describe what data this was based on. Detailed information about the volume of crab meat processed is not shared between APRI-members as they are competitors on the market. One interviewee said that the observation of a decreasing volume is probably based on data gained by the government or bought on the Internet. Two interviewees mentioned that the volume of processed crabs in their own companies was in fact still increasing, while one processor explicitly mentioned that the amount of processed crabs in his company was decreasing. Five years ago, his company exported twelve containers per month while they export five to six containers now.

Second, according to the interviewees the sizes of crabs were decreasing. Additional to the decreasing amount of containers, the interviewee mentioned that his company exported 22-24 per cent jumbo lump⁴ five years ago while that was 18-19 per cent jumbo lump at the moment this research was conducted. Bigger crabs produce bigger lump pieces than smaller crabs, so a decrease in the amount of jumbo lump can be an indication for decreasing sizes of crabs. One of the processors who said that the volume his company processed still increased also mentioned a decrease in the amount of big jumbo since the start of his company in 2005. The decreasing size of crabs is in this case indicated by the processors, but they could not tell me if this was the information was also available at the start of the FIP.

Third, the information reached the processors that fishers had to go further offshore to find the fishing grounds. Again, the origin of this information remained uncertain during the interviews, because nobody could tell where this occurred exactly. However, the information concerned the processors, because they had seen the above mentioned symptoms before in another fishery. The comparison was made with the blue crab (*Callinectes sapidus*) fishery in the Chesapeake Bay, as this was the predecessor of the BSC fishery in South-East Asia. The actors saw comparable symptoms for the blue crab fishery and the BSC fishery. According to the Asia Liaison of the Crab Council, at first, there was no international industry for blue swimming crab, but when it appeared that the blue crab resource was declining and demand started to outweigh supply processing companies started to look for alternative resources and found BSC in South-East Asia in the 1990s. BSC fishing became an important part of the overall export revenue from seafood products from Indonesia. In 2011, it had the fourth highest fishery export value (8%) after shrimp (38%), other fish (32%) and tuna (15%) (SFP, 2012a). A decreasing volume and size and increasing distance towards the fishing grounds were previously observed in the blue crab fishery and therefore the BSC FIP participants concluded these were symptoms of overfishing in the BSC fishery as well. Companies again started to worry about the continued existence of their businesses, this time in South-East Asia. However, two interviewees speculated about another cause of the symptoms and pointed at the (changing) seasons. According to two APRI-members, the high season for BSC used to be predictable, but the seasons are becoming less predictable as well as the crab catches. In the past, it is seen that crab catches are high after

⁴ Jumbo lump (Figure 4.2, right) is large muscle meat connected to the back swimming leg of the crab and can only be called jumbo if it is more than 3.5 grams (information provided by KML). If the size is less than 3.5 grams, the meat can still be sold but the profits of selling it are less and the name of the meat is different.

much rainfall, but the rainfall is not predictable anymore neither is the high season. These are, however, interviewees' observations of the situation in Indonesia which are not supported by (scientific) causal evidence. The main cause for the symptoms of change in the BSC fishery is considered overfishing based on the comparison with the blue crab fishery in the US.

The fourth stimulus to establish APRI and work towards improvement came from a demand of the US market. Retailers such as Walmart started to aim for buying seafood from suppliers that are certified according to the MSC certification or a similar standard or from suppliers who are in a process towards this certification. Walmart set this goal for 2012 and the US importers and processors in Indonesia started to wonder how they could reach that status (MSC, 2011; Walmart, 2013).

All things considered, I observed that even though limited information was available on the stock status and the origin of the information about the catch sizes, volumes and distance offshore was uncertain, the BSC FIP participants decided that action was necessary, because they thought overfishing was taking place. They based this interpretation of the situation on a comparison with an international fishery. On top of that, the demand from international retailers required action as well. Global information and demand were incentives to start working towards a more sustainable fishery.

4.2.3 The FIP-concept

APRI and SFP decided to work towards the status that was required by the US' retailers through a FIP. I have observed that the FIP-concept is a globally defined concept that is aiming to adhere to the globally set standards of the MSC. Moreover, the SFP's FIP improvement tracker that is used in the BSC FIP is based on the MSC principles. It is a format that aims to be generally applicable on several fisheries and not on the BSC FIP in particular. Therefore, I will argue that the approach chosen by the BSC FIP participants to work towards achieving improvement is based on global standards.

MSC certification is a globally set standard for sustainable fisheries that has played a significant role in determining APRI's work plan, later the BSC FIP work plan. The content of the FIP work plan is based on a MSC pre-assessment that was conducted until June 2009. According to the interviewees, at the beginning of APRI there was no data on the stock status or about what steps APRI had to take towards sustainability. The crab processors, however, experienced the market pressure from retailers in the US so they realised they had to act. APRI and SFP were looking for a way to reach the required status and thought about the MSC certification path. They knew that the condition of the fishery would not be good enough to pass for a full-assessment so a MSC pre-assessment was conducted. It was seen as a tool to identify to what extent the BSC fishery fell short of getting MSC certification. The outcome of the pre-assessment was used to start writing a work plan. The three main categories of MSC performance indicators can be found back in this work plan, namely (1) stock status, (2) environmental impacts and (3) management. The SFP had used the terminology of FIPs before and therefore introduced this term also in the BSC fishery context. The work plan became the FIP work plan and the BSC FIP was established.

Both SFP and the Crab Council, actors outside of Indonesia that act on the global scale, support working towards sustainability through a FIP. According to the BSC coordinator of the SFP, a FIP seemed a good option for the BSC fishery, because it contained all the elements that made it suitable to start a FIP. First, there was market leverage from the buyers' and retailers' sight as they were demanding for sustainably produced seafood. Second, the species was important for the business

because it was an important export product for Indonesia. Third, a clear value chain existed and the processors, which were united within APRI, had the ability to apply market pressure. The Crab Council was interested in the FIP concept, because according to the interviewee of the Crab Council they want to work on sustainability through FIPs. He defined FIPs as processes of identifying issues in a fishery, addressing those issues and hopefully changing things. The private sector needs to be engaged, because it has most impact since it is directly working with the fishermen. The Council is trying to develop and to fund initiatives towards sustainability in countries that harvest and export BSC. It funds several Asian projects that work on fishery improvement and APRI is one of them (NFI Crab Council, date unknown).

Table 4.1 SFP’s FIP improvement tracker
(Adapted from SFP, 2012b).

	Stages	Indicators
1	Launch FIP	Sustainability evaluation, best practices guidance or Fisheries Improvement recommendations publicly available
2	Form FIP	FIP members are organized and are evaluating the fishery
3	Encourage improvements	Work plan with annual improvement milestones is publicly available and FIP members are engaging regulators
4	Improve policies / practices	Fishery is achieving annual improvement milestones and fishery policies or fishery practices changed or fishery management system became more precautionary or managers are following scientific advice more closely
5	Deliver improvements in the water	Fish stock biomass increased or fishing mortality has decreased or fisheries compliance has improved
6	MSC certification (optional)	

The guideline that is used for implementation of the FIP was the SFP improvement tracker (Table 4.1), developed by the SFP as guideline and validation for FIPs in general. According to the interviewee of the SFP, the MSC principles are the basis for the FIP improvement tracker and are used for scientific justification of the FIP approach. The improvement tracker is meant to measure the progress within a FIP towards improvement, but does not give an impression of how much progress is enough (SFP, 2012b). Stage one of the improvement tracker is to launch the FIP. Stage two is the formation of the FIP in which a partnership between actors is formed. Stage three is the encouragement of improvements which includes making a work plan publicly available and that FIP participants are pressing regulators for improvements. Stage four is the delivery of improvements in policies and/or in fishing practices, while step five is the delivery of improvements in the water. Stage six is optional and is getting MSC certification. It is not obligatory to make these steps in the order they are presented (SFP, 2012b). At the moment this research was conducted, the BSC FIP was approaching the fourth stage. The BSC FIP uses this improvement tracker, but due to the nature of the concept the BSC FIP participants still have to define the content of the BSC FIP themselves. Following the argumentation of the conceptual framework, the path that is taken in the FIP is greatly determined by choices made by the actors involved; other actors could decide upon other directions, would make other choices since they can have access to different information and have different perceptions. This will be explored in section 4.3.

The involvement of multiple actors should ensure that FIP activities are appropriate for the social-political context of the fishery (WWF, date unknown-a). Two chain actors and one external actor on the international and national scale are involved in the BSC FIP, but (chain) actors on regional or local scale are not involved as BSC FIP participants. Since the FIP is initiated on an internationally oriented scale the question arises whether the FIP has been able to adjust to the local circumstances and needs of the fishery and of actors within the crab value chain. It appears that the BSC FIP is based on global demands and standards while improvement should take place within the Indonesian BSC crab value chain which starts at the local scale of fishers. However, the content of the FIP is not defined by the globally set guidelines, but is dependent on the BSC FIP participants' interpretation of improvement. Therefore, it could be possible that the adaptation to the local scale of the fishery can be found in the perception on improvement of the BSC FIP participants.

4.3 The definition of improvement in the BSC FIP

The way actors perceive improvement influences the objectives they set. This section will explore how the BSC FIP participants define improvement by analysing the elements of CI that are shown in Figure 2.5. I will show that even though the BSC FIP participants have differing information environments they can work together towards the same goal, since they have a shared perception on improvement. That perception is translated in the system objective of the BSC FIP, sustainability. Operational objectives are indicated which require involvement of external actors. Indicators for improvement were not set explicitly in the BSC FIP, but could include satisfaction of (local) chain actors and stock status.

4.3.1 BSC FIP participants' perception on improvement

An actor's perception is defined as 'successive evaluation, interpretation and appreciation of all information captured'. In this section the BSC FIP participants' perception on improvement will be introduced. The BSC FIP participants formulated improvement as being sustainable. As described in chapter 2, a movement towards sustainability is common ground in FIPs, but the definition can vary depending on who is defining it. The definition comes forward from the differing perceptions of actors. Improvement is considered by APRI interviewees as having a sustainable supply in terms of volume, quality and fishing costs. The latter should be sustained in a way the fishermen and mini-plants will get their profit as well as the processing companies themselves. On top of that, improvement is considered by the APRI-members as doing better than before. The interviewee of the Crab Council considered improvement as having a management structure in place that is looking after a resource in the long run; that *"instead of trying to maximize your production and getting everything you can all at once [...] you have some kind of foresight of what you are doing so that the industry will still be viable, from now and in the future"*. The SFP interviewee describes sustainability as being sustainable for the natural resource, which includes the species itself but also the ecosystem. He sees sustainability as being able to *"utilize the resource as long as possible"*. He realizes that, since SFP is partnering with the business they should try to combine the ecological target of the SFP with the target of the business.

I see that the general interpretation of sustainability of the interviewees is similar, although there is a difference in emphasis between the perception of the businessmen and of the NGO due to their differing interests. The businessmen are interested in the survival of the business for now and in the future and want to achieve that by ensuring the resource is sustained, while the SFP starts its

argumentation from the ecological point of view. However, the SFP realises that they do not have the direct means to change practices in the fishery themselves, because they lack a value chain and that is the reason why they collaborate with the business. They realize the FIP does not only include ecological sustainability, but that it should also lead to benefits for the private sector and communities in order to be effective and therefore they start trying to change the situation from the business level. For both different actor groups sustainability means that they are looking for a way the fishery can survive and the resource is still healthy, but their respective information environments are different. This means that even though their motivation to work in a FIP is slightly different due to their differing initial interests – survival of the business versus survival of the natural resource – they can still work together towards the same goal and within the same project since their perception on improvement is similar.

4.3.2 Continuous Improvement in the BSC FIP

The perception on improvement influences the approach of the BSC FIP participants towards improvement. How did the BSC FIP participants translate their perception on improvement into objectives within the BSC FIP? Following the concept of CI a clear distinction can be made between long-term goals or system objectives and the short-term goals or operational objectives in the BSC FIP. The system objective, to reach sustainability, is the overall goal of the BSC FIP. The short-term goals feed into and contribute to the overarching goal of sustainability. The operational objectives that came forward most prominently during the interviews were the establishment governmental regulation and getting scientific validation for the BSC FIP approach. These two goals were deemed most important by the BSC FIP participants, but were for the biggest part out of the hands of the BSC FIP participants. They can lobby for these goals and supply information, but the actual action should come from the government or from scientists. It shows that the BSC FIP is broader than only creating incentives to change through the value chain. The way the operational objectives are formulated now, the FIP needs a supporting network from outside the direct crab value chain, in this case both scientific and governmental.

System objectives

The end goal of the BSC FIP according to all interviewed BSC FIP participants is sustainability. As a system or long-term objective, it is seen by the interviewees as having a sustainable resource that ensures that the people who are dependent on it can keep their jobs and that people of the next generation can depend on it as well. Sustainability for the APRI-members means that they can continue their business and that it can be stable for a very long time. The system objective from this business point of view is thus to keep factories open and to keep people employed and therefore the raw material should be sustained. From the SFP point of view the idea behind sustainability is to utilize the resource as long as possible for the sake of the species itself and the ecosystem, but since they are partnering with the private sector they also want it for the sake of the business. The challenge for the SFP is how to combine in practice the ecological target with the target of business and give benefits to both the private sector and the community. The system objective of sustainability includes finding the balance between utilization of the resource and new recruitment in the crab population.

The system objective of sustainability is a long-term goal, but how long would it take to reach it? The interviewees gave some hopeful estimations about when sustainability would be reached and the

BSC FIP would end that ranged from about three to more than ten years. The first answer before that estimation was mostly that they did not know how long it would take or that it might never end. According to one interviewee the BSC FIP cannot finish, also not after MSC certification, since when actors are not committed the resource can still collapse and not be sustained. Another interviewee mentioned it probably is an on-going process, but once the BSC FIP gets to a certain point it is expected that the amount of work and amount of attention that should be given to the project will get less. The notions of CI imply that improvement is a never-ending process. I saw this was partly reflected in the system objectives of the BSC FIP. The BSC FIP participants expect that most effort needs to be done before a sustainable state is reached and that the effort will get less but should be maintained once a sustainable state is reached. None of the interviewees mentioned however that higher goals exist after sustainability which could mean that this sustainability is the only goal and would be the end of the improvement process.

FIPs are most often aiming towards MSC certification or towards reaching a level that can result in an unconditional pass of the MSC standard. According to the interviewed BSC FIP participants MSC certification is not considered a goal, but an additional bonus or reward within the BSC FIP. The main goal of the BSC FIP is to reach sustainability and if they then also could be certified by the MSC is a bonus. One interviewee stated they possibly want to work towards a sustainability certification, but whether that is the MSC certificate or another certificate that might come up in the coming years does not matter. Another idea that was put forward was to start aiming for MSC certification on a small scale in a specific area, since the fishery is spread over many different locations and the circumstances differ per location. This is not (yet) implemented though.

Operational objectives

The operational objectives formulated in the BSC FIP are written down in the BSC FIP work plan. The conducted MSC pre-assessment delivered guidelines for the implementation of the stages of the improvement tracker, which were integrated in the work plan. From the pre-assessment it followed that especially the stock status and the management needed attention. This study does not aim to provide an overview of the complete content of the FIP work plan since that can be read in the work plan itself, but it focuses on the operational objectives which BSC FIP participants broad up during the interviews. They mentioned two key difficulties that according to them should be overcome in order to reach sustainability. Both these operational objectives regard factors outside of the crab value chain, being governmental involvement and additional scientific research.

The first operational objective came forward during every interview and is the involvement of the Indonesian government in the BSC fishery. According to the interviewees, the influence of the government is needed to implement, regulate and enforce a fishery management plan. The BSC FIP participants already started to work towards this goal when this research was conducted. They already delivered most of the input for a fisheries management plan to the government as a stimulation to implement a management plan. The interviewee of the Crab Council expected that a paradigm shifts needs to take place within the government from focussing on maximizing employment towards sustaining a resource which might take time. APRI-members themselves say they lack the power and the authority for law enforcement and that is why involvement of the government is needed. While APRI-members are stimulating the government to act they are not just waiting until the government undertakes action. Instead, the BSC FIP participants mentioned they try to do '*something*' by making their own agreements and trying to implement these through their

value chain. This would be faster than waiting until the government introduces regulations for the fishery. However, all the interviewees say that the influence of the government *is* needed to implement, regulate and enforce the fishery management plan. According to the interviewees, to reach step four of the BSC FIP stages regulations at national level need to be introduced by the government.

A second obstruction to overcome that was indicated was a lack of scientific research on BSC which is resulting in data deficiencies. According to the interviewee of the Crab Council, it is necessary to let research validate some of the policies recommended or agreements implemented within the BSC FIP, like the minimum size limit which will be introduced later. Therefore, in order to make regulations that fit the life history of the BSC, a supply of scientific information is needed. Scientists need the time to conduct research and to draw conclusions which can validate policies and can support the regulations. APRI is actively trying to involve research institutes in the studies to the BSC fishery and keeps trying to put the BSC on the scientific agenda.

If the BSC FIP participants would wait with undertaking actions until the scientific outcomes would be presented, the process towards improvement would be delayed. Therefore they are trying to do something by undertaking action themselves while waiting for the scientific outcomes of the research. The BSC FIP participants are helping and stimulating the government and scientists to make choices, while at the same time they are implementing their own agreements even though these are not always scientifically validated (yet). The operational objectives on which the BSC FIP participants themselves focus now are stock-enhancement projects, education and agreements that require a change in the practices in the fishery.

4.3.3 Indicators of improvement

In order to be able to state that objectives are reached and a situation is improved, it is necessary to indicate a difference between the previous and current situation. In Figure 2.5 this is shown as the transition from the left to the right figure which can be measured by indicators for improvement. Since the goal of sustainability is widely interpretable, identification of indicators for improvement could help in understanding what the BSC FIP participants perceive as improvement in practice. The interviewees could not clearly state based on what indicators they will call the fishery 'sustainable'. Different indicators came forward during the interviews, but none of them were specific.

Interviewees gave different indications of ways to determine whether a sustainable state has been reached and therefore whether improvement took place. They regarded the SFP improvement tracker, the satisfaction of actors in the value chain and an increased biomass. First, they mentioned that a sustainable state would be reached when all the stages of the SFP improvement tracker were passed. The goal of sustainability would be achieved step-by-step by following the SFP milestones as they are formulated in the FIP improvement tracker, but the interviewees did not mention how they would be able to measure if a next step was reached. It was clear that the interviewees were aware of the steps of the improvement tracker, but they did not define specific indicators on which they would test the steps of the improvement tracker.

However, interviewees attempted to give their view on indicators for improvement. The second indicator for improvement that came forward was that a sustainable state would be reached when there are no complaints from the governments, fishermen, mini-plants, scientists and APRI-

members. In other words, according to the interviewees people would know that improvement is reached when everybody feels they get their own profit and when the government and scientists say there is no problem with the activities in the BSC fishery. Two other interviewees said that improvement is now measured in terms of biomass. The BSC FIP participants are trying to put a stock assessment in place in order to be able to say something about the BSC stock status; whether the population is increasing or declining. An indicator of improvement would then be an increasing population. According to the interviewee this could also be based on fishery dependent data which is gathered in the fishery. However, no indication could be given about the size of the stock at a sustainable state of the fishery.

I identified some key difference between the biomass as an indicator of improvement and the satisfaction of actors. The first is a scientific approach in which the actual stock status should be compared to a desired stock status and the second is a human-based approach. The first indicator of sustainability is quantifiable, while the second is more subjective. Another important distinction between these two indicators for sustainability is that in the first only data on the stock status are taken into account, while the second takes into account the different actors within and beyond the fishery's supply chain. The latter is an example of how a FIP can be adjusted to local (and global) needs and circumstances in the fishery. However, it did not get clear which of the indicators of improvement, or maybe both, would be used in practice.

The interviewees brought up some difficulties concerning the indicators of improvement. Two of the interviewed APRI-members specifically mentioned that they do not have the expertise in tracking improvement themselves, since they focus on the crab business and not on research. The private sector wants to get a national framework in place to measure improvement and they said they need a research branch of the governments or other scientists or NGOs to help them with that. On top of that, several interviewees suggested that improvement should be considered case-by-case and location-by-location due to the nature of the FIP and the differing indicators of improvement. According to the interviewees, actions are undertaken both on local level with local communities and on national level with the government and all these actions have their own achievements and therefore their own indicators of improvement. Currently, these achievements are not systematically measured in practice.

The BSC FIP participants define improvement as sustainability. This is seen by them as being able to continue the business in the future by ensuring the survival of the resource. Although the chain actors and external actor have differing motivations to be involved in the FIP due to their backgrounds as businessmen and NGO, they share the perception on improvement. The perception on improvement is translated in the system objective of sustainability. This goal should be reached by following the SFP improvement tracker which requires involvement of the government and of scientists. However, they also choose to set other objectives, because waiting for the government and scientists would cost time. Those other operational objectives regard the resource or the crab value chain itself instead of external actors only. Indicators for improvement are not explicitly set, but they either regard the stock status, the satisfaction of chain and external actors or both. In case the satisfaction of chain actors is really an indicator of improvement this could imply that the success of the BSC FIP is adjusted to the local needs of the fishers. This is in contrast with the previously introduced global network of actors that is determining the BSC FIP objectives in which the regional

and local value chain actors were not directly included. However, no explicit indicators for improvement came forward during the interviews.

4.4 The definition of the FIP measures

Next to the operational objectives of involving the government and scientists in the BSC FIP, the BSC FIP participants formulated operational objectives which they could implement themselves in order to do 'something'. Analysing how these objectives were defined will contribute to understanding why the BSC FIP participants chose certain operational objectives in order to reach improvement and what information they used for this. The operational objectives that will be studied in this section are two agreements (also referred to as measures) that are decided upon within APRI, being a minimum size limit for landed crabs and a prohibition to take females with eggs. The BSC FIP participants have taken decisions in an information environment full of uncertainties. The availability of information about the life history and stock status of the Indonesian BSC is low. Despite of the indicated lack of scientific data on the Indonesian BSC, the BSC FIP participants felt the necessity to do something, because they think their fishery is about to collapse due to overfishing (section 4.3.1). Instead of waiting for the scientific research to complement the information, they used the information from other cases, the Maine lobster fishery, as an inspiration to define the BSC FIP measures, partly complemented with a local study.

The BSC FIP participants say they are willing to act. According to the interviewee of the Crab Council, the BSC FIP participants face the difficult situation in which most BSC fishermen in Indonesia are poor, live day-to-day and have a low education. Another interviewee mentioned that fishers do not really understand what they are doing with regard to environmental impact and sustainability of the fishery due to their low education. It is stated that processors and retailers cannot just say that the overexploitation of the resource is a problem of the fishermen, since the fishermen's practices and yields are the basis of their own business. Therefore, the processors and retailers believe they should undertake actions themselves. According to the interviewees, it is difficult to educate all the Indonesian fishers about sustainability, because they are many and it is not possible to talk to them one-by-one. Therefore, APRI-members are trying to 'talk' to the fishers through their value chain so the information will reach the fishers faster than when all fishermen are educated. According to the interview of the Crab Council it is in the local community's best interest that the resource is managed properly, because the local economy is dependent upon the fishery, since it generates money within the community. However, he stated it is difficult if a management plan would require the fishers to scale down while their mentality is to live day-to-day and try to gain all the extra money they can. The BSC FIP participants are looking for an integrated solution for this complicated problem via the BSC FIP.

Decisions made in the BSC FIP that regard changing practices of actors are, until now, agreements between APRI-members which means a consensus is reached about the decisions made, but no enforcement on the measures is carried out. The agreements are voluntary. Following the work of Bolwig *et al.* (2010) on value chain analysis this type of change can be considered 'continued participation under new terms'. It considers an alteration of the terms of participation for the chain actors, since the BSC FIP requires stricter standards regarding the sustainability of actors' practices. Interviewees mentioned that communication of the measures happens by communication through the value chain which is often word of mouth communication. On top of that, information is spread

to mini-plant owners by letters and posters are spread which request fishers not to catch crabs with eggs, not to catch small crabs and not to use fishing gear that can destroy the environment (Appendix 2). Sometimes, communities are visited to educate people, because APRI is working on several community projects. However, they hope to be faster by communicating the measures through the value chain. When the agreements are communicated through the value chain they are communicated from the BSC FIP participants down to the local scale actors through the vertical value chain (Figure 4.1) as flows of information (corresponding with Figure 2.1) and would require a change of practices on the local level.

4.4.1 Defining the berried female measure

In November 2011, APRI adopted a policy that would restrict the purchasing of egg-bearing female crabs, berried females, after advice from the Crab Council to do so. The BSC FIP participants agreed upon this measure due to three reasons, being inspiration from another, international fishery, an ecological and an economic argument. This can be related to the information environment of the BSC FIP participants.

First, the agreement was based on the Maine Lobster (*Homarus americanus*) fishery in the US in which it is not allowed to take berried female lobsters. Fishers have to return the berried female lobsters to the sea after marking them with a V-notch in the side flippers of the tail (Acheson, 2003 and Ostrom, 2007). Fishers voluntarily started V-notching berried females so that other fishers would be prevented from taking them as well (*ibid.*). The Maine lobster policy is considered a success, because it led to a recovery of the lobster population after a crash in the 1920s and 1930s (Ostrom, 2007). On top of that, fishers have been able to exploit the Maine lobster for already more than 125 years. Moreover, the fishery became MSC certified in March 2013 (The Maine Lobster Marketing Collaborative, 2013). The interviewee of the Crab Council mentioned that although the BSC and Maine lobster are two different species with different life history characteristics and the effect of similar management can be different, they decided upon implementing the measure not to accept the berried female crabs.

I observed that the achievement of the Maine lobster fishery of being sustainably exploited for more than 125 years is in line with the system objective of the BSC FIP. Most probably it was therefore seen as a source of inspiration for the BSC FIP participants. The interviewees said that they are 'just trying to do something', but the measure they are took is certainly not just random. It is defined in a global context, because links are made with an international, successful case. The information on the Maine lobster was available, accessible and adequate for the BSC FIP participants. The information existed, they had access to it due to their globally oriented information network and it was adequate since they understood it. On top of that it appeared applicable, because of the similarity with the presence of eggs in crabs. Whether this example would also be effective for BSC was not known however. Under the statement 'we are just trying' they used this international information as inspiration for their agreement.

The second reason why the BSC FIP participants decided upon the berried female measure was ecological. The interviewees stated that the idea behind putting back the females with eggs was to give the crabs the chance to release their eggs, which would according to APRI's executive director be about one million, and give the species the ability to repopulate itself. The hope is that by putting back the berried females the growth rate of the population will be equal or preferably higher than

the mortality rate, both natural and through fishery impact. That way, the population will stay stable or will grow and the species will be able to regenerate itself while there is a certain level of fishery impact. When comparing this with scientific literature, I can raise doubts about the possible effectiveness of the berried female measure. Whale (2003) argues that the recruitment strength of crabs is often better predicted by environmental indicators than by spawner abundance. The blue crab for example, which was the predecessor of the BSC, is a species in which strong evidence shows that post-settlement processes are dominant over pre-settlement processes such as spawner abundance. This implies that the amount of juvenile crabs in the sea might be less dependent on the amount of berried females in the sea and more on environmental circumstances. On top of that, putting back berried females means reducing the fishing pressure, because part of the caught crabs is put back in the sea. This could have a positive effect on the stock size. The prohibition to take berried females might not have the desired effect in practice or might contribute less than the BSC FIP participants hope for as it is uncertain if improvement in the water can really take place.

Next to the argument of sustainability of the resource, there is an economic incentive for the processors to agree upon the measures taken. The processors mentioned the taste of berried female crabs is not good and the meat can be soft and should therefore sometimes be rejected for export. Berried females give a small amount of meat which means they do not have a big economic value. On top of that, the eggs are not exported because they do not taste good. Here, I see that the interests of the APRI-members (an element of the information environment) play an important role in the determination of the operational objectives. Processing the berried female crabs means the meat cannot be exported or processors will get complaints from buyers. For the processors it is better if they only buy and sell the high quality meat due to their economic interests.



Figure 4.2 Boxes of crab meat, ready for transport from the mini-plant to the processor.
Left: claw meat. Right: jumbo lump.

In practice, enforcement of the berried female measure on the processor level appears hard. It is difficult for processors to see if they buy crab meat from berried females, since they buy the picked meat. The products they receive from mini-plants are boxes with one type of crab meat without shell and eggs (Figure 4.2). It is not possible to see if a piece of meat came from a berried female or not since the eggs are not visible anymore. Sometimes there is a difference in the quality of the meat; the amount of soft meat can be an indication for the presence of meat from berried females but is not necessarily a proof. One processor indicated that sometimes they find leftover eggs in a box, but that is not a reason not to buy the crab meat. For some processors it is less difficult to identify

berried females, because they also buy unpicked crabs in which case it is easy to see the outside eggs since they are prominently present on the underside of the crabs. One processor admitted that in the program berried females should not be purchased but that in practice females with eggs are not put back in the sea. According to him it is necessary to go to the fishermen and create an incentive there, because when the berried females reach the mini-plant they are already dead.

4.4.2 Defining the minimum size measure

In July 2011 APRI-members agreed on a measure not to purchase crabs below the minimum size of eight centimetres. Implementing a minimum size was suggested by the NFI Crab Council. Like for the berried female measure, inspiration for the definition of a minimum size measure came from another fishery, an ecological and an economic argument. Additionally, in order to define the exact size limit, the arguments were complemented with a small, local study.

At first, the ecological motivation the interviewees gave for choosing a minimum size as a management measure is to prevent catching individuals below the size at maturity in order to give the crabs the chance to reproduce. If the size is set too low the chance exists that the population is decreasing while the BSC FIP participants want the population to be stable or to grow. The idea is to leave the premature stock in the ocean and to only catch crabs that are already mature. This approach is also applied in the Main lobster case; so again, an international fishery is used as an inspiration for the BSC FIP measures.

The minimum size limit was set on eight centimetres, measured from tip-to-tip, after considerations of a local situation combined with economic interests of the crab business. APRI and the SFP wanted to base the size limit on the situation in an area where fishing pressure was high. The SFP ended up conducting the study in Jakarta Bay, because it is known as an area with a very high concentration of BSC fishers. The results of the study showed that most fishers in the Jakarta Bay fished crabs that were on average about eight centimetres, while crabs of six centimetres were already mature since they were bearing eggs. However, interviewees indicated that compared with the rest of the country, the crabs in Jakarta Bay are small. No scientific validation of a minimum legal size was available yet, but the BSC FIP participants felt they had to start somewhere. They assumed that implementation of any minimum size would be better than the previous situation in which no minimum size limit was agreed upon. On the one hand, the BSC FIP participants indicated that not much information is available and they are just doing something, while on the other hand they are trying to apply very specific measures.

The APRI-members agreed upon a minimum size of eight centimetres, because of market constraints in the Jakarta Bay area. The Jakarta Bay area is a big processing area that would probably collapse if the minimum size would be about ten centimetres, since the small study showed that crabs there are about eight centimetres or smaller. The interviewees took into account the lives of the people depending on the BSC fishery in the Jakarta Bay, because eight centimetres allowed the fishery in the Jakarta Bay to continue. Applying the concept of the information environment indicates that this small study made new information on the BSC available and accessible for the BSC FIP participants. The information is adequate for management in the Jakarta Bay area itself, because it indicates that crabs are already mature at eight centimetres in that area and that higher size limits would probably stop the Jakarta Bay crab fishery. However, the interviewees indicated that the sizes of crabs outside

the Jakarta Bay area are bigger. The information of the study might be less applicable in other areas in Indonesia.

The plan for the future is to stepwise increase the minimum size. The SFP agreed upon implementing the minimum size of eight centimetres, because the crabs were already mature in the Jakarta Bay. However, they had strong indicators that from a scientific point of view eight centimetres would not be sufficient. They realized that it is not only about the species, but that the business and the communities should also be taken into account in the FIP. On top of that, they agreed upon the measure, because the aim is to increase the minimum size limit in the future.

Another economic incentive played a role in choosing for the minimum size measure. According to the APRI-members, crabs that are less than eight centimetres are difficult to pick and the amount of meat that can be yielded is small so not much profit can be made by processing smaller crabs. Eight centimetres is considered the smallest size that can be processed and can still be profitable. The production costs of smaller crabs are higher than of bigger crabs, because the picking speed is lower for smaller crabs and less meat, of a lower value, can be yielded. For the processors it is ideal when the crabs are bigger, because they result in more meat and they are easier to pick. On top of that, they can pay the pickers more for bigger crabs and the quality of the product is better. Processing crabs smaller than eight centimetres costs the companies that much extra time and money that they do not consider it profitable and therefore they do not want to accept them.

In practice, the minimum size is communicated and implemented through the value chain. In order to give fishermen an idea of how big a crab of eight centimetres is, APRI produced 20,000 cigarette lighters of eight centimetres with their logo and 'Standard Minimum Size Rajungan 8cm' (part of Figure 5.1). From the Discussion Paper on the Minimum Size Limit (SFP, 2011) it became clear that the use of a measuring tool was also mimicked from the Maine lobster fishery. The APRI-agreement is voluntary and therefore the implementation can vary per processing company. Some companies create price incentives. One company for example, implemented four size categories: crabs below 8.6 centimetres were not accepted and crabs above 8.6 centimetres and bigger were divided into three size categories. For every category higher, his company paid a higher price per kilogram (2,000 IDR/kg). Another interviewee said that in his company they provide an incentive for the suppliers by paying more (1,000 IDR/kg) when the amount of jumbo is more than fifteen per cent. He also admitted that they sometimes buy undersized crabs, because they need a minimum volume for the factory, but that they cut the price for undersized crabs in that case.

The measures of the BSC FIP are mainly based on international information. The measures came about in an information environment in which almost no information is available about the resource. The BSC FIP participants found inspiration for the definition of the measures in the Maine lobster fishery. The measures that were implemented in Maine had achieved what the BSC FIP participants perceive as improvement. On top of that, the Maine measures were in line with the economic interests of the BSC FIP participants as they do not want to process undersized crabs and do not want to buy berried females, because that is not profitable. Although the BSC FIP participants had to deal with uncertainty about the effect of the measures on the BSC, they adhered to the conviction that doing something is better than doing nothing in order to improve the fishery.

4.5 Conclusion

The BSC FIP is based on global demands and standards, involving national and international actors while chain actors on regional and local scale are not involved as BSC FIP participants. Indicators for improvement are not defined explicitly and therefore it is not clear as to what extent the local needs will be taken into account when evaluating the improvement process. Measures agreed upon within the BSC FIP are based on international cases, because the BSC FIP participants are able to capture this information due to their function, tasks and interests ('daily life') and their international orientation. The survival of the business and the lives of fishers were taken into account when a minimum size was set.

Although the BSC FIP participants gave the impression they are just trying to do something, because it is better than doing nothing it became clear that the decisions they are taking towards improvement are not isolated, but they are related. The global network of actors in which the BSC FIP is embedded provides a global context on which the implementation of the BSC FIP is based. The way BSC participants try to achieve improvement appears to be based on global demands, standards and information, rather than on needs, demands and information from the local scale. Can this be confirmed with observations at the local level? Can the internationally embedded Indonesian BSC FIP lead to actual changes in the Indonesian, local fishery?

5 The implementation of the BSC FIP: a case study in Betahwalang

5.1 Introduction

The minimum size limit and prohibition to take berried females were implemented in the Indonesian BSC fishery. The implementation of these measures is analysed by means of a case study in Betahwalang, an Indonesian fishing village. The extent to which the BSC FIP has engendered change in the village is studied, focusing on the flow of information and the perceptions of actors in the value chain. Both measures had different effects in practice in the fishing village. The fishers put back small crabs which are below eight centimetres or even bigger, while all the interviewed fishers took berried females. Why did the fishers comply with the minimum size measure and did they not comply with the berried female measure? This chapter will start with the introduction of the practices of the actors with regard to the two measures. Thereafter, the actors' awareness of the measures will be studied. Awareness of the measures reflects the effectiveness of the communication of the measures through the value chain. The final part of this chapter consists of the analysis of the perceptions of the fishers on the measures and on improvement. It will turn out that the fishers comply with the minimum size measure, because this was already common practice before the BSC FIP was introduced. Fishers did not comply with the berried female measure, because the information flow was hampered by the existing practices and conflicting economic incentives existed along the value chain.

5.2 Practices of fishers, collectors and mini-plants

The practices of actors can be divided into two categories, being their general practices and their practices regarding the BSC FIP measures. Their general practices regard who is selling to whom, based on what they get paid and how much. Introducing these practices first allows discussing the practices of the actors regarding the BSC FIP measures in the context of the trade relations afterwards.

5.2.1 General practices within the value chain

Trap fishers usually fish with two people: one boat owner and one helper. The money they earn after a day fishing is divided among the two fishers according to agreements made between them. Most often, the boat owner gets the biggest share (if there is any profit). He will subsequently spend his share on provisioning costs for the next time they go fishing including diesel fuel, bait, traps, food, often cigarettes and depending on the season ice and gas. If money is left afterwards he can use it to take care of his family and paying his house (if he has one). The more crabs are caught and the heavier they are, the more money the fishers earn and the more profit they make when they sell the crabs to the collector.

Fishers either sell to a collector because of a social relation or because of a monetary relation. If a fisher and a collector are family, friends or sometimes even when they live in the same neighbourhood that fisher sells his crabs to that collector. Other fishers borrow money from a collector and therefore become customer. Collectors pay fishers based on the weight of their catches. The price was paid per kilogram and appeared to be the same for all the collectors in Betahwalang. Over time, the price per kilogram has changed due to influences of the international market.

Collectors boil the crabs before they sell them to the mini-plants. During the boiling process the weight of the crabs reduces. Mini-plants pay the collectors for the weight of the un-boiled crabs though. They pay the same price as the collectors paid to the fishermen with an additional fixed fee of about 2,000 IDR/kg.

5.2.2 Practices regarding the BSC FIP measures

The actors in the value chain did not comply with the berried female measure, while they did comply with the minimum size measures.

All interviewed fishers, collectors and mini-plants said they take or purchase females with eggs and do not put them back in the sea. Their practices are not in line with the prohibition to take berried females. One fisher (out of seventeen) was an exception, because he took females with young eggs, but he sometimes put back females with eggs that are almost mature. Some fishers drop extra water on the eggs to make them heavier, like a sponge, and to increase the price of the berried female. All of the collectors in Betahwalang as well as the mini-plants accepted females with eggs. One collector was an exception since he said he paid less for females with eggs. However, that was not observed when we were present while he was collecting the crabs. Collectors are requested by the mini-plants to reduce the weight of a catch with berried females, but they only act upon this when the chances that the fishers complain are low. The mini-plants sometimes complain to the collectors about the weight of the berried females, especially when there are many, because they do not use the eggs, but due to the existing paying system they do pay for their weight. In order to reduce the complaints some collectors use a trick when they weigh the crabs. If the scale they use is balancing instead of completely falling to the side of the crabs they change a rather small crab for a berried female so that the balance tips and the weight of the eggs is measured relatively less heavy. Another suggestion of the mini-plants is to squeeze the eggs and that way reduce the amount of water and therefore the weight of the berried females. No collector did that in practice.

Other practices are observed with regard to the minimum size for landed crabs. All the interviewed fishers except for one said they put small crabs back in the sea. The size of these small crabs appeared to be about the same as the minimum size that is agreed upon by the APRI-members. Indicating the size of 'small crabs' was a challenge for the fishers, because they determine sizes based on their feeling. Three categories of size indications came forward during the interviews. The majority of the fishers (n=9) indicated that small crabs should at least be eight centimetre carapace width (from tip-to-tip). One of them even indicated that crabs of nine centimetres from tip-to-tip were already too small for him. Four fishers indicated a minimum size of five centimetres measured from tip-to-tip and lastly three fishers could not exactly explain the size. Fishers never expressed the minimum size as a number of centimetres, but they made comparisons (Figure 5.1). The most common comparison was made with a box of matches, which was five centimetres. Other reference points were e.g. two coins of 500 rupiah, half a mobile phone (which were both five centimetres) or the size of a hand. From the latter it did not get clear from the interview how big this would exactly be.

The fishers found it hard to indicate from where to where they measured the size of the crabs, but I draw the conclusion that the size they indicated was similar to the eight centimetres carapace width measured from tip-to-tip as it is indicated within the BSC FIP. I base this conclusion on the interviews held and additional observations in practice. Figure 5.1, I shows fishers indicated three different

reference points for the size. The fishers who could indicate a size either said they ‘measured’ the crab from tip-to-tip (Figure 5.1, I.a.) or they measured the body while body was expressed as from the base of the tip until the other base of the tip (Figure 5.1, I.b.) or as the space in between the back legs of the crab (Figure 5.1, I.c.). My observations showed that a crab described as having a body as big as a box of matches was similar to the size of a lighter (which was eight centimetres) from tip-to-tip (Figure 5.1, II). On top of that, I measured the size of a couple of crabs that were rejected by collectors⁵ or that were thrown back by fishers. The size of these crabs was always eight centimetres or larger, even though the collector indicated initially that the minimum size of the crabs he rejected was a box of matches (five centimetres) measured from tip-to-tip. This illustrates the difficulty to indicate the size of crabs on the one hand and on the other hand the likelihood that in practice, crabs below eight centimetres are considered undersized in Betahwalang.



Figure 5.1 Size indicators for crabs.

I: this picture (without the lines) was shown to fishers when they were asked to indicate from where to where they ‘measure’ the size of crabs. Options indicated by the fishers are drawn in the picture and were (a) from tip-to-tip (=carapace width as indicated within the BSC FIP) or (b) the body, from one base of the tip to the other or (c) the body, in between the two back legs of the crab. II: a rejected crab of about eight centimetres from tip-to-tip or of a body the size of a box of matches. III: a box of matches compared with the APRI lighter of eight centimetres.

The collectors in Betahwalang did not pay for crabs the size of matches. Roughly, three categories of crabs were indicated, but the size limits did not completely get clear. To be illustrative, I divide the

⁵ Most often these were crabs that were caught by mini trawl. It appeared that the fishers who fished with traps did not land crabs of these sizes.

crabs in undersized crabs that are below eight centimetres, small crabs for which a lower price can be paid and big crabs for which the normal price is paid. The difference between the latter two categories was not completely clear. Some collectors operated a different price, a price difference of about 2,000-3,000 IDR/kg, for catches with small crabs and catches with big crabs. These collectors could not always indicate if they also paid the lower price for undersized crabs or only for small crabs. My estimate is, however, that they do not pay a price at all for undersized crabs, since the fishers tend to throw these back in the ocean and since I saw that collectors separated undersized crabs during the weighing process⁶. Collectors got complaints from the mini-plants if these received many small crabs. Collectors gave the undersized crabs back to the fishers or boiled them and kept them themselves, gave them to the mini-plant as a bonus, or sold them on the local market. The collectors did not put the crabs back in the sea, but they did not pay for them either.

The fishers and collectors already adhered to a minimum size of crabs since before the BSC FIP existed. One fisher indicated that he already put back small crabs since he started fishing about seventeen years ago while a collector said he has been selecting against undersized crabs since he started collecting about ten years ago. This raises the question whether the compliance with a minimum size is an effect of the BSC FIP or whether this already existed. This will be explored in the next sections.

I conclude that fishers and collectors complied with the minimum size measure, while they did not comply with not taking berried females. Collectors did not accept undersized crabs, but did not put them back in the sea either, while fishers did put the undersized crabs back in the sea. Therefore, only the practices of the fishers can in theory have a positive effect on the resource. In the case of the berried females, mini-plants suggested collectors to change their practices, but these suggestions all regarded reducing the weight of the berried females and did not give the crabs the chance to survive and release their eggs. I hypothesise that the suggestions of the mini-plant and the practices of the collectors were not driven by aiming for sustainability of the resource, but by aiming for the sustainability of the business. Why did the chain actors already comply with the minimum size measure before the BSC FIP existed and why do they not comply with the berried female measure?

5.3 Awareness: information flow through the value chain

The question arises if the chain actors knew about the existence of the BSC FIP measures and if that can explain the compliance with the measures? It is not completely clear if the actors in the crab value chain were aware of the measures taken within the BSC FIP. Although collectors know that mini-plants are not happy with females with eggs they deny that they know some people say it is better to put females with eggs back in the sea. This is in contrast with putting back undersized crabs which turned out to be common knowledge among fishers and collectors. However, this knowledge already existed before the start of the BSC FIP. Whether the information about the BSC FIP measures has indeed reached the fishers is analysed through the availability, accessibility and adequacy of the information which together determine the awareness of actors about the measures, as it is introduced in the conceptual framework. Lack of awareness about the berried female measure could be a reason that actors do not comply with it, but other factors appear to play a role that influence the flow of information through the value chain.

⁶ Again, this only happened when collectors bought crabs from people who fished with mini trawls, because with traps the crabs were bigger.

I consider it worth mentioning that none of the local chain actors referred to the BSC FIP. Several times I brought up the concept during explorative talks or interviews and it turned out that for instance the APRI-collector did not know at all about the existence of a FIP. The term FIP is not translated in Indonesian and is, as far as I know, not used in the communication of the measures. This was not new in FIPs as Doddema (2012) that the fishermen she interviewed for her research in the Philippines were not aware that they were part of a FIP. The FIP concept turned out to be a term that is only communicated to the outside world and not within the value chain. Therefore, the focus was on asking people if they knew some people said it is better to put back certain crabs in the sea, instead of whether they knew about the FIP measures.

For both the agreements it is clear that the information is available, it exists. The BSC FIP work plan can be found online, posters are spread (Appendix 2) which advise not to catch females with eggs and not to catch small crabs and lighters of eight centimetres are spread as a measuring tool. However, whether the information is accessible remains a question for me. I did not see the posters in Betahwalang and none of the interviewees in the village referred to them or to the BSC FIP work plan. Three of the interviewed fishers and three other people owned the APRI-lighter, so the information on the minimum size was accessible for a couple of fishers through the lighters. The information about both measures, however, mainly had to be accessed via communication through the value chain.

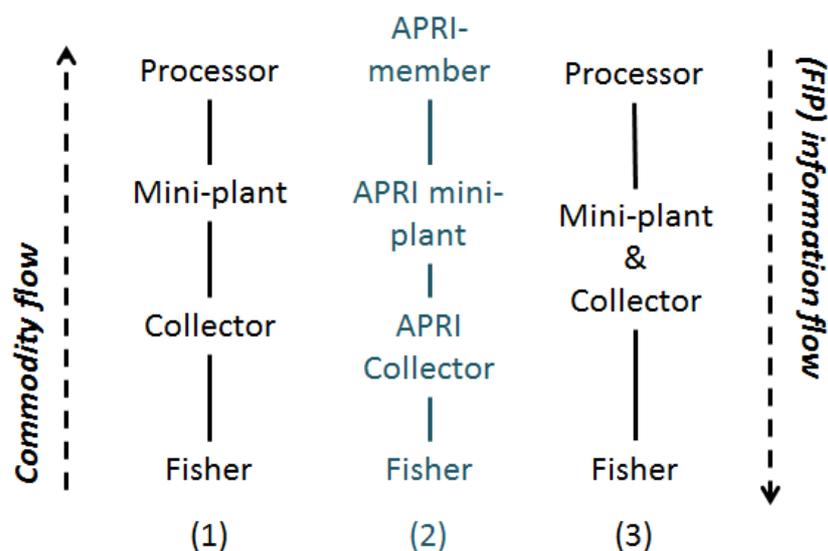


Figure 5.2 Representation of the three types of value chains identified in Betahwalang.

The arrows on the side represent the direction of commodity flow and the information flow in all the chains.

The BSC FIP agreements are implemented through the value chain. In Betahwalang, I could identify three different value chains from the processors until the fishers, which represent the information flow about the BSC FIP agreements (Figure 5.2). In general, fishers sell to one or more collectors, which sell to one or more mini-plants that might or might not be linked to a specific processor that is either an APRI-member or non-member. The three value chains are (1) a chain in which the collectors are not linked to a specific processor company which might be an APRI-member (fishermen – collector – mini-plant – processor), (2) a chain in which the collector *is* linked to a specific APRI-member (fishermen – APRI collector – APRI mini-plant – APRI processor) and (3) a chain in which the

collector is also a mini-plant owner (fishermen – mini-plant owning collector – processor).⁷ Through these value chains, all the fishers in Betahwalang were in some way in contact with the APRI-members. According to the collectors, their bosses sell to at least one processor which was an APRI-member.⁸ One collector was not sure to which processors his boss sold next to one former APRI-member. It is important to know that fishers are part of the value chain of APRI-members since non-APRI members still occupy about ten to fifteen per cent of the BSC export market. Knowing that all the fishers are part of the value chain of at least one APRI-member excludes the possibilities that collectors are not aware of and therefore do not comply with the measures, because they do not sell to APRI-members. In theory it is therefore possible that all the fishers are aware of the BSC FIP agreements, since they have a connection with APRI through the value chain.

Differences in awareness existed especially between the actors on the different scales in all value chains and between the two agreements. The division in the three different value chains (Figure 5.2) helped revealing this. With regard to berried females, none of the collectors and fishers in value chain 1 said they knew people say it is better to put back females with eggs. The collectors did know, however, that mini-plants complain when they get females with eggs since that can give them a financial loss. In value chain 2 and 3, both the APRI-mini-plant and the mini-plant owning collector knew some people say it is better not to catch females with eggs and said they told the collectors and fishers (respectively). However, none of the collectors who sold to the APRI-mini-plants and none of the fishers who sold to the mini-plant owning collector said they knew people say it is better to put berried females back in the sea. No information was available from mini-plants within value chain 1, so I do not know whether these mini-plants were aware of the berried female measure. However, the findings in value chains 2 and 3 raise the question why the information from the mini-plants did not reach the collectors and fishers.

Additionally, from the findings of this study, the question can be raised if fishers really do not know about the berried female measure or if they do not want to comply with it and therefore say they do not know it. Interviews with fishers who sold to the mini-plant owning collector were mostly conducted in the house of the mini-plant owning collector himself. During interviews he sometimes added information which could lead to confusing but interesting conversations between the fisher and himself. While this influenced the objectivity of the interviews, it also gave insight in the way people reason. After asking a fisher what the collector says about berried females he said: “nothing”. However, the collector jumped in to say that he really had told the fishers to put back berried females, but that they simply do not do it. One fisher admitted afterwards that he knew it, but that he did not want to put back berried females.

With regard to the minimum size the accessibility of the information was different. The existence of a minimum size that collectors and mini-plants would pay a price turned out to be common knowledge. This was the same for all the three types of value chains. According to fishers, undersized crabs have no price, because they are difficult to pick, they have no meat on them and the quality of

⁷ Eight out of the seventeen interviewed fishers were part of value chain 1, five were part of value chain 2 and three of value chain 3. One fisher both sold to the APRI-collector and to the mini-plant owning collector so he is part of value chains 2 and 3 and one collector sold to both the APRI-mini-plant and to other mini-plants so he was part of value chain 1 and 2.

⁸ The collectors did not talk about APRI-members or non-APRI-members. The collectors mentioned the names of the processors they thought the mini-plants sold to and I determined whether these were APRI-members or not.

the meat is not good. It appears that the fishers know this, because of incentives created through the value chain. None of the fishers said that the collector told them not to catch small crabs. The vast majority of the fishers indicated that nobody told them not to take small crabs, but that no price is paid for them on the market and collectors did not accept them. I interpreted this as a sign that it is 'communicated' through the value chain. Not actively in the sense that people were told not to catch them, but passively in the sense that fishers were demotivated taking the small crabs, because no price was paid for them. One fisher was actively aware of the minimum size measure originating from the BSC FIP, because the BBPPI (*Balai Besar Pengembangan Penangkapan Ikan*, freely translated as the centre for the development of fisheries) told him; a connection outside the value chain.



Figure 5.3 Berried females.

I: a boiled female BSC with inside eggs indicated by the white arrow. II: a female BSC with young outside eggs. This picture was shown when fishermen had to tell what they saw on the picture. All fishers mentioned they saw eggs. III: in the centre, a female BSC with older eggs.

I observed that the information about berried females was not accessible for the fishers or that they did not want to know about it. I still investigated whether the information would be adequate, manageable, for the fishers if it would reach them. I conclude that the information that is available about the berried females is adequate for the fishers, since they all know what females with eggs are. All the fishers that were interviewed in Betahwalang recognized crab eggs when a picture of a berried female was shown to them (Figure 5.3, II). Eight out of the seventeen added on their own initiative that the eggs they saw on the picture are 'outside eggs' which implies crabs can also have 'inside eggs' and that the fishers are aware of this. My own observations confirmed this, because

some boiled crabs that were opened had eggs under their shell which I could not see from the outside (Figure 5.3, I). Furthermore, two of the eight fishers mentioned that the crabs showed on the picture had young eggs, because they are yellow and one said that eggs which are black and hard are older than the yellow ones (Figure 5.3, II and III). The research of Churchill (1919) confirms that this colouration indeed occurs in the blue crab in the US, the species that was appointed as comparable to the BSC, since BSC was chosen as an alternative when the blue crab stock collapsed. The additional information the fishers gave shows in my opinion that the fishermen are aware of some processes in the life history of the crab and that they are able to recognize a female with eggs. Implementing a measure which regards berried females should therefore be possible considering the knowledge of fishers, because they know what females with eggs are. However, in this case the measure did not turn out being effective.

The information about the minimum size turned out to be adequate, because fishers and collectors considered it common knowledge what sizes could be purchased and what sizes had no price. However, the APRI-lighter was not adequate, because fishers did not know what to do with it except for smoking and lighting gas. Three of the interviewed fishers and additionally the ex-chief of fisheries, the mini-plant owning collector and one other collector owned the APRI-lighter, one fisher even owned four of them. Another fisher had seen the lighter in Jepara (a city close to Betahwalang) but did not own it himself. The fishers and ex-chief of fishery said the lighter was meant for smoking and lighting gas and nothing else. The mini-plant owning collector knew what the lighter was meant for. The collector knew it too and distributed the lighters among some of the fishers who sold to him, but he did not explain the fishers how to use it. One fisher knew how to use a lighter, although he did not own one himself, because he was involved in a project of BBPPI which rented his boat for research purposes and explained him about the minimum size of a lighter. Therefore, I argue that the APRI lighter is not adequate without an additional explanation of its purpose. In this case, however, the APRI lighter was not necessary to communicate the minimum size of the crabs since that was already common knowledge.

I conclude that the actors in the crab value chain were aware of the existence of a minimum size for crabs to be accepted; the information was available, accessible through the value chain and was adequate because it is considered common knowledge what sizes are acceptable and what sizes are not. However, it turned out that this is not the result of the BSC FIP, but that these practices were already common in the market before the BSC started. The awareness about the berried female measure differed per scale of actors that was interviewed. The available information was adequate, but possibly not accessible for all the actors. The type of value chain turned out not to be a crucial factor in differences in awareness, but it helped to identify a possible bottleneck in the flow of information through the value chains. Either, the mini-plants do not give the information to the collectors and fishers and therefore these are not aware of the measures, or the mini-plants told the collectors and fishers not to take berried females, but these would not want to do that. The remaining questions are therefore why actors do adhere to a minimum size even before the BSC FIP existed, taking into account that awareness about the FIP measure cannot be the cause. And why the awareness about the berried female measure is low lower in the value chain.

5.4 Perceptions

It turns out that the fishers and collectors were not aware of the berried female measure BSC FIP. However, if the information would be communicated well, how would the actors respond to the measures? The practices of actors are linked to the actors' perceptions on the measure. Perceptions consist of the elements evaluation, interpretation and appreciation. Differing perceptions can cause difficulties in arriving at a consensus on appropriate management (McClanahan *et al.*, 2005; Verweij and Van Densen, 2001). The perception of the fishers is compared with the perception of the BSC FIP participants to see whether differing perceptions can be an explanation for the compliance with the minimum size measure. On top of that, the potential success of the berried female measure, i.e. if actors would be aware of it, is analysed. When describing their understanding of the measures, fishers brought up elements that were important in shaping their perception. I chose to focus on the perceptions of the fishers, since they are the actors who are in direct contact with the resource and therefore they could directly undertake action by putting crabs back. The fishers explained why they would or would not want to comply with the measures.

Studying the perceptions of the fishers gave insight in their incentives to act. Fishers had a positive attitude towards the minimum size measure, but a hesitant attitude towards the berried female measure. They complied with the minimum size measure, because they knew collectors would not pay for undersized crabs. Furthermore, they would earn more money when they would wait until they were bigger. The fishers did not want to comply with the berried female measure, because they get extra money for the weight of the eggs. They are not economically incentivized to put them back. Mini-plants in principle do not want to process berried females, because it can result in a financial loss. However, the conflicting economic incentive of fishers stopped mini-plants from communicating the berried female measure down to the local level of the fishers, because they feared to lose customers.

5.4.1 Perceptions on the measure

I asked the fishers why people would say it is better to put berried females back in the sea. The majority of the interviewed fishers gave the same ecological argument for the berried female measure as the BSC FIP participants (see chapter 4.4.1). Out of the seventeen interviewed fishers, fourteen mentioned that putting back females with eggs in the sea could result in more juvenile crabs so that the population could increase. Only one fisher linked the population increase to an increase of his own catch in the long-term. Other fishers looked at the effect on the short term. Their initial reaction was that no one would put females with eggs back, because it is their own income and their own yield. Some fishers said it was impossible to put back berried females, because they are worth more money than crabs without eggs. They considered the berried females their own catch and their own livelihood. Another argument that was put forward was that other fishers would take the berried females if a fisher would put the female with eggs back. The fishers could imagine that putting back berried females could have a positive effect on the resource, but they did not indicate a positive effect for themselves. They emphasized the negative influence on their yield and income and the common access character of the resource.

On the contrary, the majority of the fishers interpreted the minimum size measure as imposing a positive effect on the resource and on themselves. I see this is in line with the ecological argumentation of the BSC FIP participants for choosing the measure. Whether the fishers really gave

an ecological argument or an economic argument was not completely clear to me at first. The fishers emphasized the positive effect on their income, but the ecological argument and the economic argument turned out not to contradict each other. The fishers said that they put the small crabs back in the sea, so the crabs could grow and the fishers could catch the crabs again when they are bigger. Fishers made a clear link between putting the crabs back and having an increased yield. Only one fisher mentioned explicitly that putting small crabs back in the sea and giving them the time to grow would result in more crabs in the sea if these small crabs get bigger and get eggs. This illustrated the effect on the resource. Most fishers said that waiting until crabs are bigger will increase their price.

Even though most of the interviewed fishers only went to elementary school, they brought up the ecological argument for both measures. This is not in line with the remark of one of the APRI-members who mentioned that fishers do not really understand what they are doing with regard to environmental impact and sustainability due to their low education. However, I state that the fact that fishers understand the ecological argument for taking the measures turned out not to be sufficient to explain the differing compliance with both measures. It could be an explanation for the compliance with the size measure, but it does not yet explain the difference between the two measures. This corresponds to the finding of McClanahan *et al.* (2005), as introduced in the conceptual framework, that shared perceptions were not enough to reach high compliance with measures. The perceptions in the situation are partly shared, because on the one hand the actors share the ecological argument, but on the other hand no (economic) incentive existed for putting back the berried females, while it did exist for the undersized crabs.

The existence of economic incentives can be further analysed by linking the general practices of the actors to their perceptions and the capturing of information. Capturing of information is determined by an actors' position in the value chain. The professional daily life and the professional experience of the actors provide an explanation for the difference in compliance with the berried females and the minimum size measure and the fishers' perception on the measures. For all scales of actors an economic incentive existed that led to complying with a minimum size, while conflicting interests and a lack of economic incentive prevented the success of the berried female measure.

Actors within the BSC crab value chain in Betahwalang have conflicting interests with regard to the purchase of berried females which is determined by their daily life, i.e. their function, tasks and interests. Fishers are happy or proud when they catch females with eggs, because they are heavier than crabs without eggs and therefore are worth more money. They would not be willing to put back females with eggs, because they reduce their yield. On top of that, competition between fishers plays an important role. Fishers are afraid other people would take the berried females if they would put them back. I observe that both vertical and horizontal elements of the value chain play a role here. On the one hand, the existing financial relation between fishers and the collectors determines the perception of the fisher on the berried female measure. On the other hand, the horizontal relations with other fishers play a role in determining the negative attitude of the fishers towards the measure.

Contrary to the fishers, mini-plants do not benefit from purchasing berried females, because they pay for the weight of the eggs, but they cannot use them. Fear for the existence of their own business prevents them from enforcing not buying females with eggs. The interviewed APRI-mini-plant representative expressed the fear of losing customers when he would stop accepting females

with eggs. Although he wanted the environment to be sustainable, he felt forced to accept females with eggs for the sake of the survival of his business and the preservation of his costumers, even though he could suffer financial loss when purchasing berried females. The vertical relations in the value chain play an important role here in determining the practices of the mini-plant.

The collectors act exactly in between the fishers who want to sell the berried females on the one hand and the mini-plants who would rather not purchase berried females on the other hand. This is a reflection of the vertical relations within the value chain. However, I saw that no incentive existed for the collectors not to purchase berried females. Collectors said they would be afraid to lose their customers if they would not purchase berried females to other collectors who still purchase them. On the one hand, collectors are not discouraged to buy berried females, because they get a fixed fee from the mini-plants, regardless of the presence of females with eggs. On the other hand, collectors feel pressure to accept berried females due to their connection with the fishermen and due to their business interests.

With regard to the berried female measure, I conclude that the non-existence of a price incentive for collectors and fishers not to purchase berried females is the reason of the stagnation of the flow of information and the non-compliance with the measure. On top of that, competition between actors at the same scale played an important role in hampering the flow of information from mini-plants via collectors down to the fishers. This reflects a horizontal element of the value chain. Since the mini-plant and collectors were embedded in a context in which several competitors act as well, they turned out less willing to communicate and comply with the measure, because they were afraid to lose their customers.

The situation with regard to the minimum size is different. For all the actors in the value chain a price incentive existed that stimulated putting back small crabs. If the mini-plants would buy the undersized crabs, they would suffer a financial loss, because picking the crabs is time-consuming and they do not have much meat on them. Moreover, it is difficult to sell the meat derived from small crabs. Collectors get complaints from mini-plants if they sell undersized crabs or they do not get a price or a decreased price for them, so for the collectors it is also better if they do not buy the crabs, because otherwise they will suffer a financial loss. From experience the fishers learnt that collectors do not accept undersized crabs and that the price per kilogram is lowered when they try to sell a catch with many small crabs. The fishers are incentivized not to land the small crabs, because they get no or less money on the one hand and because they know the crabs can grow bigger and be worth more if they put them back and catch them later. The understanding of getting a financial benefit when the crabs are put back enabled the compliance with the minimum size measure.

The same economic incentive can clarify why putting back undersized crabs was already common practice in Betahwalang. Chapter 4.4.2 described what information was used for defining the minimum size measure. Eight centimetres was indicated as the smallest size that was still profitable to pick. Processors do not want to buy crabs smaller than eight centimetres, because they will not benefit from it. The practices within the crab value chain were already adjusted to this practice. Since the common practice and the size limit coincided, the 'new' implementation of a size limit did not require a change in Betahwalang.

5.4.2 Perceptions on improvement

This study showed that differences exist in perception on management measures. Fishers had a negative attitude towards the berried female measure, while BSC FIP participants chose it as an objective towards improvement. It implies that both actors have different perceptions on improvement. During my research, I collected indications of what fishers perceive as improvement. They appear to emphasize different aspects than the BSC FIP participants. The fishers mentioned several things as improvement, ranging from more yield and less waves to the possession of more traps and the abolition of mini trawls. Putting back berried females does not correspond with their perception on improvement. Fishers do not make the link between putting back berried females and increasing their yield and therefore they do not consider it improvement.

I analysed that the difference in perceptions on improvement comes forward from the way the actors capture and process available information; they have a different time frame, spatial reference and choice of comparison. First, the time frame and spatial reference are different for the BSC FIP participants and the fishers due to their daily lives. In their definition of improvement the BSC FIP participants include the sustainability of the crab business for now and in the future. Comparing this with the fishers in Betahwalang shows opposite reasoning. The desires of the fishers are very local oriented and they consider a short time frame of possibly days or months. They would directly influence the catch per day of the fishers personally and therefore their income. Second, the choices of comparison for the status of the fishery are different. As described in chapter 4.2.2 the BSC FIP participants used international information to determine the stock status and to define management measures. The BSC fishers in Betahwalang compare the situation in the fishery and the effect of the measures with their own, individual situation and with that of other fishers.

5.5 Conclusion

The analysis in the sections above provided the answer to the question why fishers do put back crabs below eight centimetres and why they do not put back berried females. The reasons for this are the corresponding economic incentives for all actor levels in the value chain not to take undersized crabs and the conflicting economic interests with regard to taking berried females. This is happened in combination with the fear to lose customer to other actors at the same scale in the value chain. The fishers and BSC FIP participants had shared perceptions on the effect the measures would have on the resource. However, in line with the findings of McClanahan *et al.* (2005) this did not lead to compliance of the measure. The perception of the fishers consisted of more elements that were crucial in determining the compliance with the measure.

Firstly, the collectors and fishers were not aware of the berried female measure, but they did comply with the minimum size. The question arose why this difference between the two measures existed. It turned out the information flow through the value chain stagnated due to existing trade relations in the value chain. The local trade relations and practices provided incentives for certain practices, in combination with the interests of the different actors. All the actors in the crab value chain financially benefit from putting back small crabs. On top of that, mini-plants and collectors appeared not afraid for loss of their customers or yield through competition, because not accepting or taking undersized crabs is considered common practice in the BSC fishery in Betahwalang. With regard to the berried females, only the fishers benefitted from taking females with eggs, while the collectors either benefit

from it or break even. The mini-plants are disadvantaged when they buy berried females, but they do not dare not to accept them due to competition for the crabs.

I conclude that the situation in Betahwalang did not change due to trade relations that influenced the information flow through the value chain and influenced the practices of the actors. On the one hand, the practices could not change as putting back undersized crabs was already common practice in Betahwalang. This was due to the information that was used to base the measure on. On the other hand, change did not occur, because the fishers and collectors were not incentivized to change their practices towards putting back females with eggs.

6 Discussion and conclusion

6.1 Introduction

In this thesis I use the case of the BSC FIP to examine the capacity of FIPs to lead to improvement on different scales of the fishery, taking into account the capturing and processing of information of actors within the value chain. I have shown that the flows of information through the value chain and the perceptions on improvement are influenced by local trade relations. The study indicates that difficulties in compliance with fisheries management measures can arise when local trade relations and practices are not taken into account in defining and implementing the measures.

First, the most important conclusions of this study will be repeated in section 6.2. In that section the descriptive part of the two sub-questions asked in this study (chapter 1.3) will be answered. Thereafter, the connection to the conceptual framework will be made in which will be elaborated on the analytical parts of the sub-questions. Then the implications for the conceptual framework and the general concepts of FIPs will be discussed, followed by the final conclusion of this report in which the main question of this study will be answered.

6.2 A study of two different scales

For this research, a case study was conducted on the Indonesian BSC FIP by focussing on two scales of the BSC fishery. Studying these two scales included looking at both the fisheries management system and the implementation of this system on the local level. It enabled identifying the linkages between both scales and the influence of the linkages on the effectiveness of the FIP management. The linkages between the scales were studied through the information flow from the fisheries management system down to the fishers via the different actors in the crab value chain. The design of this study enabled showing that the flow of information and the processing of information were influenced by the production and trade relations between actors within the value chain in detail. Chapters 4 and 5 followed the division of this study in the scale of the BSC FIP participants and the local fishers. First, the global scale of BSC FIP participants was studied and how they defined objectives towards improvement. Second, the implementation of the BSC FIP was studied on a local scale of BSC fishers, collectors and to lesser extent mini-plants in Betahwalang, an Indonesian fishing village in Central Java, in order to identify the occurrence of change. Combined, the findings of these chapters can give an indication of the effectiveness of the BSC FIP and how that is influenced by the information flow through the value chain and by differing perceptions among actors within and outside the value chain.

In chapter 4, I concluded that the definition of the BSC FIP objectives is based on a global network of actors, demands, standards and information, because of three reasons. First, the BSC FIP has a global character due to the scale on which the BSC FIP participants act; they act on either a national or international level and are stimulated by the international market to work towards a more sustainable fishery, following the globally defined MSC principles (Figure 4.1). Second, the BSC FIP participants defined improvement as becoming a sustainable business for now and in the future, but they did not formulate clear, measurable indicators of improvement, neither for the global level, nor for the local level or for the resource. Third, the measures taken in the BSC FIP are based on other, international cases in an environment of scientific uncertainty and lack of governmental support.

Together, these three aspects underline the global trade network the BSC FIP participants act in towards achieving improvement. Therefore, it can be concluded that the BSC FIP objectives were based on information from international fisheries and on global demands and standards. Why this specific information was used, will be elaborated on in the next section.

From the case study in Betahwalang, I concluded that the practices of actors in the fishing village have not changed due to the BSC FIP. The trade relations, especially the existence of economic incentives, hampered a change of practices. The berried female measure was not effective, because fishers were motivated to catch them due to their positive effect on the yield. The minimum size measure was already in force in Betahwalang before the start of the BSC FIP and therefore the minimum size measure could not change the fishers' practices. It can be concluded that the BSC FIP had no effect on the practices of actors in the crab value chain in Betahwalang. The information that was used to base the measure on was the lowest size that processors want to purchase. Therefore, putting back undersized crabs was already common practices. The role of the information flow and perception in this process of change will be elaborated on now.

6.3 Extending the link to the conceptual framework

How can the above mentioned conclusions be explained with the conceptual framework, answering the analytical parts of the sub-questions? The analysis of the data collected in this study was done using the concepts of value chains, continuous improvement and the information environment that is shaping actors' perceptions. The information environment, adapted from Verweij *et al.* (2010), could link the other concepts of the framework. It showed how perceptions of actors influence choices of management measures and goals towards achieving improvement on the one hand and how these perceptions are dependent on the trade relations between actors on the other hand. The relations influenced the information flow and the perception of different actors. Linking the previously summarized findings of chapter 4 and 5 to the conceptual framework allows concluding that trade relations within the value chain have influenced the progress towards improvement within the BSC FIP.

6.3.1 The role of information in defining the BSC FIP objectives

The BSC FIP participants used international information to base their operational objectives on, because no sufficient information on their own resource was available. The BSC FIP participants had to look for other information in order to set objectives for reaching improvement. Due to their position in the global trade network, the BSC FIP participants had access to information about other cases. Much information was available on the Maine lobster fishery. In an environment where no information is available on the own resource, the BSC FIP participants used information from this international case they had access to. It was not a random choice, because the achievement of the Maine lobster fishery was in line with the BSC FIP participants' perception on improvement. On top of that, the BSC FIP participants could bring in economic arguments for not purchasing berried females. Taking this measure was in the interest of the BSC FIP participants, because it would result in both economic benefits and in a positive effect on the resource; taking this measure was in line with the BSC FIP participants' perception on improvement. However, actors lower in the value chain did not share this perception on improvement (section 6.3.3).

The minimum size measure was also based on practices in other international fisheries. However, this international information had to be complemented with information about the BSC, because the limit should be based on the size at maturity of the resource. Collecting data in Jakarta Bay was a guided choice, since the crab business was very active there. In the end, the size limit was set at eight centimetres, because it was in the interest of the BSC FIP participants not to boycott the fishing practices in Jakarta Bay. On top of that, there was another economic incentive to choose this limit, because processing crabs smaller than eight centimetres would not be profitable. Setting the size limit at eight centimetres turned out being in line with maintaining the crab business on the short term without suffering a financial loss. The local trade relations forced the BSC FIP participants to choose this size. Improvement would take place once the minimum size limit was increased.

6.3.2 The information flow through the value chain

The aim of the research was to analyse the improvement of the BSC fishery that is imposed by global actors aiming for change on the local level. Therefore, it was essential to study the flows of commodity and information between these levels of actors, taking into account the vertical linkages and horizontal elements (after Bolwig *et al.*, 2010). The vertical linkages that represent the commodity flow from fishers until processors, importers, retailers and consumers as shown in Figure 4.1 provided a starting point for understanding the general relations between the actors of the different levels. Moreover, analysing *“the influence of horizontal actors and processes at each transaction point”* indeed, as stated by Bush and Oosterveer (2007:p.389), turned out to be *“essential to understanding how goods move through different hands and how information flows back down to producers”*. Describing the FIP in the context of value chains allowed illustrating that local trade networks were embedded in global trade networks of actors and imposed standards and demands.

The way actors are embedded in networks of production and trade turned out to play a significant role, both on the transaction points in the value chain and between actors on the same level. This could be revealed by the linkage of the concept of value chain to the information environment. Information about the BSC FIP measures had to be communicated from the global trade network via the value chain down to the local trade network. The flow of information about the prohibition to catch berried females stagnated at the transaction point from the mini-plants to the collectors. Both horizontal and vertical elements of the value chain played a role here. The mini-plant representative feared his customers would switch to other mini-plants, which is competition. Fishers were economically rewarded for catching berried females and collectors were neither rewarded nor penalized for purchasing berried females. The mini-plant owner was not incentivised to communicate the measure to the collectors and fishers, because this would result in protests of his customers. In the case of the minimum size limit, the minimum size was communicated down to the local level of the fishers. Apparently an incentive existed that did not exist for the prohibition to take berried females.

6.3.3 Trade relations and perceptions on improvement

This incentive could be found in the perceptions of actors at the local scale on the measures and on improvement. By not including local actors as BSC FIP participants and in defining BSC FIP measures the BSC FIP participants ignored the fact that different actors have different perceptions on improvement. This contributed to the non-compliance with the berried female measure. The

conceptual framework already described that perception differences can cause difficulties in arriving at a consensus on appropriate management, because actors can have different views on which management measures will be effective (McClanahan *et al.*, 2005; Verweij and Van Densen, 2010). In the BSC FIP, the perceptions of producers were not taken into account. On the first sight this non-engagement might lead to the absence of friction in determining management as is stated by Kusumawati *et al.* (2013). However, non-engagement can result in less effective management, because it can limit the creation of change as is shown in the same article and also happened in the BSC FIP. The BSC FIP participants were able to reach consensus about the berried female measure, but the remaining actors in the value chain were not involved in the BSC FIP decision making. Thereby the differing perceptions were ignored which contributed to non-compliance with the berried female measure.

The differing perceptions were caused by existing trade relations and practices. Conflicting perceptions on the purchase of berried females existed amongst actors on different scales of the value chain. The existence of an economic benefit turned out the most important driver for all actors. Due to the existing trade relations, however, different practices were maintained on different levels of the value chain. Therefore, fishers were hesitant towards the berried female measure, while mini-plants were in principle positive against it. On the contrary, in the case of the minimum size, all actors were incentivised not to purchase undersized crabs, because they all interpret they benefit economically from not taking the undersized crabs. For both measures, economic benefits turned out to determine the practices of the fishers.

6.3.4 Implications for improvement

Linking the theoretical concepts allows arguing that the differences in capturing and processing of information by actors along the value chain should be taken into account in defining BSC FIP objectives for improvement. On top of that is important that the local trade relations are taken into account as they shape the actors' perceptions and influence the flow of information between actors. This could prevent frictions between the regulatory networks on the local and the global scale. How should the local scale then be taken into account?

Creating incentives

I argue it is important to, on top of providing information through the value chain, create an incentive to change when FIP measures are implemented. Based on the previous analyses I will hypothesize what these incentives could be like. At first, I argue that an incentive should be that attractive that it will lead to collective action. That way, actors can communicate the information and change their practices without having to fear for unequal competition due to the open access character of the resource. In the case of the berried female measure, such an incentive was not created and therefore the mini-plant representative was not motivated to communicate the information derived from APRI-members and comply with it. What kind of incentives could have this effect can only be hypothesised based on findings of this study and should be extended with follow-up studies in order to get a complete impression of suitable incentives.

Incentives should also be created to overcome the 'problem' of the differing perceptions of actors. I hypothesise that the BSC FIP participants therefore either could create positive effects directly on the level on which the fishers perceive the fishery, or they should try to change the fishers' perceptions – for example from short-term to long-term reasoning – in order to count on the support of the fishers.

I hypothesise that the berried female measure might work, when economic incentives for the lower levels of the value chain could be successfully created and implemented. Such an incentive might be paid a higher price for not taking berried females than for taking them. Fishers would be motivated to put back berried females when they would financially benefit from it, because it is in line with their perception on improvement.

Based on what I saw in Betahwalang, I argue that especially fishers should be incentivized to change practices collectively in order to achieve improvement. In Betahwalang, collectors (and mini-plants), even though they did not buy undersized crabs, did not throw the undersized crabs back in the sea. These practices cannot have a positive effect on the stock size, even though the small crabs were not accepted. As the fishers catch the living crabs, they should directly put it back in order to give the crabs a chance to survive and be able to contribute to increased sustainability. In line with the concept of FIPs, the fishers should be approached through the value chain while taking into account the vertical and horizontal relations.

I conclude that the FIP concept of creating positive incentives through the value chain, as introduced in chapter 2, can work provided that the incentives are adjusted to the local trade relations and practices. Doddema (2012: p.66) wrote that *"[i]t is questionable whether the FIPs really improve a fishery as FIPs only focus on meeting their goals. Many aspects like the livelihoods of the fishermen are not considered."* The same occurred in the BSC FIP, where the fact that fishers earn more money when they catch berried females appeared to be ignored when the BSC FIP participants decided upon the no take of berried females. The fact that actors at the producer level of the value chain were not involved in determining the BSC FIP work plan might have caused the absence of incentives for the fishermen in the two agreements as they could not share what they needed at the local level. The means to create the incentives should, however, be provided or created through the value chain. It cannot be assumed that actors within the value chain can easily spend more money to incentivize a certain action to occur. Moreover, if the existing relations should be manipulated by changing the actors' perceptions, the FIP participants should know how to approach that. Possibilities for this should be explored in further research.

Further implications for improvement

Taking the local situation into account is not a guarantee for achieving improvement as can be illustrated with the implementation of a minimum size in Betahwalang. The local reference that in fact was used to set the minimum size limit for the BSC fishery turned out to be too small to require a change of practices in Betahwalang as it was based on a different area. This brings up two discussion points, the first regards the definition of the measures and the other regards the prospect of a future increase of the minimum size. The seemingly contradictory findings that on the one hand adjustment to the local situation is needed, like in the berried female case, and on the other hand adjustment to a local situation was not challenging enough for the situation in Betahwalang raise questions about what approach towards improvement would be effective. Several interviewees on the BSC FIP participants' level suggested that the fishery should be improved case-by-case and location-by-location instead of for the whole country. This might be a good approach as the minimum size of eight centimetres was already complied with in Betahwalang and therefore no change was required and no improvement could occur with this specific measure. However, a location-by-location approach might not be successful as the resource is most probably not bound to these location boundaries and therefore overexploitation by fishers from other areas could still take place.

Nonetheless, a higher minimum size would enable change and improvement in Betahwalang, but it is unclear how fishers would react on the planned increase of the minimum size to a limit higher than eight centimetres. That limit will not correspond to common practices in the value chain anymore. Situations similar to the berried female measure might take place if the minimum size limit is increased and no collective action is incentivized.

An evaluation of whether set operational objectives can really lead to improvement is not part of the framework of CI as it was presented in the conceptual framework, but from this research the question can arise if improvement could at all be achieved by the BSC FIP approach. As described in chapter 4 from a scientific point of view it is uncertain whether it is even possible that improvement in the water can be delivered by complying with the BSC FIP measures. The fact that doubts can be raised about the effect of the measures on the resource level does not mean that these measures are 'wrong'. In a data-poor fishery such as the Indonesian BSC fishery the management can only be implemented through a process of trial and error as no exact information on the level of the stock is available. It is legitimate to base choices for management on other success stories if no data about your own resource is available. The approach is justifiable, but it is still questionable if the desired effect will be reached.

It might be possible to complement the existing information with local knowledge. This study did not look into the perception of the fishers on the stock status. The BSC FIP participants regarded the fishery as overfished and saw this as a problem. An interesting follow-up question would be asking whether the fishers perceive a problem as well. The use of local knowledge might be able to contribute to the assessment of the stock status of the fishery.

6.4 Implications for the conceptual framework

In general, the conceptual framework worked very well in identifying factors that enabled and hindered change to occur that was required by the BSC FIP.

Linking the concept of the information environment to value chains was different from the approach of Verweij *et al.* (2010). It was new to use the information environment to describe the flow of information in a value chain. Therefore, some elements of the concept turned out being less applicable for this study. The transition from data to information to knowledge did not turn out particularly useful to this research, due to the type of questions that were asked. In this study, the focus was on flows of information between actors and therefore this information did not enter actors' information environment as data, but as information directly. The transition from information to knowledge was not considered explicitly at all in this study. In the research of Verweij *et al.* (2010) the transition from data to information to knowledge was essential, because of the nature of the question; they were interested in the actors' perception on the stock status. However, as this research focussed on perceptions on a measure it was more difficult and also not directly necessary to make a clear distinction between the three terms and only the term information was used.

I do not argue that data and knowledge should be taken out of the framework, as important elements of the information environment would then not be taken into account anymore. I do argue though, that the importance of the terms can vary with the type of perception that is studied. Linking the concepts of value chain and CI through the information environment had an added value compared to other studies on FIPs and fisheries. For further research, it should be taken into account

that the concept of information environment and perceptions is very broad and is subject to interpretation. Therefore, the researcher should clearly define the terms that he or she is using. The researcher should find out which elements of the information environment are important in his or her study. 'Background' and 'daily life' are broad terms that are open to interpretation. In the case of FIPs I argue that trade relations with other actors within and outside the crab value chain are essential elements of the daily life and background of actors. It turned out very important to integrate these in the analysis of flows of information and choices for objectives in the context of trade and production systems.

'Perception' could be interpreted very broadly because it includes the ways an actor evaluates, interprets and appreciates the available information. As people can have perceptions on practically everything, the concept of perception on the one hand turned out to be applicable to many situations while it on the other hand turned out to be challenging to identify which perception was studied and why. If the link between continuous improvement and perceptions would not have been made, it would not have been possible to identify why these goals were set. Identifying why goals were set was essential in this study as a comparison is made between actors on two different scales and an explanation is sought to why change did not occur on the one level, while it was requested by the other level.

Using the concept of CI turned out being helpful in identifying the BSC FIP approach towards improvement. The link to the concept of perception appeared especially important in the context of fisheries compared to the original use of the concept in business studies due to the multiple actors that are involved in the fishery. In chapter 2, I described CI in the context of a fishery as 'a recurring process of enhancing the **fishery management system** in order to achieve improvement in overall **practices in the fishery** consistent with the **FIP work plan**'. Even though the original concept of CI comes from business studies, the application of this definition held in the context of the BSC fishery. However, I hypothesize that the implementation of positive change – and therefore improvement – is more difficult in a fishery context than in the context of a company. Reaching all actors in the crab value chain and incentivizing a change of their practices turned out to be difficult in the case of the BSC FIP, while due to the employee-employer relations within an organization it might be less complicated to implement change in a single organization than in a fishery that consists of several organizations and actor groups.

I think it is important to monitor the effect of the taken measures well in order to be able to evaluate and adjust the measures after progressive insights. Part of the CI process is also adjusting existing measures to these new insights, instead of seeing measures as pre-determined and unchangeable. It is not new to build in an evaluative step in a model of CI as it is already done, ISO (2004) shows the plan-do-check-act (PDCA) methodology, in which 'check' means checking monitoring and measuring processes against objectives. Therefore, I argue that adding a monitoring step to the framework as it is presented in this study would be good as this would allow considering adjustment of the measures as improvement too.

Although improvement has been analysed and discussed comprehensively in this study, the 'continuous' aspect of the CI theory did not come forward distinctively. However, signs of a continuous process of working towards improvement were found. Continuous improvement could be identified on the operational levels of the BSC FIP as the participants, for example, want to

increase the minimum size over the years. Nevertheless, on the level of system objectives no continuous improvement could be identified. This is in line with a statement of Bush *et al.* (2013) who state that though continuous improvement comes forward at the operational level within the MSC certification system, less evidence is found for continuous improvement at the system level⁹. This is exactly what I saw in the BSC FIP and although this might be a coincidence it also might be the case that the 'static' system objectives that are set through the MSC (this is exaggerated as discussions go on about continuing improvement after the MSC label is obtained) are reflected in the approach FIP participants choose for achieving improvement in their fisheries. According to interviewees, reaching the point of certification is still a long way ahead for the BSC fishery. At this point of the improvement process, the fact that actors in the BSC fishery are at all trying to work towards sustainability appeared more important than if the ambition level of the project would continuously be increased.

6.5 Implications for FIPs in general

As not much literature is available yet about FIPs as a new governance arrangement for fisheries, this research contributes to and extends the thus far existing knowledge on FIPs. This study in its approach embroiders on the research that has been done by Doddema (2012). She looked at the definition of FIPs and explored how FIPs use notions similar to CI to change practices within fisheries. This research underlines her conclusion that *"FIPs are projects that aim guide a fishery towards specific improvements using a systematic approach"* (p.64). The approach followed in the BSC fishery should lead to improvement in the shape of a sustainable BSC business, however not all improvements aimed for were specifically indicated in the BSC FIP. Nonetheless, the approach chosen in the BSC FIP is systematic as it is guided by the MSC principles and by SFP's improvement tracker. After Doddema (2012), I compared the FIP approach to improvement with the notions of CI, but I extended this with the concept of perceptions and the information environment in order to identify what the objectives were based on and how they were implemented in the field. Therefore, firstly I can support her statement that *"FIPs set out a process of improvement that is very similar to CI as there is a clear distinction between strategic goals and tactical activities"* (p.65), as I showed previously.

After combining the concept of CI with the information environment in this study, it can be added to the research of Doddema (2012) that the formulation of the system goals and operational activities is actor specific. This can on the one hand explain differences in approaches within varying FIPs, while in the case of the BSC fishery it is shown that the FIP participants defined other goals for improvement than the fishers would do. This supports Doddema's statement that *"[i]t is questionable whether the FIPs really improve a fishery as FIPs only focus on meeting their goals. Many aspects like the livelihoods of the fishermen are not considered."* Fishers define improvement on a more local and personal scale than the BSC FIP participants due to differences in their information environments. Within the BSC FIP the local situations of the fishers are not taken into account as the fishers did not participate in the BSC FIP. Moreover, the BSC FIP participants did not take into account that the trade relations influence the information flow through the value chain. In the previous sections I already argued that it is important to take into account local trade relations between actors in order to enable FIPs to create change at the local level of a fishery. Therefore, I

⁹ They use the terms 'continual improvement', 'tactic level' and 'strategic level' respectively.

think the most important lesson that can be learnt for FIPs in general is that the FIP approach should be adapted to local needs and circumstances in order to be effective. I identify four implications for FIPs in general in this section regarding the use of a centralised concept on local fisheries, the inclusion of local actors, the creation of incentives to change and evaluation of the FIP management.

Analysing the horizontal elements of the value chain – i.e. the trade relations between actors within the value chain – with the information environment is new within the context of FIPs. It indicated that within the BSC FIP a lack of information or adaptation to the local trade networks led to management that did not fit the local situation, because the trade relations and interests at that level were not taken into account. This phenomenon already came forward in the research of Lynch (1994) who saw that in the urban fruit industry a lack of information about the local situation led to misdirected management as a centralised concept was imposed on the local trade network, but the centralised concept lacked the flexibility to adapt to different, local situations. Parallel to this, FIPs are a globally formulated regulatory framework that is applied on local fisheries, but due to the format it is not automatically adapted to the local situation. I think that the link to the local situation is crucial in creating a successful FIP and that just copying the global standards might not be optimal for a fishery on the local level.

Different fisheries might need a different approach in order to be sustainable. The MSC certification asks for very specific information, while in a data-poor fishery this information is often not available. Are the managers trying to impose something on a fishery that does not fit in order to meet the international demand? This also came forward in the study of Doddema (2012) to FIPs. She mentions that *“[a]s FIPs are geared towards providing sustainable seafood for the international market, there is a chance that fishermen will not really benefit from being sustainably managed.”* (p.66). The risk arises that actors on the local level will not benefit from the improvement project, since it is based on global standards. Therefore, I deem it important that the global standards are adapted to the local relations, which might be done by actively adapting the global demands to the local situation or by including actors on the local level as FIP participants.

Doddema (2012) also describes that in order to achieve their objectives FIPs should consider the pre-existing relations and practices that shape fishers' behaviour. In this research, the pre-existing relations could be studied in depth through the information environment. FIPs are seen as new governance arrangements with the power to involve resource users in the management that should therefore enable effective management because they create the potential of integrating local needs within the fisheries management. However, in the case of the BSC fishery this inclusion was not successful. The unsuccessful adaptation to local needs and demands might have been caused by the fact that only one chain actor at a non-local scale of the Indonesian BSC value chain was involved as BSC FIP participant (APRI). This is a point of critique to FIPs, as the concept in this case failed to involve actors on the local level and thereby failed creating increased compliance with the measures.

A rising question is which actors should then be involved as BSC FIP participants. Friction between local and global regulatory networks due to non-inclusion of local regulatory networks has already occurred outside of FIPs. Kusumawati *et al.* (2013) showed that in the shrimp aquaculture in East-Kalimantan (Indonesia) friction emerges because middle-men are ignored by the national and global environmental regulatory network, while they actually are a key player in enabling the aquaculture in that area. It did not get clear if the BSC fishery also has a key player in enabling the fishery, because

of the limitations of this research. I could not interview many mini-plant representatives due to their spread locations and a lack of time and means and therefore most information was collected on the level of the fishers and the collectors. It is difficult to point out which, if not all, value chain actors should be involved in the BSC FIP. I hypothesise that collectors play a key role in the BSC fishery as they have a number of fishers as customers who are loyal to the collector due to their social relations. Involving collectors in the BSC FIP could possibly be a representation of the fishers at the same time. However, it is subject to future research to explore if and which actors in the BSC fishery play a key role.

In 2000, Woodley and Sary already indicated that compliance with management might be helped when some compensation is included in the management proposal, which I interpret as incentives. They concluded this from their research on a FIP in Jamaica which was a FIP slightly different from the ones that are studied here as the MSC was not used as a guideline, but actors worked collectively towards improvement of a fishery. After studying the interests of the fishers in Betahwalang, I can give an indication of what kind of compensation would be appropriate. 'Penalty or punishment' incentives – which I consider not paying for something that otherwise would be worth (much) money, as in the case of berried females – did not work. Competition would trigger the fear to lose customers and the possibility to get a better price at a different collector would hinder the compliance with such a measure. Therefore, I argue that FIPs should aim to create 'reward' incentives in such way that actors will receive more money – or possibly non-monetary stimulations – if they act according to the FIP management than when they would keep acting the way they did. The means to create the reward incentive should be provided through the value chain. As mentioned in the previous section, it would be necessary to conduct more research in order to find out what kind of incentives could work best and are also feasible to create within the value chain.

Finally, in the case of FIPs it turns out that good examples tend to be followed and therefore it is important that FIP management is evaluated and monitored. In the relatively new world of FIPs, the Indonesian BSC FIP is a pioneer setting examples for other FIPs. The concept of FIPs is upcoming and the BSC FIP is considered as one of the frontrunners in applying the FIP approach. Therefore, I argue that evaluation of the measures against their effectiveness on sustainability should get more attention in order to guarantee the quality of not only the BSC FIP, but of FIPs in general.

6.6 Conclusion

In this thesis, a case study was conducted to analyse the extent to which the Indonesian BSC FIP improved the production and trade practices of actors in the crab value chain. It can be concluded that the practices of actors in the crab value chain in Betahwalang were not improved, because no change occurred since the start of the BSC FIP. Additionally, the influence of the (availability of) information and the perception of actors in the value chain on the process of change were analysed. Friction occurred between the definition of the BSC FIP measures by the BSC FIP participants and the implementation on the local level. Local practices and trade relations between actors in the value chain were not specifically taken into account in defining the FIP measures. Firstly, actors at the local scale were not involved as BSC FIP participants. Secondly, a limited amount of local information was used in defining the BSC FIP measures. The BSC FIP measures were based on perceptions of national and international actors on improvement and their access to international information. The perceptions on improvement of the BSC FIP participants were not completely in line with those of

the fishers. However, the attitude of all the actors along the value chain was positive against the minimum size limit, because everybody was incentivised to act in line with the measure. This was due to the perceived positive economic benefit as a result of the practice for all actors in the value chain. On the contrary, local trade relations surrounding the purchase of berried females in Betahwalang hampered the implementation of the BSC FIP measures, because they influenced the information flow through the value chain and the practices of the actors. Fishers perceived catching berried females as something positive, because it increased their profits, while at the regional and national scale it was perceived as something negative. No change of practice was incentivised through the value chain and therefore fishers remained acting the way they did before the start of the FIP.

What does this imply for the general capacity of FIPs to lead to improvement of a fishery? Local trade relations influenced the capacity of FIPs to lead to improvement. I argue that FIPs cannot lead to improvement if they do not fit the measures to the local trade relations and practices. Either local actors playing a key role in the fishery should be included as BSC FIP participants or at least they should be consulted. That way, FIP participants can become aware of the perceptions of local actors and the trade relations that influence their practices. With that knowledge, incentives to change could be created through the value chain that fit the local interests.

It might be good to integrate a systemic focus on trade relations between actors involved in fisheries within the FIP guidelines. It turned out that these relations significantly influence the implementation of the FIP measures. Integrating the adjustment step to the local situation would enable adjusting the centralised concept of FIPs to the local context of a fishery. That way, local trade relations and perceptions can be taken into account. Either manipulating those or accepting and using the knowledge about the relational structure of the fishery would enable formulating management that fits the local situation and creating incentives to change. If no adjustment to the local trade relations and practices takes place, the chance of failure of a FIP is high.

6.7 The BSC FIP continued

It is worth mentioning that within the BSC FIP, just after this research was conducted, APRI started a community-based project in Betahwalang to educate the people about sustainability. It would be very interesting to look at the effect of this specific project in future research. FIPs are new government arrangements that are constantly changing and developing. I found that the BSC FIP participants were very passionate and motivated for their objectives of achieving improvement; they had the wish to improve their fishery. It is worth to keep studying FIPs as FIP participants and on top of that other fisheries managers will learn from these studies. They will be able to keep adjusting and improving their management with the new findings.

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Appendices

Appendix 1: list of interviewees

BSC FIP participants:

#	Function	Date
1	Executive director APRI	15 February 2013
2	Asia Liaison NFI Crab Council	15 February 2013
3	BSC coordinator of SFP	25 February 2013
	<i>APRI-members:</i>	
4	Representative of Blue Star	25 February 2013
5	Representative of BMI	25 March 2013
6	Representative of KML	26 March 2013
7	Representative of WU	3 April 2013

Collectors in Betahwalang:

Interviews with collectors were conducted in the period from 8 March 2013 until 17 May 2013.

#	Experience (years)	Customers (# boats)	Remark
1	6	15-20	
2	>10	6-10	
3	10?	35-40	
4	>15	50-75	
5	17	15-25	
6	>15	20-50	
7	>10	100	
8	2 months	25-30	
9	8	30-100	
10	5	10-15	
11	10	25	He stopped as collector

List of interviewees continued.

Fishers in Betahwalang:

Interviews with fishers were conducted in the period from 8 April 2013 until 17 May 2013.

#	Boat owner (Y/N)	Number of traps	Engine (hp)	Experience (yr)	Owens APRI lighter (Y/N)	Put back berried females (Y/N)	Put back 'small' crabs? (Y/N)	Remark
1	Y	400	?*	5-10	N	N	N	
2	Y	400	?*	20	N	N	Y	
3	Y	370	?*	15	N	N	Y	
4	Y	370	?*	15	N	N	Y	
5	Y	400	?*	12	N	N	Y	
6	Y	420	?*	20	Y	N	Y	
7	Y	450	?*	50	Y	N	Y	We had doubts about the length of his experience
8	N	460	?*	15	N	N	Y	
9	Y	400	?*	10-11	N	N	Y	
x								
11	Y	425	20	36	N	N	Y	
12	Y	400	16	16	N	N	Y	
13	Y	340	16	30-37	N	N	Y	
14	Y	TRAWL	2x16	10	N	N	Y	
15	N	330/400	12/16	4	N	N	Y	He was helper of two different fishers
16	Y	380	20	15	Y, 4	N	Y	
17	Y	370	12	14	N	Y & N	Y	He put back crabs with old eggs
18	Y	400	16	17	N	N	Y	

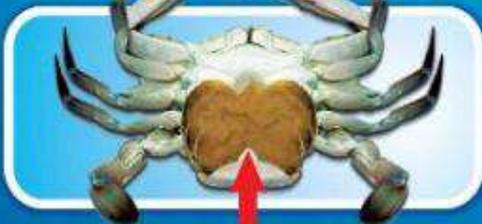
* We did not ask this

Appendix 2: Poster of APRI that says that you should not (1) catch BSC with eggs, (2) catch small crabs and (3) use gear that damages nature.



LESTARIKAN RAJUNGAN DEMI KESELAMATAN HIDUP KITA

1



Jangan Tangkap Rajungan Bertelur

2

Jangan Tangkap Rajungan Kecil



3



Jangan Gunakan Alat Merusak Alam



