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LIVELIHOOD CHANGES ENABLED BY MOBILE PHONES

-the case of Tanzanian fishermen-

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Give a man a fish, and you will feed him for a day.
Teach him how to fish and you will feed him for a lifetime.

But give him a mobile phone, and you're really talking!
(The International Development Magazine, 2005)

ABSTRACT

Mobile phones have had a tremendous diffusion rate in Africa in recent years. This has brought access to telecommunication to new user groups, among them Tanzanian fishermen. But how does mobile phone use affect the way fishermen live their lives, how they pursue economic activities and how they protect themselves from vulnerability to risk?

During a field study in Tanzania, interviews with fish boat captains were conducted in order to investigate what impact mobile phone use has on the livelihood indicators empowerment, opportunity and vulnerability to risk. Our research shows that increased access to information, enabled by mobile phones brings positive effects to all indicators. Mobile phone use empowers, both through increased bargaining power and increased control over external events. Mobile phones give increased knowledge about market opportunities and a possibility to work more efficiently. Furthermore, mobile phones give fishermen a possibility to take measures to decrease the risks they are exposed to, such as emergencies out at sea. The negative effects are found negligible.

These effects are most likely not isolated to Tanzanian fishermen. Communication through mobile phones can bring similar advantages to other groups that have earlier been excluded from the communication system.

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1. AN INTRODUCTION TO MOBILE COMMUNICATION IN AN AFRICAN CONTEXT

The need for communication is shared by people all over the world. We communicate to share and receive information on many issues and in many phases of life. In social interaction we constantly send and receive messages that help us forward our own intentions and decode the intentions of others. We communicate to get support and assistance from other persons, to exchange information about friends, family and work and to co-ordinate social as well as business activities. Telegraph and land-line telephones have changed the way people communicate and made communication easier over large distances. When mobile phones were introduced people in industrialized countries complemented their land-lines and took communication to places and situations that had been impossible to reach before. In 21st century Sweden, hardly anyone lives involuntarily without access to telecommunications, may it be Internet, landline or mobile telephony; it is always present in some form.

In an area like Sub-Saharan Africa where a large proportion of the population lives in poverty this is not the case. The same need for communication is present here and is even further accentuated by the struggles that have affected the area. Wars and diseases have scattered families, drought and famine has forced people to look for income in places far away from their native homes, and insufficient public sectors force people into situations where they rely heavily on others in their network.

It's not hard though to see why it has been difficult to build a viable business case providing telecommunication in an area, like Sub-Saharan Africa, where one in two persons has a daily income below US$ 1 (United Nation Development Programme, 2006). Despite this, mobile phone diffusion has had enormous growth in Africa in recent years (ITU Telecom Africa, 2004). This diffusion has brought communication to new groups of users, users that earlier were excluded from the telecommunications system.

Newspapers have recently reported that African fishermen are a part of these new users (BBC News, 2005; The Economist, 2005; Washington Post, 2006). This is reasonable

given the characteristics of their work. Fishermen often spend a lot of time away from families and away from their customers. Furthermore fishermen are vulnerable out at sea, where a broken engine in rough weather can be a life threatening experience.

How does this new access to communication affect the way fishermen live their lives? How does it affect the way they pursue income generating opportunities and how does it affect the measures they take to protect themselves from vulnerabilities?

Aspirations for the study

The aim for this study is to investigate what impact mobile phones has had on the livelihood of Tanzanian fishermen. Livelihood impacts are primarily assessed from the non-monetary livelihood indicators opportunity, empowerment and vulnerability to risk.

Disposition

Chapter 2, *A Theoretical Framework- Mobile Phones and Livelihood* presents previous research on mobile phone use in Africa as well as on the connection between mobile phone use and livelihood.

Chapter 3, *Research Methodology* outlines how the study was executed. This relates both to how the data was collected and how it was processed.

Chapter 4, *Presentation and Labelling of Empirical Findings* presents the empirical data along with a labelling of the events related to mobile phone use. The events are labelled in accordance with our theoretical framework.

Chapters 5, *A Discussion on Mobile Phone and Livelihood* summarizes the labelling process and discuss our result. It also includes recommendations for further research.

Chapter 6, *Conclusions* is devoted to some concluding thoughts.

2. A THEORETICAL FRAMEWORK – MOBILE PHONES AND LIVELIHOOD

In this theoretical framework we start by outlining the discourse on African mobile phone use. We continue describing the relation between mobile phones and livelihood issues in developing countries.

Previous research on mobile phone use in Africa

The mobile phone diffusion in Tanzania has had enormous growth in the previous years as can be seen in figure 1. This evolvement is not restricted to Tanzania, Africa in large has faced a similar scenario. In 1994 there were 1.76 telephone subscribers (land line and mobile) per 100 inhabitants. This number had increased to 12.2 per 100 inhabitants in 2004. Mobile phones accounted for 75% of these in 2004 but only 3.4% in 1994 (Gray, 2005).

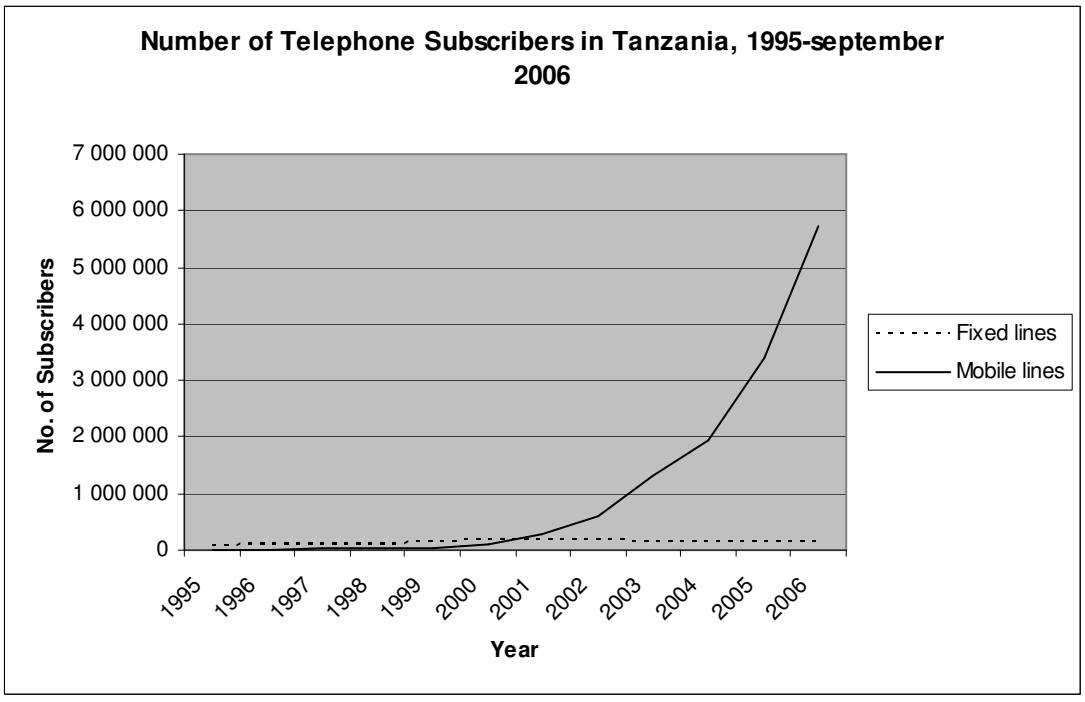

Fig 1. Number of telephone subscribers in Tanzania, 1995 – September 2006 (Tanzania Communications Regulatory Authority, 2006).

Research has shown that more people are having access to mobile phones than persons subscribing due to a widespread sharing of mobile devices (Kaplan, 2006). This fact,

along with growth in mobile phone subscribers, imply that many people that earlier were excluded from the telecommunication system are now being able to communicate. What impacts on society can be derived from this massive spread of mobile phones in developing countries?

Professor Waverman (2005) of the London Business School has shown that ten extra phones per hundred inhabitants can lead to 0.59% extra annual GDP growth in a typical low-income country. This was made in a study examining 92 countries, both rich and poor. The data derived from Waverman's studies are at macro-level and some work has been done to link individual mobile phone use among poor people to societal effects. The British Department for International Development (DFID) conducted a large study in India, Mozambique and Tanzania in 2005 (Souter, Scott, Garforth, Jain, Mascarenhas, & McKemy, 2005) and found that people in the their sample perceived mobile phones to have a great impact on social networking and for reducing vulnerability but only to have mixed economical value. The economical impact was perceived to be greater for saving money[1] than for earning money. The samples used were 2300 persons in three countries without focus on any specific group. The group we focus on in this report is Tanzanian fishermen. The relation between fishermen and mobile phone use has mostly been covered by newspapers and no scientific reports on this group are available, from what we have experienced.

How can mobile phones have an impact on livelihood?

Information for development (InfoDev), is an association closely linked to the World Bank. InfoDev focuses on how information technologies, such as mobile phones, can contribute to development and livelihood changes for poor people in the developing world (Information for Development Program, 2006).

But what constitutes livelihood changes and what makes people poor? One definition of livelihood appraised by the UN Food and Agriculture Organization is the following: "a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living" (Neely, Sutherland & Johnson, 2004). In developed and developing countries some people suffer from poverty which is seen in

[1] on trips for example

relation to livelihood as "a human condition characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights." (United Nations High Commissioner for Human Rights, 2006).

InfoDev outlines several areas where information and communications technologies such as mobile phones can have an impact on livelihoods and thereby on poverty in developing countries. They state that information and communications technologies can contribute greatly to improvements in the following fields (McNamara, 2003).

- Increased opportunities to access resources and use capabilities through improved access to information
- Empowerment through information about choices that affect themselves
- Decreased vulnerability to risk due to the possibility to send and receive information

Also Lustig and Stern (2000) argue that the above factors are important in relation to livelihood issues since poor people define their situation in these terms. Since these indicators are important in relation to mobile phones and livelihood we will further elaborate on them.

Characteristics of livelihood constructs related to mobile phone use

Nobel laureate Amartya Sen (1999) and philosopher Martha Nussbaum introduced The Capability Approach to livelihood status. This approach focuses on the people's capabilities and freedom when trying to assess livelihood status. It focuses upon the actual life of the poor, if the people are capable to live an acceptable life. This is described in terms of well being – to be healthy, to feel safe and to have control over ones situation this well being is to be achieved through the capability to reach opportunities. Sen discusses how improvements in such fields can help the poor towards a better life and therefore can be seen as a contributor against low livelihood status and poverty. Sen (1993) identifies basic capabilities as "the ability to satisfy certain crucially important functioning up to certain minimally adequate levels". Feeling of safety is closely linked to perceived vulnerability to risk. Having control over ones situation is linked to the

livelihood construct empowerment. The capability approach includes the livelihood constructs opportunity, empowerment and vulnerability to risk.

When The World Development Report group examines the term opportunity their focal point is the term market opportunity, i.e. the possibility for people to access a market. This includes both a national and an international level. They state that good market access has a positive effect on development. The report also discusses the access to assets for poor people, how an improvement in human, physical, natural, and financial assets increases the opportunities for the people and also how changes in one asset can affect others. The solutions and recommendations made in this paper are on a macro level but the problems faced are on an individual level (The World Bank, 2001). High transaction costs[2] can impose barriers for realising an opportunity that could lead to improved quality of life (Lawrence, 2005). Information and communications technologies can provide buyers or sellers with information about prices at different suppliers thereby improving the market situation (The Food and Agriculture Organization of the United Nations, 2003). There are various negative factors affecting the possibility to grasp market opportunities in Tanzania. For example, the transport network consists mostly of unpaved gravel roads, 72 000 km out of a total 79 000 km (The World Factbook, 2006).

The concept of empowerment addresses the question about control over ones situation. Harvard professor Gita Sen (1997) describes the phenomenon as increasing control over both external factors as well as personal capabilities. One important factor she presents is that empowerment has to be achieved on a personal level and not only accomplished by structural changes. The World Bank (2006) defines the concept of empowerment as: "the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives."

World Bank Senior Adviser Deepa Narayan (2005) presents the different attributes of empowerment as a conceptual framework in her book Measuring Empowerment. Among the different factors that contribute to empowerment according to Narayan one can find; access to information which can increase the number of choices available, local organizational capacity, forming associations in which people can get together and find

[2] Transaction cost is a cost incurred while making an economical transaction

support for common problems. Mobile phones can have an impact by providing information about available choices or helping people connect to each other when looking for support (Quibria, M. G. & Tschang, T. & Reyes-Macasaquit, M, 2002).

Oxford Professor Fafchamps (1999) presents how vulnerability to risk can be addressed. His work discusses risk among farmers but the problems the farmers are confronting are analogous to the general risks that face poor people in developing countries. The risks are closely tied to the situation of the country where diseases, environmental hazards and the absence of a stable market can cause harm to the individuals. These are problems that have a large impact on the daily life and therefore reduce the people's possibilities to be productive and efficient. To reduce these risks people tend to embrace different methods such as risk sharing in large networks, trying to preserve flexibility while keeping options open, and forming strong family and social network ties. To rely heavily on others in ones network and keeping strong ties may be even more important in developing countries since formal structures often aren't present in this environment (Vodafone, 2005). Low and fluctuative incomes often result in low accumulation of capital buffers that in turn makes people more vulnerable to risk when affected by external shocks such as drought (Maxwell, 1999). Mobile phones can also help people in developing countries be more proactive in relation to risk, by providing information about future events that can cause damage if certain measures aren't taken (The Information for Development Program, 2003).

To discuss livelihood issues in developing countries only from these three constructs is to provide a simplified depiction of the concept. This simplified approach is useful though in relation to our research purpose; the impacts of mobile phones on livelihood. It's fertile for the discussion to further outline the livelihood concept since we might stumble across connections between our constructs and other impacts on livelihood. Another way of describing livelihood status is to base it on monetary indicators such as income or consumption (The World Bank, 2002). Monetary and non-monetary indicators can be inter-related to each other and can both be used to assess livelihood status (Bosco, 2005). We can illustrate this relationship with a simple example; grasped market opportunities might lead to an accumulation of resources (monetary measure) that in turn can help a person in hard times when vulnerability to risk otherwise would be high.

The livelihood constructs presented in this chapter will help us categorize and label our empirical findings. The labelling process will be further presented in the next chapter, under "Method for categorisation and labelling".

3. RESEARCH METHODOLOGY

In this section we present how we realized our research purposes through empirical findings made in interviews with fishermen. We further present decisions made in relation to; choice of respondents, research location and the interview situation. In the end of this chapter we present the criterion used to categorize and label our findings.

The empirical material for this report was collected during a ten week field study in Tanzania during autumn 2006, from September to mid November. The study was partly funded by the Swedish Development Cooperation Agency (Sida) as a part of their Minor Field Study (MFS) programme. During the study we conducted 13 translator aided interviews with local fishermen at two different locations. We used interviews since this form of knowledge gathering provides flexibility which is important when assessing a complex phenomenon like livelihood changes.

Tanzanian background and fishermen as study objects

Since no one in the research team had spent time in a developing country before, we decided to prolong our pre-study by collecting background material while in Tanzania. We spent three weeks in Dar es Salaam discussing our study and research purpose with local stake holders such as experts on telecommunication, fishing and local development issues. We also spent time at the fish market. These measures were taken in order to increase the validity of the study; we needed a clearer view of our research object in order to be certain that we investigated what we set out for in our research purpose.

Research locations and respondents

It can be possible to generalise findings from a low number of observations, what really matters is the comprehensiveness of the measures. Comprehensiveness allows us to reach a fundamental understanding of the structures and processes we study (Normann, 1970). We therefore decided to seek for research locations that were different from each other in order to find similarities and disparity between them in order to get a comprehensive picture with a broad spectrum of respondents. We give some details about the two locations below.

> Dar es Salaam is the economic capital of Tanzania with over three million inhabitants. Regulated fish auctions take place continuously at the city fish market. The boats operate the Indian Ocean fishing for everything from Sardines to Tuna. Our respondents fish mostly for Sardines that are sold by the bucket at the auction. We conducted ten interviews at this location.

> The fishing village Guta is situated on the eastern shore of The Lake Victoria. The village holds some five hundred inhabitants. The fishermen catch Nile Perch and Tilapia. The Nile Perch is sold via agents to large fisheries exporting the fillets meanwhile the Tilapia is sold locally. The fish is brought from the beach to the fisheries by cooling-trucks gathering fish from several landing sites in the region. We conducted three interviews at this location.

When choosing respondents, some restrictions were made in order to find respondents that could contribute to our research purpose. Fishing as an economical activity includes both buyers and sellers that must communicate in some way, we therefore chose to interview only people working on boats that fish for economical outcome and not micro-scale artisans fishing for subsistence. From that restriction we chose also to interview only captains, since they were presumed to work as gate keepers for business related information in relation to both suppliers and the market. It's also the responsibility of the captain to command where, when and how to fish. When searching for respondents, at the research locations, we instructed our translator about a boat of interest and the translator arranged for us to meet with the captain. An introduction to the respondents is presented below.

> All the respondents were male and had families to provide for. Their ages ranged from 25 – 40 years with the main part of the respondents in the upper interval, 35-40. All of the respondents have access to a mobile phone, though three of them have recently lost theirs. The time holding a mobile phone varies from six years down to just a couple of months. They all pay for their mobile phone use in advance, through pre-paid arrangements.

The generalization we aim for in our study is analytical (Lundahl, Skärvad, 1998). Analytical generalizations are made through argumentation that empirical findings have a

connection to relevant theories. This method is not sensitive to the number of respondents that state a certain finding in opposite to statistical generalizations. Since we aspire on analytical generalization, the different numbers of interviews at the two sites aren't critical to the quality of the study.

Interview scheme and interview situation

Our interview scheme was semi structured with questions leading in to larger areas of interest in relation to mobile phones and livelihood impacts. In addition to every start up question we decided which important areas that were to be covered within the timeframe of the interview. The interview questions are all thematic and based on our theoretical framework and arranged in order to achieve a good dynamic in the conversation and also to gain the confidence of the respondents. In order to make the respondents feel comfortable in the interview situation, we first informed them that their names would be treated confidentially. This leads to a higher reliability since the respondents hopefully don't fear being troubled and can speak more freely.

Theme:	Opening question:
Work situation:	Could you please describe your work as a fisherman?
Mobile phone:	Do you use a mobile phone?
Future use and trust:	Are you aware of other possible means of usage than voice and SMS?
Background:	Could you please describe your background and family situation?

Table 1. Condensed interview scheme. The full scheme is available in the appendix. (Own production)

One of us led the entire set of interviews and the other took notes. This arrangement was chosen to maximise learning benefits but also to keep consistency between the interviews in order to gain a higher reliability. We always asked the respondents if they agreed on recording the interviews on tape, all but one did. We offered the respondents monetary

payments of no kind but a soda or a tea after the interviews. These small talk sessions, after the interviews were officially closed, was often an opportunity to clarify uncertainties and validate interview findings.

As soon as possible after the interview, the members of the research team used the notes taken and the recorded tape to write an interview summary. Since the statements in the summaries would be in the words of our translator, we didn't include any direct quotes.

Method for categorisation and labelling

After all the interviews were executed we ended up with large amounts of data, in summary form. From this data, vital events had to be distinguished and those events had to be ordered and categorized to visualize connections between our findings and our theoretical framework. This process was performed in two steps. We started by deciding what events that are relevant in relation to our research purpose, mobile phones impact on livelihood. Both members of the research team performed this task individually and the events distinguished were then compared and merged into a final set of events. Since livelihood is such a wide concept, all activities that take in account mobile phone use were included.

Those events were then classified and labelled in accordance with the livelihood constructs presented in our theoretical framework. Namely, empowerment, opportunity and vulnerability to risk. To recapitulate the characteristics of the constructs we present them in a highly condensed form in the table below. (They are further elaborated in the chapter Mobile phones and livelihood – a theoretical framework.)

Opportunity	Empowerment	Vulnerability to risk
• access to market • access to resources	• participate in… • negotiate with… • influence… • control… • hold accountable… …institutions that affect their lives	• risk sharing • forming of strong family and social networks • working proactive

Table 2. Condensed scheme of our livelihood constructs (own production)

The labelling process is performed in the next chapter Presentation and labelling of empirical findings. There we discuss the categorization in connection with the presentation of the empirical findings.

4. PRESENTATION AND LABELLING OF EMPIRICAL FINDINGS

In this chapter we outline the empirical findings we have made during our fieldtrip to Tanzania. We first present a narrative interview with a fish boat captain. Our results are presented further in this chapter, in connection with the results we also label the findings with support from our theoretical framework. The labels that we use are the constructs defined in our theoretical framework, namely opportunity, empowerment and vulnerability to risk

In the box below we present an interview with a fish boat captain. It was conducted in Dar es Salaam. We present it in order to supply a thick description of the livelihood of a fisherman. It also provides a background to the empirical findings we present further on in this chapter.

Interview with Ahleem

Ahleem, is a 35 year old fisherman. He has been fishing for almost 20 years. For the last three years Ahleem has been working as a captain for a 14 member's crew. In their 20 meter long inboard engine boat they can stay out fishing for up to seven days. This is made possible since the boat is equipped with insulated ice storage for the catch. Ahleem is one of two captains for this particular boat and in advance to his shift out at sea he is in contact over the mobile phone with his boss who is also the boat owner. This contact is to schedule when they are going out and also a possibility to report if he is sick and therefore can't make it out fishing.

Prior to the trip they stock up on supplies needed, food, ice, diesel and such. The ice is bought from an ice broker to whom Ahleem places his orders over the mobile phone and then gets the deliveries to the boat. Prior to departure Ahleem also charges the mobile phone so that it will last during the whole stay out at sea.

Where they go fishing varies over the year but the fishing grounds are situated about ten hours boat travel away from Dar es Salaam. The fishing is conducted primary during night time and depending on where they are they use either lines for big fish or nets for small fish. The duration of the stay is limited by the ice but it is also determined by the situation at the

fish market. Ahleem receives market information continuously from his boss who is loitering at the market collecting information. Ahleem reports the status of the fishing and the owner either tells them to keep working or return back for selling depending on the current market situation. They always travel back to Dar es Salaam in order to sell the fish, for numerous reasons; the price is always the best there, the fishermen have their families there and access to supplies is the best there, Ahleem states. The amount of money Ahleem and the crew earns from a trip is directly connected to the price they get for the fish at the auction. The crew and the boat owner share the profit in two equal parts. When they are out at sea there is not always coverage, although Ahleem knows where to travel in order to find coverage in case he needs to communicate.

Ahleem tells us that he's not only in contact with the boat owner when out at sea. He also exchanges information with other captains he knows, mostly about where to find good catches. Although, it only happens in emergencies such as an engine breakdown, that he calls a friend out at sea that can tow them to shore where they can receive spare parts sent from the boat owner. Compared with the procedure before the mobile phone, getting attention by waving their shirts, this can save them several days. Another use for the mobile phone for Ahleem is to stay in contact with his wife and three daughters when he is out fishing.

Ahleem trusts his experience when it comes to forecasting weather, in stormy weather they seek a calm area and wait there. When they encounter bad weather Ahleem also makes sure to carry his mobile phone in a safe bag so that it does not get damaged. His previous phone was lost in the ocean and this is a risk that Ahleem is facing. The phone can also get stolen. This worries Ahleem since he has invested a large sum in the phone.

When Ahleem gets back to the mainland he delivers the catch to the fish market. When work is done, Ahleem luckily has his whole family living close to the market.

Ahleem is an assumed name

Below we present findings from our interviews. The findings are arranged according to when they occur; preparing for, during and after fishing. This structure is based on the life of the fishermen that roughly follows this cyclic pattern from what we have seen in our

research. When we asked the fishermen about their life and work as fishermen their narrations followed this pattern.

Use of mobile phones when preparing for fishing

Before going out fishing the fishermen need to make preparations. They arrange supplies, co-ordinate the departure time and collect information about the weather.

All of the fishermen in Dar es Salaam, just like Alheem, use ice to store the fish out at sea. The ice is brought to them from different agents working with companies who supply ice. The fishermen therefore never have any contact with the actual producer but with an agent whom the captain or in some cases the boss contact over mobile in order to appoint a time of delivery. In the era prior to the mobile phone the ice had to be ordered from a physical person working in the quay area. That person could be present or absent, and the ways to find him was to run around looking or waiting for him to come around. The other supplies are mostly collected locally, with no or small need of planning.

The big variation of the length of the fishing trips, from two up to ten days, makes it hard to schedule the next departure. This gives the crewmembers a need to co-ordinate the departure. This is achieved with phone calls from the boss who has an overview over the situation. In the era prior to the mobile phone the only possibility to gain this information was to meet in person at the market or another place. This shall be seen in relation to some of our respondents living 1.5 hour of travel away from the fish market in Dar es Salaam. If the captain or a crewmember is not in shape for going out fishing, it's also a possibility to call the boss and alert him of the situation. The boss then has the possibility to arrange with a substitute and the sick person does not have to travel or send a messenger to the boat.

The weather during the journey affects the fishermen greatly, and the importance of predicting and forecasting is essential. From our findings we have seen a low trust in mass media such as radio and newspapers, some fishermen use them but with a large amount of criticism. One respondent stated that the medias sometimes reports rain and it turns out to be sunny and vice versa. Instead they trust their own experience and skills in forecasting the upcoming weather. In addition the fishermen keep in contact with the

colleagues who are out at sea and can deliver reports of the present weather situation at the fishing grounds. This way the captain can get information he trusts and finds reliable.

Labelling of findings – preparing for fishing

The use of mobile phones has brought possibilities to co-ordinate activities and made information accessible with small regards to physical location. The coordination of ice deliveries and when to depart for the fishing grounds lead to increased opportunities since such a procedure can make resources (human and physical) accessible at the same time. For the individual to know more certain when to fish may also lead to grasping of opportunities, using the time not devoted to waiting or travelling to pursue other projects. It's also reasonable to assume that not always being on standby for fishing leads to a feeling of empowerment, knowing when to fish and when to have time off gives a greater control of ones situation. When the fishermen contact their colleagues out at sea to check on weather conditions they proactively reduce their vulnerability to weather shocks.

Use of mobile phones out at sea

In our mapping of the fish boat captains use of mobile phones out at sea we have identified four large fields. These four are; emergency situation, fishing locations, access to market information and family contacts. The first two areas are similar in both Dar es Salaam and Guta, while the latter two differs due to differences in local conditions.

As Ahleem states, and so do most of the other respondents, the mobile phones are highly valued when it comes to requesting assistance. Either for solving complicated problems with for example the engine or lost nets out at sea. All boats in Dar es Salaam have what the respondents refer to as an engineer in the crew who can solve simpler problems. The mobile phones are used when the problem exceeds the engineers capability, this could be in terms of complexity or lack of proper spare parts. In these situations the mobile phone are used to call for expertise or to arrange for a delivery of parts as in Ahleem's case when they can reduce the repair time by several days due to the use of mobile phones. These solutions should be contrasted with the situation prior to mobile phones when the fishermen in these cases had to wave their shirts and shout for attention from other boats passing by. When they got the attention from another boat the engineer could travel back

and forth to collect spare parts. The shirt waiving approach is though still used when the boat is in an area where there is no mobile coverage.

When the fishermen are out at sea their task is to find fish. When they were asked how they knew where to find it most fishermen mentioned two ways of deciding where to look for fish. First and foremost they use their experience to decide where to fish but as a complement and an extra resource they talk to other fishermen who have been out fishing recently or are out fishing for the moment. The mobile phone enables this kind of communication and enable information in real-time to flow out at sea. The respondents call other captains and receive information about where good catches have been found. The communication isn't limited to the boats within the same fleet; rather the captains prefer to call their friends prior to calling a boat with the same owner. In Dar es Salaam the captains also have regular contact with their boss who is highly involved in the fishing even though the level differs between the respondents. He can direct them to transfer from one area to another if he for example has gotten certain information in the quay area.

In Dar es Salaam the contacts with the boss or another trustworthy person operating in and around the quay area aren't primarily focused on information about good fishing areas. The main information that travels this way is the current price level at the fish market. The fish is sold in buckets and the price varies highly over time depending on basic economic principles of supply and demand. Between a good and a bad day the variations can be four times the price according to one respondent. Since both the boss and the fishermen have their income directly connected to this price level they all have a great incentive to deliver the fish when the price is best.

Even after the introduction of mobile phones the ice brought as coolant for the fish will melt. When the ice is about to completely melt the fishermen have no choice but to return, no matter the price level. This improvement in market information has therefore not totally removed the risk of making a loss on a trip the fishermen states but it has decreased greatly. Now they can choose to return with a half full boat and still make a profit compared to when they didn't have any price information and returned jam-filled back but made a loss due to bad market price combined with the perishable nature of the

fish. Many respondents stated that they now didn't have to rely on guessing, but could achieve reliable information. One of our respondents stated that his income has grown 30% since he got his mobile phone. No matter the stated numbers, this is an income perception shared among several captains.

The fourth main usage of the mobile phone is to keep contact with family. This is stated in both DSM and Guta and regards mostly wife and kids but in some cases grandparents and siblings as well. Several of the respondents points out the importance of contact with the family while he is working away from home. Other fishermen exemplified where the mobile phone have helped them; calling for a taxi when someone at home was sick or help from one's parent when the respondent had put himself in conflict with the law. This respondent had been caught by the police for illegal fishing. Through the mobile phone he got in contact with his parents who later convinced the police to release him.

Some, in our interviews less mentioned fields, where the mobile phone have had an impact on the fishermen out at sea are; the possibility to order new supplies such as ice with outgoing boats. The mobile phone has also given fishermen the possibility to know the price situation at different markets and the choice to decide where to sell the catch, though this was stated by only one fisherman.

Labelling of findings – out at sea

As can be seen from the examples depicted above, before the arrival of mobile phones it was only possible to exchange information face-to-face. When the fishermen are out of cover they still face the same situation even now though. But as many respondents state they know were to find coverage and if they get attention from another boat they can be towed to such a place and call for assistance.

The fishermen are vulnerable to risk out at sea. The weather can turn ugly fast or the engine may break down. Mobile phones provide a possibility to reduce vulnerability to risk by connecting the fishermen to sources of assistance i.e. their social network. In addition to reduced vulnerability to risks the use of mobile phones also provide a possibility to be more efficient, not wasting time out at sea waiting for spare parts or trying to shout for assistance. To use the time more efficiently can be crucial seen to the

perishable nature of fish, if the ice melts and the fish get warm, a market opportunity will be lost.

Fish boat captains have started to complement their experience with information obtained through mobile phones, this is happening both for weather information and where to find fish. Mobile phones have given an opportunity to access human resources holding information about where to find fish. What could only be decided through experience and qualified guessing can now be decided through informed decision making.

The greatest change that mobile phones have brought according to the respondents in Dar es Salaam is the possibility to access human resources holding information about the current market situation. Through this opportunity an option to base decisions of when to sell the fish on something else then experience has emerged. As the respondents state they could earlier only base their decisions on guessing, since face-to-face contact out at sea was scarce and market information out of date.

Through the mobile phone the fishermen have acquired the possibility to be present while absent. Earlier they were cut of from their wives and children for long periods having no possibility to communicate with them. With the help of a mobile phone the fishermen can play a part in decision making and supporting their families, they can participate in their family life. This has empowered the fishermen, but also made them less vulnerable to risk since mobile phones have given them a possibility to connect to their family network in hard situations. This is evident for example in the case of the fisherman who had been caught by the police.

As one respondent pointed out he chooses between different markets when selling the fish. Without the mobile phone this wouldn't be possible due to the time consuming activity of getting information from different markets. The volatile nature of fish prices in the auction markets made this process even harder. Now this fisherman has a possibility to make informed decisions about where to sell the fish, enabling him to grasp what he perceives as the best opportunities. Increasing the number of choices available can also lead to empowerment since the possibility to influence ones situation increases.

Use of mobile phones back at shore

In this part of the presentation of the empirical findings we address the events that take place when the boat lands and the fish are about to be sold, the contact with remote relatives and transfer of money over long distances.

The sale procedure for the two locations varies vastly. The fishermen in Dar es Salaam have a constant flow of regulated auctions to sell through while the fishermen in Guta need to communicate with the buyers and set individual deals. This in combination with the rural and remote location of Guta gives these fishermen a much more widespread use of mobile phones in the aftermath of the fishing. Since most of their catch is sold to agents who usually aren't at the landing site when they return, the fishermen use the mobile phone to call and arrange appointments for a pick up of the fish so that the fish don't perish at shore. The agents also state the price of the fish; the agent price is the price set by the factories plus an additional charge for the work of the agent. All fishermen told us that if they find the price too low they have the option to call directly to the fishery and receive the true price. This information gives them better possibilities to negotiate a fairer price. The fish they don't sell to the agent is sold locally, and also in association to this trade the mobile phone is very useful. The buyers can place a call and see if there are any fish to buy that day instead of travelling to the landing site which is about 30 minutes travel by bus away from the nearest larger town.

We have also identified a possibility to sell the fish directly through the mobile phone. This use was only mentioned by one respondent in the rural Guta but it's still very interesting to refer to. The captain and the buyer agree on a price and the buyer transfers the set amount in air-time credit[3] to the fisherman's mobile phone who in response arranges for a delivery of the fish to the town of the buyer. The respondent sent it to the nearest town about 15 km away. The air-time credit received was divided by the crew or transferred and thereby exchanged for money with other mobile phone users in the community.

As Ahleem stated in the interview one field of application for the mobile phone is to place a call in advance to a visit and in this way make sure that the friend is home.

[3] Air time are the credits available for communication for a mobile phone subscriber

Another common use that the respondents have mentioned is to call ones parents or relatives who are living far away. This should be put in contrast to a couple of days travel to a high cost in both expenses as well as lack of income. One respondent stated that he earlier had to pay bus fares 20 times the cost of a phone call and be on the road for two days to see his mother. Now he checks on her continuously through phone calls that cost a fraction and consumes a fraction of the time used to travel. He also states that he now has the option to choose when to go and see her instead of having to travel on regular basis no matter the conditions. If the parents don't own a mobile phone the solution is to call someone in the village and get information about their health situation or arrange a time when to call back.

Mobile phones are also widely used to check up on money transfers done to or by relatives living far away. These money transfers are often made by bus or post since money transfer agencies, like Western Union are too expensive.

Labelling of findings – back at shore

In the rural location Guta, it can be seen that mobile phones have a large impact on the aftermath of fishing. Mobile phones give an opportunity to co-ordinate activities and thereby bring efficiency. The possibility to communicate with customers leads inevitably to lower transaction costs. The advanced use of air-time for fish selling as presented by one respondent is a way to address the poor road conditions in Tanzania by letting the goods travel on their own, saving time for other opportunities.

The possibility for the fishermen in Guta to contact the fish factories and receive information about current price levels gives them a possibility to negotiate better with the agents. This balances their power asymmetric relationship and empowers the fishermen.

Mobile phones have brought an improved possibility to communicate with family and friends over large distances. This was earlier only possible through time consuming letters and travels. This improved communication has a social aspect but also a function of seeking support, for example in form of monetary funds from relatives. This reduces vulnerability to risk by making funds accessible in emergency situations.

The respondent that today decides by himself when to travel and when not to has gained a larger influence on his own situation and on the same time gotten a possibility to use the time to access other resources, e.g. through fishing.

5. A DISCUSSION ON MOBILE PHONES AND LIVELIHOOD

In this chapter we link our empirical findings to the argumentation presented in our theoretical framework. We first summarize the labelling that we performed in the previous chapter. We thereafter outline positive and negative impacts on livelihood caused by mobile phones as well as links to a broader livelihood concept. The chapter is finished by a discussion on future impacts that can be derived in relation to mobile phone use and livelihood.

Positive impacts on livelihood caused by mobile phone use

From the categorization made in the previous chapter we can see clear evidence that mobile phones have an impact on the livelihood constructs opportunity, empowerment and vulnerability to risk. Increased access to information, the basic function provided by mobile phones, leading to greater possibilities to grasp opportunities. It empowers our respondents and reduces their vulnerability to risks. We summarize the labelling process from the previous chapter in the table below.

	Opportunity	Empowerment	Vulnerability to risk
Preparing for fishing			
Getting deliveries of ice	x		
Coordinating departure	x	x	
Weather information			x
During fishing			
Emergencies	x		x
Finding fish	x		
Obtaining market information	x		
Contact with family		x	x
After fishing			
Fish collection	x		
Call factories		x	
Selling via mobile phones	x		
Contact with distant relatives			x
Money transfer		x	x

Table 3. An overview over areas of fishermen livelihood that are affected by mobile phone use, structured according to the livelihood constructs opportunity, empowerment and vulnerability. (own production)

In our theoretical framework we presented research results about mobile phones and livelihood that stated that mobile phones have great value for social networking and for reducing vulnerability to risk. This is a discovery that we find support for in our results. That research stated further that mobile phones are perceived to have mixed economical value, being more valued for saving than for earning money. In our research we show evidence that mobile phones have an impact in grasping opportunities that lead to higher income. This can clearly be derived from the table above. This partly divergent result is probably affected by our selection of respondents. Our respondents were chosen on the premise that they were involved in economical activities; the respondents in the Souter et

al. (2005) sample were randomly chosen, mixing people performing subsistence activities with persons performing economical activities.

Negative impacts on livelihood caused by mobile phone use

Our research has shown mainly positive impacts on livelihood due to use of mobile phones. A valid question to further address is therefore what negative impacts mobile phones might bring to the livelihood of our respondents. None of our respondents have stated explicitly that there are negative impacts of mobile phones on livelihood. Our theoretical framework can though help us derive potentially negative areas.

One issue that the respondents mentioned was the increased risk that comes along with the possession of a mobile phone. Mobile phones are both fragile to climate factors and attractive for thieves. Large amounts of capital are being deployed into the mobile phone, both when purchasing it and when uploading air-time credits. This capital could be used as a buffer in harsh times for reducing vulnerability. The fishermen do take measures in order to reduce these risks, safe storage out at sea for example, but still live with the risk of losing it into the water or breaking it by incautious handling. Mobile phones can therefore bring negative impacts on livelihood. It can reduce the free capital accessible in harsh times and therefore increase vulnerability to risk. Mobile phones are though rather easy to sell in order to release capital, but most likely this will incur a loss. It can also result in perceived increase vulnerability to risk of losing the artefact. These are negative impacts that can be generalised to poor people in many contexts.

We have earlier argued in favour of the higher empowerment brought along by mobile phones. This empowerment can though be ambiguous since mobile phones can both be used to control and gain information about external factors but also for others to pose control over the respondent. When the respondents state that mobile phones have given them access to market information they also state that the source of this information is their boss with whom they stay in contact on a regular basis. The boss can thereby use the mobile phone to prolong his control over the fishermen. This can have a contra working effect in relation to the empowerment of the fishermen. One example could be that the boss can force the respondents to stay out at sea in situations where they would have

returned back to shore otherwise. None of the respondents have though indicated that this is a problem.

Links to a broader concept of livelihood

As we discussed in the theoretical framework livelihood is a complex concept that comprises many interrelated factors. We can see evidence in our research that there are relations between our non-monetary livelihood constructs and monetary livelihood status indicators. There are also relations between the constructs themselves. The grasping of opportunities that mobile phones have enabled lead to a perceived higher income, both through larger catches and through larger revenues.

The information made available gives the fishermen a possibility to reduce price fluctuations of the fish markets. This reduction in fluctuations leads to a steadier and more predictable income flow which in turn gives a better foundation for accumulating financial resources that may reduce vulnerability to external shocks. Mobile phones reduce risks for example through facilitation of information acquiring related to weather. Mobile phones also provide a possibility of knowing that one can request help in emergencies. When the fishermen perceive risks as lower, it's reasonable to assume that their attitudes towards pursuing opportunities change. Gaining information about different market opportunities, lead to higher empowerment since the numbers of choices become larger. These interrelated relations are countless and can be illustrated in a figure.

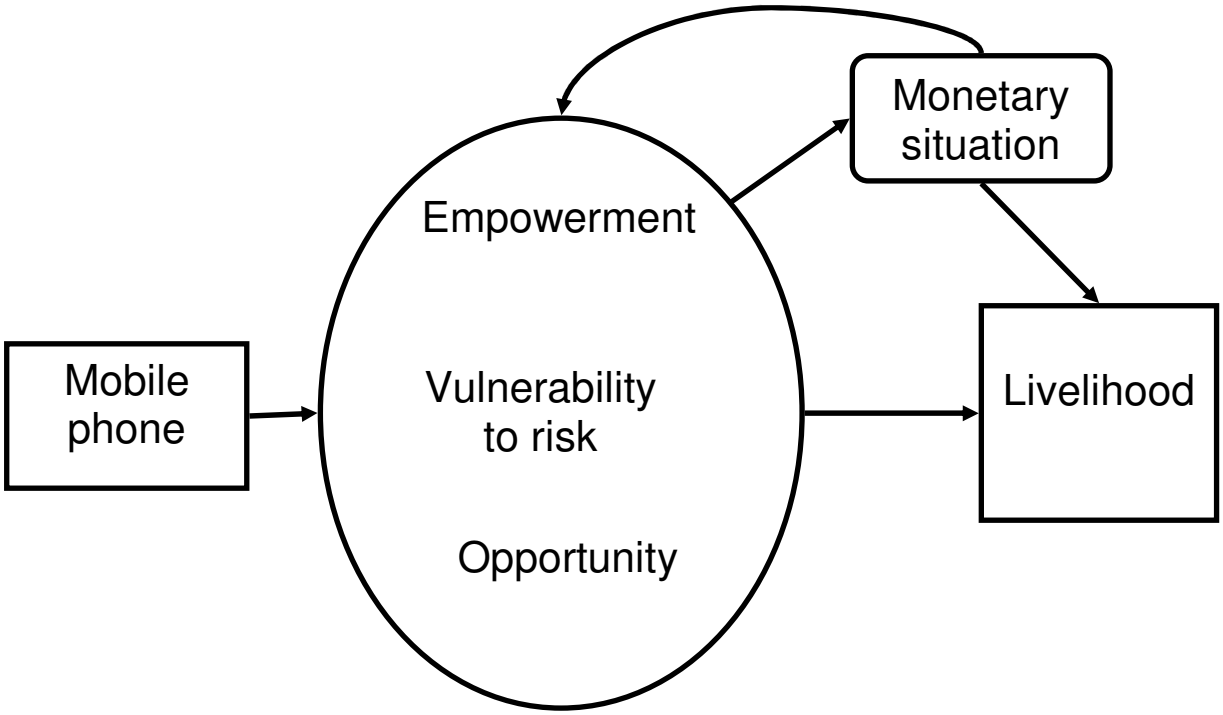

Figure 2, Mobile phone related constructs in relation to monetary situation and livelihood issues. (Own production)

Our findings emphasize and strengthen the value of non-monetary livelihood constructs when trying to understand the underlying factors behind the mobile phones impact on livelihood.

How can mobile phones affect the fishermen in the future?

As can be seen from the charts in the theoretical framework the mobile phone penetration in Africa has increased tremendously in the previous years but it is still moderate. In addition to this the artefact has not been around for long. From what we can see mobile phones have brought no organizational changes to fishing. The buyers are in large still the same as before and the work of the fish boat fleet are organised in the same way as before. A reason for this can be that technical artefacts diffuse fast but organizational patterns change slowly. We have seen that mobile phones lead to higher coordination in the fishing selling chain. Yet no evidence for cutting links in the chain has occurred. We have for example seen no example of forward selling even if the fishermen in the Lake Victoria region already are in contact with the fish factories on a regular basis. Nor in Dar es Salaam has evidence of forward selling or backward integration occurred in our research. There are several middlemen in the chain both in forward direction and in backward. When the fishermen get access to the same information and become more

empowered this might lead to more efficient selling chains and higher profits for the fishermen. When the gap between technical artefact diffusion and organization change will be narrowed interesting changes in livelihood might be realised.

Recommendations for further research

We will in this section outline some areas that can further improve the understanding of mobile phone impacts on livelihood.

The results of this study are to some extent bounded to the fishermen at our research locations. To reach a higher understanding of the study field and achieve a higher external validity for the results it can be fertile to examine whether similar results can be found in other places and/or during different circumstances. We therefore recommend conducting further studies with similar approach, mobile phone use in contrast to our variables, opportunity, empowerment and vulnerability to risk, but in other contexts. This could be executed by studying fishermen in other parts of the developing world or by shifting to another study group.

In our study we have looked at the fishermen in a rather isolated manner. To regard the whole supply chain can also be fertile. Therefore we recommend studying boat owners, fish buying agents etc. This knowledge could then be used to see where mobile phone use could lead to organizational changes like shortening of the supply chain or making the links work even more efficient. As we have discussed earlier in this report, cutting out the middlemen might improve the profits of the fishermen.

Another topic we have found interesting is how the introduction of mobile phones has changed the livelihood for the families of the fishermen. Have the perceived increase in income for the fishermen led to a general improvement of situation of the families? Or has it only increased the revenue of the business?

In this study we have outlined areas where mobile phones have an impact on livelihood. This has been done through a qualitative interview method. To execute a quantitative study with an aim to reach statistical generalizations can also increase the knowledge base about mobile phones and livelihood.

6. CONCLUSIONS

The newly acquired possibility to own or access a mobile phone has brought radical changes to the way Tanzanian fishermen communicate, receive information and support decision making. Before the advent of mobile phones, fishermen had extremely small possibilities to communicate with others while out at sea. They were literally cut off from all activities that affected their livelihoods but fishing and the current weather. Even at shore their possibilities to communicate were restricted to communication in person or through letters.

The improved access to information that mobile phones carry have resulted in changes in all the livelihood status indicators that we set out to investigate. The fishermen have become more empowered due to access to information about choices that affect them and acquired a better possibility to negotiate with institutions that affect their lives. They can also enjoy the possibility of being less vulnerable to risk since they can request assistance in times of trouble as well as work more proactive e.g. knowing the weather out at sea in advance. They have also gotten a possibility to participate and play an active role in their family network and be a part of decision making while out at sea. Increased access to market information raises the amount of opportunities available. Those changes are mainly positive and lead also to a perceived higher monetary income for the fishermen. Depending on the use of this higher income, it may in turn reinforce the livelihood indicators we focus on.

From what is known today there is no diminishing in the rate of mobile phone subscribing in Africa. This along with the fact that mobile phones hasn't been around for long makes the future interesting. Will mobile phone use bring organizational changes to fishing and other activities in the future?

Gaining access to information that is reliable and up-to-date, may it be through mobile phones or other means, is highly important in relation to livelihood issues. This is true for Tanzanian fishermen and most likely also for other people in the developed and the developing world, since we all share the same need to communicate.

7. REFERENCES

BBC News, (2005, July 22). Mobile Phones boom in Tanzania. *BBC News World Edition.* Accessed 2007-01-04 from http://news.bbc.co.uk/1/hi/programmes/click_online/4706437.stm

Bosco, J. (2005). *Multidimensional Poverty in Senegal: A Non-monetary Basic Needs Approach.* Accessed 2007-01-13 from http://132.203.59.36:81/Group/papers/papers/PMMA-2005-05-eng.pdf

The Economist, (2005). *The Real Digital Divide.* Accessed 2007-01-04 from http://www.economist.com/opinion/displayStory.cfm?story_id=3742817

Fafchamps, M. (1999). *Rural Poverty, Risk and Development.* Accessed 2006-12-12, from http://www.economics.ox.ac.uk/members/marcel.fafchamps/homepage/fao3.pdf

The Food and Agriculture Organization of the United Nations (2003). *"e-Agriculture" A Definition and Profile of its Application.* Accessed 2007-01-04 from http://www.fao.org/rdd/doc/e-agriculture%2014-10-051.pdf

Gray, V (2005). *The un-wired continent: Africa's mobile success story.* Accessed 2007-01-05 from http://www.itu.int/ITU-D/ict/statistics/at_glance/Africa_EE2006_e.pdf

Information for Development Program (2003). *ICT for Development. Contributing to the Millennium Development Goals.* Accessed 2007-01-12 from http://www.infodev.org/en/Document.19.aspx

Information for Development Program (2006). *About infoDev: Overview.* Accessed 2007-01-04 from http://www.infodev.org/en/Page.About.html

ITU Telecom Africa, (2004). *Africa's Booming Mobile Markets: Can the Growth Curve Continue?.* Accessed 2007-01-04 from http://www.itu.int/AFRICA2004/media/mobile.html

Kaplan, W. A. (2006, May 23). Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries?. *Global Health.* Accessed 2007-01-03 from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1524730

Lustig, N. & Stern, N. (2000 Dec). Broadening the Agenda for Poverty Reduction: Opportunity, Empowerment and Security. *Finance & Development.* Accessed 2006-12-12 from http://www.imf.org/external/pubs/ft/fandd/2000/12/lustig.htm

Lawrence, P. (2005). Explaining Sub-Saharan Africa's Manufacturing Performance. *Development and Change, 36,* 1121-1141.

Lundahl, U. & Skärvad, P-H. (1998). *Utredningsmetodik för samhällsvetare och ekonomer.* Lund: Studentlitteratur

Maxwell, S. (1999). *The Meaning and Measurement of Poverty.* Accessed 2007-01-04, from http://www.odi.org.uk/publications/briefing/pov3.html

McNamara, K. S. (2003). *Information and communications technologies, poverty and development: Learning from experience.* Accessed 2006-12-14 from http://www.infodev.org/en/Document.17.aspx

Narayan, D. (2005). Conceptual Framework and Methodological Challenges. In D. Narayan (Red.), Measuring Empowerment: Cross-Disciplinary Perspectives (s. 3-38). Washington: The World Bank.

Neely, C & Sutherland, K & Johnson, J (2004). *Do Sustainable Livelihoods Approaches Have a Positive Impact on the Rural Poor? A look at twelve case studies.* Accessed 2007-01-04 from http://www.fao.org/docrep/008/j5129e/j5129e00.HTM

Norman, R. (1970). *Personal Quest for Methodology.* Stockholm: Scandinavian Institutes for Administrative Research.

Quibria, M. G. & Tschang, T. & Reyes-Macasaquit, M. (2002). New Information and Communication Technologies and Poverty. *Journal of the Asia Paci.c Economy. 7,* 285-309

Sen, A. (1993). Capability and Well-Being. In M. Nussbaum & A. Sen. (Red.), The Quality of *Life* (s. 30-54). Oxford: Oxford University Press

Sen, A. (1999). *Development as freedom.* Oxford: Oxford University Press

Sen, G. (1997). *Empowerment as an Approach to Poverty*, Accessed 2006-12-14, from http://www.globalhealth.harvard.edu/hcpds/wpweb/97_07.pdf

Souter, D. & Scott, N. & Garforth, C. & Jain, R & Mascarenhas, O & McKemy, K (2005) *The economic impact of telecommunications on rural livelihoods and poverty reduction.* Accessed 2006-08-14, from http://www.cto.int/downloads_programmes/kar8347.pdf

Tanzania Communications Regulatory Authority (2006). *Market statistics: Telecommunication.* Accessed 2007-01-03 from http://www.tcra.go.tz/Market%20info/statsTelecom.htm

United Nation Development Programme (2006). *Facts on Poverty in Africa.* Accessed 2007-01-02, from http://www.africa2015.org/factspoverty.pdf

United Nations High Commissioner for Human Rights (2006). *Poverty.* Accessed 2007-01-04 from
http://www.unhchr.ch/development/poverty-02.html

Vodafone (2005). *Africa: The Impact of Mobile Phone* [Policy paper]. Accessed 2006-08-14, from
http://www.vodafone.com/assets/files/en/GPP%20SIM%20paper.pdf

Washington Post, (2006). *For India's Traditional Fishermen, Cellphones Delivers a Sea Change.* Accessed 2006-12-08 from
http://www.washingtonpost.com/wp-dyn/content/article/2006/10/14/AR2006101400342.html

Waverman, L.& Meschi, M.& Fuss, M (2005). *The Impact of Telecoms on Economic Growth in Developing Countries.* Accessed 2006-12-15 from
http://web.si.umich.edu/tprc/papers/2005/450/L%20Waverman-%20Telecoms%20Growth%20in%20Dev.%20Countries.pdf

The World Bank (2001). *World development Report 2000/2001, overview.* Accessed 2006-12-13, from
http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/overview.pdf

The World Bank (2002). *What is Empowerment?.* Accessed 2006-12-19, from
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTEMPOWERMENT/0,,contentMDK:20272299~menuPK:546167~pagePK:148956~piPK:216618~theSitePK:486411,00.html

The World Bank (2006). *Poverty Measurement and Analysis.* Accessed 2006-12-14 from
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPRS/0,,contentMDK:20177055~pagePK:210058~piPK:216618~theSitePK:384201,00.html

The World Factbook (2006). *Tanzania.* Accessed 2006-09-27 from
https://www.cia.gov/cia/publications/factbook/geos/tz.html

APPENDIX

Informed consent and short presentation of study background

Work situation:
Could you please describe your work as a fisherman?
Important areas/issues to cover in this section:
-locations of fishing, selling, home
-suppliers and customers (long/short terms relationship and other variables that affect, market info)
-payments (cash, credit, bank account, how check on payments, safety)
-income, expenses, savings
-size of boat, ownership, financing of equipment
-years in the business
-weather info, tide info
-emergencies

Mobile phone:
Do you use a mobile phone?
Important areas/issues to cover in this section:
-ownership, financing of equipment
-first impression, when?
-with whom do you communicate (SMS, voice, data)
-spending
-charging of batteries?
-quality of service, easy to get in contact with operators?

Future use and trust:
Are you aware of other possible means of usage other than voice and SMS?
Important areas to cover in this section:
-is there a possibility of transferring air-time today? (use as payment, send money to relatives)
-Is it possible to reconvert air-time to cash?
-How do you feel about putting money on the phone? Is it safe?
-Inhibiting forces on your use, solution according to you?

Background:
Could you please describe your background?
Important areas to cover in this section:
-age
-family (do you send money, why, how, to whom)
-origin
-spoken languages
-level of education
-how many to provide for