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Title:

Unlocking Small-Scale Fisheries Value Chains through Information & Communication Technology (ICT) – the case studies of Lamberts Bay & Kleinmond, South Africa

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I hope that through this thesis I can inspire other young people to study further. I also hope that many more will engage with topics and contribute to solving some of the challenges faced in the small-scale fisheries sector. Through knowledge and education, I believe it is possible to change the world.

Abstract

Focusing on the small-scale fisheries sector, this thesis examines the question of how the usage of Information and Communication Technology (ICT) can unlock value chain opportunities for fishers. Using a case study approach by focusing on the communities of Lamberts Bay and Kleinmond in the Western Cape of South Africa, it seeks to discover what ICTs should take cognisance of to adequately speak to the value chain realities of small-scale fishers. Some of the work done was observed while engaging with fishers from both communities and other relevant stakeholders during certain engagements with the Abalobi programme, a co-designed smartphone application programme. The emphasis of the research was to speak to different stakeholders who are involved in the value chain and who are engaging with or impact the value chains of small-scale fishing communities. As value chains start with small-scale fishers, their narratives are of utmost importance as they are the initiators of these value chains. The three objectives of this research are to understand the value chain activities of the two communities, differentiate the different value chain activities of the communities at the local, regional and international levels and then contribute to how ICTs such as Abalobi can assist efforts of connecting fishers to their markets. Interviewing and engaging fishers, supportive organisations, authorities, value chain stakeholders in both communities as well as corporates and an ICT specialist, the thesis considers the different perspectives and needs of those involved in the small-scale fisheries value chain. The result of this thesis lead to six ICT requirements being identified to unlocking of small-scale fishing value chains: easy to use, self-sustaining, people-centred and inclusive, integrated, evolving and detailed. Although value chains exist in the sector, ICTs can enable better coordination between stakeholders in it. This research was done to understand how ICTs as a tool can improve and better facilitate the interactions between fishers and their desired markets and that their narratives are brought to the fore in understanding the value chains and in sourcing ICT solutions for them.

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Acronyms and Abbreviations

DAFF…….Department of Agriculture, Forestry and Fisheries

DEA……...Department of Environmental Affairs

DEAT…….Department of Environmental Affairs and Tourism

DTI…….Department of Trade and Industry

FAO……Food and Agriculture Organisation

FIP……. Fisheries Improvement Project

ICT/ICTs……....Information and Communication Technology/ies

IR……...….Interim Relief

MDT……...Masifundise Development Trust

SASSI…….South African Sustainable Seafood Initiative

SSFP……...Small-Scale Fisheries Policy (of South Africa)

UCT……University of Cape Town

VGSSF……...Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries

WCRL…….…...West Coast Rock Lobster

WWF SA……World Wide Fund for Nature South Africa

Glossary

Term	Meaning
Abalobi	An empowerment programme and a suite of mobile applications to aid the activities of small-scale fishers
Information and Communication Technology/ies	Technology which eases communication between different persons and facilitates interactions digitally and in virtual space
Small-Scale Fisher/Fisher/s	Men and woman engaged in fishing activities through harvesting or processing using low technology for commercial and consumption purposes at an artisanal level
Small-Scale Fisheries Policy	A policy to formally recognise small-scale fishers in South Africa and to redress the injustices and imbalances of the past fishing
Small-Scale Fisheries Sector	Sector employing men and women identifying as small-scale fisher people engaged in harvesting, processing and distribution of products on a fulltime or part time basis
Value Chains	Chain of activities bringing a product from conception to consumption through various exchange and processing

NB! Permission was granted by the fisher people to use their pictures in the thesis before the photos were taken. No person was forced to be part of a picture. Some participants in the study directly requested that I add their pictures to the document.

CHAPTER 1: INTRODUCTION

1.1 Background

This thesis presents an attempt to understand the value chains of the small-scale fisheries sector and the role of technology in unlocking opportunities. With the Small-Scale Fisheries Policy (SSFP) being rolled out for the sector by the Department of Agriculture, Forestry and Fisheries (DAFF) value chains are earmarked for the development and growth of the sector (DAFF, 2012). The policy envisages that links between small-scale fishers and other role players would contribute to developing an economy in which all would enjoy maximum benefits.

Discussing the small-scale fisheries sector globally, Pomeroy and Andrew (2011) stated that economic growth, human development and sustainable livelihoods at community and organisational level are crucial for progress. Many fishing communities in South Africa need these attributes to improve their livelihoods. Schultz (2016) states that a great sense of disempowerment exists among many traditional small-scale fisher people because they do not participate formally in the sector. Value chains form an important part of the sector as it can stimulate broader socio-economic development for fisher people. Value chains for small-scale fishers present an opportunity to engage with different market role players.

In South Africa, the fishing industry at present consists of three sectors: the commercial sector which can be further divided into nearshore and offshore; the recreational sector for sport and leisure; and the newly declared small-scale sector, previously known as the subsistence sector. Prior to the establishment of the new small-scale sector, policy reforms between 1998 and 2006 led to improved entrance and access for black persons in the commercial sectors through joint ventures and share-holding in white-owned companies, as well as through the formation of small and medium enterprises (Sowman et al., 2014). Despite this, many people of colour were still not able to gain legal access to marine resources.

Pomeroy and Andrew (2011) and Schultz (2016) state that small-scale fishers remain largely impoverished and do not have access to various local and international markets. Globally, small-scale fishers form the bulk of the fishing sector but are among the most marginalised groups in the sector. Glavovic and Boonzaier (2007) point out that many fisher people have limited access to information and markets. An opportunity therefore exists for connecting fisher people with their desired markets.

In giving small-scale fishers access to information and markets, Mallalieu (2015) advocate the use of information and communication technology (ICT) to rejuvenate the value chains of the sector. Furthermore, Omar and Chhachhar (2012) discuss the role ICTs can play in helping fishers in their daily fishing routines and activities such as record keeping; monitoring catch data; monitoring weather and climate change; safety notifications; and marketing activities in the value chain.

In South Africa, Abalobi (http://abalobi.info) has begun to engage small-scale fishers and has taken active steps in bringing about much needed action. By connecting small-scale fishers with their desired markets in South Africa, the programme aims to empower them to make better livelihood decisions. In doing so, small-scale fishers can choose their desired markets and obtain better prices for their products. Small-scale fishers from the two traditional fishing communities of Lamberts Bay and Kleinmond have begun using Abalobi for recording their catch data. Discussions have begun with government and academics to promote ICT usage and for exploration of various markets. Here small-scale fishers are actively engaging with various stakeholders to improve their value chains through ICT usage.

In undertaking this research endeavour my research positionality should be noted. Prior to the writing of this thesis, I was employed in the Small-Scale Fisheries Directorate of DAFF from 2015 to 2016. I then became a student, undertook to write this thesis and did fieldwork for Abalobi by undertaking field trips and engaging with fishers. When I was employed by DAFF in my previous capacity, I was introduced to ICTs for the small-scale fisheries in the form of Abalobi. This experience enabled me to gain greater insight into the sector and to identify gaps for research.

Working at DAFF in my previous position, I engaged with community representatives and assisted countless fishers in comprehending legislation and processing fishing vessel licence and permit applications. I attended various community and policy task team meetings in which I also engaged with different industry stakeholders and community representatives. These insights and experiences gave me a greater background in the small-scale fishing sector and made it possible to understand its complexities better. It is because of my work experience at DAFF that I was motivated to undertake this research and to help to actively contribute to the improvement of the sector for fisher people.

1.2 Research Question and Objectives

With the focus of this thesis being on value chains in the small-scale fisheries sector, the researcher made use of knowledge from ICT, value chain analysis and community development perspectives.

Research question for this study:

How can ICTs be used to unlock small-scale fishery value chain opportunities in fisher communities?

The objectives of this study were to:

1. Understand the value chain activities of the two communities, namely Lamberts Bay and Kleinmond
2. Differentiate value chain opportunities at local, regional and international levels
3. Contribute to how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

1.3 Thesis Structure

In presenting the background on which this thesis is based together with the research question and objectives in this chapter, Chapter 1 provides insight into what is discussed in this thesis. In the second chapter, a theoretical overview is given regarding the concept of a value chain and the SSFP. Also discussed are the current operations of the value chains of small-scale fishing communities in the Western and Northern Cape Provinces, as well as the concept of ICTs.

Chapter 3 presents a discussion of practical ICT programmes in the sector, both locally and globally, and how these have begun to impact the operations of small-scale fisher people in the relevant countries. Some of these projects are linked and form part of a network called ICT4Fisheries (www.ict4fisheries.org) which seeks to use technology to improve the lives of small-scale fishers. A case study which discusses the role of ICTs in community supported fisheries and how it has improved their value chains is included in this chapter.

The methodology and study areas are discussed in Chapter 4. I detail the areas of Lamberts Bay and Kleinmond as chosen study sites and discuss some of the ICT and value chain work there. In going about sourcing the required information to answer the research question and objectives, I discuss scoping and participant observation along with the interviews and the groups I decided to

target for interviews. Of importance is the discussion of the ethical considerations I undertook before engaging with the different research participants.

In Chapter 5, the results from responses during the interviews are discussed. Responses from fishers from both communities are grouped together while those of the supportive organisations are also combined. The interview with the authorities is discussed on its own while the value chain stakeholders are divided between those situated in the communities and corporates situated outside of it.

In Chapters 6 and 7 respectively, the important themes which emanated from all the research groups are discussed. I discuss the objectives and map the local, regional and international value chains. It is also in this chapter that the interview with the ICT specialist is discussed to help guide the discussion. Furthermore, I discuss the Abalobi Marketplace Pilot Programme and some of the findings which I have derived from it. I then answer the research question and identify gaps for further research before concluding the thesis in Chapter 7.

Fishers sailing out of Lamberts Bay Harbour

CHAPTER 2: LITERATURE REVIEW

2.1 Small-Scale Fisheries Policy of South Africa

In 2004, traditional fishers from various coastal communities undertook a legal battle in the Equality Court against Martinus van Schalkwyk, the then minister of the Department of Environmental Affairs and Tourism (DEAT) (*George K and others vs the Minister of Environmental Affairs and Tourism 2004*). These fishers were backed in the case by the Masifundise Development Trust (MDT) – a non-governmental organisation – and the Legal Resources Centre, as well as academics. Sowman et al. (2014) stated that a key argument of this case was that the state failed to recognise and allocate appropriate rights to small-scale fishers, thereby violating the Constitution of the Republic.

According to Sowman et al. (2014), the court sanctioned the Minister of DEAT to develop a policy to address the needs of these excluded fishers and to furthermore grant an immediate and temporary 'interim relief' (IR) system to access marine resources until the policy is implemented. This IR system granted fishers access to harvest and sell various marine resources traditionally found in their waters and from which they have harvested for many years prior to any regulation guiding their activities.

Sowman et al. (2014) argued that, by excluding fishers as such from the sector, significant levels of socio-economic hardship were reinforced in fishing communities. Glavovic and Boonzaier (2007) stated that these conditions stemmed from the former apartheid and colonial eras during which black South Africans were limited and restricted from accessing capital, employment, infrastructure, education and social services, among others. As government only allocated long-term fishing rights to the commercial sector prior to the IR system, many small-scale or subsistence fishers were overlooked as they could only harvest for personal consumption and were prohibited from selling.

At the time of writing this thesis, the policy is being implemented by DAFF but has been confronted with various challenges. Fishers have become impatient and disillusioned with the pace of implementation. These challenges range from bureaucratic delays in the implementation of SSFP implementation; a lack of staff within DAFF to implement the policy; minimum financial resources from the state to implement the policy; and limited facilities provided by government for small-scale fishing communities.

The role of the policy for communities, as outlined by the government, concerns poverty alleviation; job creation; ensuring food security and enhancing value chains and alternative livelihoods (DAFF, 2012). With implementation under way, it is hoped the policy will soon take full effect across coastal communities with value chain initiatives, one of the crucial aspects in achieving the above-mentioned goals. Sowman et al. (2014) point out that the policy must restore the rights of small-scale fishers and have resources redistributed to poor coastal fishing communities.

In the provinces of the Eastern Cape, KwaZulu-Natal and the Northern Cape, small-scale fishers reside mostly in rural areas compared to urban and peri-urban areas in the Western Cape (DAFF, 2012). It was estimated in 2002 that there were approximately 30 000 subsistence fishers along the South African coastline (Clark et al., 2002). Sowman et al. (2014) state that fishing along the west and south-west coasts is traditionally boat-based while it is shore-based along the eastern seaboard, and resources caught here are of low commercial value. Sowman et al. explain that fishers along the eastern seaboard earn less than those along the west and south west coast. These societal geographic constructs shape the structure of the fishery economy of these communities and the way fishers conduct their activities.

Within the value chain, the policy envisions equity in the sector and growth and competitiveness, as well as environmental sustainability (DAFF, 2012). For selling products, the policy speaks about interactions with different markets. Value chains within the sector are envisioned to help develop and grow the economy sustainably. For achieving this, the policy outlines investing in processing and marketing infrastructure; developing marketing zones; capacity building; and information sharing. Furthermore, the policy also seeks to develop fishery economic zones; develop existing harbours; and promote job creation through aquaculture.

For value chains to become a reality, marine resource ownership is necessary. In South Africa, marine resource ownership is a highly politicised and contested topic. During the colonial and apartheid eras the ruling governments had greater regulatory control over fishing along the west and south west coastlines, whereas the eastern seaboard fell under semi-autonomous ‘homelands’ and were managed by black South Africans (Sowman et al., 2014). In these regions, access to marine resources is influenced by African customary rights. Whilst the Marine Living Resources Law of 1998 initially did not explicitly make provision for customary rights, the SSFP (DAFF, 2012) does make provision for the recognition of these rights.

The policy states that rights to harvest marine resources in the small-scale fisheries sector will be allocated to community-based legal entities in the form of co-operatives based in areas where small-scale fishers are located (DAFF, 2012). Before any value chain can function for small-scale fishing communities, co-operatives need to be granted an allocation for harvesting marine resources. In post-apartheid South Africa, the size of allocations has been a contentious issue confronting the whole industry in the face of transformation and development of the broader sector. Enough allocations are crucial to fisher people as the livelihoods, not of fishers only but also of a broader community that forms part of a value chain depend on it.

The SSFP states that small-scale fishers harvest a variety of resources with different use trends; hence a basket of species will be allocated to cooperatives (DAFF, 2012). Resource value and usage trends influence the value chains of small-scale fisheries resources along the coastline. This can be seen in two different lobster species with West Coast Rock Lobster (*Jasus lalandii*) (WCRL) and East Coast Rock Lobster (*Panulirus homarus*) (ECRL). These species are found along the west and east coasts of South Africa respectively but are used for different purposes, even though they are related species. WCRL is sold almost entirely because of its high market demand while ECRL is used for bait, consumed for food security and portions of it also sold.

2.2 Value Chains

A value chain describes the full range of activities required to bring a product or service from conception, through production to the final delivery to consumers and beyond (Bjørndal, Child and Lem, 2014; Kaplinsky and Morris, 2001; Rosales et al., 2017). Gereffi, Humphrey and Kaplinsky (2001) define value chains as activities required to bring a product or service from conception to completion through phases of production which include physical transformation and service provider inputs. Gereffi et al. conclude that a value chain ends with delivery to consumers and final disposal after use. The purpose of value chains as described by Bjørndal et al. is to provide more mutual benefits to all stakeholders involved with handling a product.

Although referred to in the corporate sector as well as in a host of academic disciplines like economics, commerce, development studies and tourism studies, the value chain concept remains vaguely understood (Hempel, 2010) as no single or universally accepted definition exists. Value chains cannot be defined by using a single definition, however, as there are different scales, complexities and theoretical approaches at which they exist and are determined (Leslie & Reimer,

1999). Bjørndal et al. (n.d.), in a study of value chain dynamics and food security of small-scale sectors, state that value chains differ significantly across all continents.

According to Bjørndal et al. (n.d.) value chains are solely export driven in some countries, compared to others which are only domestic. As value chains present a contested notion, they can range from local producers within a small town or community exchanging homemade products to complex multi-billion-rand international exchanges between numerous stakeholders. Bjørndal et al. remark that a combination of domestic and international value chains is evident in certain instances. In discussing globalisation, Gereffi et al. (2001) make a case for global value chains that implies an integration of internationally dispersed activities. Kaplinsky and Morris (2001) refer to a great flow of information, ideas, capital, skilled labour, technology and goods through globalisation.

Discussing the functions of value chains, Gereffi et al. (2001) state that value chain governance challenges and production are important elements in the full range of activities from design to marketing. According to Making Value Chains Work Better for the Poor (M4P) (2008), a value chain can be understood in a narrow as well as a broad context. A narrow perspective of a value chain occurs within a firm producing a product for which conception, design, input, production, marketing and distribution, as well as after-sales, are executed by one organisation. The broader context of value chains, however, does not look at the activities produced by one firm but at the forward and backward links of the chain which include multiple firms in the above-mentioned processes.

As Henderson, Dicken, Hess, Coe and Yeung (2002) state, the manifestation of power relations comes with the exchange of goods and services through globalisation and value chains. Power relations are manifested in value chains where multiple actors participate in the links of the value chain (M4P, 2008). Power relations in value chains can play out in international trade relationships when local stakeholders try to gain access to exporters, importers and retailers outside a country and try to negotiate favourable business transactions with varied success.

2.3 Value Chains vs Supply Chains

In discussing a value chain and a supply chain it should be recognised that the two concepts are similar but can have different meanings. In some instances, authors, academics and business people might use the one to refer to the other, which results in the distinction being lost (Feller,

Shunk and Callarman, 2006). Tarver (2015), in discussing supply chains, explains these as the flow of all information, products, materials and funds between the different stages of creating and selling a product. Tarver states that manufacturing, transporting and selling a product forms part of an entity's supply chain.

La Londe and Masters (1994) distinguish supply chains as comprising several independent firms each involved in manufacturing a product and simply procure it as is and pass it to the next firm. It should also be stated that multiple stakeholders are required in a supply chain as the product is moved between different firms, whereas a value chain can comprise of one to multiple firms. In the value chain of a single firm, the organisation does all value adding to a product itself from inception and does the marketing and selling to consumers. Ganeshan and Harrison (1995) add that multiple end products exist in a supply chain.

Feller et al. (2006) state that the major difference between a supply chain and a value chain is in the fundamental focus shift from the supply base to the customer or consumer. These authors further argue that the focus of supply chains is upstream and in integrating supplier and producer processes, seeking efficiency. Where a supply chain is mainly about procurement, logistics and providing a product as is, value chains seek to increase its value each time it exchanges hands.

With value and supply chains being different yet similar in certain aspects, each of the two is better suited to certain industries, sectors and products. In a global community, value chains are expanding more and more into global markets, because of demands for certain products and services, thereby emphasising relationships between consumption and production (Greenberg, 2013). Regarding South Africa and Sweden, value chains and supply chains both exist in the wine export sector through the interactions between these countries.

Greenberg (2013) discusses two kinds of custody chains in the wine sector – a value chain and a supply chain. The Greenberg study discusses the operations of two wine farms, one at Stellenbosch (Chain A) and one at Paarl (Chain X), presented in Figure 1. Both farms produce their own wine. In Chain A the producer sells wine bottled in South Africa in bulk to Sweden (supply chain) where it is branded and packaged before being sold to consumers in that country. In Chain X the producer packages and brands the product in South Africa (value chain) before exporting the final product where it is sold to consumers in Sweden. Most of the value of the final product is added in South Africa. Greenberg states that Chain A sells a higher value product compared to Chain X, as it is a refined product and fetches a higher shelf price.

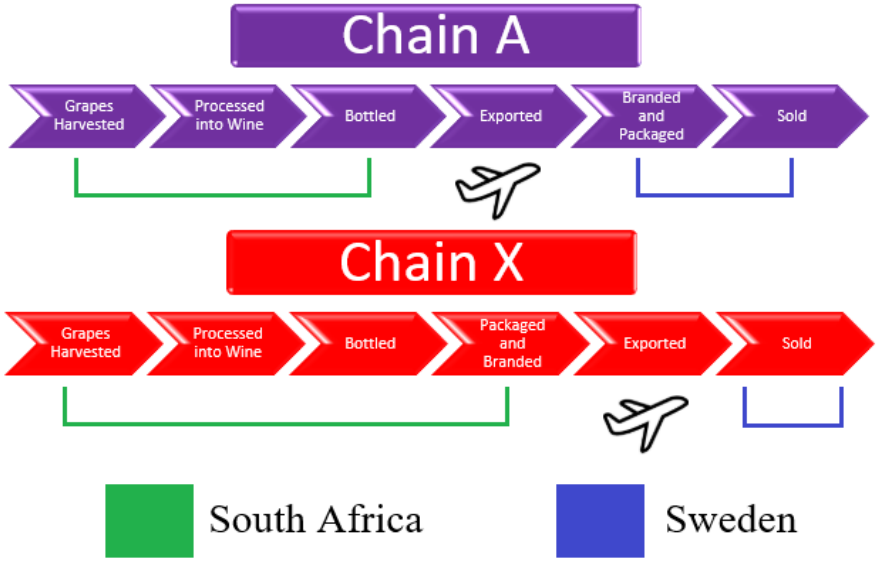


Figure 1: Chain A and Chain X based on Greenberg (2013)

2.4 Small-Scale Fisheries Value Chains

Globally, large numbers of people are involved in activities and services related to small-scale fisheries (Josupeit, 2016). Many of these activities contribute to adding additional value to products. Josupeit agrees with the United Nations Food and Agriculture Organisation (FAO) (2016), stating that the sector directly employs millions of fisher people through various services. These services include aquaculture, fish processing, marketing and boat building as well as net making. Rosales et al. (2017) mention that small-scale fisheries value chains feed into diverse and spatially extensive networks that connect producers with consumers generating employment.

As stated in the SSFP, fishers are integral to the communities they reside in as their activities are reflected in the socio-economic profiles of these communities (DAFF, 2012). Value chains in the small-scale fisheries context are socially, culturally and politically embedded in communities as the South African coastline comprises a highly productive, diverse and dynamic system (Sowman et al., 2014). Both men and women learnt their respective pre- and post-harvest roles in the value chain over many years, with knowledge and skills being passed down from the older generations. Value chain dynamics as such do have social repercussions in how they play themselves out (Rosales et al., 2017).

Mallalieu (2015), in discussing post-harvest value of captured fish, states that trade from small-scale fisheries account for nearly 1% of the global gross domestic product (GDP), with half of all global fish exports originating from developing countries. Despite this, small-scale fisher people

from these regions remain impoverished, neglected and marginalised as poor financial returns keep them in poverty traps (Rosales et al., 2017). Josupeit (2016) maintains that the standard of living of most fishing families in the developing world is comparatively low, despite decades of fisheries development and national economic growth.

Josupeit (2016) furthermore points to nutrition, food security, health, livelihoods and poverty as challenges for fisher communities globally. In discussing the common issues faced by small-scale fishing communities in the Caribbean and Latin America, Salas et al. (2007) list overexploitation of resources, competition with the recreational and commercial sectors and a lack of support infrastructure for post-harvest activities. In these regions, the common problems are identical to those of small-scale fisher people in South Africa. Salas et al. also point out that a lack of fisher involvement in the management strategies for the sector has also contributed to some of the challenges faced by small-scale fishing communities.

2.5 Small-Scale Fisheries Value Chains in the Western and Northern Cape Provinces

In the Western and Northern Cape provinces of South Africa, small-scale fisheries activities are distinctly different from that of the rest of the country. This is because their activities are mainly small-scale industrial fisheries operations as opposed to subsistence-based activities found in the Eastern Cape and KwaZulu Natal. Snoek is the main target species for line fishers, comprising more than 50% of all line fish landed (Isaacs, 2013). Some small-scale fishers under the IR system only target lobster while others harvest either just line fish or both.

2.5.1 Interim Relief (IR)

The IR system is the temporary system that was granted to fishers in 2007 after the Equality Court ruling for small-scale fishers to harvest legally. The system is the modus operandi for many fishing activities along the West Coast of South Africa, from Port Nolloth in the Northern Cape as far as Stillbaai along the Southern Cape Coast of the Western Cape. This was intended to be a short-term system giving fishers access to marine resources until the policy was finalised (Sowman et al., 2014). The system was still ongoing at the time of writing this thesis. The promulgation of the policy took five years, but implementation only began in 2015.

Under the IR system, DAFF issues communal permits to fishers who potentially qualify as small-scale fishers. The department issues two permits under the IR system; one for lobster with a Total

Allowable Catch (TAE) quantity and another containing a combination of species of line fish, red bait and white mussel. Fishers have been identified by community members to be part of IR after the 2007 Equality Court Case and this is updated annually by adding and removing members based on community consensus and good reasoning. For the IR system, fishers must democratically elect permit caretakers acting as liaison officers between fishers and the DAFF.

IR as a temporary system is difficult to regulate as the system is plagued by many problems. Among the problems faced by communities are limited options and freedom to sell their products, especially higher value species like WCRL, as IR does not enforce laws which stipulate what fishers are paid for their products, and taxation and the transfer of fishing quotas under the system. These problems caused by the unregulated IR sector have added to the disillusionment fishers experience with government and with the implementation process of the policy. Sowman et al. (2014) state that, while the IR system has provided much needed relief for some fishers, it has failed to include many poor traditional fishers and others along the value chain, like women.

With little regulation, weak compliance, administrative and bureaucratic delays to implementing the SSFP, the IR system leaves many fisher people vulnerable to exploitation. Like the cooperative model envisioned in the policy, the IR system is community based but is prone to highly problematic external marketer influence and control. Through this influence and control, fishers that are part of the IR system can become aligned directly to certain marketers' keen to exploit the permits and resource allocations of these fishers.

As such, a problematic alliance is created whereby elites begin to emerge within fishing communities because of corrupt permit caretakers, who become answerable to the marketers rather than community structures. This division within communities' leaves fisherfolk open to exploitation as marketers underpay fishers for their products. This leads to increased conflict, factionalism and blatant disregard for any rules (Sowman et al., 2014) and has eroded community cohesion and has damaged work and trust relations in the sector.

2.5.2 West Coast Rock Lobster (WCRL)

As a popular local delicacy, *Jasus lalandii*, commonly known as crayfish, lobster or *kreef* in Afrikaans, is a high value species in high demand not only in South Africa but also abroad. WCRL for small-scale fishers in the Western and Northern Cape provinces is the main target species (Wentink, 2014). Higher prices are fetched when sold internationally, therefore small-scale fishers would sell their entire allocations to major exporters to obtain the highest possible income. The

WCRL value chain is very important for small-scale fishers (Schultz, 2016) as fishers earn the bulk of their income through it. It is under the IR system specifically for WCRL where some permit caretakers act in a corrupt manner with marketers denying other fishers their earnings.

WCRL caught by small-scale fishers eventually ends up in the formal value chains with exporters and marketers. Isaacs (2013) states that a lack of equipment and means to do exporting themselves mean that fishers are forced to enter catch, processing and marketing agreements with large industrial marketers. Although beneficial to them in the immediate term, it has a detrimental impact on them in the longer term. In the immediate term, they receive major lump sums or "voorskots" for their allocations while in they the longer term become indebted to these companies, having to pre-sell to them in the following season to clear their debt.

In 2012 some small-scale fishers under the IR system earned as little as R15 000 per annum for their IR allocations (Schultz, 2015; Schultz, 2016) caught over a season lasting five to six months. In most cases, fishers would sell their entire IR WCRL allocations for export, with nothing remaining for the local market. With no recognised system or regulatory mechanism to assist fishers, they struggle to obtain higher prices for their WCRL catches (Schultz, 2016). As a major source of income for small-scale fishers, WCRL makes a big contribution to the economy of small-scale fishing communities (Isaacs, 2015). Although an important source of income, Wentink (2014) states that they are limited to the harvest phase.

Because of the great demand outside of South Africa for WCRL consumption, the monetary value of the species has increased dramatically and WCRL is now seldom consumed by fisher people (Isaacs, 2015). Despite selling to the local elite or marketers for export, Isaacs further points out that WCRL is still in high demand locally for special occasions such as weddings, dinner parties, religious festivals and New Year celebrations. Because of this high demand, WCRL is poached and sold on the black market to supplement the local demand.

Regarding earning increased income for WCRL, Isaacs (2015) alluded to fisher people having to market their WCRL to the global market as a luxury food source; caution needs to be taken in doing so, however. With a considerable portion of South Africa's WCRL sourced from small-scale fishers, their involvement in the global value chain has significant implications for coastal livelihoods (Wentink, 2014). The livelihoods of many fisher people and their families are directly dependent on the resource through harvesting.

2.5.3 Line Fish

Under IR, line fish is harvested on the line fish permit along with red bait and white mussel permit which includes species like snoek (*Thyrsites atun*), Cape bream (*Abramis brama*), yellowtail (*Seriola lalandi*), white stumpnose *(Rhabdosargus globiceps*), jacopever (*Helicolenus dactylopterus*), carpenter (*Argyrozona argyrozona*) and steentjies (*Spondyliosoma emarginatum*) (DAFF, 2017). Although fishers are given access to harvesting all these species with this one permit, the main target species for line fish are snoek and, to a lesser extent, Cape bream and yellowtail (Wentink, 2014). Although fishers catch a combination of these, the most commercially exploited line fish species is snoek.

During periods of good harvest, small-scale fishers will harvest snoek and sell it directly to middlemen or *langanas*. Langanas are independent buyers with pick-up trucks filled with ice who travel between different communities, purchase fish at the lowest price possible, transport it to the relevant markets and resell it at higher prices. Snoek and yellowtail are sold by fisher folk to langanas, whole and unfrozen, who might do processing such as drying, salting or smoking before the fish is resold, usually on the same day (Isaacs, 2013).

In small-scale fishing communities, a lack of facilities such as storage, cooling and processing, an oversupply of line fish can occur after a good snoek run. It is in such situations small-scale fishers have minimal bargaining power in setting prices for their products and must be satisfied with whatever they get from langanas. In cases where snoek is in oversupply, snoek of a lower quality will also be salted, dried or smoked before being sold (Isaacs, 2015) as storage is a problem.

Snoek usually gains additional value when the original state of the product is altered, as value adding enhances the appeal of the product. Isaacs (2013) documents the monetary value of snoek as it passes through the supply chain. At a landing site, snoek is bought by langanas for R20 to R30 per unit, with an extra R10 being added once gutted and cleaned. Within the community, snoek is also resold for between R40 and R70, or between R100 and R130 on credit. Once effort is added to a product, its price increases. Snoek which has been dried increases in value ranging from R14 and R28 per piece, whereas snoek roe costs between R28 and R40 per kilogram. Smoked snoek can cost between R14 and R28 per piece compared to a whole fresh snoek which can cost the same price.

Although the process of value adding usually gives a product higher monetary value, it does not always filter down to fishers. Although they play a critical role in the line fish value chain, and

specifically for snoek through harvesting, most of them have little involvement in adding value beyond this point (Isaacs, 2013; Wentink, 2014; Schultz; 2016). Small-scale fishers must rely on other sectoral role players, through unequal power relations, to earn a living in the sector. In most cases, small-scale fishers are merely suppliers when interacting with both the formal and informal sectors.

As the interaction of small-scale fishers and the market is mainly informal, direct contact with the formal sector is intermittent. In most cases small-scale fishers do not interact directly with the formal sector but with langanas, as indicated above. The formal and informal sectors operate differently, as Wentink (2014) noted: formal retailers and wholesalers sell snoek per kilogram while langanas sell snoek per unit price. Wentink (2014) states that some langanas sell to fish and chips shops in the formal sector.

In the formal sector, as Isaacs (2013) states, some establishments sell imported barracoota from New Zealand labelled as snoek to locals or purchase snoek from major trawl companies. This is because many small-scale fishing communities are located significant distances from major urban centres and it is difficult for fishers with limited transport and storage facilities to reach their desired markets directly. Wentink (2014) states that wholesalers situated geographically closer to small-scale fishing communities, can more easily source their products directly from the small-scale sector.

As small-scale fishers cannot always guarantee a supply of snoek because of the migration of the species and lack of storage facilities, formal businesses are more likely to turn to commercial fisheries who store snoek until there is a demand. Despite this, consumers in the Ocean View community in Cape Town prefer not to buy frozen snoek from major retailers, but purchase fresh from langanas (Isaacs, 2013).

Isaacs (2013) states that, while some langanas are boat owners with commercial fishing rights, or even fish under the IR system themselves, they still purchase snoek caught by other small-scale fishers. Schultz (2016) states that the snoek value chain, in drawing different actors into its orbit, also has implications for women. In some instances, as Isaacs mentions, some langanas employ women from a community to fleck the snoek and to sell it. Very few women are actively involved in harvesting line fish in the value chain, however. As the structure of the fishing industry thus is mainly beneficial to marketers and major corporates, fishers are continuously disadvantaged and need assistance or a mechanism of some kind that will help them to be in control of their own marketing activities, hence the investigation of ICTs in this thesis.

2.6 Information and Communication Technology

ICT – Information and Communication Technology (or Technologies in plural form) is the term used to collectively describe any communication device or application. ICTs include radio, television, cellular phones involving text messaging and data applications, computer hardware and software as well as satellite systems (Rouse, 2005; Payne, Kearns & Schiff, n.d.). Payne et al. (n.d.) include print media, bar coding technology and digital cameras as ICTs. ICTs therefore involve a broad range of activities and for some people play a big role in their daily activities.

The history of ICTs is linked to the development of the Internet, as Duque et al. (2007) explain. Duque et al. state that Internet technologies have played a key role in the diffusion of information in the last 50 years. Starting out as a scientific research project, the Internet has developed from being a tool for use by scientists only to a crucial vehicle for commerce, entertainment, news and personal communication. The Internet therefore started out as a highly exclusive space for scientists and technicians able to comprehend its jargon to become a tool which can be accessed by almost anyone in possession of a digital device and connectivity.

In discussing the role of ICTs in the social public space, Abdel-Aziz et al. (2016) offers a narrower view to that of Kearns & Schiff (n.d.) by categorising ICTs into four elements; namely Wi-Fi networks, digital interactive media facades, interactive public displays, and smartphone applications. The functions of ICTs across the spectrum mentioned here span across learning, translating, data management, gaming, shopping, conducting business, banking, safety and tracking. Prior to major technological advancements, many of these activities were impossible to do without physically being in a designated location, but various mobile applications have made it possible to do this now. Abdel-Aziz et al. (2016) point out that telecommunication technology has diminished various activities which needed to be carried out in the public realm and has become easily accessible from home, via the Internet.

Rouse (2005) further states that ICTs are spoken of in the contexts of education, health care and libraries and are associated with videoconferencing and distance learning. Similarly, the four elements of ICTs as discussed by Abdel-Aziz et al. (2016), play major roles in public domains such as art and culture, education, planning and design, gaming and entertainment. ICTs are therefore intended to assist human activities and to minimise effort and maximise production in a simplified manner.

2.6.1 Information and Communication Technology for Development (ICT4D)

Information and Communication Technology for Development (ICT4D), is a relatively new one. It came about as a response to the use of ICTs in international development, particularly focusing on the poor and less materially advantaged (Walsham, 2017). According to the UCT Centre in ICT for Development (2017), ICT4D, as a field of research and practice, seeks to utilise ICTs to achieve economic, social and political goals in low-resource or low-income regions. ICT4D has been looked to for both policy and practice as a tool and a solution in solving various pressing issues facing societies and in making solutions and services accessible to people who need it most. As its name suggests, ICT4D seeks to bring together the fields of technology and development.

ICT4D is not specifically centred or focused on one sector but presents itself as an idea which can be applied across sectors and fields where human development is the main agenda. With the multiple uses and functions of ICTs as pointed out by Abdel-Aziz et al. (2016) and Rouse (2005), Gholami et al. (2010) investigates whether ICTs is the key to unlocking development opportunities, especially in the developing world. With technology constantly improving and evolving at a rapid pace, governments are also trying to improve their systems and streamline their services to be more efficient as well as to service the needs of their citizens.

With the United Nations Sustainable Development Goals (SDGs) replacing the Millennium Development Goals (MDGs) in 2015, Close the Gap and WorldLoop believe that ICTs play a crucial role in achieving these goals (Close the Gap and WorldLoop, 2015). According to Close the Gap and WorldLoop, efforts have been made among national governments and international organizations to compose ICT4D initiatives for the education and healthcare sector, as well as for economic transformation of developing communities.

Increasingly ICT4D is becoming more and more ingrained in government policies. As efforts have been made in the arena to streamline various services, more and more governments are discovering what potential ICTs can do to improve their operations and service delivery. Through ICT4D initiatives governments can better connect with citizens of their different countries and ensure that they remain updated with important information.

2.7 Chapter Summary

This chapter has provided an outline of the SSFP of South Africa and how value chains fit into it. By focusing on the Western Cape and Northern Cape provinces of South Africa, the chapter discusses some of the structural challenges which fishers encounter in making value chains work for them under the IR system. The literature that is discussed specifically focused on the WCRL and line fish sectors of small-scale fishers under the IR system. The literature also discussed ICT4D as a concept which details the ICTs and what its purpose is. Chapter 3 presents a discussion of practical examples of ICTs in small-scale fisheries and how ICTs have been applied in these different contexts. As ICT4D is a concept applied to non-specific fields and the broader perspective of society, ICT4Fisheries, which will be discussed in the next chapter specifically focuses on the fishing sector.

Kleinmond Harbour

CHAPTER 3: ICTS IN SMALL-SCALE FISHERIES

In an ever-changing world with advances in technology and knowledge, the small-scale fisheries industry also is impacted upon as new innovations which can benefit livelihoods and activities are introduced to the sector. In the small-scale fisheries realm, ICTs are seldom discussed in relation to the sector with a lack of research papers, peer reviewed journals and academic papers as clear evidence of it. Most information on ICTs can be obtained directly from websites of various projects but little academic literature exists. In the fisheries sector ICTs as tools to assist small-scale fishers have not been explored in comparison to for example the educational or health care sectors.

Many small-scale fisher people are yet to be exposed to technologies as such, as many have historically been marginalised globally (Sowman et al., 2014; Rosales et al., 2017). As a result of this, many small-scale fishers globally are not exposed to various technologies that can aid their livelihoods or activities. In the developing world, Mallalieu (2015) makes a case for technologies to be introduced to the sector with training to the fishers in order to rejuvenate sector in Africa, the Caribbean and the Pacific.

According to Payne et al. (n.d.), ICTs offer different ways to exploit opportunities, address constraints of value chain growth, and competitiveness. Omar and Chhachhar (2012) point out the role of ICT in the development of fishermen and how it can aid them in their daily activities. ICTs can assist fishers with data management pertaining to their activities, safety and communication at sea and accessing markets. Omar and Chhachhar state that ICT enables fishers to quickly disseminate important information regarding markets and value chain activities, especially in rural contexts. As broader knowledge application of value chains is important for developing the sector (Mallalieu, 2015; Schultz, 2016), ICTs can help to disseminate such information.

Introducing ICTs to small-scale fisher people can bring their activities into the digital age. With approximately 50 million of the world's 51 million fishers and millions more in fisheries-related activities (FAO, 2016) being involved, an opportunity exists to introduce ICTs to those engaged in the greater small-scale fisheries value chain as the sector produces nearly half of the world's fish production. With ICTs, fisher people involved along the value chain can be recognised for their efforts through initiatives such as Fairtrade[1] and potentially generate income by means of

[1] Fairtrade International, an organisation that serves the interests and rights of farmers, workers and producers and seeks support from buyers to purchase products that help to change the lives of farmers and workers (Fairtrade, 2017).

technology. Schultz (2016) states that value chains in the small-scale fisheries sector have been largely unexplored in South Africa and more knowledge of socio-economic conditions, livelihoods, harvesting and post-harvesting has only recently come to attention.

3.1 ICT4Fisheries

The term *ICT4Fisheries* stems from the broader notion of ICT4Development (ICT4D). Kahle (2015) states that various ICT devices can instantly gain connectivity through the global presence of the Internet. This connectivity through ICTs as Kahle states, enables individual users to gain a sense of independence and offers new business and employment opportunities, access to information, knowledge, and services. Kahle emphasises that ICT4D enhances the livelihoods of people previously cut off from the mainstream economy, thereby positively impacting the status of human development worldwide.

The Voluntary Guidelines for Securing Sustainable Small-scale Fisheries (VGSSF) published by the FAO seeking to address common issues in the sector globally, facilitated the founding of the ICT4Fisheries collective in 2016 to help achieve this. The collective was founded by NGOs and fisher representative organisations encompassing a global network of projects and partner organisations promoting broader, international collaboration to develop open source data applications for small-scale fisheries (ICT4Fisheries, 2016). As members represent small-scale fishers from different parts of the world, the aim of the collective is to establish global collaboration and partnership.

Members of the ICT4Fisheries initiative participated in the ICT4Fisheries Conference in Cape Town, South Africa in November 2016, under the theme "ICTs for equitable and sustainable small-scale fisheries – promoting international cross-learning". Common challenges in the small-scale fisheries sector and possible solutions to be implemented across different geographic contexts were discussed.

What emanated from the workshop was that an ICT collective like the VGSSF trying to assist fishers globally should be established across various technological platforms to help achieve the objectives of the guidelines.[2] A website listing all partners and stakeholders has been established

[2] VGSSFs objectives:
(a)Enhance the contribution of small-scale fisheries to global food security and nutrition
(b)Equitable development of small-scale fishing communities and poverty eradication

to build relations and contacts regarding various developments. Some of the members of the ICT4Fisheries initiative are discussed in the next section which demonstrates how ICTs have been used in different regions across the world to connect small-scale fishers to different markets.

3.1.1 Case Study: Abalobi South Africa

Source: http://abalobi.info/

Abalobi, which means "fisher" in isiXhosa, a local Nguni language, is a transdisciplinary ICT smartphone partnership program involving DAFF, the University of Cape Town (UCT) and small-scale fisher people of South Africa. The program is housed within the Environmental and Geographical Science Department of UCT and is the first of its kind in South Africa for the fishing sector and thus is the focus in this research as it investigates two South African fishing communities. The project's implementation through providing fisher people with a suite of application tools to assist them in their fishing activities is simultaneous to the rollout of the SSFP.

According to one of the founders of the ICT4Fisheries initiative, Abalobi was established to give a sense of power and knowledge for managing and directing their own livelihoods in the hands of fishers. Abalobi is modelled on open-source software which Poynder (2001) labels as software in which the source code of an application is freely available for others to view, amend, and adapt for themselves. The program is aimed at social justice, transformation in the production of knowledge, fostering a better understanding and stewardship of marine resources and building resilience for small-scale fishers in the face of climate change as well as seeking to alleviate poverty in the value chain (Abalobi, 2016).

The Abalobi (2016) suite of five applications is continuously being developed in collaboration with small-scale fishers. On its website, Abalobi states that, pending implementation of the SSFP,

(c)Sustainable utilization and responsible management and conservation of resources
(d)Promote the contribution of small-scale fisheries to an economically, socially and environmentally sustainable future for all
(e)Provide guidance to states and stakeholders on development and implementation of policies
(f)Enhance public awareness and promote knowledge advancement, cultures, roles, contributions and potential of small-scale fisheries

there would be an opportunity to organise the sector as the leader of co-managed fishery activities using mobile and cloud-based ICTs. With no programme as such existing in the country, as mentioned, the opportunity arose to establish a locally suited ICT to aid fishers to empower them and improve their activities.

The five applications of Abalobi assist fishers to systematically and digitally keep records of their various activities. The ICT also allows them to gain access to other resources not easily accessed in the past. The five applications of the program are as follow: Abalobi Fisher, Monitor, Manager, Co-op and Abalobi Marketplace (Abalobi, 2016). Currently, only the Monitor application has been fully developed while the Fisher, Manager and Co-op applications have some completed functions.

The applications of Abalobi are inter-connected, co-designed and cover the full spectrum of sector stakeholders through its "Hook to Cook" programme displaying fisher stories, fisheries governance and more (Abalobi, 2016). The Fisher application enables users to log catches, communicate, share data, view income and expenditure on the personal accountant function, while the safety-at-sea and information hub functions are still in concept phase. The Monitor application is suited for community catch data monitors by which users can record, and monitor catches landed by fishers, analyse these and communicate with fishers, other monitors and fisheries managers by means of the integrated chat platform.

The Abalobi Manager application aims to act as a platform to stimulate co-management in fishing communities. With this application, the fisheries analytics function enables fishers to share dashboards of community catch monitoring data and enable communication between different stakeholders on the integrated chat platform (Abalobi, 2016). The Abalobi Co-op functions aim to encourage transparent collective accounting, which is necessary for small-scale-fisheries cooperatives. The functions of this application are co-operative accounting and auditing; an internal control system for transparent transactions; a value-adding log (which has been completed); sales traceability; co-operative member management and integration with finance and insurance technology.

The Abalobi Marketplace application seeks to empower fisher people in the value chain by providing direct access to markets. The functions of this application are the virtual market live mapping; the market price and trend feature to understand market fluctuations; co-operations detailing the narrative behind the product; and a retailer and demand function (Abalobi, 2016). The Marketplace application at the commencement of this research was still in concept phase.

In promoting sustainability through value chains, Abalobi has joined efforts through the Marketplace application with the South African Sustainable Seafood Initiative (SASSI) established by the World-Wide Fund for Nature South Africa. According to SASSI (2017), the organisation promotes voluntary compliance, encourages consumers to demand sustainable seafood and creates awareness around sustainability of seafood matters. Voluntary compliance, as Schultz (2016) describes it, comprises governance and societal regulation, which are important aspects for the future of marine resources, as well as value and supply chains.

SASSI conducts stock assessments of marine resources and categorises seafood species according to a traffic light system of red, orange and green. SASSI plays a vital role in seafood supply as it works with stakeholders ranging from large fishing companies to small-scale fishers, as well as marine scientists, government, consumers, retailers, restaurants and environmental non-governmental organisations (NGOs) (SASSI, 2017). SASSI does have a free ICT application for Android and Apple devices which lists the different species per the traffic light system.

3.1.2 Case Study: mFisheries Caribbean Islands West Indies

Source: https://www.cirp.org.tt/mfisheries/

mFisheries, a mobile application program, was established through a partnership between the Caribbean ICT Research Programme and the University of the West Indies. Mallalieu (2015) in working on ICT solutions for the small-scale fisheries sector in the Caribbean, leads the smartphone multidisciplinary research group at the University of West Indies in developing new technology to assist small-scale fishers. mFisheries was developed in the context of the low-income earning Caribbean on the islands of Trinidad and Tobago (mFisheries, 2014). mFisheries is also part of the ICT4Fisheries collective.

The programme consists of a suite of open source applications that can be used by different groups of fishers classified as full-time fishers, sport fishers and leisure fishers. The open source software applications of mFisheries include a navigation module, a weather module, information, camera, alerts and S.O.S. modules (mFisheries, 2014). With the continuous development of the application, research and collaboration is under way with its ICT4Fisheries partners to improve mFisheries. As mFisheries is under development, attempts are being made to connect fishers to desired markets such as restaurants and consumers for forming possibly new value chain partners.

3.1.3 Case Study: ThisFish Canada

Source: http://thisfish.info/

In tracing seafood from the source of harvest to the consumer, ThisFish (2013), another member of the ICT4Fisheries collective, enables consumers to trace the journey of seafood from the ocean to the plate. ThisFish, based in Canada, emphasises the need to provide authentic, good quality and sustainable seafood while promoting the fisher people who catch it. When packaged, each catch is tagged with a barcode which allows a consumer to trace the origins of the product back to the harvester. The program involves various role players in the fishing industry who play a different role in the handling of the product ranging between fishers, processors, distributors, retailers and restaurants.

ThisFish (2013) enables small-scale fisher people to better connect to their markets, brand their catches and tell their personal stories to the consumer on their unique online profiles. The online profiles allow fishers to share information such as biographies, images, videos, vessel and crew member details with consumers, detailing their fishing trips and the various steps of the value chain. ThisFish offers fishers a feature whereby consumers can contact fishers who caught their seafood, thereby creating a channel for consumer feedback and, possibly, for future orders. By being directly linked to consumers through this ICT, fisher people gain a competitive edge as they have market intelligence through getting to know their clientele.

3.2 Case Study: FishLine United States

Source: http://fishlineapp.com/

FishLine (2016) is an ICT application by the Phondini Group for fostering interaction between various role players in the sector. It is used by fishers, local seafood markets, farmer markets, restaurants, cafes and community-supported fisheries. FishLine is a free web-based application based in California in the United States. It can also be downloaded onto a smartphone and tablet. The Phondini Group states that the FishLine application locates fresh local seafood for consumers and enables fishers to make instant contact with consumers. The application operates with geographic information and locates the nearest port or point of sale of desired fish for consumers. FishLine is not a member of the ICT4Fisheries collective.

The application enables fishers, markets and restaurants to list fresh locally caught seafood and provides direct communication to potential customers who could buy from them (FishLine, 2016). As FishLine is used as a selling channel for fresh fish, it could stimulate possibilities for value chain activities, especially for small-scale fishers. For small-scale fishers this presents an opportunity to add value to the raw product, such as cleaning, salting, spicing, smoking or even preparing fish as requested by customers.

3.3 Community Supported Fisheries (CSFs) and ICTs

Community Supported Fisheries (CSFs) are important role players in the seafood sector and have emerged in parallel to community supported agriculture (McClenachan et al., 2014). Brinson, Lee and Rountree (2011) define CSFs as arrangements between fishers and consumers whereby upfront payments are made to fishers in exchange for scheduled seafood deliveries. In CSFs, huge emphasis is placed on purchasing locally caught products which are sustainable and reap benefits for local communities (Brinson et al., 2011; Campbell et al., 2014 and McClenachan et al., 2014).

In reaching out to their potential clientele, some CSFs in North America have begun using ICTs to get fisher people to access markets directly. For CSFs, ICTs for the harvesting and processing of fish products are organised by different role players within a fishing community; they can access

their desired markets with the ICTs. The economic benefits obtained from sales should then be distributed to those involved with getting the final products (Brinson et al., 2011; Campbell et al., 2014; McClenachan et al., 2014) through the usage of ICTs.

3.3.1 Case Study: Dock to Dish Canada, United States and Costa Rica

Source: https://docktodish.com/

In connecting various role players in the small-scale fisheries sector, Dock to Dish (2017) involves fishers, cooperatives, chefs and restaurants. Dock to Dish has chapters situated across different fishing contexts within the three countries mentioned as fishing activities and market access is different in each country. Dock to Dish has a chapter in the Canadian city of Vancouver, in the two American cities of Montauk and Los Angeles and in Quepos, Costa Rica. Consumers connect to fishers and vice versa with Dock to Dish through a web-based application for creating their desired value chain.

This value chain ensures that product sales are distributed to fishers recognised for their efforts in the value chain. The use of Dock to Dish enables fishers to record their catch data, sell their products and deliver these within 24 hours to subscribed consumers (Dock to Dish, 2017). All harvesting must be done locally and sustainably with respect for the ocean following a "catch of the day" principle in which only that caught on the day to be sold, as fishing is highly susceptible to external fluctuations such as climate change and resource migration.

The Montauk and Los Angeles chapters have value chain partnerships, mainly with restaurants and individual consumers, while the Vancouver and Quepos chapters also have partnerships, but with a hotel and resort respectively. By participating in these value chain partnerships, fishers in these regions are part of the value chains of the tourism and hospitality industries. This type of value chain linkage could become a common one in many small-scale fishing communities in South Africa as many are in popular holiday destinations.

3.3.1.1 Pelagic Data Systems, Local Catch and Fish Trax ICTs

As of 2017, Dock to Dish has decided to partner with Pelagic Data Systems, LocalCatch.org and Fish Trax Technologies to be able to track and monitor wild seafood from fishers at sea directly to end consumers on land in near-real time calibration (Dock to Dish, 2017). This partnership was sought to improve the activities of small-scale fishers, to better facilitate interactions with markets. The ICT bundle dubbed "Dock to Dish 2.0" comprises an open-sourced program for any independent small and medium scale fisheries operations to use, providing clear, verifiable source information to users in near-real time.

Source: http://www.pelagicdata.com/

Pelagic Data Systems was founded in San Francisco, California, in 2014 to bring a technological approach to human problems in the fisheries sector globally (Pelagic Data Systems, n.d.). Pelagic Data Systems brought together telecommunications, hardware, software, science, and operations management experts to help fishermen earn a better living through the minimisation of environmental impacts. The system relies on solar energy and the device is mounted on a fishing vessel for tracking and storing fishing data in a digital cloud as depicted below.

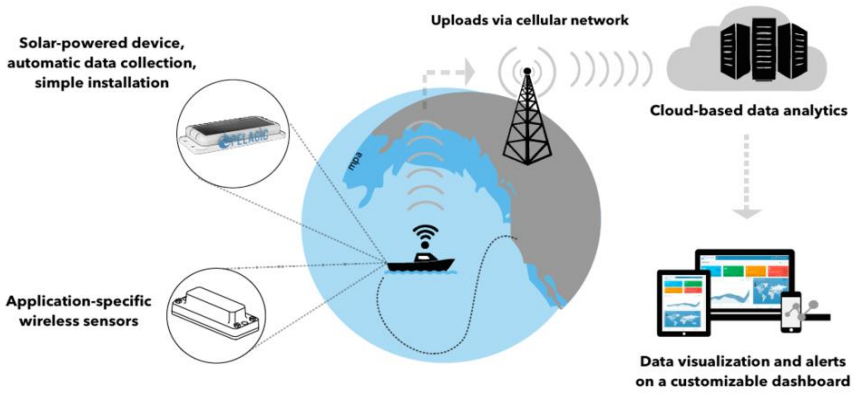


Figure 2: Pelagic Data Systems (www.pelagicdata.com)

Source: https://localcatch.org/

LocalCatch.org is a programme of collective fishers, organisers, researchers, and consumers from across North America. The aim is to provide local healthy, low-impact, and economically sustainable seafood via CSFs and other direct marketing arrangements (LocalCatch.org, 2017). The program lists various CSFs across North America on its seafood finder platform to enable fishers to communicate with consumers, chefs, and fisher and farmer markets, as well as with other businesses that might be interested in purchasing fish. This feature also has a filter option to further decipher different criteria by core values[3] of organisations involved in seafood supply.

Source: http://fishtrax.org/

Fish Trax Marketplace is an application which was developed by the Advanced Research Corporation, Oregon State University; the Oregon Salmon Commission; and Ariel Seafoods (Fish Trax Marketplace, 2017). It is fully owned and operated by Fish Trax™. The marketplace function is available to users to find fish for consumption and locates different businesses and services in the seafood value chain. Fish Trax Marketplace enables consumers and businesses to track their seafood from point of harvest to consumption which, besides fishers, involves retailers, fish dealers and seafood enthusiasts. Like ThisFish, Fish Trax Marketplace also enables consumers to trace the value chain route from the place back to the fisher by viewing their online profiles and by communicating with them.

3.4 Case Study: Punta Abreojos and FEDECOOP México

Eleven small community co-operatives along the west coast of the Baja California Sur state in Mexico joined efforts with the help of the Mexican government to form a regional co-operative (Cunningham, 2013) named *FEDECOOP*. The acronym FEDECOOP, which is Spanish for Baja California Regional Federation of Fishing Cooperative Societies, is an overarching federation responsible for all exports and macro scale marketing of post-harvest products of these 11

[3]The core values under which seafood can be searched for using LocalCatch are Catch and Handle with Honour; Community and Ecosystem Based Fisheries Management; Community-Based Fisheries; Creativity and Collaboration; Eating with the Ecosystem; Fair Access; Fair Price; Honouring the Ocean; Traceable and Simple Supply Chains.

communities. The Punta Abreojos community of FEDECOOP has recognised the importance of ICTs for their fisheries activities and has begun utilising ICTs to advance their activities.

The Punta Abreojos community cooperative has had a software program designed for them with assistance from partners to assist the community with administration of data recording and for the commercialisation of different species caught by fishers (Cota-Nieto et al., 2015). The co-operative of the community has thus labelled the fisheries resources as cultural – high value lobster and abalone, target – line fish and complementary resources, bycatch species – untargeted (Cota-Nieto et al., 2015).

The current value chain of the community relies on collective efforts with other communities that are part of FEDECOOP, which exports its products to Europe and Asia (FEDECOOP, n.d.). This is done under the *Rey del Mar* or "king of the sea" brand belonging to FEDECOOP in conjunction with all the other member cooperatives that form part of the organisation. As some value adding requires specialised facilities, the 11 cooperatives transport their catches to the centralised location of FEDECOOP for processing, canning, labelling and then exporting. Cota-Nieto et al. (2015) states that the ICT software program can therefore help with the commercialisation and administration of products for the community.

3.5 Chapter Summary

ICTs in the small-scale fisheries sector represent a relatively new phenomenon and various organisations, companies and individuals are beginning to realise the worth of the technology, especially in connecting small-scale fisheries to their desired markets. As seen from the ICT4Fisheries initiative, common challenges in the sector do exist and possible solutions to be implemented should be flexible and applicable across different geographic contexts. Some work has been done on connecting fishers to markets through ICTs by Abalobi, mFisheries, ThisFish, FishLine, Dock to Dish partnering with Pelagic Data Systems, LocalCatch.org and Fish Trax Technologies. Chapter 4 presents the methodology that was followed for answering the research question and the objectives that were posed and an explanation of the specific context in which the research was based.

CHAPTER 4: METHODOLOGY

The approach to the research was qualitatively based as it relied on interviews and participant observation for gathering the necessary data. From a fishers' perspective, the geographic aspect of the bulk of this research is mainly located in the fisher towns of Lamberts Bay and Kleinmond. These two communities provided the case studies for the research and were selected because of various similarities and because of the usage of the Abalobi Fisher app in these towns.

The literature and case studies discussed in Chapter 2 and Chapter 3 was selected as these publications speak to the different challenges and events in the South African small-scale fishing sector and even more so to the semi-industrial small-scale fishing sectors in the Western and Northern Cape provinces. The literature that is discussed in these two chapters is relevant to these two communities regarding fishing community dynamics, market access and the introduction of ICT initiatives.

4.1 Study Sites

No legally recognised small-scale fishing community and cooperative with allocated small-scale fishing rights existed at the time of doing research for this thesis, as DAFF was busy implementing the SSFP. With no formally recognised community existing, this research engaged fishers from Lamberts Bay on the West Coast and Kleinmond in the Overstrand region. Both these towns are traditional fishing towns harvesting WCRL as well as a variety of line fish.

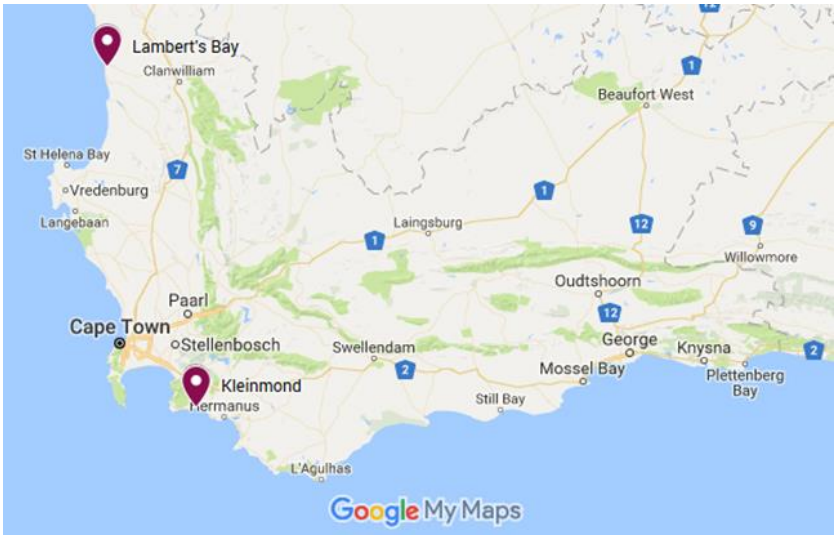


Figure 3: Location of Lamberts Bay and Kleinmond (https://www.google.com/maps)

While located at different parts of the coast, as shown in the map, Lamberts Bay and Kleinmond share similar characteristics. Value chains in both these towns filter into the tourism sector as visitors from elsewhere usually purchase fresh fish and/or consume some sort of seafood there during their stay. As traditional fishing towns, both face similar realities in their fishing activities. Fishers from these towns have shown an eagerness to explore new opportunities for their livelihoods. At the time of writing this thesis, both towns were fishing under the IR system.

4.1.1 Lamberts Bay

The town of Lamberts Bay is situated 262 km north of the city of Cape Town. Named after Admiral Lambert of the British Navy who conducted marine survey of the bay between 1826 and 1840 (Lamberts Bay Tourism, 2017), the town is part of the Cederberg Local Municipality and is situated north of Elands Bay. The economic activities of the town historically include fish harvesting, agriculture at surrounding farms and. more recently. tourism activities. The 2011 national census recorded the population of the town at 6 120 (Census 2011).

While some fishers in Lamberts Bay have organised themselves into cooperatives, these cooperatives are not dedicated small-scale fishing cooperatives as stipulated in the SSFP. These cooperatives were formed by the Department of Trade and Industry (DTI) through the Co-operatives Incentives Scheme (DTI, 2012) with fishers under the IR system pooling their allocations. These cooperatives subsequently received grants and vessels. One such cooperative that received funding and vessels is the Coastal Fellas Cooperative, while another cooperative called Fish Tails is involved in the processing of products.

The Coastal Fellas Cooperative, a pre-harvest cooperative, was started in 2011. It supports about 30 community members in Lamberts Bay. The cooperative is run and managed by six active IR harvesters who are its board members. The Coastal Fellas Cooperative creates postharvest jobs along the value chain for the Fish Tails Cooperative, a post-harvest cooperative, through its value chain operations in harvesting line fish. The Fish Tails Cooperative was established by fisher people unable to become part of the IR system but who were reliant on marine resources. The Fish Tails Cooperative purchases line fish from Coastal Fellas Cooperative to clean, salt and/or smoke fish to sell further to other intermediaries, like langanas. During a period of good snoek harvesting, the Fish Tails Cooperative can create work for about 30 to 40 community members.

Community members from Lamberts Bay have led a workshop in which they hosted academics from UCT, WWF SA officials and food buyers from the Woolworths food group. This workshop

was organised to discuss topics such as product development, marketing and value chain upgrading, among others. In learning about the cooperative and the way in which fishers use Abalobi, the engagement led by the fishers allowed fishers, academics and retailers to brainstorm and collaborate to find ways of improving value chains and ICTs.

In November 2015, two community members from Lamberts Bay, together with DAFF officials, including myself in my previous capacity, comprised a delegation to introduce Abalobi to the Minister of DAFF – Senzeni Zokwana. This was in preparation for the World Fisheries Day Imbizo in Humansdorp in the Eastern Cape at which time the minister formally endorsed Abalobi as the official catch data management system for small-scale fisheries governance in South Africa. Community members along with the project leaders from UCT and DAFF outlined to the minister the relevance of ICTs for small-scale fisheries and the impact it can have on their activities.

Fishers in Lamberts Bay are frequently involved with Abalobi hence this community was chosen for the research as community members here are more familiar and acquainted with ICTs. Abalobi has a strong presence in the Lamberts Bay community as it was the first pilot site for the application in 2015. Fishers here essentially were among the first in South Africa to use dedicated ICTs as such for their activities and were instrumental in the continuous development of the program. Fishers from Lamberts Bay were also instrumental in the rollout of Abalobi's pilot phases to other communities such as Struisbaai and Kleinmond.

4.1.2 Kleinmond

The town of Kleinmond is located 103 km from the City of Cape Town towards the Southern Cape Coast. It derives its name "small mouth" from the Bot River which enters the ocean at the lagoon. The town is situated within the Kogelberg Biosphere Reserve, an environmentally protected UNESCO area, which encompasses the coastal towns and villages of Kleinmond, Rooiels, Pringle Bay and Bettys Bay (Kogelberg Biosphere Reserve Company, 2017). Situated within the Overstrand Local Municipality in the Western Cape Province, the population of Kleinmond was recorded at 6 634 (Census 2011).

WWF SA has a presence in Kleinmond through their engagement with small-scale fishers through the Kogelberg Small-Scale Fisheries Improvement Project (FIP). WWF SA states that the aim of the Kogelberg FIP is to maximise socio-economic benefits for the communities through market-based incentives, before addressing environmental challenges faced by small-scale fishers (WWF,

2016). This project is intended to rejuvenate small-scale fisher activities in the region and acts as a catalyst for new projects and ideas.

Fishers from the broader Kogelberg region use the Kleinmond Harbour to launch their boats from as well as carry out their various activities. Listed among the many projects undertaken by the FIP is value chain stimulation, anti-poaching efforts and skills building and training. Through the FIP, there has also been discussions with the tourism board to establish work relations as there are various restaurants, eateries and gift shops in the town, as well as in the neighbouring communities in the Kogelberg region.

Through the FIP, fishers have begun to engage local restaurants and chefs through pilot projects. In the past, a women's cooperative from the community engaged with the retail group Pick 'n Pay by collecting and pickling mussels for sale in stores. In 2015, the FIP facilitated collaboration between WWF SA and Pick 'n Pay and the small-scale fishers to actively involve them in the seafood supply chain (Cape Town Green Map, 2015). At the event in Kleinmond, award-winning South African chef Bertus Basson assisted fishers with preparing local dishes.

As fishers from the Kogelberg region are involved in the pilot phases of Abalobi, they play a crucial role in giving input regarding how ICTs can help unlock new opportunities for small-scale fishers. In the Kleinmond and broader Kogelberg area, conditions are different from those at Lamberts Bay regarding collective action. In Kleinmond fishers are not as well organised in cooperatives as they are at Lamberts Bay, but some fishers do work with others from Bettys Bay as fishers there do not have vessels of their own.

4.2 Scoping

Scoping in each community was done during Abalobi engagements as well as by participating in WWF SA workshops with different fishers. As small-scale fishers operate within certain lived realities, I had to obtain first-hand experience of this and to observe some of their activities and realities in their communities. It was also important for me to listen to what community members had to say before continuing to research the topic in greater depth.

The first scoping engagement with Abalobi that I attended took place in Struisbaai at the southernmost point of the African continent with small-scale fishers from that community as well as from Lamberts Bay and Kleinmond. Here fishers shared ideas and discussed the various

experiences and challenges of the sector. Some of the ideas that were discussed included value chains and marketing challenges in the sector. At this workshop, the fishers' journey of co-developing and using Abalobi was documented in the visual presentation presented below. Fishers had the opportunity to explain how ICTs assisted them with challenges in the sector and made suggestions concerning what needs to be done to help solve these.

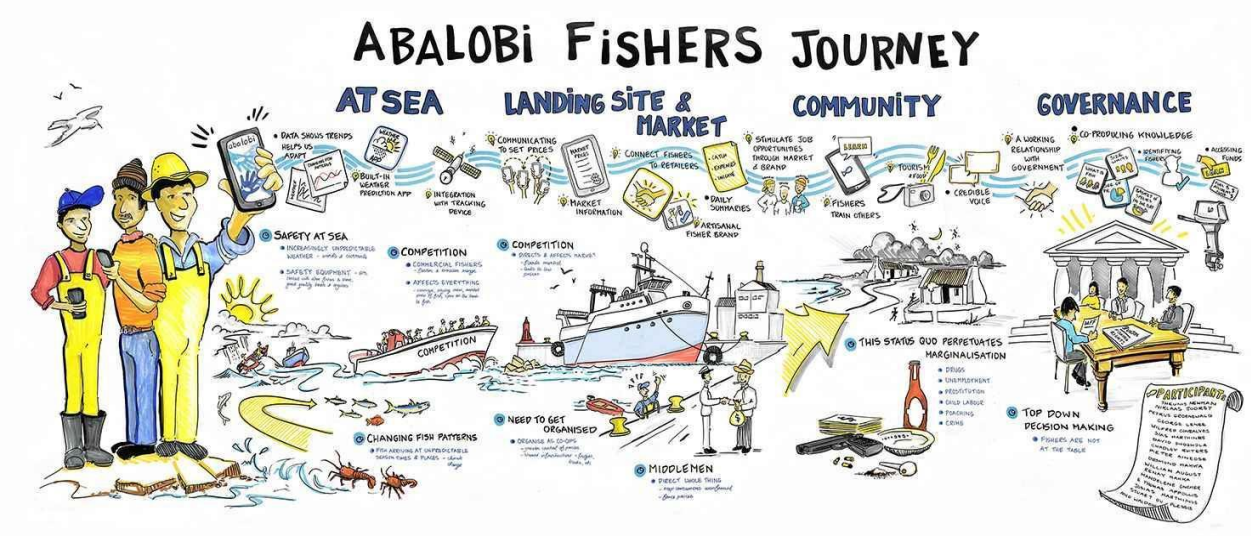


Figure 4: Abalobi Fishers Journey (https://abalobi.info)

I also attended a workshop organised by the local fishers of Lamberts Bay in which they hosted seafood buyers from the Woolworths group. Members of Abalobi and WWF SA were in attendance to give input at the workshop. Various matters regarding value chains such as market access, facilities for storage, food hygiene and cooperative models, as well as the role of the SSFP in aiding value chains, were discussed with the fishers.

Just before I started conducting interviews, I participated in a fisher exchange program hosted by MDT in Lamberts Bay for which the organisation brought Coastal Links fishers from the Eastern Cape Province to the Western Cape. This engagement was to bring different fishers together to share knowledge on the fishing cooperatives in Lamberts Bay, such as Coastal Fellas and Fish Tails (Masifundise Development Trust, 2017). Fishers from Lamberts Bay and neighbouring town of Doringbaai were in attendance. The goal of the exchange was for the Eastern Cape fishers to learn from their Western Cape counterparts in setting up and working in cooperatives (Masifundise Development Trust, 2017) as well as managing their value chains.

In Kleinmond, Abalobi did a relaunch of the programme to encourage greater participation in the Kogelberg region. At this engagement fishers in attendance were from the local community as well as the neighbouring communities of Mooiuitsig, Bettys Bay and Pringle Bay. Fishers in attendance comprised a mixture of IR fishers as well as local commercial rights holders. Topics which were discussed ranged from the importance of data recording to connecting fishers to markets.

4.3 Participant Observation

Participant observation is the method by which a researcher learns about the explicit daily activities, rituals, interactions, routines and cultures of a group of people while interacting and reacting to events and situations unfolding before them (DeWalt & DeWalt, 2011). I visited the two communities for participant observation; Lamberts Bay three times and Kleinmond twice. During my visits to both communities I managed to visit the harbour and engaged in informal conversations with as many fishers who were willing and interested in speaking to me. The topics which were discussed ranged from challenges in the fishing sector, general community development, how politics influences the sector and value chain work pertaining to the sector.

My involvement with Abalobi as a student opened my mind to greater insight into the lives of small-scale fishers and how they interact with each other in their communities. Through the five various Abalobi community engagement events which were workshops, I was able to engage and build greater rapport with certain fishers, some of whom I managed to interview at a later stage during the data collection stage. These interactions with fishers made me cognisant of the challenges that fishers' have regarding ICTs. Outside of Abalobi I was then able to frequent both communities independently and engage with fishers by myself.

4.4 Interviews

Qualitative interviews are useful for gathering rich data describing the verbal and nonverbal behaviours of interviewees (Su, 2016). During an interview, the interviewer does not just receive data but collaborates with the interviewee to create and construct stories (Nunkoosing, 2005). An interview involves face-to-face or voice-to-voice interactions and can be conducted in question-answer format or in conversation style (Su, 2016). This allows greater flexibility in gathering data to suit the context, feelings and mood of the interviewee as all participants are different.

By making use of purposive sampling, participants were selected at random but based on sound judgement. The emphasis of the research was to gather substantive yet manageable amounts of data from interviewees while focusing on quality as opposed to quantity. In-depth interviews use purposeful sampling whereby the researcher seeks participants most likely to provide rich, informative information (Morris, 2015). This approach can be random through approaching participants for the research based on their availability and willingness to participate.

During in-depth interviews, key themes and issues kept arising from respondents. Glaser and Strauss (2017) developed the concept of "data saturation" referring to the point in qualitative research when additional interviews do not add any new data from that which has been noted already. Guest, Bunce and Johnson (2006) similarly define saturation as the point at which no new themes are observed in the data. With saturation, the researcher does not follow a predetermined path in going about collecting data (Nelson, 2016).

The number of interviews for a study depends on the nature of the study as an extensive number of interviews does not necessarily yield the required data to answer the research question/s (Morris, 2015). Only after gathering some data in the first round would the researcher be in a better position to make an estimate for the next sample size (Nelson, 2016). From here the researcher would also have a better idea whether enough data has been assembled to answer the research question/s during the analysis and write-up process (Morris, 2015).

An interview, while time consuming, requires building rapport with the interviewee (Su, 2016) to understand the societal context of the interviewee's reality. Building rapport could prevent some difficulties in the interview process (Nunkoosing, 2005), such as lack of willingness to participate or lack of enthusiasm and interest in the research (Su, 2016). Without rapport, an interviewee might not agree to a 'formal' interview but speak informally on a topic. During an interview, an interviewee could potentially start asking questions of the interviewer (Roulston, 2014), thereby changing the course of an interview and discussing topics not relevant to the research.

For obtaining the necessary data to answer the research question for this research, interviews were conducted with five different groups of participants, as illustrated in Figure 5. The five groups who were interviewed are fisher people, supportive organisations, authorities, value chain stakeholders, divided into establishments in the communities as well as corporates. The last interview group involved an interview with an ICT specialist. Some of the interviewees were linked to Abalobi project in their various capacities while others were not.

Figure 5: Interview Timeline and Number of Participants

4.4.1 Fishers

The fishers from both communities comprise a combination of ICT and non-ICT users. Prior to this research some participants used Abalobi while others may have just heard about it. The research participants consist of a mixture of fishers with different experiences and positions in their communities. Fishers from Lamberts Bay were approached at random at some Abalobi engagements and while I was in the town.

In Kleinmond, where fishers frequented the WWF SA offices in the harbour on a regular basis, I had conversations with some and asked for an interview for the research. While participating in research projects with WWF SA and other stakeholders, I approached more of the fishers and asked whether they would be willing to participate in the research. I managed to build rapport with some fishers through these engagements over the course of time.

Each fisher interview lasted between 20 and 45 minutes and participants were asked the same questions (Appendix C). To ensure anonymity, research participants were identified as “FL” for “Fisher Lamberts Bay” and “FK” for “Fisher Kleinmond” along with a number for the sequence in which they were interviewed, i.e. “FL1” or “FK1”. In Lamberts Bay, nine fishers participated and in Kleinmond, six. A combination of small-scale fishers and nearshore commercial rights holders participated in the interviews although the research targeted small-scale fishers. The nearshore commercial rights holders were interested and eager to participate in the research, hence their inclusion as they also use similar harvesting techniques to those of small-scale fishers. FL3, FK5 and FK6 were women, with FL3 and FK5 involved in post-harvest activities. FK6 held a WCRL nearshore commercial right and was an active harvester.

In both communities all the interviews were conducted in a relaxed environment in which they were comfortable. Some participants also felt more comfortable in doing the interview in the presence of their peers, which made them more relaxed and confident in answering. With another

person present while doing an interview, fishers usually encouraged one another and made others think more broadly about their various activities, therefore prompting more in-depth responses.

4.4.2 Supportive Organisations

As mentioned previously, the supportive organisations interviewed for the research were the Masifundise Development Trust (MDT) and the World-Wide Fund for Nature South Africa (WWF SA). MDT works with small-scale fishers in the four coastal provinces of South Africa and seeks to empower them with knowledge and skills for promoting food security and justice in the sector (Masifundise Development Trust, 2017). Up until the writing of this thesis, MDT acted as the secretariat to Coastal Links South Africa, a non-governmental organisation, and assisted in creating awareness on the human rights of small-scale fishers and securing their livelihoods (Masifundise Development Trust, 2017).

WWF SA was chosen for the research due to the organisation's position as a leading role player in the Kogelberg FIP. The FIP's scope includes issues of value chain work as well as capacity building of fishers, anti-poaching efforts, and using and administering various Abalobi functions for fishers in the region. As the organisation is a user of Abalobi and works towards linking fishers to markets, their insights are crucial in the small-scale fisheries sector of the region regarding ICTs and value chains.

4.4.3 Authorities

The government department falling under the category of authorities was the Small-Scale Fisheries Directorate of DAFF. As the SSFP of this directorate was still being implemented by the department, its work is vital to the research to envision how the sector will look with the full scope of the policy. As the leading authority of government in ensuring that the policy is implemented for the sector, it is crucial for the directorate to provide insight into how value chains of the sector will look. With this directorate already using Abalobi for some of its functions and it being endorsed by the minister of the department, the responses of participants will contribute to the richness of the research data.

4.4.4 Value Chain Stakeholders

Interviewing participants from the private sector who were stakeholders in the value chain involved a mixture of actors in local, regional and international value chains. Some of these actors operate within multiple spheres. The participants from this research group were from the

communities of Lamberts Bay and Kleinmond as well as from corporates based in Cape Town. In Lamberts Bay, participants from two establishments were interviewed – a local café and a holding storage facility. These two establishments were approached and were willing to participate in the research.

For Kleinmond, participants from three local businesses were interviewed. The selected establishments were chosen based on good judgement because of scoping. Interviews were also conducted with participants from establishments who were willing to participate. Such establishments in the community included a deli, a farmstall and a restaurant. In Kleinmond these establishments are situated at the Kleinmond Harbour, one of the busier parts of the town.

Having participated in work regarding small-scale fisheries, corporate groups like Woolworths and Pick 'n Pay were approached to participate in this research. Because of its earlier interaction with fishers from Lamberts Bay, a participant from the seafood division of Woolworths was interviewed in Cape Town, as well as a participant from Greys Marine, one of their suppliers. Greys Marine was included for the research as it supports the Fishing for the Future programme at Woolworths as they play an active role in managing the fresh fish counters in certain Woolworths stores. Although Greys Marine is an independent entity, their role in the value chain is closely involved with Woolworths regarding seafood operations in certain stores and for this research. Frequent reference is made to this company in this research. The interview with the Pick 'n Pay seafood division was sought because of previous engagements in the Kogelberg FIP with WWF SA.

The interviews involving businesses in the communities were shorter than those involving corporates. Corporates were engaged much more thoroughly because of the variety of their operations and activities spanning different value chains. Like the smaller local businesses in the communities, corporates also have various procurement procedures that must be followed in purchasing products as well as greater due diligence checks because of franchising.

4.4.5 ICT Specialist

As ICT solutions need to be developed for certain societal contexts to address the needs of its intended users, an ICT specialist was interviewed for this research. This specialist is involved with Abalobi and contributes to the continuous development and functioning of the application. The ICT specialist develops ICT solutions for small-scale fishers in private practice and guides the process from conceptualisation to realisation.

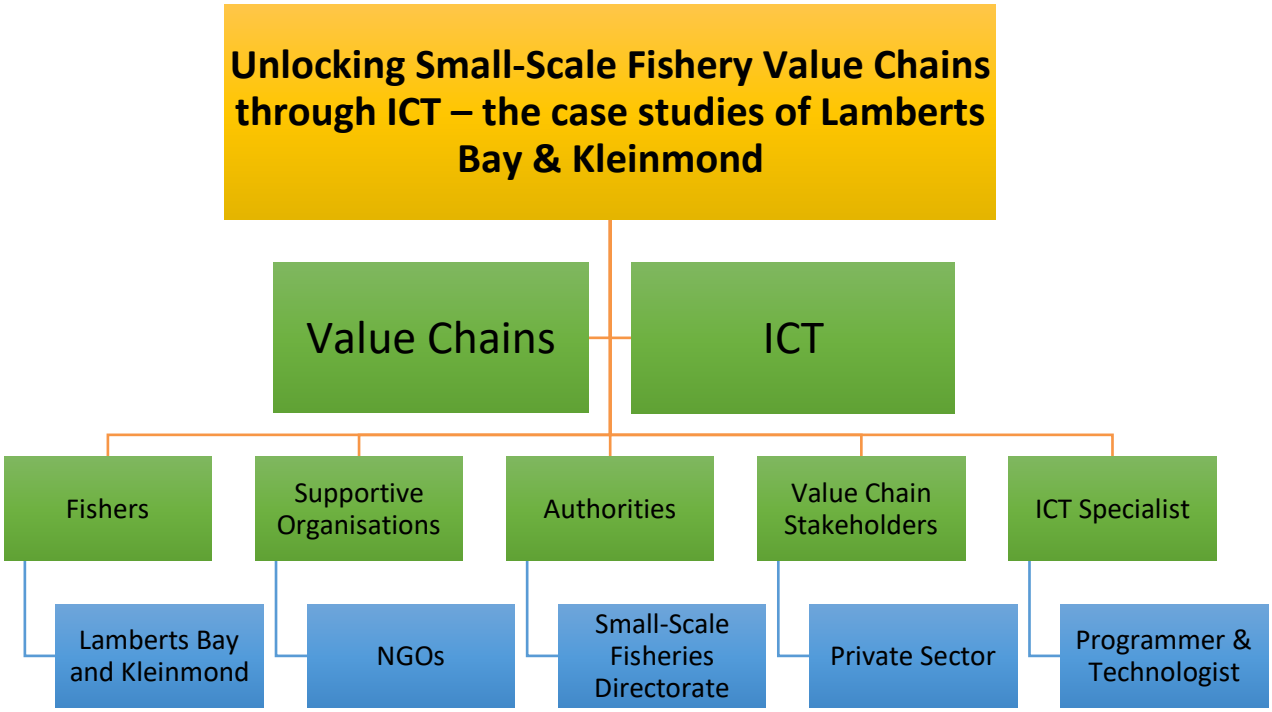


Figure 6: Structure of Interview Groups

4.5 Data Gathering and Flexibility

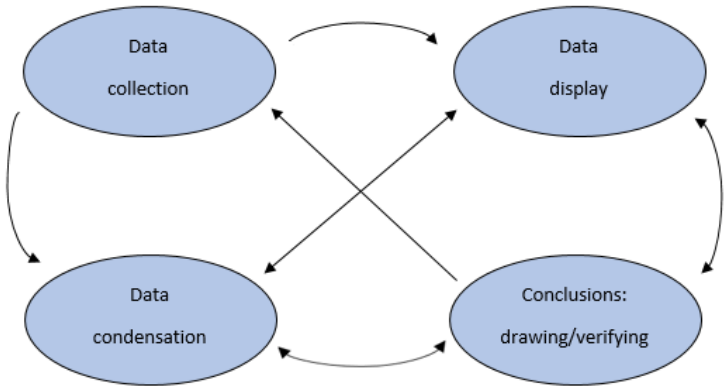


Figure 7: Components of Data Analysis: Interactive Model (Miles et al., 2014)

This figure derived from Miles, Huberman and Saldana. (2014) depicts the fluidness and sometimes irregular process of data collection, data display, conclusions and data condensation. As a process influenced by different factors, it is different for all researchers. Scheduling of interviews and meeting potential interviewees was based on the availability of the participants. The interview with the ICT specialist followed upon the conclusion of interviews with the four mentioned groups.

In gathering the research data, flexibility was required in scheduling interviews in line with the availability of participants. Some interviewees in the fisher category with whom I was acquainted were willing to do interviews immediately while others had to be rescheduled. I stayed in Lamberts Bay for four days to conduct the interviews during a snoek harvesting period and I undertook six short day trips to Kleinmond to do the same there. During the time of interviewing the fishers in the two communities, I also interviewed the stakeholders in value chain in these communities.

The interviews with the supportive organisations, authorities, value chain stakeholders and ICT specialist were also undertaken according to their availability and in more formal settings at their places of employment. During the process of data collection, I identified themes which led to data condensation as I pieced together a more holistic picture of value chains, ICTs and small-scale fisheries. The ICT specialist was the last to be interviewed as the most common themes derived from the other groups were discussed with him.

4.6 Answering Research Question and Objectives

In answering the research question and objectives of the study, I primarily used the data obtained during the interviews. It was important that the interview questions spoke to the realities of each of the stakeholder groups and the issues they face or could face in the value chain. Each participant was given an opportunity to give their input regarding as to what and how ICTs should be to enable and stimulate value chain opportunities.

In arranging the data to answer the research question and objectives, I first transcribed all the interview responses manually by typing it up and then I noted common responses. Following this, the responses were summarised and grouped according to three identified common themes which are as follows: perception of the value chain, past legacies impacting the value chain and ICTs as a value chain disrupter. These themes will be discussed in chapter six. In using data from interviews, it is crucial that the voices of the interviewees be heard in the answering of the research question (Martı´, 2016). Numerous interactions with the sector provided tacit knowledge that enabled me to answer the research question and meet the objectives.

Information from the interviews with the fishers and value chain stakeholders from each community was used in understanding the value chains of the two communities. For background to understanding the value chains, the supportive organisations provided a better context for understanding operations and challenges. The interview with WWF SA provided insight into some

of the commercial and resource challenges of the value chain, and MDT provided insight into the human rights aspects of the sector.

To visualise the different value chains, I mapped them based on information obtained from observation, discussions and various sources of literature. The value chains of the snoek and WCRL species, as well as other line fish caught by small-scale fishers are applicable to other small-scale fishing communities in the Western and Northern Cape provinces. The case study was discussed to include the context of the research on the value and supply chains of snoek in the Ocean View community (Isaacs, 2013).

With Abalobi contributing to the development of ICTs to unlock value chain opportunities for small-scale fishers, this research may assist in further development and expansion Abalobi. In seeking to facilitate this, suggestions and inputs from all the interviewees were considered to help guide the process. To meet this objective, the responses from the interviewees had to be formulated coherently to be able to make the solutions for ICTs and marketing functions implementable.

4.7 Ethical Considerations

This research was ethically cleared by the Faculty of Science Research Ethics Committee in April 2017 before interviews commenced in May 2017. While no interviews were conducted before ethical clearance was approved my investigations of the dynamics of each community had increased my awareness, so that I was in a better position to craft the research question and objectives and to know which topics to avoid.

I alerted the ethics committee to the use of written consent forms which could have dissuaded potential interviewees from participating in the research. This was because fishers are very reluctant to sign any documents, having been misled for many years through unscrupulous marketing deals. The ethics committee suggested that I seek verbal agreements instead of using consent forms before proceeding with interviews. Such agreements carry the same weight as signing a consent form. Participants were assured that their responses would be classified as anonymous. I took a similar approach to what I did with the fishers for the value chain stakeholders in the communities and sought verbal agreements with them. The supportive organisations, authorities, corporates in the value chain stakeholder group and the ICT specialist signed consent forms.

During engagements with community members, most of the correspondence was done in Afrikaans as it is either the first or second language of most fishers in these two communities. Language usage was an important factor to consider during engagement, as fishers use their own dialect of Afrikaans through which they express themselves adequately. As an Afrikaans speaker, I translated much of the content and engaged the fishers mainly in Afrikaans.

As a precaution, I always clarified, where necessary, that I was no longer employed by DAFF, nor funded by or carrying a mandate from it. I emphasised that I am only a fulltime student at UCT and alluded to my involvement with Abalobi, as many fishers were familiar with the programme. I also presented my student card to the research participants and wore apparel from the university while in the communities to distinguish myself. I took these precautions to avoid ambiguity, confusion, unrealistic expectations or being asked favours.

It is important to state that the research participants had the option to refrain from answering or engaging at any given point if they did not feel comfortable with what was being discussed. No participant was forced to participate in the research and no participant was told what to share and what not to share. Those who wanted to share additional information were free to do so, and I listened attentively.

Upon completing the research, I reported back to the fishers regarding the outcomes and findings. This was done by means of presentations to fishers from the different communities. In reporting back to community members, I explained the significance of the results and how this information could be used in unlocking value chain opportunities through ICTs.

4.8 Limitations of the Study

As the study is classified as being a minor dissertation, it does have limitations. As this study engages stakeholders across five different categories – fishers, supportive organisations, authorities, value chain stakeholders and ICT specialists – careful consideration was taken as to who would participate in the study. In each of the groups of participants who were identified, different interest levels in the topic existed.

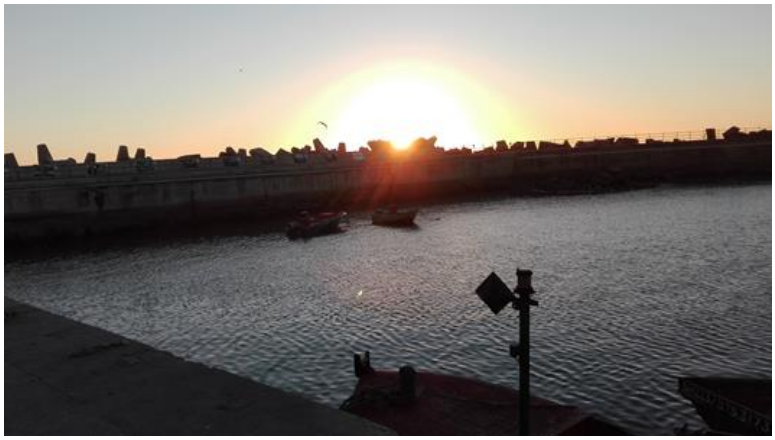
As pointed out, anyone who of relevance who was willing to participate and speak to me was interviewed from the five different interview groups. The participants who were involved in the research all showed a willingness and eagerness to participate. Informal conversations were held with a range of stakeholders to discern their willingness to participate before information gathering

took place. For example, langanas were spoken to while at the harbour in Lamberts Bay but none were formally interviewed. As the harbour in Lamberts Bay was busy and filled with activity, langanas were only willing to have informal conversations which gave me crucial background to the value chain and various challenges which exist.

This does not mean that certain perspectives and voices from stakeholders in the small-scale fishing community are not recorded directly in the thesis. However, many other voices, often of those similar to these silent groups, were engaged and are included in the thesis. During the process of engagement, including the off-the-record conversations with those who chose not to be formally interviewed, a saturation point (see Morris, A. 2015. A practical introduction to in-depth interviewing. Sage) was attained where comments from formal interviews were repeating all comments and narratives emerging from the participant engagement.

As a study which engages with role players across different fields, it was made explicitly clear that the study could be used to improve ICT programmes, but no promises were made. Research participants were informed that this research only focuses on ICTs and unlocking value chains in the small-scale sector. As the small-scale fishing sector has many challenges which need to be solved such as rights allocations, resource quantum as well as politics, I kept the focus to mainly ICTs and value chains.

With a myriad of responses coming forth from the different interview participants, in order for the research to be concise three main topic will be identified which will be spoken about in greater detail. In order to manage the data accordingly, as well as ensure that a more rounded perspective is given, three broad themes for this research will also show what the commonality is among the different participants who partook in the research. In the Discussion chapter these themes will be fleshed out.



Sunset over Lamberts Bay Harbour

CHAPTER 5: RESULTS

The research findings of this study were collected from May 2017 to September 2017 and the last interview was conducted in August 2018. Miles et al. (2014) states that fieldwork notes, audio and video recordings and interviews all form part of the corpus of research findings. The processes of data gathering are not a fixed process, as influences outside the researchers' control can impact it. Because of this, I always reminded myself that different research participants have different feelings, moods, emotions, preferences and different outlooks to different things in life. I had to be very flexible while gathering data.

5.1 Value Chains as Observed

The challenge to get participants for the research in Kleinmond was greater than in Lamberts Bay. Lamberts Bay was busier than Kleinmond during the period for data collection, as the area was experiencing a period of good snoek harvesting. Both communities face similar challenges in the value chain as they are affected by the same legislation, policies and bureaucratic processes; target the same species; and have similar marketing channels and histories as seen in Figure 8.

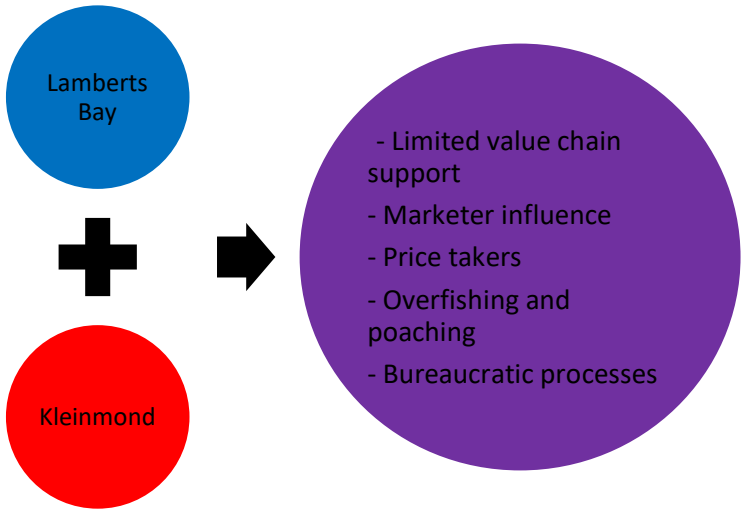


Figure 8: Value Chain Challenges as Observed in Both Communities

With little to no support and regulation existing in the value chains of the communities, the expectation of better value chain operations in the future lies in the implementation of the SSFP. The lack of enforceable law for the sector at the time of writing this thesis, concerns aspects such as fishing rights, minimum income for the sector and value chain upgrading activities regarding processing which cannot be adequately addressed by an institution like government. As the IR

system under which many small-scale fishers and potential small-scale fishers operate is temporary, it has limited enforcement and accountability mechanisms.

The value chains are limited for small-scale fishers in both communities, as they are price takers not price makers. Value chains also are not well regulated for fair prices as there is little government intervention, which disadvantages local people. Processing snoek in the line fish value chain costs as little as R7 per snoek and this R7 is split between the number of cooperative members involved with processing the batch purchased by a langana. The lack of options and market assistance means that fishers remain disadvantaged; although their marketing activities in the past were less sophisticated than at present, their harvests, had been more abundant.

External marketer influence is a major challenge for fishers in both communities. Infighting among different marketer-aligned factions within a community occurs in the WCRL value chain in both communities. As WCRL is a high value species, the WCRL value chain always generates greater interest in communities to get involved in it, compared to line fish. This is because only WCRL passes through the international value chain in both communities, because of greater profits abroad, but WCRL fishers under the IR system are sometimes excluded from community decisions concerning the IR permit due to manipulation and threats.

As a supposed democratic system, the IR system has failed fishers in the WCRL value chain because of the unequal and skewed power dynamics in which marketers are able to carry out unscrupulous business practices through community representatives. Under the IR system, community members must agree on vessels which they will use for a season to harvest WCRL and their line fish. Non-aligned community members struggle to get their preferred vessels licenced and added to the WCRL IR permit to harvest a community's allocation. This leads to the exclusion of certain community members from the value chain.

Fishers from both communities have little power and influence in the value chain, hence they are price takers not price makers. My observations and interaction with members from both communities revealed that small-scale fishers have minimal bargaining power in the market. Fishers are manipulated and forced into signing harvest and sales agreements for their WCRL with certain marketers and have minimal options in selling their line fish as they usually sell to langanas. Due to dubious marketing practices through permit caretakers, it is not unusual for fisher people to receive reduced amounts of money when the marketers pay them for WCRL. Prices for line fish fluctuate drastically, as it is usually determined by langanas.

Langanas direct the line fish value chains in both communities. Before fishers land their snoek at a harbour, langanas begin an auction type bidding which lasts until fishers accept the maximum they are willing to pay them for all their snoek. Fishers are left with little option but to sell their snoek per unit for between R30 and R40, on average, to the langanas who would resell it elsewhere for between R80 and R120. Most of the snoek caught is transported for sale in Cape Town and other peri-urban markets (Isaacs, 2013). both processed and unprocessed. Cape bream is sold by fishers at approximately R120 for a bundle of six to nine and is also transported when in big quantities. During my fieldwork, only Lamberts Bay had good snoek harvesting periods, whereas no snoek harvesting had occurred in Kleinmond for more than three years. Fishers in Kleinmond expressed similar sentiments regarding langanas.

Bureaucratic processes feature among the current challenges in both the WCRL and the line fish value chains. Because of bureaucratic processes, fishers struggle to be admitted to the IR permits of the communities; permit and licence applications as well as renewals of these are delayed for long periods of time. Their lack of education and knowledge among many fishers also means that they struggle to comprehend certain complex laws and legislation and are not able to perform various functions or to make the value chain work effectively.

Their lack of access to marine resources is compounded by the hardship of poverty and debt from loans of previous seasons owed to major marketers, so that poaching has become a problem in both communities and impacts the value chain. Poaching or unregulated fishing, albeit illegal, is a coping mechanism for fishers in dire financial circumstances. As fishers usually obtain the minimum for their products when sold to markets, poaching and selling species like WCRL on the black market is the result of desperation.

5.2 Interview Responses

Differing responses from the various interviewees were combined and summarised to make better sense and for easier analysis. The responses from the interviews with the different groups are therefore discussed together to show commonalities and differences between the groups. Only the interviews with the authorities and the ICT specialist are from one person as only one person was interviewed in each of those groups. The questions for the interviews are listed in the appendixes.

5.2.1 Fishers: Lamberts Bay and Kleinmond

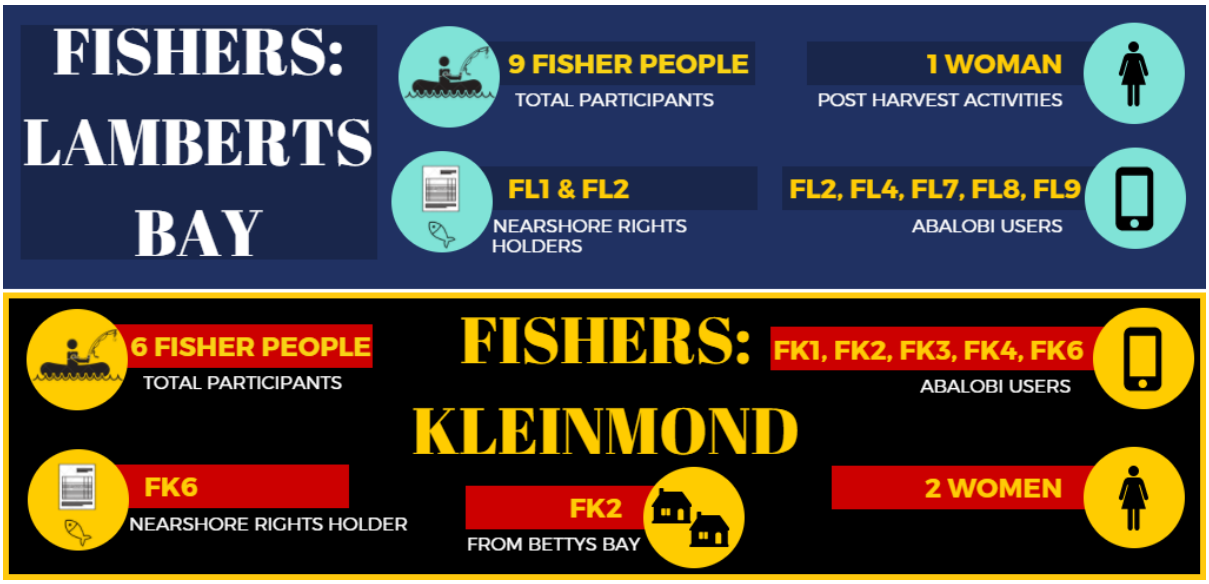


Figure 9: Fishers - Lamberts Bay and Kleinmond

In discussing their understanding of what a value chain is, fishers from both communities described it as an opportunity to be able to sustain a livelihood by adding value to their products before selling it to consumers. There was consensus that the marketing activities of fishers form an important part of the value chains. Non-harvesters saw a value chain as a source of employment because they are able to earn money from being involved in the sector. FK2 and FK6 alluded to product pricing as crucial to their value chains.

Describing their value chains, fishers stated in these were simpler than currently. Resources were in greater abundance and fishing was open to access by everyone as fishers could harvest without any permits and there was less regulation than currently. Sectoral divisions, especially between small-scale and local commercial fishing, was also more limited. FK3 stated that sales in the past were poor because of the lack of a constant market and that fishers, like today, had to rely on middlemen for market access. FL1 stated that, although the monetary value of fish was less than today, fishers were still able to live comfortably as they shared and traded fish among themselves.

With the regulation of the sector through exclusive laws, fishers have resorted to poaching or illegal harvesting as in the past when they were denied permits. With the competitive Fishing Rights Allocations Process excluding many participants from the sector because they are not able to obtain rights, poaching and illegal harvesting ensure that fishers and their families were provided for. In the past, some fishers purchased recreational permits to harvest four WCRL daily, but FL5 and FL9 stated that they had to harvest up to four times over limit to sustain their livelihoods. When inspected by monitors, only four WCRL would be presented and those poached would be hidden and later sold on the black market. FL1, having been granted successful nearshore rights,

had less pressure to poach, whereas FK5 and FL3's roles in the processing and cleaning of fish remained the same.

In both communities, most of the monetary benefits derived from their products are lost to langanas or other stakeholders like major marketers outside the communities. For line fish, prices are always set by langanas and fishers have little to no bargaining power. FL5 stated that fishers should access their preferred markets and FK3 stated that the selling price of their products should be increased as they have a lot of expenses to cover from harvesting. FL3 and FK5, as non-harvesters, stated that they earn an income from flecking and cleaning snoek, of which FL3 can lend to her neighbours. FK5 concurs that most monetary benefit in the value chain is lost to businesses. At time of minimal harvest, FK2 only uses fish for consumption.

Discussion of the value chain challenges faced by fishers in the value chain revealed that the main concerns of both communities can be grouped as finance, lack of facilities, lack of market guarantees and others. These concerns are not present in Lamberts Bay and Kleinmond only, but also in other communities along the Western and Northern Cape coastlines. In describing and discussing their challenges, the fishers revealed links indicating how their challenges were related. These challenges are depicted in Figure 10.

VALUE CHAIN CHALLENGES OF SMALL-SCALE FISHERS			
FINANCE	FACILITIES	MARKET	OTHERS
• No guaranteed income	• Adequate workspace	• No constant market	• Marine Protected Areas
• Debt	• Storage (refrigeration)	• No constant pricing	• Fishing rights
• No investment	• Electricity	• Marketing (awareness)	• Education and skills
• Financial planning	• Transportation	• Price negotiating	• Ecosystem changes

Figure 10: Value Chain Challenges of Small-Scale Fishers

Finance and money are major obstacles for small-scale fishers and is a hindrance to their activities. FK3 stated that fishing does not always guarantee income as harvests yield unpredictable results, making future planning a challenge. Many fishers must pay off debt owed to marketers from previous seasons and this makes it difficult for them to invest or save. As financial provision is a challenge in the value chains of fishers, little investment is ploughed into communities to make provision for facilities.

Along with money and finance, many fishers referred directly or indirectly to a lack of facilities as being a challenge in the value chain. Facilities referred to adequate workspace, storage, refrigeration and electricity. Fishers in Lamberts Bay referred to a major refrigerator in the harbour owned by DAFF which they could not use as it is not operational and has no management plan to operate it. FK3 stated that fishers need land for an alternative community project in Kleinmond for small-scale farming when fishing activities are not good.

Fishers like FL7 stated that selling their products is not an all-time problem, but that the challenge lies in the lack of a constant price from the market. FK3 and FK6 stated a different challenge: fishers at Kleinmond have a marine protected area which encroaches on their traditional fishing grounds. When fish is available, the lack of a constant market price compounded by high expenses leaves them struggling to make an adequate living. Fishers have minimal negotiating power with markets and many of their markets of choice might not know about their products.

Furthermore, a major challenge of the value chain, according to FK4, is in the tonnage and allocations granted to fishers during the process of allocating fishing rights. FL3 stated that limited involvement of youth in the value chain is a challenge compounded by a lack of training initiatives, as stated by FK2 regarding value chain processes. FK1 stated that there is little willpower among community members to work together in the value chains.

Fishers also face ecosystem challenges such as red tide lobster walkout, climate change and weather patterns. FL3 states that saving income is crucial with changes in the ecosystem, while FK4 said that he tries to budget and invest his earnings. FL4 said, "Sometimes you win, sometimes you lose" as some days they cope better than on others. With climate change and weather patterns, many get by simply living from "hand to mouth", sometimes resorting to piecemeal work for an income. FK5 stated that fishers take risks at desperate times by poaching while FK6 stated that fishers sometimes take risks and harvest even if sea conditions are rough.

Fishers emphasised involvement and cooperation in the attempt to make value chains work for the benefit of communities. Involvement and participation are important to make value chains work for small-scale fishers, as emphasised by FL2. FL9 called for meaningful conversations between different parties in the value chain whereas FL5 pointed to the need to draft an adequate management plan. Fishers feel that government support and better facilities, as listed under value chain challenges, must be addressed.

Fishers feel that unified discussions and interactions with current and potential markets should take place to improve value chains. FL3 stated that more products should be processed in the community before being sold elsewhere. FL2 and FK3 stated that small initiatives must be started to involve all excluded participants, as in the past. FK2 and FK6 stated that poaching and overfishing is an issue and that community members need to stand together to stop this scourge. FL1 and FL6 respectively stated that they felt they could not do anything personally at the time due to a lack of finance and lack of community cohesion.

Awaiting the full implementation of the SSFP, FK2 stated that DAFF should explain to communities how value chains will function. In ensuring their preparedness for the policy's implementation, fishers who were interviewed stated that they are doing their "homework" on cooperative functions by attending capacity building workshops presented by the Kogelberg FIP and WWF SA and some of the older and experienced fishers are helping to skill the youth. Fishers who are users of Abalobi stated that they interact with markets and other stakeholders in the value chain through the programme.

In visualising value chains under the SSFP, the common theme was inclusivity. Fishers stated that they envision a sector whereby many community members are involved in the value chain, without any middleman influence. Strong emphasis was placed on benefit sharing of the broader community as well as participation in the processing and marketing of products. Fishers emphasised sustainability in their activities as well as granting of access to some of the existing infrastructure, like the freezer and factory in the Lamberts Bay Harbour, to their communities. FL9 described the value chains of the SSFP as "a fishing community prospering and moving forward", harvesting various species and independent from marketers.

Most fishers indicated that ICTs have been beneficial to their activities. A strong sentiment that was echoed was that ICTs could be beneficial to those who were not using them. ICTs present fishers with a new way to record and manage their data and the potential to access markets. FL1, who has not used ICT was the only one from both communities who stated that using ICTs would not improve his activities. Among those who have used ICTs, FK2 found that the technology has broadened his mind to new perspectives but has not led to the improvement of his activities yet. FK5, who has not used ICTs, stated that she had not been introduced to ICTs that could aid her activities. Fishers' responses to the use of ICT are depicted in the following figure.

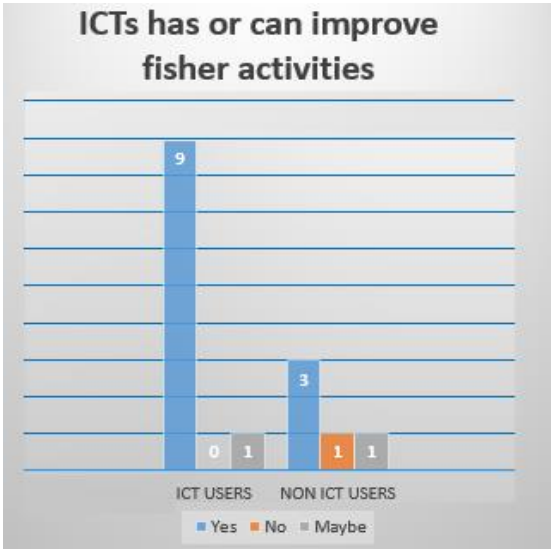


Figure 11: ICTs and the Improvement of Fisher Activities

Fishers stated that ICTs can be used as a tool to help regulate value chains because of its data sharing potential. ICTs can assist them with adequate data management and simplify trying to understand value chain trends and changes. FK2 stated that ICTs can help them share knowledge. FL7, FL8 and FK6 stated that ICTs can help fishers with price setting, as well as with marketing their products. They should become users of ICTs for getting their products to their intended markets, businesses and the broader public. FL2 stated that businesses should use the ICTs used by fishers during their procurement processes for purchasing fish. Emphasis was placed on the need for direct communication with markets. FL3 listed caterers and hotels as being such markets. FL1 stated that fishers should advertise their products on ICTs.

FL5 further went on to state that short message services of fishers and emails should be linked to social media to communicate with markets. Fishers stated that they need assistance from ICTs to better understand the various markets and to inform markets when they have products to sell. FK3 and FK6 stated that they would like to be able to set their prices and sell to buyers who could provide the best offer. Fishers also emphasised that they need a constant market to sell to and hoped that ICTs could assist them in this regard.

Having proposed various interventions and solutions to solve value chain challenges, fishers placed emphasis on the broader societal context in which their value chains are based, as they feel this is overlooked. FK1 stated that continuous interaction and community engagement is necessary for value chain challenges to be solved. It is Important that all fisher folk should be taken care of despite their classification in the sector. Fishers involved in functions such as processing,

transporting and selling of products also need to be engaged and included in discussions and value chain initiatives, not harvesters only.

5.2.2 Supportive Organisations: MDT and WWF SA

The supportive organisations who were interviewed for the research were asked similar questions regarding ICTs and value chains. Both MDT and WWF SA interact with fishers in different capacities by assisting them in their challenges to improve their activities and livelihoods. Both supportive organisations are aware of the SSFP and are involved in assisting fishers in Lamberts Bay and Kleinmond towards the full implementation of it.

In describing the value chain operations of the above-mentioned communities, the main focus was on the WCRL and line fish. In the case of WCRL, fishers with IR quotas sold their full allocations to major marketers with prices agreed upon before the start of the season, and once delivered to the companies, the WCRL were kept in holding tanks till exported. The value chain for line fish species is locally concentrated as large quantities of fish infiltrate the local market. Groups of women also harvested and sold mussel products, but these did not involve major quantities.

In accordance with the SSFP, organisations envision value chains which are transparent with effective communication channels and value adding activities within the local communities. As the policy seeks to link multiple communities through secondary cooperatives involving various marketing activities, there is a need to communicate effectively. Cooperatives are to be assisted with business functions, health and safety concerns and marketing. Consideration is also needed for the work of small-scale fishers to be factored into the market value of products.

A case was made for Fair Trade Guidelines guided by specific legislation to be followed for assisting small-scale fishers with their value chains. These guidelines will ensure that fishers are remunerated fairly for products and ethically address the challenge of the lack of constant pricing or guidelines for products. A case was also made for the usage of the Marine Stewardship Council certification framework to label small-scale fisher products as these guidelines and frameworks are to be used concurrently with the SSFP and the VGSSF by the FAO. Both organisations conducted workshops focusing on this with regard to the way forward in line with the policy.

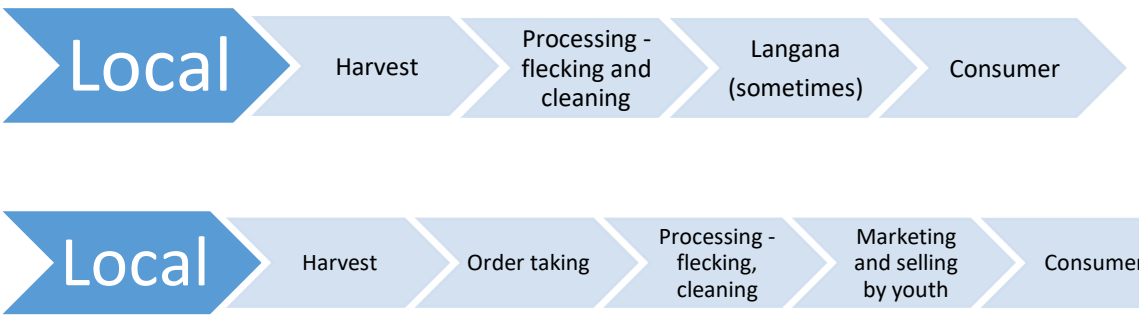
In trying to improve current value chains, both organisations are seeking different partnerships to link fishers to businesses and new markets. These include selling SASSI listed sustainable products that are traceable from the source to restaurants, as well as assisting fishers to obtain preferential prices. WWF SA through the Kogelberg FIP is engaging the local economic development

departments of the region and the tourism association of the Kleinmond region for new opportunities. Initiatives like these seek to stimulate value chains as fishers prepare themselves for the implementation of the SSFP.

In discussing ICTs for the sector, both organisations expressed awareness of Abalobi. WWF SA, through the Kogelberg FIP, uses Abalobi to assist fishers with recording data and engaging markets. A few MDT members also uses the application. Emphasis was placed on continuous government support and endorsement of ICTs by both organisations in connecting fishers with their desired markets. ICTs should document and profile communities, their histories, attractions and the food they have on offer by plotting activities along the value chain on a map.

Both organisations focused on introducing different ICTs to fishers and training them in what it has to offer regarding value chain activities. Alongside this training, exposure would also be needed for fishers to inform new markets of their products, especially the international market. ICT applications should play a facilitative role, should be easy to use, and users should know exactly where and how their data is being used. In using ICT applications, fishers need to be encouraged to enter as much of their data as possible onto the platforms to document their stories and narratives. Records are important because it has been lacking in the sector as such records help organisations to engage fishers digitally and systematically. MDT stated that ICTs should be sector driven by the fishers to be able to attract different market role players.

By describing the value chains of Lamberts Bay and Kleinmond, a broad perspective detailing the local, regional and international chains was given. The value chains described by the research participants from the organisations were broad but are generalisable for both communities. All three value chains begin with the fishers or harvesters and end with the consumers as presented in the following figure.



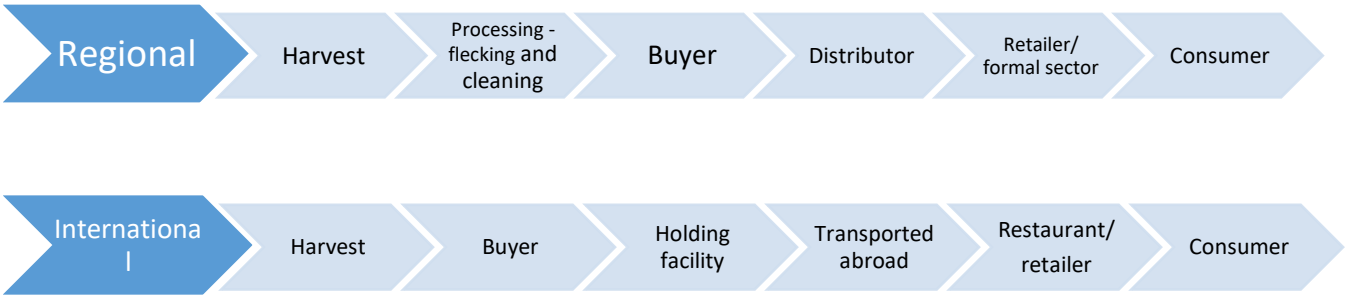


Figure 12: Value Chains as Described by Supportive Organisations

5.2.3 Authorities: DAFF Small-Scale Fisheries Directorate

In describing the value chains of small-scale fishing communities, the research participant from the department stated that these chains are very short and limited. Participation for lower value species is limited to harvesting, cleaning and flecking before selling, but participation of small-scale fishers for higher value species is virtually non-existent after harvesting. Under the IR system, government currently has no mechanisms to assist small-scale fishers in improving value chains. Future efforts will be geared towards working within the parameters of the SSFP.

The department envisions value chains whereby small-scale fishers will participate throughout the entire value chain to become business savvy in their processing and selling of products. Value chains should operate on a free market principle, ideally without middlemen and benefiting local communities. As communities have their own selling practices, DAFF wants to protect them from being exploited. This, however, can be done more efficiently once the SSFP has been implemented and the sector formally established.

Discussion of value chain initiatives yielding positive results revealed that very few are evident. One such initiative is the DTI-funded Co-operatives Incentive Scheme in Lamberts Bay, but however such schemes are not designated small-scale fishing cooperatives in accordance with the policy. Some of these cooperatives are operating as envisioned in the SSFP. Cooperatives in Lamberts Bay are interacting with each other and some members are part of Abalobi.

As the leading authority on the implementation of the SSFP, DAFF will continue to engage other governmental departments in furthering the mandate of small-scale fisheries. Assistance is required from other departments like the DTI, the Department of Small Business Development and the local municipalities in which small-scale fishing cooperatives are to be based. DAFF will

also look at the policies and legislation of these sister departments in assisting the various cooperatives.

Regarding ICTs for the sector, the department is a key partner and stakeholder of Abalobi, as the programme has been endorsed by the minister and deputy director general of the department. The real-time data on the programme provided by the fishers is seen as of great value to the department as little concrete data exist for the sector. The research participant stated that ICTs can assist the department greatly in the continuous rolling out of the policy by assisting with value chain work.

For assisting small-scale fishers to gain access to new markets, the department is to play a facilitative role through screening potential trade markets for small-scale fishing cooperatives. The department would like to keep exploitative marketers out of the value chain of small-scale fisheries. A challenge to achieving this is the limited human resource capacity within the department and the fact that many of the fishers often are unwilling to work together.

Some of the challenges facing the department in assisting value chains for small-scale fisheries involve in the quantum of resources to be allocated to the sector, compliance and traceability of products. With the Fishing Rights Allocations Process, the burning question remains "how much" of the total allocation is to go to small-scale fishers. Compliance and the traceability of products is a challenge as there is no proper system for proper checks and balances. There also is no "code of best practice" to guide and assist fishers in their value chain operations.

Using ICTs to unlock small-scale fisheries value chains, it was suggested that advertising space be made available to make fishers visible to the public. The current internal control system of DAFF – the Marine Administration System, has limitations and is only used for issuing permits and licences. A platform needs to be made available for businesses such as hotels and restaurants to subscribe to and participate in online auctions of products sold by fishers. Buying fish from small-scale fishers is usually a "hit and miss" situation as consumers do not know when and where fish may be available, as many fishing communities are not known to buyers and potential buyers.

Describing value chains of small-scale fishing communities provided a broad perspective. The value chains depicted below occur in the above-mentioned communities but can differ from time to time. The research participant mapped out the local as well as regional value chains but stated that the international value chain is complicated and has many complexities. It was also stated that while the local value chains are short, the regional and international ones are more complicated and are subjected to rigorous compliance procedures.

Only WCRL passes through the international value chain as it fetches greater profits abroad and small-scale fishers within this value chain are only harvesters. As they do not have the means to access the international markets directly, they must work through the major marketers to have their products exported. It was also stated that value chains in the sector will continue to be run by the major corporations in the immediate future, as small-scale fishers need help with doing various business functions by themselves.

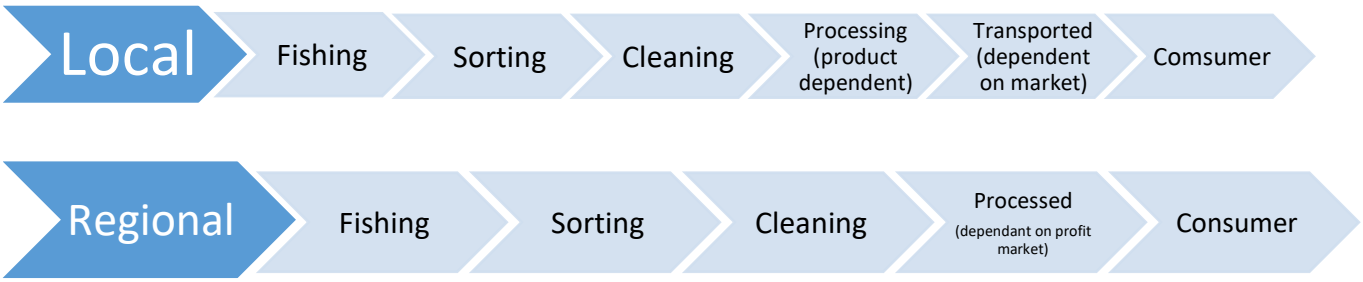


Figure 13: Value Chains as Described by DAFF official

5.2.4 Value Chain Stakeholders

Stakeholders in the value chain were divided into two sections. These two sections are situated within the communities and the major corporations based in Cape Town.

5.2.4.1 Lamberts Bay and Kleinmond

A combined total of five establishments were interviewed in the two communities. All these establishments besides the WCRL holding facility only participate in the local value chain. All the establishments are near where small-scale fishers frequently conduct their activities, being either within or near the town harbours. By approaching them at random, I managed to build up a rapport with some of the establishments before I interviewed them.

During the interview process, I discovered that local businesses in both communities have minimal to no interaction with small-scale fishers, despite being close to them. The restaurant in Kleinmond only mentioned frequent interaction with small-scale fishers. Most businesses purchase very little or nothing at all from small-scale fishers but have done so in the past. Such products ranged from WCRL, snoek, yellowtail, Cape bream and Cape Salmon to silverfish.

In discussing ICT solutions to help establishments connect with small-scale fishers, it became clear that there is a need for simple and user-friendly technology that would enable direct communication with fishers. Establishments need a function whereby they can certify the details

of fishers involved in the value chain whose produce they could purchase. A payment option is also needed to ensure that payment of fishers will be done quickly; as the deli in Lamberts Bay suggested, this might result in products being delivered more quickly. With regard to certifying the details of fishers, the deli in Kleinmond emphasised that ICTs would need to prove that products are "above board" or sustainable and legitimate.

The establishments interviewed in the two communities stated that they require ICTs to assist with menu planning for how they would go about catering for their clients. Along with such a feature, there was also a suggestion from the deli in Lamberts Bay for a database system for businesses to list themselves to inform fishers about who wanted to buy certain fish products. ICTs would also need to provide advertising and direct contact details of fishers for businesses to know how to immediate contact with them for fish products. This database would need to have a notification system by which fishers could notify businesses of the fish they have, and businesses could notify fishers when they needed fish.

Businesses in this category also referred to potential benefits in purchasing products from local small-scale fishers. These benefits ranged from products being cheaper, fresh and having a reduced carbon footprint. A reduced carbon footprint also means that products purchased locally stimulated a form of job creation as more local people would be involved along the value chain. At the farmstall in Kleinmond it was also stated that purchasing from small-scale fishers is convenient, and that financial leakage would be less than in sourcing from outside the community.

5.2.4.2 Corporates

The corporates who participated in the research are based in Cape Town and are crucial role players in the seafood value and supply chains. As with the fishers, these participating corporates are referred to as C1 and C2. Interviews with respondents from corporates lasted between an hour and an hour and a half as a lot of background information was given, although the same questions were asked.

While discussing the interactions of corporates with small-scale fishers, both C1 and C2 stated that they have little contact as were not sourcing their products directly from them at the time. At the time of writing this thesis, however, C2 started interacting with small-scale fishers by purchasing, processing and selling some of their fish through a supplier. Fish was being purchased at different harbours from small-scale fishers through a middleman who then supplied a supplier. Although interaction was minimal, C1 has purchased products from small-scale fishers in a pilot programme

with a women's co-operative. Pickled mussels were listed among the species purchased by C1, whereas C2 has purchased line fish such as yellowtail, tuna, and galjoen and Cape salmon from line fish vessels in the commercial sector and from an intermediary directly involved with small-scale fishers.

With reference to particular products, C1 and C2 indicated a preference for a combination of processed and unprocessed products. Both corporates only procured and purchased products sourced through suppliers who had been scrutinised and met certain compliance criteria. C1 has sold a combination of processed and unprocessed products as store branches have an option in choosing the type of product. Some level of processing is acceptable for C2, such as removing the gut and cleaning the fish, but the head and tail has to be intact. For C2, unprocessed and fresh products need a guaranteed six-day shelf life to comply with the store's quality check processes.

As far as supporting small-scale fishers in becoming value chain suppliers, neither C1 or C2 had a dedicated initiative for small-scale fishers. Both C1 and C2 had their own enterprise development and support programmes but neither one had a programme specifically for small-scale fisheries. Small-scale fishers were supported by C1 through funding to a project which engaged with fishers in the past, but products had to show uniqueness and a commercial incentive to be procured. C2 stated its enterprise development support programme could be tailored to suit small-scale fisheries for them to purchase directly from fishers, but the legal status of the chain's actors needed to be checked and verified. Sustainability and ethical practice are important for C2.

Issues which were raised by both corporates while discussing challenges in purchasing from small-scale fishers included poaching and traceability of products, quality and logistics. C1 explained that unsustainably caught fish posed a risk to the brand because of health and safety concerns in harvesting activities. For C2, the primary concern was that small-scale fishers who acted as suppliers might be involved in poaching and illegal fishing. Of secondary concern to C2 were logistics and transportation of products. Another challenge concerned getting fishers to understand the broader value chain challenges such as permissible products that could be sold commercially.

With reference to using ICTs to procure and purchase seafood products, both corporates indicated the use of vendor systems with all suppliers listed on it. These vendor systems detailed of all major suppliers but contained no function for listing small-scale fishers on it. C1 still had to implement a feature not for small-scale fishers only, but also for the broader fishing sector as there was no specific one yet. C2 stated that the corporate had a database of suppliers but not for small-scale fishers as all purchases were done through suppliers. C2 indicated that the SASSI application as

well as the Marine Stewardship Council and Aquaculture Stewardship Culture applications were adhered to by their suppliers use while the corporate also used its own database for fish products.

For ICTs to aid value chain interactions with small-scale fishers, corporates require a platform that provides easy communication and exchange of information. C1 stated that ICT usage in the sector need to be underpinned by legislation and policy, like the line fish procurement guidelines. In doing so, usage of ICT programmes would become standard practice in the sector when engaging small-scale fishers. C2 suggested that ICTs should allow fishers with through verification to sell their catches online, with direct payment into the bank accounts of small-scale fishers. In going about procuring and purchasing fish, ICTs would need an online locator informing buyers of products, with a two-way communication link to cooperatives.

Discussion about the benefits or potential benefits to purchasing from small-scale fishers suggested that species not commercially exploited could be explored. C1 stated that there are opportunities for fishers to sell species not previously sold in stores as there would be better coordination in the value chain, should fishers collectively sell to markets. C2 stated that increasing ethical consciousness, renders locally sourced fish more popular with consumers. Purchasing from fishers also leads to establishments forming better work relations with fishers.

5.3 Chapter Summary

The results from the interviews show that there are challenges which are related, as each group expressed certain needs and opinions about how to ensure the success of value chains in the small-scale fisheries sector. A need for ICTs to stimulate small-scale fisheries value chains was mentioned by research participants from all the different groups. The needs and opinions of these different research participants will be discussed in relation to each other to find the middle ground regarding what needs to be done in the value chains. These notions will be probed and discussed further in the next chapter.

Fishers selling bundles of Cape bream in Lamberts Bay

CHAPTER 6: DISCUSSION

In this chapter I present an overview of how the results were obtained from the interviews. I also discuss the three commonly occurring themes as said in the Methodology chapter. After discussing the themes, I discuss the general small-scale fisheries value chains as present in Lamberts Bay and Kleinmond. The various value chains are also mapped out and detailed to show some of the complexities of value chains, I discuss how ICTs can be used as a link between fishers and markets to connect small-scale fishers to their ideal markets. While working in the sector, I encountered these themes in Lamberts Bay and Kleinmond as well as other small-scale fishing towns and villages.

6.1 Important Themes

Many responses from the different groups that were interviewed depicted the differences and similarities of opinions held by interviewees. Three broad themes were identified according to which most of the interview responses are detailed in Figure 14 and shows similarities among participants. These three themes are the perception of the value chain; the legacy of the past which has impacted the value chain or has remained a hindrance to any new value chain work; and the role of ICTs as potential disruptors of the value chain. Under each common theme, I have shown the perceptions of the different stakeholders from each group which shows the middle ground existing between them, of which ICTs might aid their value chain interactions.

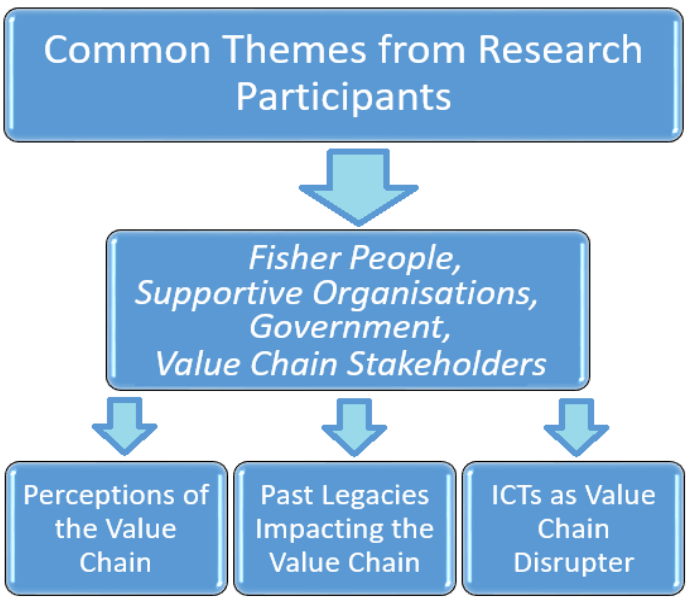


Figure 14: Common Themes from Research

6.1.1 Perception of the Value Chain

During the interviews with all the research participants from the different groups in the data gathering process, a strong perception of what a value chain should be, as opposed to what it is, emerged. The responses from the fishers revealed a strong sentiment towards an "ideal" value chain and what this is supposed to be. As the ideal value chain is non-existent, each participant showed some sort of understanding of what needs to happen in the sector for ideal small-scale fisheries value chains to become a reality. For many, this meant that a value chain as such should be to their utmost benefit and prosperity.

Among the fishers who were interviewed, there was constant thinking that value chains are sometimes too complex and that there was not much which they could currently do to impact it meaningfully. The belief among fishers is that the ideal value chain would be highly unattainable for them. Many fishers believe that they need major infrastructure, like a big factory and expensive equipment, for their value chain to be successful and meaningful and that not much can happen until that is achieved. Some fishers therefore feel that they cannot have any meaningful value chain. FL1 expressed this in "Ek dink nie ek kan nou veel doen nie. Ek moet geld het om waarde by produkte te skep en vir 'n koelkamer." (I don't think I can do much. I need money to help add value to products and for cold storage.)

Others however, expressed slightly more positive sentiments in a contrasting view of value chains. Some fishers acknowledged that they had to start somewhere, despite value chains being complex and they not having all the equipment and means. Some fishers expressed the sentiment that action from local people was needed to improve value chains, and that involvement was key and that they had to work towards the envisioned value chains.

"Die beste is om iets te begin wat werkbaar is, dit te implimenteer en dan ander mense in te bring. Ons moet met klein initiatiewe begin." (The best thing to do is to start something workable, to implement it and then to draw in other fishers. We must start with something small) is how FL2 put it.

From the perspective of fisher people, value chain improvement does not always have to be about big steps or big changes as they need to have agreement between fishers and businesses. These agreements or conditions range from good faith and good work relations, as well as fair and ethical trading. Such agreements would be crucial for value chains and for the flow of products to their end markets. As for interacting with businesses, fisher people should work together for greater

value chain interactions with businesses. As shown in the case study from Punta Abreojos Mexico, fishers there mobilised themselves and pooled efforts for better value chain work and interactions with markets.

Although the implementation of the SSFP has become a frustration for many fishers over many years, eagerness remains for fishers to stimulate their own value chains apart from the status quo value chains based on selling their line fish to a langana or their WCRL to a major marketer who exports and pays them a lower rate. As seen in both Lamberts Bay and Kleinmond, fishers have decided to take a bold step in interacting with markets in the form of retail stores and fishers in Lamberts Bay by themselves started their own small cooperatives with the purpose of interacting with markets as such.

6.1.2 Past Legacies Impacting the Value Chain

Regarding the value chains and the current situation of small-scale fishers, many challenges in the sector are the result of past legacies. The challenges which fishers face in the sector today should be understood in the broader context of the South African society. Apartheid came to an end in South Africa in 1994, but many of its legacies can still be seen in different facets of life today, with the small-scale fisheries sector being no different. As value chains are an important mechanism of the small-scale fisheries sector, which is plagued by various challenges, it, too, has challenges impacted by past legacies.

At the end of apartheid in South Africa, the sectoral structure of the sector and most of the ownership in the fishing sector remained skewed. Mnisi and Lekezwa (2014) stated that even though 57% of the fishing industry has been transformed to reflect the diverse ownership pattern of the population, this has not translated into the promotion of small and medium-sized enterprises owned by people of colour. Ownership in the fishing sector is crucial in sustaining livelihoods as one can then determine ones' own destiny.

Fishers who participated in this research emphasised lack of ownership as a crucial part of their challenges in the value chain. With people of colour being denied many opportunities afforded to white persons during apartheid, this also played itself out in the fishing sector. Because legislation was in place to hinder people of colour from accessing educational opportunities, capital and resources, many do not own vessels, machinery and equipment. As the apartheid system favoured white individuals over people of colour, many could not purchase equipment and facilities and had

to work for major companies owned by white persons. It is due to this that some fishers still feel resentment towards the government after 25 years of democracy, as many are still not able to access opportunities by themselves.

Even though some traditional small-scale fishers have access to marine resources through the IR dispensation, they still struggle because they do not have guaranteed long-term fishing rights to enhance their livelihoods. In the absence of long-term security, the resource has little value for the fishers, but long-term rights would guarantee them a sense of security for their livelihoods and the assurance of their participation in the sector. While many white individuals who have participated in the sector over a longer period could build up credit and purchase equipment and facilities, many persons of colour still have to build up and create their own wealth to be able to make use of opportunities in this regard. This greatly impacts fishers in their activities and in unlocking new value chain opportunities.

In South Africa, a country with deep racial scars, many negative connotations have been attached to people of colour. Small-scale fishing activities during the apartheid era was not considered legal and fishers were not allowed to sell their products. Over a long period of time, distrust with regard to the legality of products became evident in the formal sector and it became very hesitant to purchase the products that small-scale fishers were selling to support their livelihoods, because the perception that these products were illegal and not above board took root. The historical legacy of apartheid and even traces of colonialism are still perceived by many in the sector, so this history continues to impact value chain work in fishing communities.

Though some progress has been made in the sector for small-scale fishers in the post-apartheid era, many still struggle to access and engage markets. The interviews revealed that many value chain stakeholders display a willingness to purchase from small-scale fishers but will do so with great caution and requiring certain conditions to be met. Despite a willingness in principle to purchase from small-scale fishers, value chain stakeholders still entertain scepticism. There is a need for adequate documentation and proof of the product's validity and legal status. Value chain stakeholders often think that the products of small-scale fishers are poached, and trust needs to be rebuilt between small-scale fishers and value chain stakeholders in the private sector.

As seen in responses during the interviews, participants from establishments who were interviewed stated that they have little or no contact with local fishers in their communities and that they do not purchase anything from them. A common response was that that they need a function whereby the fishers and their products may be certified to be able to purchase fish from fishers. Many of

the establishments involved in the interviews were very cautious about purchasing from fishers and it was necessary to build trust with fishers as the perception in the formal sector has been bad for many years.

6.1.3 ICTs as Value Chain Disrupter

During the interviews, most fishers stated that using ICTs has been or could be beneficial for them and their value chain activities. ICTs for small-scale fishers essentially changes the way in which fishers conduct their various business activities and in engaging the market. This sentiment can be seen in both the responses of the research participants and also in the various case studies of the various technologies as presented.

As fishers have been subjected to unscrupulous marketer agreements by permit caretakers in the current IR system, ICTs present an opportunity for them to take back the power held by these caretakers, langanas and unethical marketers. It is common for fishers in the line fish sector to lose large amounts through dealing with unethical marketers and langanas as prices are extensively manipulated as fishers have limited marketing options.

FL9 stated that langanas would purchase his line fish for between R20 and R30 per kilogram and resell it at close to R100 and R120 per unit, which on average was close to five times more than it cost. For WCRL, marketers would initially pay R260 per kilogram and drop the price to as low as R170 per kilogram during the season, despite the fishers agreeing to sell at R260 per kilogram at the start of the season. As fishers are paid as they land their fish throughout the season, they hardly ever receive a lump sum.

As fishers do not have the means to access markets directly, langanas and marketers have become a ‘necessary evil’ in the value chain. This alludes to fishers being enabled to almost instantly move their stock through middlemen, although at a low price because they do not have their own facilities to process and store products to sell it later. These fishers are thus denied any form of choice in who to sell their products to and thus have to "take it or leave it” when interacting with langanas and middlemen. For them, ICTs would thus mean more than just giving the fishers market access by, more importantly, giving them choices.

Technologies like Abalobi, ThisFish, FishLine and Dock to Dish actively seeks to give fishers options in which the middleman gets cut out of the value chain. With technology like that of Abalobi with its Hook2Cook programme, fishers are enabled to sell their products directly to the

market, through the Abalobi Marketplace. Similarly, ThisFish through telling the stories of fishers to consumers cuts out any middlemen from taking any major amounts of money from fishers. Both Abalobi and ThisFish makes it possible for fishers and end consumers to communicate with each other. Similarly, with FishLine and Dock to Dish, fishers are able to sell their products online and directly list it to the market. These initiatives disrupt the status quo of fishery value chains and enables consumers and fishers to be in direct contact with each other.

In South Africa in particular, ICT smartphone applications for small-scale fisheries will bring a new perspective to their market and value chain activities. Many thereby view these ICTs as a possible solution to solving some value chain challenges and disrupting the status quo of the value chain. Through ICTs, value chain stakeholders and fishers are digitally introduced to each other to carry out transactions. As a new introduction to the sector especially for the value chains, the impact ICTs will have on the broader sector is unknown at this point in time as little literature and evidence exists which accurately describes what the impact/s on the sector might be.

With the current value chains viewed disadvantageous to fishers, ICTs in the form of smartphone applications bring them into the digital space to enable them to compete with different markets not previously accessible to them. How those deriving undue and questionable benefit in the current system respond to the disruptions brought by the introduction of ICTs is as yet unknown and an area for future research once there is a greater uptake in the use of ICTs in the sector.

All research participants made suggestions as to what and how an ICT smartphone application should be like to connect with their intended markets and disrupt the value chains. These suggestions included advertising to encourage restaurants, hotels, and caterers to request fish products, as well as for them to procure their products before paying for it. It was suggested that fishers should also have a platform to advertise their stock on the market, set their preferred prices and have direct communication with the market. An online auction and easy payment system providing buyers with electronic certification of the products bought from the fishers was also suggested.

The sentiment among fishers was that using Abalobi as an ICT is a tool for disrupting power relations generally held by corrupt and malicious community representatives under the IR system. It is evident that ICTs have the potential to help bring a paradigm shift or change in line with what the policy intends. Despite all the challenges faced by fishers, Abalobi as an ICT has introduced a positive mindset for addressing some of the data recording challenges and has given fishers a new sense of optimism.

In the interview with the ICT specialist, the participant alluded to ICTs being able to provide better prices for fishers, maximising what fishers can earn. In doing so, fishers would no longer be at the mercy of middlemen such as the langanas in the line fishery to whom they are forced to sell or the marketers in the WCRL sector. These sentiments echo Omar and Chhachhar (2012) in stating that ICTs can aid in the development of fishermen, as marketing and value chains involve a major part of their post-harvest activities. In the same way that telecommunications technology has diminished various activities which needed to be carried out in the public realm (Abdel-Aziz et al., 2016), ICTs for fishers will remove the variable of the middleman and get better value for their products.

6.2 Local, Regional and International Value Chains

Local value chains operate only within the local community. These value chains begin and end within a community. Buyers and consumers in these value chains are usually local people and smaller shops like café's and fish and chips shops. Any fish products which remain in the local community forms part of the local value chain. These follow a short route to the consumer as consumers are within a town or village as seen in both Lamberts Bay and Kleinmond. In the local value chains of the two communities, products are sold or traded informally with neighbours, family members or the surrounding community. In the past, some fish had been sold by fishers to some local businesses in both communities.

Regional value chains occur when fish is transported to markets and consumers outside a community but are within the same country. A regional value chain can function between communities or between provinces as products are transported between communities, towns and cities. These can be seen with the case studies of Abalobi, ThisFish, Fishline and the Dock to Dish programmes.

With the case studies of Abalobi, ThisFish, Fishline and the Dock to Dish, trade with the regional value chains are a combination of transactions between formal businesses as well as individual consumers. As seen in Lamberts Bay, the interactions with the regional value chains for many fishers are informal as trade of snoek occurs with the langanas during snoek runs. In both communities when discussing the regional value chain, fishers stated when they catch various line fish species and sell to the langanas, they then sell directly to consumers or other sectoral role players elsewhere at a higher price to the benefit of langanas.

In the regional value chains of the two communities, only pilot studies and experiments in selling to major retailers have been conducted over short-term periods. In accessing form markets regionally, many fishers in both communities did not have the resources and capacity to engage formal markets themselves hence they had to do so through programmes such as though of the Kogelberg Fisheries Improvement Project and through workshops organised by Abalobi. Most fishers in the regional value chain do not have direct contact with consumers as they are geographically removed from the markets hence work through middlemen.

In the international value chain, fishers participate in global value chains as their products crosses international borders but this only applies to the WCRL in this thesis - which fishers in both communities' harvest. These value chains for small-scale fishers only involve selling on to those engaging in exporting. The export process takes place after their products have been purchased by major export marketers. As said, no line fish species from the different fishers who participate in this research are exported from both communities.

As said, fishers are reliant on marketers who export their products to participate in the international value chain as they do not have access, equipment and their own logistics and facilities to export products themselves. Fishers need to gain the knowhow of negotiating with markets and securing deals for themselves. Exporting abroad also requires crucial connections internationally, as well as capital to cover the costs of doing so. The international value chain would also be subjected to stricter laws and regulations locally and abroad as products are moved between countries.

In the case studies, none of the ICT projects or initiatives gives fishers direct access to international markets. This might change but at the time of writing this thesis all only focused on the local and regional value chains. However, the Punta Abreojos Cooperative along with the 10 other FEDECOOP communities along the Baja California coast of Mexico do export their products abroad. Although FEDECOOP exports products on behalf of Punta Abreojos community, their entry point in using ICTs is through the software programme they developed. Collectively products are exported for the community of Punta Abreojos.

Specifically concerning the international value chain, caution has to be exercised to prevent products traditionally consumed by small-scale fishers from becoming inaccessible to them. As in the case of WCRL which was consumed frequently by many in fishing communities and elsewhere, caution needs to be taken when marketing products. WCRL, being classified as high value because of its earning potential has become almost legally inaccessible to small-scale fishers and the local markets. Abalone (*Haliotis midae*), which was traditionally harvested by small-scale

fishers, similarly to fishers from the Punta Abreojos community, is not harvested under the current IR system, nor consumed as a staple as demand for it is so great abroad.

6.2.1 Value Chain Mapping

Mapping the local, regional and international value chains of the communities was done by using the labels harvesters, processors, buyers, exporters, marketers, retailers, restaurants and consumers. It should be noted that these labels vary slightly from the groups which were interviewed as some research participants fitted under multiple categories. The order of the different participants along the value chain may also differ as some role players play more than one role, thus eliminating other participants from the chain altogether.

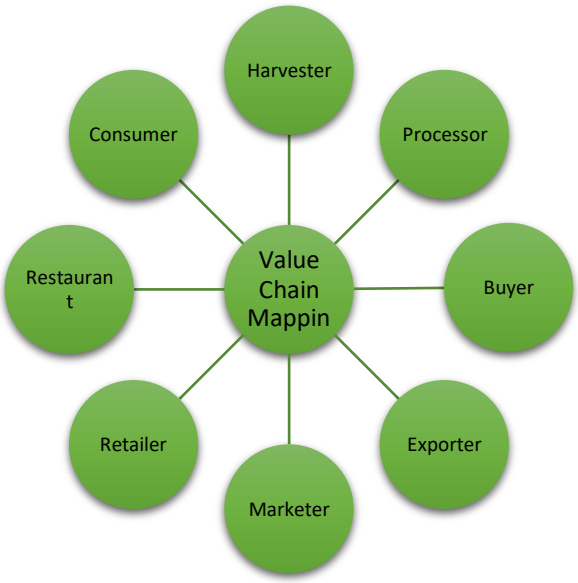


Figure 15: Value Chain Actors

For value chain mapping, fishers can be classified as harvesters and processors, while value chain stakeholders can be classified as processors, buyers, exporters, marketers, retailers and restaurants. The supportive organisations, government and ICT specialists have not been included here because they are not commercially involved in the value chain. Although processing might be done by fishers, retailers themselves might also do their own processing of products such as filleting and packaging. Similarly, with buying, marketing and exporting, all three functions could be undertaken by one company before exporting products abroad.

The value chains presented below show the common trends for products from small-scale fishers from the two communities passing from the fisher to the consumer. Value chains exhibit numerous

permutations and outcomes dependent on the number of participants, agreements between actors, power relations and accessibility to consumers. All these factors impact the product flows from small-scale fishers. The different species used in the value chains are colour-coded as follows red for snoek, blue for Cape bream, purple for other line fish and orange for WCRL. This is represented in figures 16, 17 and 18 below.

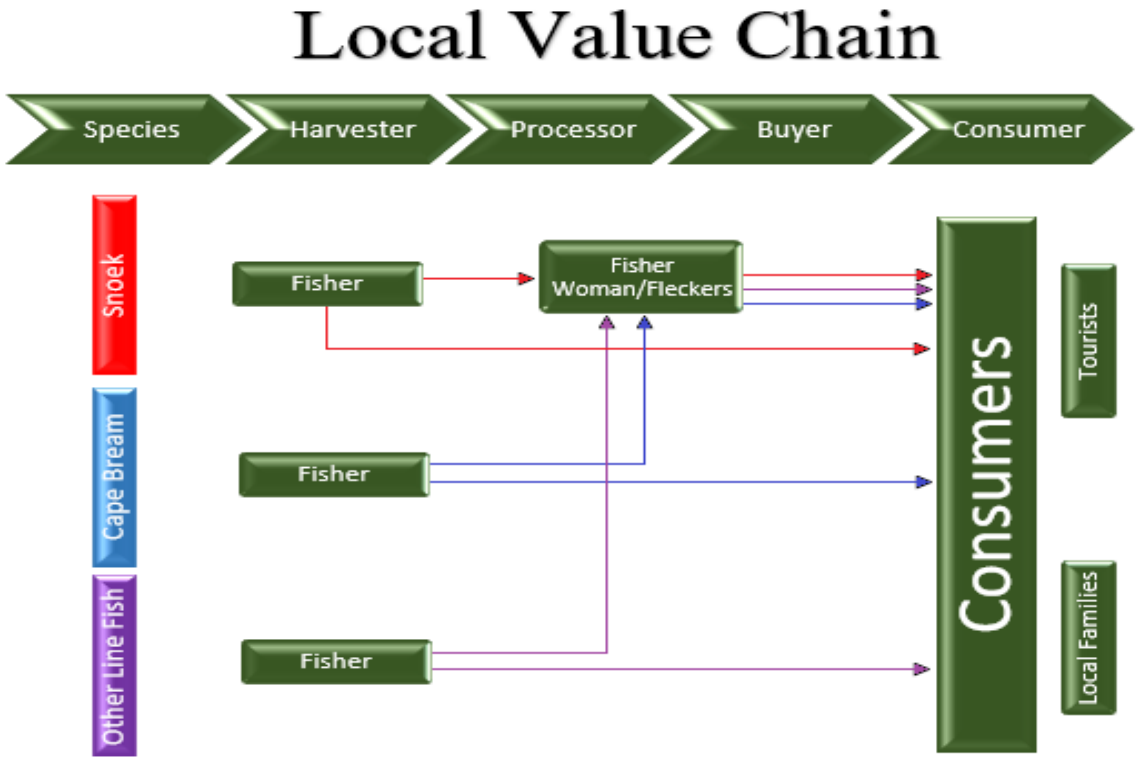


Figure 16: Local Value Chain

The local value chain describes the flow and change of ownership of lower value species like snoek and Cape bream which are sold within a community, but also other line fish like yellowtail, white stumpnose, jacopever and carpenter. Beginning with the harvester, a product like snoek is caught on a vessel under the IR system and is flecked and cleaned by post-harvesters who have historically been mostly women. Women and fleckers in these value chains can be both buyers and processors as post-harvest cooperatives, as seen in Lamberts Bay, sometimes purchase fish from harvesting cooperatives, to clean and process it themselves before selling it.

Within the processing stage, products can be salted or smoked before being sold to local community members. Sometimes products are sold directly from the harvesters without any processing or altering of the products. As products like yellowtail, white stumpnose, jacopever and carpenter are considered lower value species because of the monetary value, they mostly remain in the local community unless there is an oversupply of it.

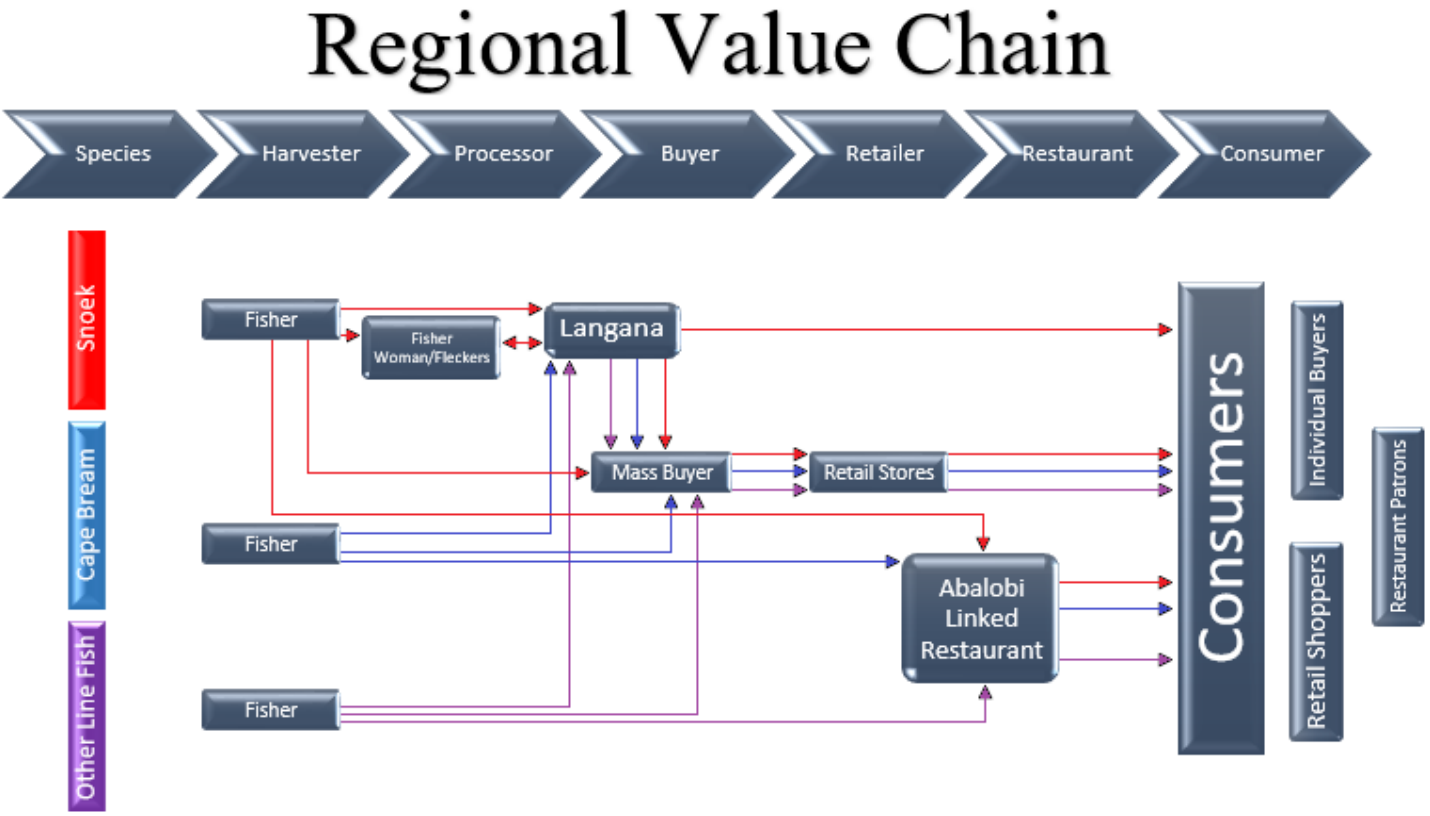


Figure 17: Regional Value Chain

The regional value chain as depicted details the flow and change of ownership of only line fish species from the community to the market. This value chain also includes multiple changes of ownerships of products before it reaches the consumer. The regional value chain for small-scale fishers has various formal and informal role players as fishers interact with a variety of stakeholders. As in the local value chain, role players can have multiple roles too.

With snoek, harvesters would sell their catches by auction to langanas at the highest price that langanas are willing to pay. From there onwards langanas would either pay a post-harvest cooperative to fleck and clean the fish or they would transport it to their markets, process it themselves and then sell to consumers in urban and peri urban areas. Post-harvest cooperatives sometimes purchase snoek themselves from the harvesters, do some level of processing and then sell to a langana. Although not often or regular, snoek has also been sold to mass buyers for factories where processing may be done before selling to major retailers.

Dependent on the quantity, Cape bream, as well as other line fish caught by small-scale fishers, sometimes follows a similar flow as snoek from the harvester to the consumer. Cape bream and other line fish are sold similarly to snoek, but little to no processing is done and it is usually sold to langanas as is. Mass buyers like fish factories might purchase from the fishers through a buyer

like a langana who purchases fish from various fishers. It should be noted that the value chain is very fluid and fishers in the line fish sector may often change from one langana to another to sell on a day.

Abalobi has played a role in the regional value chain in the way in which fishers from the two communities conduct their value chain activities for getting their products to restaurants. Snoek, Cape bream and various other line fish are recorded, barcoded and sold to restaurants linked to the ABALOBI programme. Through this, the restaurant patrons are able to trace their meals to exactly where and from whom it came. This value chain came into operation for the communities of Lamberts Bay and Kleinmond at the time of writing this thesis.

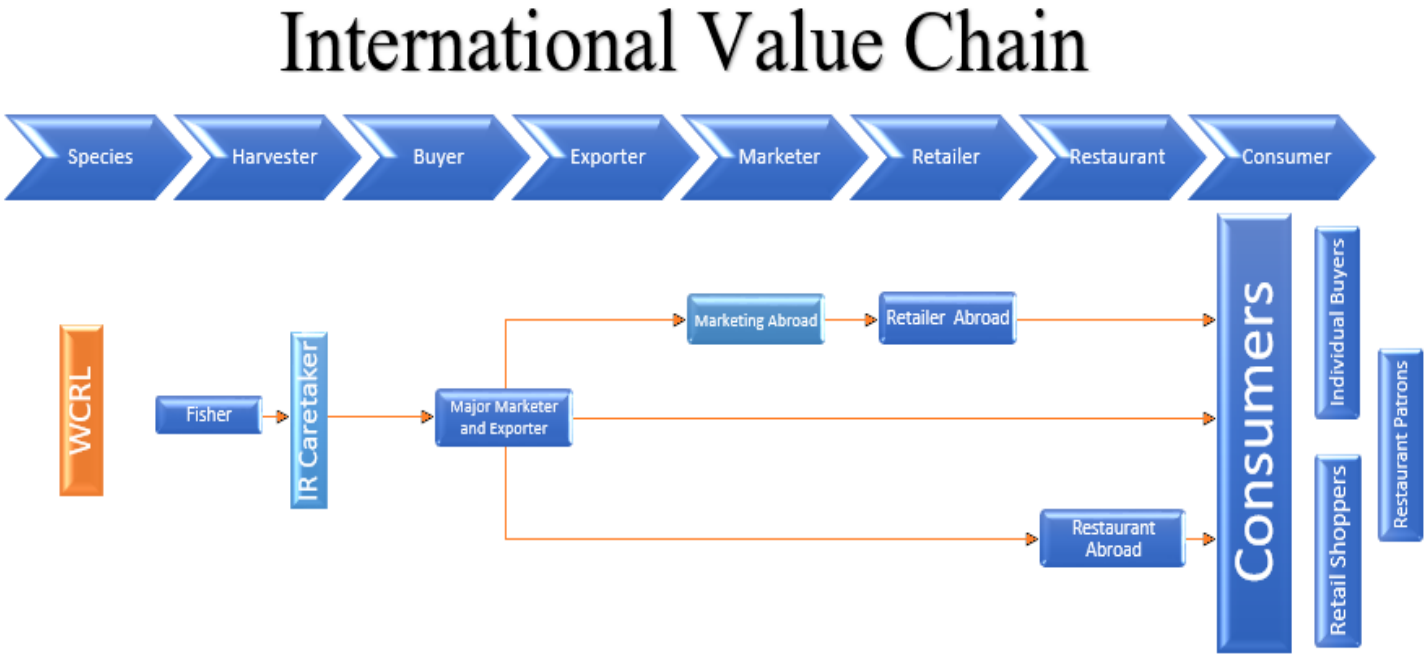


Figure 18: International Value Chain

Only WCRL is exported through the international value chain of both communities. As indicated, fishers, after harvesting, play a minimal role in the current international value chain. This value chain is fraught with challenges, especially under the IR system, as the permit caretakers responsible for the administration of community permits generally act as gatekeepers to the markets. Caretakers and community representatives in many cases deprive fishers of their full earnings as they are persuaded by marketers to engage in unscrupulous dealings. This is difficult to control and manage by DAFF as IR caretakers and marketers work together.

After a marketer and exporter in the international value chain have purchased products from the small-scale fishers in the two communities, they either do further marketing or sell their products to retailers. These companies might also sell products directly to high end restaurants which then

prepare the products for restaurant patrons or consumers. Once fishers have sold their WCRL to marketers and it is exported, they generally get to know little about exactly where the product goes and what happens to it.

Although in a different sectoral category of the WCRL nearshore commercial rights holders, FL1, FL2 and FK6 stated that the SSFP or IR systems do not apply to them, but they face similar marketer challenges as those mentioned. FK2 and FK3 referred to limited facilities for greater autonomy over their products in the value chain. The WCRL nearshore rights holders also do minimal processing of their products because of this lack of facilities for them to process their products. Additionally, fishers are only able to sell their products to specific buyers in the WCRL nearshore commercial sector who are registered with DAFF as the nearshore commercial sector must pay income tax, unlike the current IR sector.

6.3 Abalobi Marketplace Pilot Programme

As the Abalobi Marketplace programme was conceptualised and brought to actualisation at the time of writing this thesis, I attended many discussions, workshops and training initiatives to give inputs and make contributions to it. Being the first of its kind in South Africa in the small-scale fisheries sector, the programme was well received by fishers and brought different stakeholders together to discuss different issues. As a new phenomenon, the pilot programme introduced fishers to new markets, something previously thought to be unattainable by them.

When attending a pilot demonstration in Lamberts Bay for the Marketplace application in January 2018, I observed 105 units of Cape bream weighing 55kg in total being landed by three boats. Fishers proceeded to use the ICT platform to record the data of their catches and packed it in cooler boxes before it was delivered to a restaurant linked to the programme. The fish caught was delivered to Bistro Sixteen82 Restaurant at Steenberg Farm in Cape Town who used the application to purchase fish directly from fishers. A few concerns arose while observing these interactions.

From the pilot project, the first observation concerned connectivity when fishers uploaded their information to the system. Internet access is a challenge in both communities. In Lamberts Bay, only 23.5% of residents have access and 10.4% of them use their cellphones to do so. In Kleinmond, 33.7% have access while only 7.9% use their cell phones to do the same (Census

2011). Fishers in Kleinmond who participate in the various FIP initiatives can access the Internet through Wi-Fi at the WWF SA offices.

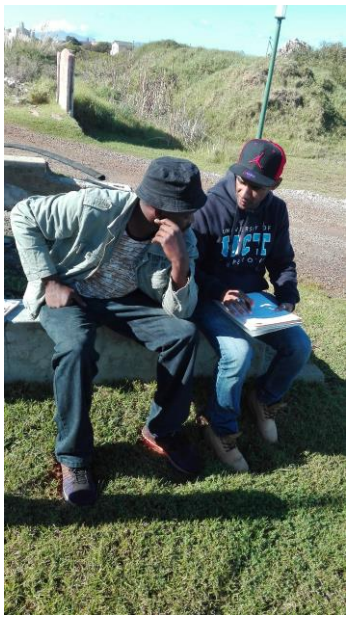
Through accessing the Internet, fishers use Abalobi to connect with various restaurants. During the pilot programme, fishers in Lamberts Bay struggled with direct and real-time communication while at the harbour. Throughout the pilot project an Abalobi staff member assisted when any challenges arose while engaging with restaurants. Although prices had been agreed via the project prior to the delivery of products, ICTs should enable fishers to have direct contact with restaurant owners and managers to negotiate these themselves in the absence of a pilot project.

During this pilot programme demonstration, unregistered fishers wanted to join and sell their fish to the restaurant. The main reason for this interest was the higher monetary gains which are to be achieved. Although the monetary benefits are there, fishers did not want to participate in the other aspects of the programme but were only interested in monetary gain. It is in this that ICTs can be effective, as there is more at stake than the monetary and financial aspect in that skills development and educational initiatives make them competent in engaging markets.

With Abalobi Marketplace, there is a lack of branding and visibility in the communities. As the programme has been in existence for three years, it has generated some interest in the communities where it has a presence, but many still do not know exactly what it is, or what its purpose is. As observed during the pilot programme, although many fishers knew of the Marketplace function they still needed assistance in getting started as well as knowing what requirements are necessary or what they need to do.

At the time of writing this thesis, Abalobi had only 13 dedicated staff members involved in the project, according to the ICT specialist. More human resource capacity is needed to drive the program and create awareness in more communities. Going forward, Abalobi Marketplace needs to enable fisher people to approach new and existing markets themselves. It is important that participating establishments and fishers using ICTs for linking fishers and markets agree on the ethics, philosophy and code of conduct of the ICT programme.

Fisherwoman in Lamberts Bay during a snoek run in 2017



Discussion with Fishers in Kleinmond (left) and Lamberts Bay (right) respectively

6.4 Shortcomings and Criticisms of ICTs in the Small-Scale Fishing Sector

Although small-scale fishers require assistance to gain better access to markets through their value chains, little is documented on their needs and perspectives regarding ICTs and value chains. While a substantive amount has been written on small-scale fishing communities, little is known about their value chains and how they function, even outside the ICTs related practices. With technology becoming a crucial element in the way business, commerce and trade is conducted, small-scale fishers should also be brought into the loop for them to be able to improve their activities and maximise benefits.

All of the ICT projects and case studies which were presented as evidence of practice-related initiatives in this thesis were written about very positively. This is due to most information on these organisations being the product of organisational self-reporting, by either the projects or through media reports. Given the promotional nature of these reports, as opposed to critical academic-type engagements, these ICT project and initiative reports do not highlight any negative impacts or discuss negative impacts that they have or may have had on communities or people who come in contact with them or whom have used their products. As said previously, the impact of ICTs on the small-scale fisheries sector are currently not known as little empirical data suggests.

As a sector which is mainly informal, the negative effects of ICTs on the small-scale fishing sector, communities in particular or fisher groups, are not documented. Some ICT initiatives intended for small-scale fishers began as research projects at universities with too much focus and emphasis on academia projecting an almost top down approach. mFisheries and Abalobi both started out as university projects with the former not growing further as it failed to graduate past a project phase by not increasing its user base. Abalobi even though it has challenges managed to source greater funding and began to adapt a more practical approach but also struggled to get fishers to firstly use the Abalobi Fisher app before using Abalobi Marketplace.

A participatory process with fishers for fishers is needed for ICTs in small-scale fishers, not an approach which develops technology on their behalf. From the various case studies and literature consulted, there was a lack of information speaking to co-designed and development-oriented projects enacted with small-scale fishers involving dedicated interventions engaging small-scale fishers.

As small-scale fishers, especially in the developing world, might not have access to a greater abundance of resources, technologies and potentially markets, ICT project implementations in most cases would require a developmental approach. A developmental approach requires great amounts of time spent in situ engaging with fishers as opposed to a plug-and-play approach where fishers or community stakeholders merely download an app and run it. In the various case studies which were reviewed, limited information exists as to the style of engagement these various initiatives have with fishers. As getting products from the fishers to markets require a great deal of work such as technology development, training and logistics, none of the case studies described a detailed process of how this is done. These processes are essential as they ultimately empower the fishers and allows them to adequately use ICTs to unlock their desired value chains independently.

ICT initiatives need to be done over a period of time to build up trust, rapport and good relations with fishers. With a plug and play type approach to ICTs, it is assumed that the users are able to simply use a product without any qualms, however with the low literacy levels which are prevalent in many communities this is a real challenge. Where income and education levels are low, ICT applications cannot merely be plug and play as unlocking value chain opportunities require skills for negotiations, business knowledge, extensive commercial networks as well as either grant funding or sponsorships to keep costs at a minimum for fishers or to make it free for them. The

case studies which have been included in the thesis shows a lack of this approach as they mainly present a technological solution.

Group discussion with fishermen in Lamberts Bay

CHAPTER 7: CONCLUSION

7.1 Answering the Research Question

How can ICTs be used to unlock small-scale fishery value chain opportunities in fisher communities?

For ICTs to unlock value chain opportunities in small-scale fishing communities, certain requirements are needed to make it not both possible and effective. Cognisance of the current value chain systems should be present and social, cultural and economic dynamics need to be understood. This is one of the biggest challenges facing the ICT specialist in creating one system that is suited to a variety of contexts. The role of ICTs in connecting small-scale fishers to their ideal markets requires cognisance of many different factors and the challenges faced by the various participants in the value chain.

The requirements for unlocking value chains for small-scale fisheries include easy use, self-sustainability, being people centred and inclusive, being integrated, evolving and detailed as depicted in figure 19. These requirements can be made suitable and applied to different regions or contexts where ICT solutions need to unlock chains for small-scale fishers. Each requirement is underpinned by the literature consulted, observations and interviews.

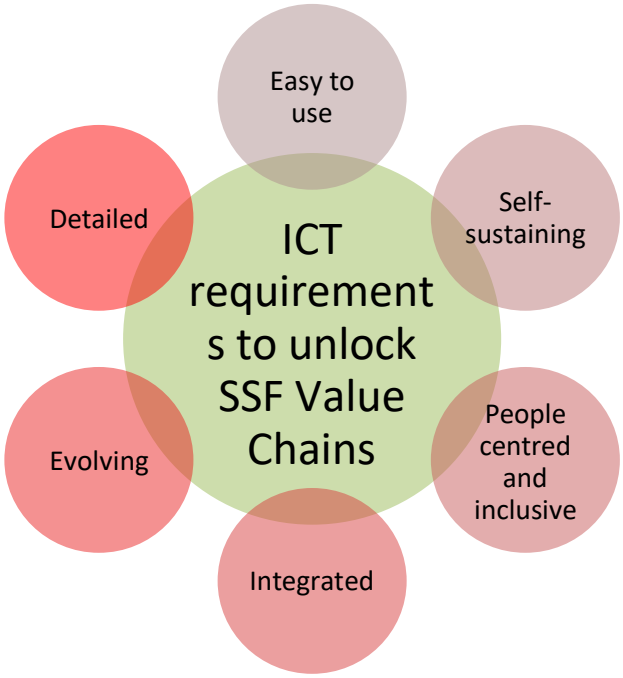


Figure 19: ICT Requirements to Unlocking Small-Scale Fisheries Value Chains

In employing ICTs to connect small-scale fishers to markets, the technology should be easy to use and basic to understand. ICTs for Connecting small-scale fishers to their ideal markets, should present simplified methods to be easy to use, operate in real time and provide fishers with a variety of market options. Omar and Chhachhar (2012) have emphasised that ICTs should be simplified to assist fishers with their various activities, which include marketing.

Complicated technology makes it challenging for small-scale fishers to engage with markets and it should therefore be easy to understand by all, regardless of age, skills and level of education. ICTs such as mobile applications need to be straightforward and to the point to avoid struggling to comprehend technical jargon. It is also preferable that such applications and programs be written and coded in the local language and incorporate terms and phrases in the local dialect used by fishers.

In using technology to assist small-scale fishers, ICTs need to be self-sustaining and be able to exist beyond a pilot or research project. In the interview, C2 emphasised that for corporates to be encouraged and engage with the small-scale sector, ICTs must be underpinned by legislation and policy from government, with incentivisation. At a certain point in the lifespan of an ICT initiative, it would need to generate its own funding as operational expenses begin to mount over time. Being self-sufficient and self-sustaining is an important aspect for ICTs but this should be with minimum to no cost for fishers to use continuously. Generating such funds must be achieved by using innovative ways through advertising, partnerships or collaborations with value chain stakeholders.

As ICTs concern technology, it is important that the human aspect and focus does not get lost in unlocking value chains for small-scale fisheries. Abdel-Aziz et al. (2016) stress this in stating that the social aspect of ICTs should not be ignored while lots of attention is focused on the purely technological aspect. ICTs unlocking value chains for small-scale fishers in connecting them to their ideal markets must have an emphasis on skills development and training for fishers to understand the various processes and procedures of the value chain. Being people centred, ICT should incentivise and encourage more people to become involved. ICTs should seek to include role players such as fish fleckers, cleaners, youth and women who have been excluded or marginalised from the value chain. These participants who are generally left out of the value chain should be included as their contributions need to be recognised.

With ICTs addressing the needs, not of small-scale fishers only, but also that of markets, the approach in developing value chain technology needs to have an integrated nature. This integrated approach requires consultation for inputs from various stakeholders through meetings, discussions

and workshops, as seen in the interviews with different groups in this research project. ICTs as a tool to connect small-scale fishers to their markets should provide a meeting space for a range of needs, opinions, ideas and suggestions to be brought together and amicable solutions are sourced, as in the ICT4Fisheries group. ICTs need to bring a variety of people together to discuss different challenges and needs, as well as for drafting a plan regarding implementation and responsibilities.

In an ever-changing world where new technologies are constantly evolving, ICT cannot be too fixed as it needs to adapt to meet the needs of people of the current day. In the small-scale fisheries sector, new occurrences are constantly happening ICTs need to take cognisance of this for unlocking value chain opportunities for small-scale fishers. ICTs therefore need to be constantly updated, evolving and improving as legislation, policy changes, market demands, and fish stocks are always changing. For ICT to remain relevant in the sector it needs to evolve and adapt to the needs of society as small-scale fisheries value chains feed into diverse and spatially extensive networks (Rosales et al., 2017) encompassing stock assessments, data management and permitting.

An example of where ICTs need to be evolving and adaptive in the value chain occurs with the stock assessment work of SASSI and in new markets entering the value chain system. With WCRL being listed as an endangered species by SASSI, ICTs need to take cognisance of this by providing fishers, consumers and value chain stakeholders with this information. For consumers, ICTs should provide alternative products provided by small-scale fishers. This will unlock new opportunities for fishers to commercially exploit alternative species which are more environmentally sustainable.

As ICTs seek to unlock markets not previously explored by small-scale fishers, ICTs needs to be detailed in providing adequate information to both fishers and markets. This is necessary if ICTs are to assist with the traceability of products and detailing the narratives of fishers. As discussed in the literature review, Abalobi, ThisFish and Dock to Dish have dedicated traceability features in which the narratives of fishers can be specifically recorded to be displayed to consumers. During the interview with the ICT specialist, it was said that connecting small-scale fishers to markets of choice requires that the full story is told, from harvesting to consuming. This is to conscientise consumers to understand the entire process for obtaining their products. ICTs present an opportunity for persons in a fisher community who are not recognised for their efforts in the value chain to gain recognition.

7.1.1 ICT Features for Unlocking Small-Scale Fishing Value Chain Opportunities

As ICTs need to be easy to use, self-sustaining, people centred and inclusive, integrated, evolving and detailed, these requirements need to be translated into features to make it possible. An important aspect of this process should be capacity building and development as demonstrated by mFisheries (2014) and Abalobi (2016). These two organisations started out as research projects at universities and engaged and trained fishers in using technology as many have not used this before. Although various ICT applications are downloadable and require little to no training, Abalobi (2016) has shown that, working closely with fishers, ICT projects can be further improved and continuously refined through the co-design process.

As after post-harvesting functions like value adding of products takes place as part of commercial operations, information concerning who has processed the products should be recorded to enable better traceability and accountability of products. In the Mexican case study of Punta Abreojos, their broader cooperative FEDECOOP has its own *Rey del Mar* brand. The sentiments of Cota-Nieto et al. (2015) is solidified in stating that ICT software programmes can help with the commercialisation of products through the value chain. Post-harvesters, usually females responsible for processing fish by means of flecking, salting, pickling and smoking of products can also have their efforts recorded and recognised through software.

Assisting fishers and fisherwomen to record and share the narratives of their products with markets and consumers could make use of quick response (QR) codes. These QR codes can help fishers to record activities around harvesting and preparing the products, to present this to consumers while promoting themselves, their brands, their cooperatives and communities. ThisFish (2016) uses barcodes similar to QR codes to record data and share it with consumers. This solves the challenge of traceability when consumers demand accountability for products. This recorded information could raise the monetary value of products as consumers will be able to trace where their meals come from.

Like the Uber Eats (2016) application that connects food outlets and clients through a delivery service, ICTs for the small-scale fisheries value chains could also enable consumers to track their order until it arrives and then pay electronically. Among the stumbling blocks of value chain processes is that, when fish is sold and leaves a community through a langana, value adding is usually done by women, but they do not share adequately in the benefits as persons from outside the community usually gain greater profit. Dock to Dish (2016) connects small-scale fishers to their nearest regional communities and allows communities to place orders with the fishers. A

multifunction option for small-scale fishers is needed for requesting, ordering, delivery, tracking and payment.

Authentic local dishes could be sold by using this function, with a small-scale fisheries cooperative running the various operations. If the market is big enough, a cooperative could employ drivers from the community to do deliveries. Furthermore, fishers could use ICTs to communicate with retailers who may want different fish products at various times. In unlocking value chain opportunities for small-scale fishers, ICTs need to address the challenges faced by fishers as well as their value chain stakeholders.

Value chain stakeholders have stated that they do not have any specific mechanism or method for sourcing products directly from fishers. Without a specific ICT program or applications, besides websites and supplier bases, there is a need for a product to have all these in one location. These systems should simplify the process of engaging with each other for both businesses and fishers. During interviews it was clear various establishments were willing to purchase from small-scale fishers, but their reluctance was due to certain conditions that had to be met.

7.2 Future Research

While this research looked at the value chains of small-scale fisheries and ICTs, a lot of work must still be done to make the sector grow and function better. Various avenues for further research and further enquiry were uncovered during the research project. These avenues of enquiry and research stem from the responses of the research participants, from fieldwork and engagements with the sector, as well as the limited amount of literature on certain topics. Many of these topics impact the value chains of small-scale fisheries directly or indirectly and ICTs need to take cognisance of these.

A very popular theme which arose from the fisher interviews was that of climate change and the impact this has on different marine resources. While discussing climate change and resource behaviours, the sentiment was expressed that more use should be made of local knowledge of fishers in trying to understand these phenomena. Fishers complained that their harvests have declined over a long period of time and is continually declining, hence the need for further research.

Along with climate change, sustainability with regard to the value chains also arose from the interviews. Sustainability was linked to tackling the scourge of poaching which impacts the value

chains of small-scale fisheries. Caution in purchasing from small-scale fishers arose from a perception that most small-scale fisher products are poached or illegal. This was linked to the concern that it is difficult to prove that products as such are legal.

In the various interviews, points were raised regarding commercial operations and logistics of the value chain. These ranged from business education in the value chain, youth employment and involvement, and integration with the tourism sector. Literature on these aspects of the value chain is very limited, especially in South Africa, and more should be written on these topics and researched regarding the value chain.

Regarding ICTs in the small-scale fisheries value chain, points were raised regarding financial technology and its role in various fishing operations. Fishers referred to being able to use ICTs not only for record keeping but also for payment and receiving income. As for paying through ICTs, fishers also asked what role technology can play in helping to unlock assistance such as potential access to a sea accident fund similar to that of the road accident fund. As fishers are buyers of huge amounts of fuel for their boats, questions that were asked focused on how they can claim from a fund in the case of an accident. This included questions about the role ICTs could play in safety at sea and how the narratives of fishers could be documented.

As this thesis was written at the time of the SSFP's implementation, an investigation of the possibility of a joint government and sectoral policy for the usage of ICTs may be an area for further research. This would be crucial for value chain work as well as for other areas of the small-scale fisheries sector. The question of policy needs greater work and insight as it would need the input and opinions of different stakeholders. Policy also does not necessarily yield results and greater engagement and work is needed to ensure that ICTs and a sectoral policy are attainable.

7.3 Concluding Remarks

As this research focused on the use of ICTs for unlocking small-scale scale fisheries value chains, the needs of people were the focus point. For many small-scale fishers in South Africa, ICT as a tool to aid value chain activities is a relatively new phenomenon. This is seen with the limited options of ICT available to them. This field of endeavour is new in the domain of small-scale fisheries and requires further and continuous engagement.

What this research has stressed is that it is crucial that fishers' rights be secured for long-term participation in the sector before any specific technology is used to assist them. ICTs will then be

able to assist them with much better planning for their future as they seek to engage in various commercial activities with different markets. ICTs have the potential to disrupt value chains by breaking down the complexities perceived by small-scale fishers in contacting their desired markets.

In any region where small-scale fishers are found, cognisance must be taken of their geographical and societal contexts. In South Africa, context is important as the country has many challenges which small-scale fishers face daily and some of these are the result of past injustice committed against them. Their challenges range from literacy levels, language barriers between fishers and markets, willingness of both the markets and fishers to try new means of doing things to forming good trust and good working relations. Facilities and transportation remain issues but can be offset by good working relations between the various stakeholders.

While programmes such as Abalobi, ThisFish, Dock to Dish, Fishline and mFisheries have begun to discuss and implement technologies towards better coordination and value chain processes for connecting fishers to markets, more must be done by all the organisations involved. Accessing new markets should take place with the involvement of fishers using the technology. ICTs need to detail the activities of fishers by keeping proper records of their activities for accountability and traceability. This begins to address the challenge of data collection in the sector as fishers store crucial information regarding their activities in one place. As indicated with reference to my previous observations and engagements with the sector, many ICT challenges as experienced in the two communities are applicable to other small-scale fishing communities in both the Western and Northern Cape Provinces and potentially elsewhere as well.

But utilising ICTs to unlock value chain opportunities for small-scale fishers makes educational and training initiatives imperative. As small-scale fisher people have for a long time been dependent on the current value chains for conducting their activities, it is crucial that some negative practices be unlearnt. Various stakeholders who either directly or indirectly are involved in the value chain have a role to play in this. This approach can be a major catalyst for change in the way in which ICT and value chain work are conducted and studied. As Abdel-Aziz et al. (2016) state, too much focus has been placed on the technological aspect in the past while ignoring the human and societal aspects.

Value chains are complex systems for small-scale fishers in South Africa and are influenced by the legacy of the past which has for many years shaped what the sector is today. ICTs are seen as a potential value chain disrupter of the current status quo of small-scale fisheries value chains. For

ICTs to unlock value chain opportunities for small-scale fishers the process needs to ensure that the technology is easy to use, self-sustaining, people centred and inclusive, integrated, evolving and detailed.

Despite the many challenges facing small-scale fishers directly and indirectly, some progress has been made. ICTs can enable small-scale fishers to become more independent and self-reliant in conducting their activities to avoid being exploited. In concluding this thesis, I would like to end with the following quote from a fisherwoman:

"What gives us hope is that despite the adversity and hardships faced by small-scale fishers, it is the human spirit which strives every day to overcome all these challenges faced."

Hilda Adams, Mamre

Through my research, fieldwork and various engagements I have personally seen the human spirit of the fisher people overcoming on countless occasions despite the adversity and hardships faced by small-scale fishers. This human spirit is in the lived experience, culture and history of small-scale fisher people. ICTs should therefore not be seen only for its technological capacity but as a tool and catalyst to continue to strive for a better life for all fishers.

Activity in Lamberts Bay during a snoek run

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Appendix A: Ethics Clearance

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

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25 April 2017

Robin George
Department of Environmental and Geographical Science

Unlocking small-scale fishery value chains through information and communication technology (ICT) - the case studies of Lamberts Bay and Kleinmond

Dear Robin George

I am pleased to inform you that the Faculty of Science Research Ethics Committee has approved the above-named application for research ethics clearance, subject to the conditions listed below.

- The Faculty of Science Research Ethics Committee (FSREC) has pointed to some confusion in your application particularly with regard to the following comment: "In fishing communities care has to be taken as there might be a refusal or fear to sign any documents as they might not understand the content or the language being used. Because of this a verbal agreement will be sought with the fishers." There is concern from the FSREC that participants will be opted-in regardless of their informed opinions. However, an individual's refusal to participate must also be respected and not merely side-stepped by stating that oral consent was obtained.
- Implement the measures described in your application to ensure that the process of your research is ethically sound; and
- Uphold ethical principles throughout all stages of the research, responding appropriately to unanticipated issues: please contact me if you need advice on ethical issues that arise.

Your approval code is: **FSREC 19** – 2017

I wish you success in your research.

Yours sincerely
Prof Timm Hoffman
Chair: Faculty of Science Research Ethics Committee
Cc: Dr Serge Raemaekers (Supervisor)

Appendix B: Consent Form

DEPARTMENT OF ENVIRONMENTAL & GEOGRAPHICAL SCIENCE

UNIVERSITY OF CAPE TOWN
PRIVATE BAG X3
RONDEBOSCH 7701
SOUTH AFRICA

RESEARCHER: Robin Peter George
CELLPHONE: +27-78-645 4402
E-MAIL: GRGROB005@myuct.ac.za
URL: http://www.egs.uct.ac.za/

Informed Voluntary Consent to Participate in Research Study

Project Title: Unlocking Small-Scale Fishery Value Chains through Information and Communication Technology (ICT) – the case studies of Lamberts Bay & Kleinmond

Invitation to participate, and benefits: You are invited to participate in a research study conducted with small-scale fishers of Lamberts Bay and Kleinmond. The study aim is to contribute to the continuous development of the Abalobi application, stimulating value chains in the small-scale fisheries sector through ICT usage. I believe that your experience would be a valuable source of information, and hope that by participating you may gain useful knowledge.

Procedures: During this study, you will be asked to respond to the questions to the best of your ability.

Risks: There are no potentially harmful risks related to your participation in this study.

Disclaimer/Withdrawal: Your participation is completely voluntary; you may refuse to participate, and you may withdraw at any time without having to state a reason and without any prejudice or penalty against you. Should you choose to withdraw, the researcher commits not to use any of the information you have provided without your signed consent. Note that the researcher may also withdraw you from the study at any time.

Confidentiality: All information collected in this study will be kept private in that you will not be identified by name or by affiliation to an institution. Confidentiality and anonymity will be maintained as pseudonyms will be used.

What signing this form means:

By signing this consent form, you agree to participate in this research study. The aim, procedures to be used, as well as the potential risks and benefits of your participation have been explained verbally to you in detail, using this form. Refusal to participate in or withdrawal from this study at any time will have no effect on you in any way. You are free to contact me, to ask questions or request further information, at any time during this research.

I agree to participate in this research (tick one box)

☐ Yes ☐ No _____ (Initials)

_____	_____	_____
Name of Participant	Signature of Participant	Date
_____	_____	_____
Name of Researcher	Signature of Researcher	Date

Appendix C: Fisher Interviews

Category: Fishers Interview number: __

Community: Lamberts Bay / Kleinmond Date: _____

Gender: M / F Abalobi User: Y/N Consent Given: Y/N

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

The objectives:

- Understand the value chain activities of the two communities Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, national and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

Current role

1. What is your understanding of the term "value chain"? *Wat is U begrip van "waardekettings?"*
2. Describe the historical context of value chains in your community. *Beskryf die historiese konteks van waardekettings in U gemeenskap.*
3. Have you been involved in any "alternate" value chain process in your community in the past? If yes, please explain your role. *Was U in die verlede betrokke by enige alternatiewe waardeketting inisiatiewe in U gemeenskap? Indien ja, dui dit aan.*
4. Do you obtain any benefit from value adding to marine resources? *Kry U enige voordele uit waardekettings van mariene hulpbronne?*
5. How do you or your organisation cope with constant changes in the value chain? *Hoe hanteer U of U organisasie veranderings en verskeie gebeure in die waardekettings?*
6. What challenges are you or your organisation faced with in your work as part of a value chain or to be part of a value chain? *Met watter uitdagings is U of U organisasie gekonfronteer in U werk as deel van 'n waardeketting of in U poging om deel van een te wees?*

7. What do you think should be done to enable or improve the value chains of your community? *Wat dink U moet gedoen word om waardekettings te begin of te stimuleer in U gemeenskap?*
8. What steps can you or your organisation take in getting value chains to be stimulated? *Watter stappe kan U of U organisasie neem om enige waardekettings in U gemeenskap te begin?*

Alignment with Policy

9. What value chain activities are you or your organisation carrying out which is in preparation for the Small-Scale Fisheries Policy's implementation? *Watter waardekettingaktiwiteite onderneem U of U organisasie, soos in die Beleid, vir die implementasie van die Beleid?*
10. What do you think value chains should look like with the full implementation of the Small-Scale Fisheries Policy? *Wat is U verwagting van waardekettings met die implementering van die Beleid van die Kleinskaalse Visserye Sektor?*

ICT and Abalobi

11. Do you think ICTs has or can improve the way in which you carry out your activities? *Dink U dat die gebruik van kommunikasietegnologie U aktiwiteite verbeter het of of dit tot die verbetering daarvan kan lei?*
12. Do you think an ICT such as Abalobi can help regulate value chains for small-scale fishers? Motivate. *Dink U dat kommunikasietegnologie soos Abalobi kan help met die regulering van waardekettings? Motiveer.*
13. How do you think ICTs could be used to encourage fisher people to get in contact with other value chain stakeholders? *Hoe dink U kan kommunikasietegnologie gebruik word om vissermense aan te moedig om kontak te maak met ander waardekettingrolspelers?*

Own contribution

14. In your opinion, where do you think is there a misunderstanding in trying to understand small-scale fisheries value chains? *In U opinie, waar dink U mis ons die punt met waardekettings vir kleinskaalsevisserye?*
15. What do you think should also be considered for further research of value chain research for ICT? *Vir verder navorsing, wat dink U moet ook ondersoek word in navorsing oor kleinskaalsevisserye waardekettings?*

Appendix D: Supportive Organisations Interview

Category: Supportive Organisations Interview number: __

Organisation: _____ Date: _____

Abalobi User: Y/N

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

The objectives:

- Understand the value chain activities of the two communities Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, regional and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

Questions:

1. Describe the operations in the value chains of the community's your organisation has a presence in.
2. In accordance with the Small-Scale Fisheries Policy, what value chain initiatives does your organisation envision for small-scale fisheries cooperatives?
3. Are there any specific guidelines, besides the Small-Scale Fisheries Policy, which your organisation currently uses or will use to assist small-scale fishers in carrying out their value chain activities?
4. In the communities in which you work, which mechanisms are in place to stimulate or aid value chains of small-scale fishers or to connect them with their desired markets?
5. Does your organisation assist fishers with marketing such as price setting for their various species which they catch, and if so, do you think they are duplicable elsewhere?
6. Does your organisation use any ICT applications to connect with small-scale fishers?
7. In using an ICT such as Abalobi, has it improved your organisation's work in engaging with small-scale fishers and in assisting them? Explain.

8. Describe the most common local, regional and international value chains of the community you work in. E.g. *fisherman (harvest) – fisherwoman (cleaning) – packaging (packers) – consumer*
9. What function/s do you think an ICT application such as Abalobi needs to have to connect fisher people with their desired markets?
10. What has been stumbling blocks in value chain upgrading processes of small-scale fishers, both ICT and non-ICT related, in the community you work?
11. In your opinion, how do you think should ICTs be used to assist small-scale fisher communities in unlocking new value chain opportunities in the long term?
12. With regards to small-scale fisheries value chains, who else would be of importance to the study and to contribute knowledge?

Appendix E: Authorities Interview

Category: Authorities Interview number: __

Organisation and Position: _____ Date: _____

Abalobi User: Y/N

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

The objectives:

- Understand the value chain activities of the two communities - Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, regional and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

Questions:

1. Prior to the gazetting of the Small-Scale Fisheries Policy, describe the operations of small-scale fisheries value chains.
2. What kind value chain initiatives does your organisation envision for small-scale fishers?
3. Are there any specific guidelines, besides the Small-Scale Fisheries Policy, which your organisation currently uses or will use to assist small-scale fishers in carrying out their value chain activities?
4. What mechanisms are in place to improve or aid value chains of small-scale fishers or to connect them with their desired markets?
5. Which existing small-scale fisheries value chain initiatives in fishing communities are yielding positive results and are duplicable elsewhere?
6. How does your organisation use ICT applications (Abalobi) to connect and interact with small-scale fishers?
7. In what way has the usage of ICT improved your organisation's work in engaging with small-scale fishers and in assisting them?

8. Map out the general local, regional and international value chain of fishing communities e.g. *fisherman (harvest) – fisherwoman (cleaning) – packaging (packers) – consumer*
9. What will your organisation do to assist small-scale fishing cooperatives in the value chain to be able to access new markets?
10. How do you think should ICT be used to assist small-scale fisher communities in unlocking new value chain opportunities?
11. What function/s do you think an ICT application needs to have to connect fisher people to government as well as with their desired markets?
12. What are stumbling blocks in value chain upgrading processes of small-scale fishers, both ICT and non-ICT related, in the community you work and how can these be overcome?
13. With regards to small-scale fisheries value chains, who else would be of importance to the study and to contribute knowledge?

Appendix F: Value Chain Stakeholder Interview (Communities)

Category: Value Chain Stakeholders (Lamberts Bay & Kleinmond) Interview number: __

Community: _____ Date: _____

Establishment: _____ Consent Given: Y/N

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

Objectives:

- Understand the value chain activities of the two communities Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, national and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

Questions:

1. As an entity, how would you describe your interaction with small-scale fishers?

   □ Frequent □ Occasional □ Little □ Non-Existent

2. Have you ever purchased any products directly from small-scale fishers? If so, what did you purchase?

   □ Yes □ No

3. If you decide to purchase from small-scale fishers, would you prefer to purchase processed or unprocessed products?
4. Do you use a method or procedure, of any nature, to secure and purchase food products?
5. Are there any challenges or concerns which you have in purchasing from small-scale fishers?
6. Do you use ICT applications, software or programs of any nature, to secure and purchase any food products? If yes, what type do you use?

   □ Yes □ No

7. As technology plays an ever-growing important role in conducting various business functions, what do you think ICTs should look like to be able to connect businesses such as yourself with small-scale fishers?
8. As Abalobi is in the process of developing marketing functions to connect small-scale fishers with businesses, what functions do you think it should have to ease this process?
9. What possible benefits do you think might be there for your business in purchasing from small-scale fishers?
10. With regards to small-scale fisheries value chains, who else would be of importance to the study?

Appendix G: Value Chain Stakeholder Interview (Corporates)

Category: Value Chain Stakeholders (Corporates) Interview number: __

Establishment: _____ Date: _____

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

Objectives:

- Understand the value chain activities of the two communities Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, national and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

Questions:

1. As an entity, how would you describe your interaction with small-scale fishers?

   □ Frequent □ Occasional □ Little □ Non-Existent

2. Has your organisation ever purchased any products directly from small-scale fishers? If so, what did you purchase?

   □ Yes □ No

3. If you decide to purchase from small-scale fishers, would you prefer to purchase processed or unprocessed products?
4. Does your organisation have specific initiatives to support small-scale fishers, in becoming effective value chain actors to supply your organisation with products?
5. How would your organisation potentially go about in procuring and purchasing food products from small-scale fishers?
6. Are there any challenges or concerns which you have in purchasing from small-scale fishers? If so, please explain them.

□ Yes □ No

7. Do you use ICT applications, software or programs of any nature, to secure and purchase any food products? If yes, what type do you use?

□ Yes □ No

8. As technology plays an ever-growing important role in conducting various business functions, what do you think ICTs should look like to be able to connect businesses such as yourself with small-scale fishers?
9. As Abalobi is in the process of developing marketing functions to connect small-scale fishers with businesses, what functions do you think it should have to ease this process?
10. What possible benefits do you think might be there for your business in purchasing from small-scale fishers?
11. With regards to small-scale fisheries value chains, who else would be of importance to the study and what else should be looked at?

Appendix H: ICT Specialist Interview

Category: ICT Specialist Interview number: __

Organisation and Position: _____ Date: _____

Abalobi Tech Support

Research question:

How can ICT be used to unlock small-scale fishery value chain opportunities in fisher communities?

The objectives:

- Understand the value chain activities of the two communities - Lamberts Bay and Kleinmond
- Differentiate value chain opportunities at local, national and international levels
- Determine how an ICT such as Abalobi can assist in connecting fishers to markets such as retail stores, restaurants and tourism enterprises

1. How did you become involved with Abalobi and describe your role in the project?
2. As a technologist, what are your biggest challenges in working to source solutions in the small-scale fisheries sector?
3. In what way can ICTs be used to disrupt the current value chain structure of small-scale fishing communities? (langanas, marketers)
4. How should ICTs such as Abalobi be packaged to entice different market role players and even more fishers to get involved in using it for their activities and what incentives should be added to make this possible?
5. What functions can ICTs apply to aid the cause of connecting small-scale fishers to their ideal markets?
6. If you were a strategic advisor to government on the role of ICTs for stimulating the value chains of the small-scale fisheries sector, what would be the things you would advise them to do and what would you advise them not to do? As a follow on to the previous question, how has this response been informed by your work being involved with Abalobi?
7. If you were a strategic advisor for retailers like Woolworths or Pick ‘n Pay to use ICTs to assist them in improving their value chain interactions with the small-scale fisheries sector, what would be the things that you would advise them on and what would you not advise

them on? As a follow on to the previous question, how has this response been informed by your work being involved with Abalobi?

8. If you were a strategic advisor to a fisher organisation or collective on the role of ICTs for stimulating the value chains of the small-scale fisheries sector, what would be the things you would advise them to do and what would you advise them not to do? As a follow on to the previous question, how has this response been informed by your work being involved with Abalobi?
9. Should ICTs help regulate the marketing activities of small-scale fishers and if yes, in what way?
10. What should ICTs be able to do to change the commonly held perspectives regarding marketing practices in the small-scale fisheries sector?
11. Do you think it is necessary for a policy for the usage of ICTs across the small-scale fisheries sector for better coordination and work relations in the value chain?
12. Where is the biggest misunderstanding between various stakeholders in work dealing with ICTs for the small-scale fisheries sector?