CHAPTER 3

THEORETICAL FRAMEWORK

3.1 THE BIG ICT4D DEBATE

In this chapter, the role of ICTs for development is discussed. This situates the current thesis within the disciplinary interest of communication for development or development communication. The last two decades has shown exponential growth in literature on ICT4D yet the contribution of communication discipline is very limited in this field. Raiti (2006) observes that media studies have focused on the debate over de-westernization of dominant Anglo-American models of communication and has consequently neglected developing countries, where some of the most important initiatives on mobile for development are taking place. This may be why ICT4D literature draws more upon development studies than upon media studies (Lardner 1993; Wiseman 1995, 1996; Dibie & Agiri 2001; Harrison 2002; Neto, Niang & Ampah 2005; Ukaga 2005). However, the current thesis should be situated within the larger debate on the role of technology in society.

Several segments in developing countries are struggling with varying degrees of success to attain socio-economic development. As ICTs spread in the developing countries, the question about their contribution to the development process has become an issue of much concern. A great deal has been written about ICTs being a critical resource for the promotion of socio-economic development (Munasingh 1989; Mansell et al 1996; Bhatnagar & Schware 2000). Gupta (1981) echoes this optimism as early as 1981, when he writes that: It is now an accepted fact that there are various areas in a
developing country where the pace of development can be speeded up significantly by the use of computers. This thesis makes an attempt to relate mobile advisory adoption with that of the resulting impact from the perspective of choice framework proposed by Kleine (2013) in her book *Technology as Choice*. The United Nations Centre for Regional Development (UNCRD) has pursued this line of argument by examining the potential of microcomputer-based applications for third world regional development programmes (UNCRD 1988).

ICT4D as a field of inquiry has benefited from the insights from previous debates over technological determinism and social shaping. For example, very few scholars maintain that ICTs are "panacea" for developmental problems, despite the substantial hyperbole surrounding aggressive promotion of ICTs. The context of debate over the role of new ICTs are taking place under very different circumstances with rapidly growing demand, especially from the poor communities themselves. The social and institutional shaping of technologies is not contested anymore.

The World Development Report Knowledge for Development (1998/99) has stressed the importance of ICTs for building a knowledge-based society. Rahim and Peennings (1987) provided a number of examples of the ‘rhetoric of computerization’. The same ideas are also echoed in developments related to the internet (Bedi, Singh & Srivastava, 2001).

This enthusiastic attitude towards ICTs for development bears a strong resemblance to the dominant paradigm of the 1950s and 1960s. The dominant paradigm saw backwardness as the first stage of development which should be followed by a process that realized the forces of modernization. Different stages of development were just different points on a continuum, ranging from the least developed to the most developed countries (Servaes 1996).
The Modernization model was, however, rejected due to its inadequacy and inability to explain the phenomena in the development process. The model was criticized for being top-down, assuming a linear view of communication and blaming the victim for lack of development. Modernization was equated with westernization and ‘delivery of information’ was seen as sufficient for development. The 1970s and 1980s saw the emergence of alternative paradigms such as the dependency theory and participatory approaches which not only questioned the dominant paradigm but also developed a receiver-oriented, bottom-up perspective. These perspectives emphasized the need to bring structural changes in society (Melkote & Kandath 2001).

Despite these developments, the rhetoric of the dominant paradigm and modernisation model seem to dominate the ICT strategies in many developing countries and has remained the driving force behind building an ‘information society’. From de Salvo (2013) diffusion of innovations is still a common theme in technology research nowadays, as Orlikowski and Iacono (2001) argue. This perspective has proved to be an important modernization approach in the communication for development field since it also relies on technology transfer to achieve improvements (Melkote & Steeves 2001).

Drawing on Morandé (1984) and Garcia de la Huerta (1992), Escobar (1995) points out that technology, it was believed, would not only amplify material progress, but it would also confer upon it a sense of direction and significance. In the vast literature on the sociology of modernization, technology was theorized as a sort of moral force that would operate by creating ethics of innovation, yield, and result. ICT, thus, contributed to the global extension of modernist ideals. Leye (2007), Mansell (2011) and Nulens (2003) have been arguing that there is a renewal of this same modernization paradigm where ICT4D programs and discourses are concerned.
3.2 META-THEORETIC FOUNDATIONS OF ICTS

Everret Rogers (1996) presents four visions of technology and their implications for society. The popular narrative pitches two versions of new technologies, one that takes an optimistic view of technology as the solution to human problems and pessimistic view of technology as a source of problems. Beyond this, there is the neutral view of technology that holds that technology does not carry intrinsic value. Its effects on society depend on its use whether it is deployed for positive or negative purposes. Rogers goes on to outline a fourth perspective which makes the case for contingency approach of how technology design, use is shaped by the social-cultural, political contingencies that ascribe to technology a malleable set of values. This debate criss-crosses with the discourse of technological determinism and social shaping perspective (Williams 1996).

The deterministic view of technology is considered to be the dominant paradigm and represents a cluster of ideas about technology-society interface. This perspective holds that technology determines the structure of the society. The influence of technology on society is powerful, widespread and inevitable. The social shaping theorist on the other hand argue that social factors shape the outcomes of technology.

These fundamental questions are now being rehashed in the context of mobile phone and its impact. The high expectations of mobile phones contribution to development is also matched by cautionary tale suggested by historical experiences with new media. However, there is a crucial difference between earlier forms of ICTs and the newer versions.

Firstly, mobile phones have reached a greater number of socially and economically disadvantaged sections than other comparable technologies. Despite having high hopes, computerization, and desktop-based internet
telecentre models have had only limited reach. In many cases, they have been a failure.

Secondly, new ICTs are relatively more portable, accessible and affordable. One implication of these features is that new ICTs like mobile phones are demand driven, a demand coming from the "bottom of the pyramid" (Praklad 2004).

Thirdly, with a need for minimal or no literacy skills, mobile phones have taken a bottom-up trajectory, unlike the previous top-down version (Donner 2008). At a more scholarly level, studies of new ICTs have taken place within the context of debate over the four approaches of utopian, dystopian, neutral and contingency perspectives (Rogers 1986).

The contingency of social, cultural and historical context has also become an accepted part of realities of ICTs. The key debate today centres around the question of mechanisms that enable or constrain the opportunities opened by new ICTs.

Thus, there is considerable skepticism regarding the impact of ICTs on developing countries. This skepticism is also not new. In an early work on computers, Lind (1986) questions whether the promise of the benefits of information technology are nothing but a myth and argues that unrealistic expectations of information technology have led to the perceived failure of the systems. While there has been an intensive debate on the potentials of ICT for developing countries, we are yet to understand fully what hampers their use.

The role of ICTs has fuelled a debate among optimists envisaging the positive role of ICTs for transforming poverty in developing countries and skeptics who believe that new technologies alone will make little difference
one way or another, and pessimists emphasize that digital technologies will further, exacerbate the existing divide (Norris 2001).

To understand this mechanism, we need to develop a framework for conceptualizing the key aspects of ICT4D, especially the idea of development, which is the core and the goal of social interventions.

A closer look at the present Internet usage in many developing countries reveals considerable uncertainty as to the real achievements and benefits. However, the growth of mobile phones has renewed interest in using technology for development, primarily because of its high reach amongst the poor and vulnerable sections of the population (relative to other media and ICTs), its affordability, accessibility, utility and relative ease of use.

3.3 DIFFUSION OF INNOVATION AND MOBILE SERVICES ADOPTION-ICT4D AS A VARIANT OF DOMINANT PARADIGM OF COMMUNICATION

Within the field of communication for development, diffusion of innovation model is conceived as an artifact of dominant paradigm and relegated to theoretical backyard (Escobar 1998, Colin Sparks 2007, Servaes 2008).

However, the model has gained tremendous reaction within other disciplines (for example computer science, management). Further, some of the central ideas from diffusion model has been incorporated and even superseded by ideas drawn from theories of complex systems and social network models of communication (Rogers 2003). ICT4D approaches have sought to frame communication from a "multi-track perspective" that integrated insights from participatory communication models (Mefalopulos 2008).
The rapid growth of new information and communication technologies has renewed interest in diffusion models and their variants. Theories of critical mass, viral content circulating online, spreadability of social information has found significant thrust in recent scholarship on new social media of communication. For example, Technology Acceptance Model (TAM) by Davies (1989) has identified several determinants for acceptance of mobile technologies. As mobile phones are widely diffused, the attention has shifted to patterns in use and adoption of various services and applications and the competence with which these are deployed by individuals.

One of the central ideas that has been of interest in the research on mobile is the question of diffusion and adoption process. While the diffusion of mobile phones has been rapid in many developing countries, we could expect the rate of adoption differs on various characteristics – both at the individual as well as social positions. In evaluating the impact of mobile advisory we need to take into account the stage of mobile adoption. Innovators and early adaptors are likely to show differential impact not only because of the intensity of usage but due to the kinds of services they use at different stages of adoption.

The ICT4D approach can be seen as a variant model of dominant paradigm-it translates the ideas of vital modernity-technology support to practical actions aimed at improving the conditions of vulnerable people and their communities, similar to health communication as argued by Colin Sparks (2007).

3.4 KNOWLEDGE LEVELS AND GAPS AS COMMUNICATION EFFECT

Different macro-level factors that have an impact on ICT application and usage in the context of developing countries have been
observed. Would large-scale adoption of ICTs exacerbate these factors among potential users? Early attempts to answer these questions lead to the issue of knowledge gap thesis which argued that far from alleviating disparities, the overall impact of ICTs is likely to be widening the gap between the information rich and information poor (Viswanathan & Finnegan 1996). New ICTs may, in fact, have an overall effect of increasing the information gap (Norris 2001; Loader 1998).

Many scholars have examined the knowledge, information and infrastructure gaps between developing and industrialized countries as well as within developing countries (Norris 2001). They have pointed to the emergence of the ‘new underclass of the information poor’ and ‘zones of silence’ regions that are geographical, socially and economically outside the digital space.

The UNCSTD Working Group Report (1998) notes that ICTs can make a distinctive contribution to sustainable development but this opportunity will be accompanied by major risks. For example, least developed countries face enormous risks of exclusion because they often lack the economic and social capabilities needed to take advantage of innovations in ICTs. This difference in “knowledge-gap” is attributed to a number of factors, specifically social structure of the society in which the information flows. The likely effect would be to increase the power of those in control, increase centralization and provide more wealth to the already rich. ICT-based systems will differentially benefit the resource rich (large corporations and government) and the resource poor (small business and non-profit organizations).

The importance of knowledge for development is clearly captured in the foreword of the World Development Report (1998/99): “Because knowledge matters, understanding how people and societies acquire and use
knowledge—and why sometimes they fail to do so—is essential to improving the lives of the poorest.” The report adds that “Poor countries—and poor people—differ from rich ones not only because they have less capital but because they have less knowledge.

While acknowledging that knowledge is costly to create, the World Development Report, (1998/99), argues that people are poor because they lack knowledge. However, Wilson & Heeks (2000) point out that the reverse might also be true - people lack knowledge because they are poor. Poverty and social exclusion mean poor people are also deprived of their ability to access, assess and apply knowledge, particularly those available through new ICTs.

While it is clear that knowledge and information are critical resources for development, there are many constraints placed on applying ICTs for poverty alleviation. In attempting to examine these questions a few scholars have drawn attention to the constraints that exist for the poor to harness the potential benefits of ICTs. The works of the Richard Heeks and others, Melkote & Steeves (2002) identify the following constraints: constraints in accessing technology, constraints in assessing technology, and constraints in evaluating information, constraints in applying/using information.

3.5 ICT COMMUNICATION FOR DEVELOPMENT FRAMEWORK

The neglect of communication perspective in the field of ICT4D and the neglect of ICT4D in mainstream communication and media studies have been identified. This is remarkable given that communication and media studies have been engaged with technologies of communication from its inception as a discipline (Rogers 1994). Samarajiva & Kapugama (2015)
provide a critical overview of mobile communication studies from the broader ICT4D approach. Their work highlights the contribution of communication for development discipline to the studies on M4D and ICT4D focusing on economic impacts as well as social impacts such as health and disaster early warnings based on mobile communications. C4D perspective on ICT4D holds that communication is critical for development, but their role is complex and subtle. Far more than a model of the social process, communication is a perspective to analyze social reality.

From the communication perspective, human actions are seen as the process by which persons collectively maintain and create "social reality." Human beings simultaneously live in a symbolic universe (social reality) and are engaged in sequences of interactions with their environment and with other people. They actively strive to create coherent "stories," drawing from the resources of their social reality and from the practices in which they are engaged with others. They tell themselves stories that explain and guide their performance in practices, and they enact stories that exemplify and "test" their resources (Narula & Barnett 1986).

Heeks & Molla (2009) identify communication for development as one of the key approaches for studying the impact of ICTs. Mass communication researchers, especially those focusing on information and communication campaigns have been found to be the most relevant to study the impact of ICTs. In this approach, communication interventions are considered as independent variables having a causal influence on the outcome variables, moderated by contextual factors. ICT4D value chain as suggested by Heeks & Moola (2009). It can be seen as a variant of the dominant C4D models, used widely in fields such as health communication. Mobile advisory is conceived with communication intervention.
In an emerging scenario, fisheries in Tamil Nadu have become more complex calling for coordination with multiple agencies and actors. These factors have made content creation and design just as important as the delivery and effects of messages. The need for highly contextualized, situational information such as OSF, and PFZ are preferable than more generalized content about "awareness creation" for some common issues. Fisherfolk demand access to varied kinds of messages. Timeliness and accuracy are features that are necessary for adoption of platforms that support these services. Developing messages that are situationally appropriate, just-in-time, require investment in human, social and economic resources. Fisherfolk prefer short messages that are highly credible and delivered at the point of decision-making.

To cater the needs of the fisherfolks, mobile advisories need to be developed with an understanding of the socio-demographic, economic and occupational roles and activities of fisherfolk. Scheduling and notifications are important models of delivery for fisherfolk. Special attention needs to be paid to marginalization and vulnerabilities at local levels – the relative positions of fisherfolk within their communities. The socio-economic divides are just as critical for micro-community levels while projects are large projects to address digital divides (like e-governance initiatives).

There is a need to study the characteristics and profile of fisherfolk to better understand their information needs, vulnerability levels, and coping strategies. From ICT4D perspective, the fundamental question that arises is: what type of information does different fisherfolk need for improving their livelihood? A design based on formal needs assessment should also be flexible to accommodate emerging information needs. Many fisherfolk do not know, for example, that information on PFZ is available. These might not be visible informal needs assessment, but might be significant for fisherfolk -
especially the small boat owners. Most impact studies build on the idea that information needs are identifiable in terms of gaps in awareness, knowledge, attitudes, practices and resources experienced by the participants.

3.6 ICT4D VALUE CHAIN

Most studies and models of ICTs including capabilities approach do not take into account different levels of analysis. At macro level, impact could indicate the social system wise influence of ICTs. Here ICTs are typically operationalized in terms of country level analysis. Indicators include countries’ ICTs penetration, subscriber base etc. At meso level, impact could be analyzed in terms of community – How ICT adoption aggregate to communities or sub-regional units. At the micro level, the impact could be understood in terms of ICTs impact on household or individual levels. What we are dealing with is human use of ICTs and its consequences, invidiously-micro level analysis. Heeks (2001, 2005) provides a framework based on information value chain. The chain begins with the message which flows to the users through the ICT platform, which acts as a channel or the medium. Heeks & Molla (2009) in a collection of approaches to study the impact of ICTs distinguish between three levels of impact: outputs, outcomes, and developmental impact. They define these terms as:

1) Outputs: the micro-level behavioral changes associated with the ICT4D project.

2) Outcomes: the specific costs and benefits associated with the ICT4D project.

3) Development impacts: the contribution of the ICT4D project to broader development goals.
Heeks & Molla (2009) observe that interest in assessing different aspects of the ICT4D value chain has changed over time, with the strong diffusion of ICT4D projects now creating the most particular interest in assessment of impacts, as opposed to uptake, availability or readiness. In this compendium, the main focus is on assessment of impacts rather than on other value chain stages.

Heeks & Molla (2009) builds on a standard input—process—output model to create a sequence of linked ICT4D resources and processes. It is divided into main targets for assessment—efficiency, effectiveness and equity. Studies on validation of PFZ and OSF for example are related to questions over efficiency or outputs. Studies on market information, profitability are related to effectiveness or outcomes. Studies dealing with equity are primarily concerned with development outcomes.

Levels of ICT activities suggested by Heeks & Molla (2009) can be mapped onto the fisher communities in Tamil Nadu.

3.7 READINESS – 1998-2004

For Heeks & Molla (2009), "e-readiness" assessment typically measures the systemic prerequisites for any ICT4D initiative e.g. presence of ICT infrastructure, ICT skills, ICT policies, and so on. One could also assess the strategy that turns these precursors into project-specific inputs, and the presence/absence of those inputs. Readiness involves awareness of ICTs and its services and the ICT infrastructure. Historically, the main concern here has been with the digital divide, which is operationalized as access divide. Commercial cellular operators have been installing mobile towers along coastal region to increase coverage and reach. At present the coverage reaches up to 10 nautical miles into the sea. Vodaphone and Airtel are competing with government run BSNL which has limited reach. Readiness can also be
detected in fisherfolk use of GPS, echo sounder and other technologies that support their fishing activities. Adoption of new technologies creates conditions for the adoption of ICTs.

3.8 AVAILABILITY – 2005 TO 2010 – POST TSUNAMI

For Heeks & Molla (2009), availability relates to “implementation of the ICT4D project turns the inputs into a set of tangible ICT deliverables; one can assess the presence and availability of these intermediate resources”. The availability of village knowledge centres and digital bulletin boards created awareness – through word of mouth. Inexpensive mobile devices and aggressive promotion through the mass media increased the availability of mobile phones among fisherfolk. ICT activities have clearly moved to a maturity stage and the availability of mobile phones has led to a rapid for general adoption.

Incidental factors such as tsunami 2004 also changed the conditions dramatically and the need for safety was strongly felt. Post tsunami increase in boats, gears and export demand were a result of more development fund flows and supply of new technologies.

3.9 UPTAKE 2010-2014

For Heeks & Molla (2009), uptake refers to assessment that typically measures the extent to which the project's ICT deliverables are being used by its target population. The broader assessment could look at the sustainability of this use over time, and at the potential or actuality of scaling-up. Mobile advisories are on the verge of uptake, with early adopters benefiting from the service and creating a condition for further awareness reaction and adoption. Still mobile advisories are yet to take off as widely as expected by the project.
Linear models of impact assessment need tradeoffs. Short-term assessment risks miss discontinuities and complexities and long-term impact assessment are complicated by increasing number of variables that need to be considered. However, for the present study, PFZ and OSF information can easily be validated by fisherfolk where the outputs can be measured at the level of single sea trip. It can be assumed that PFZ/OSF information lends itself to short-term assessment because the levels of the catch are also influenced by boat type/net and other gears. An aggregate assessment of impact over a period of one or two years will enable fisherfolk to see if the information satisfies their expectations. So the question arises as to the state of the project or interventions lifecycle or whether it is appropriate to undertake an impact assessment.

Heeks further identifies contextual factors and characteristics of each of these elements of the value chain. Characteristics involve the extent to which the information is pre-processed and the kinds of knowledge repositories, which organize this information. Institutional intermediaries are serving as a knowledge repository by integrating community-level knowledge with expert scientific knowledge into a set of messages that seek to fill the gaps in making sense of changes in marine ecology (Dervin 2003).

Messages are shaped by political, economic, social and cultural factors. At the level of platform or the medium, the characteristics of the medium itself constraints or enables certain kinds of use. The extraction of locally relevant information which is “assessed and adapted" are central to message design (Modi 1991).

Technological capabilities, human and economic resources determine the success of these platforms for staying as a viable medium of communication. Heeks’ model stresses the importance of users who process this information within their socioeconomic and cultural context to decide on
actions (or inactions) that might flow from users. The message needs to be
designed with the users and the medium. The users, in turn, need to possess
the resources and capabilities to adapt the medium and its content into their
everyday life. The model recognizes that users shape messages as much as the
medium itself and pays particular attention to how content are developed and
managed.

While the model still echoes the source oriented dominant model of
communication, the model has the advantage of acknowledging the contextual
factors that have an influence on how ICTs are used and with what
consequences. ICT projects need to pay special attention to the design of the
message. Localization and choice of appropriate medium and format of
delivery are critical as they encode the message with certain preferred
meaning or course of actions. Of central importance is the reliability and
overall credibility of the messages. There is scope for both expert-generated
contents like PFZ as well as local user-generated or suggested content such as
information on local festivals, functions, and cultural activities. While the
model itself does not focus on impact, these issues are dealt with elsewhere in
more details (Heeks & Molla 2009). In this study, micro-level analysis of
individual fisherfolk is carried out with an understanding that ICT impact
operates on a sliding scale. However, impact assessment is not a value-neutral
process and explicit specification of value commitment is essential. Heeks &
Molla (2009) model needs to incorporate multi-directional flow of
information and communication.

3.10 MULTIDIRECTIONAL COMMUNICATION MODEL

Thackeray & Neiger (2009) present a multidirectional model of
communication as the most appropriate one for understanding the bottom-up
communication processes that are driven by active users. While their interests
are in social marketing/health communication, the model can be usefully
deployed in the context of mobile advisory usage. The multidirectional model emphasises that communication flows in and out of user actions. Users develop messages, initiate communication and actively seek and share information. The vertical flows of communication from experts to an audience are enabled with information flows from audience to the experts as well as the horizontal flows between audiences.

The model can be useful in understanding the communication flow in the context of MAS. Information on PFZ and OSF are actively sought by the fisherfolk via their information seeking activities while the experts of INCOIS-disseminate these messages (along with other perceived and field information needs) to the users. Users share this information through their horizontal social networks bounded by the fisherfolk community, village, caste, and fleet team. The horizontal flows can take multiple forms-interpersonal, community gatherings and walkie talkie (during sea trips). Bottom-up flows of information is facilitated by helplines and feedbacks gathered by project workers.

Fisherfolk not only receive information but also actively seek and share them via multiple channels in multiple directions. The challenge of MAS is to develop systems and services to support this multi-directional flow of communication between various stakeholders.

In multidirectional communication, fisherfolk are both recipients and creators of the message. The challenge for mobile advisories is to match the expectations encoded in their queries into information services. This involves not only meeting their needs but also using their expectations to identify new information that the fisherfolk need.

The multidirectional communication model emphasises the centrality of users. The communication process is initiated through fisherfolk
information seeking behavior, which is then responded to by expert sources as advisories or other members of the social network. The act resembles turn-taking in day-to-day conversations, only now enacted asynchronously. The communication also takes place between peers-fisherfolk in other boats or fleet communication, wherein information is shared selectively. Further communication channels are opened between other stakeholders such as local market agents and service providers (e.g. ice factory, local vendors).

Extending this model, we can argue on the mobile advisory reception and use as communication interventions. Knowledge levels as intermediate outcomes or behavioral precursor and the dependent variables can be conceived as behavioural change measured in terms of perception of impact. Since MAS involves developing a particular content, PFZ and OSF have a specific intention of modifying the behavior of the fisherfolk to follow the advice. The core of the model is the communication of information in the form of advisory in this case which effects the change in the behavior. Information resources are found either with the experts or available with a small section of the community.

Action Resources - Behavior means human decisions and actions. To study the impact of ICTs on behavior means to examine how these tools support their livelihood activities, the core behavior that we are interested in.

C4D (communication for development) investigates the presence or absence of those information and action resources and the extent to which these have helped fisherfolk develop their own resources. The model is useful for examining how MAS works to create impact-specific, mechanisms that lead to specific effect.
3.11 SOCIAL AND TECHNICAL CAPABILITIES

Robin Mansell (2001), while commenting on the opportunities opened by “knowledge-based development” argues that ‘there are three major prerequisites for this development process. First is communication network connectivity at affordable costs. The second is the availability of local capacities to generate sources of information and to access those which are available externally. The third, and arguably the most important, is the capability to transform local and external sources of electronic information into socially and economically useful knowledge’.

Considerable policy initiatives, technological solutions, and research attention are being paid now to address the first two issues. But the ability to access, apply and assess information resources that are available digitally, has not received attention. Mansell adds that “all prerequisites for knowledge-based development involve new social capabilities but it is the third area that is the most critical for ICT users. Inequities in this area are likely to be major contributors to the regeneration of social and economic disadvantage in developing countries”.

Social capabilities complement technological capabilities when they contribute to generating economic growth and social benefits (Mansell 2001). Technological capability can be defined as the ability to manage the technological function of an enterprise (Trindade 1991). Thus, building social and technical capabilities of the individuals and organizations to take advantage of the potentials of ICTs might be a short-term but realistic approach to establishing a link between poverty, development and ICTs.

Mansell adds “those with access to ICT innovations – those with the capacity to absorb them and use them – are more likely to have opportunities to gain social and economic advantage than those without the
relevant capabilities. Those people with no access to ICT-using capabilities run the risk of being marginalized in the 'knowledge-based' development process.” She further, argues that the “most critical inequality or gap in the knowledge-based development process will be the absence of broadly based skills and knowledge relevant to the use of ICTs and the new ‘digital’ forms of information”.

3.12 INSTITUTIONAL INTERMEDIARY APPROACH

Institutional intermediaries were assumed to play a central role in ICT4D projects services (Gopalakrishnan 2003). The thrust of the argument was that it is unlikely that the poor, particularly those below the poverty line will be able to directly use ICT. Intermediary organizations such as non-government organizations (NGOs) are likely to act as a critical link. Heeks (1999), points out that the ICTs currently have far greater enabling value in building capacity within the intermediary institutions than directly affecting the poor.

There is a general realization for a need to invest substantially in human or social capabilities and in the underlying infrastructure. Intermediaries are needed to bridge both the “overt and social resources endowment gaps between what the poor have and what they would need” to harness the potential of ICT (Heeks & Gordon 2000). The role of ICTs within such intermediary institutions is not well conceptualized in literature. The role of the intermediary is closely tied to the idea of a change agent in the diffusion of innovation model.

James (2004) provides major arguments and practical case studies to illustrate the significance of institutional intermediaries, calling it a "new paradigm" and from, on the one hand, a model based on large-scale telecentres equipped with modern computers that are frequently financed by
foreign capital, towards, on the other hand, an approach that, by contrast, provides internet access primarily to local intermediaries, who are much better placed to provide information and services based on the internet, in a form that is relevant to local circumstances (defined broadly to include incomes, customs, language and needs). What is provided to the rural inhabitants in the latter case is thus not individual access to computers with direct internet connectivity, but rather the knowledge and services that are indirectly (via an intermediary) provided to meet the specific needs and challenges of the local community.

3.13 MOBILE PHONES AND INSTITUTIONAL INTERMEDIARIES

The rapid growth of mobile phones, especially amongst the poor and socially excluded communities might appear to undermine some of the earlier empirical and theoretical relevance of institutional intermediaries. However, wide availability of mobile phones need not readily translate into development gains. Institutional intermediaries are still required to serve as facilitator. A multidirectional communication approach assumes that there are significant agents that service too catalyze and strengthen communication networks and the quality of messages circulating within them. Further, institutional intermediaries are likely to serve a critical function in bringing greater alignment between development goals of the community and technical, social and human resources required to achieve gains. Institutional intermediaries are organisations that serve to bring stakeholders into a dialogue on identifying, articulating and seeking solutions to specific problems facing a vulnerable community. The characteristics of the intermediaries are the key factor that influences targeted interventions.

There are many kinds of institutions that can play an intermediary role in development. Non-governmental organizations form one such sector
(Lewis 1999). The approach proposed here emphasises the social factors such as the role of NGOs and community-based voluntary organizations in social and economic lives of poor people. The issue has been widely discussed in development literature (Brown & Tandon 1994). NGOs are increasingly being put forward as vehicles for development, for social actions and as a means of popular participation in social-problem solving. They are seen as key components of the civil society (but by no means sole).

3.14 UNDERSTANDING DEVELOPMENT OUTCOMES

If mobile advisory services are the form of communication intervention, what is the outcome of these processes? Here, we need to depart from the modernization paradigm that prioritizes economic outcomes as the sole measure of development. While there is an extensive body of scholarly and practical works attempting to define and operationalize development, the nature of the phenomenon that we seek to understand remains context dependent. Whatever be the ontological bases of development, the consensus is that "developmental impact" needs to be locally defined, understood and acted upon. To develop the argument further we consider a widely adopted framework for explicating development, Amartya Sen's Capability Approach (Sen 1999). Capabilities Approach frames development in terms of freedom-freedom to choose and capabilities to exercise choices.

3.15 CAPABILITY APPROACH TO ICTs

In this study, Amartya Sen’s capability approach is used to operationalise the impact of mobile advisory services. Amartya Sen's capability approach has been widely adopted as a model for the explication of development. Moving away from treating development as an economic growth, Sen proposes an alternative framework that compels us to consider development as a freedom and lack of development as capability deprivation.
Capability approach works at macro and meso levels, for micro-individual level capability has to be operationalized in terms of how mobile advisories affect individual’s choice or a sense of choice, Kliene (2013) in *Technology as Choice* argues. Sen's work has inspired the creation of human development index as an alternative to more economic-centric GDP as the measure of development.

For Sen, development is freedom to choose. Enhancing the capabilities of individuals to exercise freedom of choice is central to development. Several types of research in the field of ICT4D have tried to adopt and adapt the capability approach to guide impact assessment (Heeks & Molla 2009). Experiences from these studies point to both strength and weakness of the capability approach.

Capability Approach is widely used for assessing individual well-being. The purpose of the approach is to guide policies that are aimed at improving the conditions of the poor and the vulnerable people. Rooted in development studies, the approach has found wide acceptance in the study of ICT4D (Kliene 2013). Sen's understanding was developed against the background of increasing use of economic indicators-income, PPP and GDP-a measure of development. Development in this context has come to mean growth with progress. For Sen, this modernization model of development fails to account for classic notions of freedom and personal development. Sen makes choice a critical outcome of development intervention, irrespective of how the choice is exercised.

The Capability Approach is relevant for this study because, as Kliene (2013) argues in her book *Technology of Choice*, mobile phones have the capacity to augment human communication and social interaction. It is of a empirical concern whether these capabilities are translated and realized as development goals. To the extent that fisherfolk capacities are increased by
use of mobile advisory services, we can postulate that they contribute to individual development. PFZ, OSF and information on government scheme increase the choices of individuals to exercise freedom.

However, Capability Approach does not concern itself with the actual choices and consequences of these choices. Long-term developmental outcome depend not only on expanding choices but also depend on the consequences of those choices. The concept of impact perception is a realization of these choices made available through mobile advisory use on the livelihood of the fisherfolk. Perceived impact of mobile advisory use is defined as realization of the potential of the specific set of functions encoded in the design, development and deployment of ICTs.

Impact perception is the achievement of the expectations built into using mobile advisories. Impact perception results from the use of fisherfolk’s affordances of technologies. The actualization of the function is key to the successful impact of ICTs and mobile advisories, where there are connections between affordances and capability.

The development model presents a normative framework for developing criteria for social change. However, the model does not specify what these developments ought to be, only that any measure of outcome should be judged again with the standard of enabling or constraining choice or more practically a sense of choice.

Sen's decision to keep specifics out of his analysis has invited criticisms from several scholars (Naussam 1996). It is argued that without a clear notion of development criteria acting as a mirror to assess the performance, Sen's work on risks supports a version of cultural relativism. Other scholars have also critiqued Sen's model for being individualistic while ignoring collective actions that might also contribute to development.
However, the argument that capability approach supports an individualist measure of development is consistent with the mobile phones—which are primarily individual oriented and personal medium (Katz et al 2002).

3.16 CONCEPTUALIZATION OF IMPACT OF MAS ON FISHERIES

Fisherfolk’s perception matters on how marine resources are used. Their perception also matters with regard to how mobile advisory services affect their occupational goals. For example, Gangal & Karanth (2014) examine the ways in which fisherfolk’s perception affects trends in sustainability in the Indian context. The authors work from the understanding that fisherfolk rarely comply with regulations, instead operationalizing and directing the fishery on their own.

Emphasizing the role of fisherfolk’s perception and use of marine resources, their survey of 342 fisherfolk in two states, Tamil Nadu and Maharashtra, (Gangal & Karanth 2014) finds that 86% of fisherfolk perceived a decline in catch and 69% perceived a decline in bycatch. Fisherfolk adapt to these declines by increasing fishing area and time spent, changing their gear, and overlapping in fishing zones. They observe that the convoluted interactions between ineffective community and state regulations guiding their actions have prevented fisherfolk from developing successful models of sustainable fisheries management (Gangal & Karanth 2014).

Further, these authors identify non-compliance with regulations and government incentives as an important livelihood opportunity. Non-compliance drives change in fishing practice by giving fisherfolk the flexibility to respond to perceived fish catch dynamics by modifying their practices. They recommend strengthening local fishing communities by
enabling them to enforce fishing regulations locally and by scaling back of existing government incentives, to protect the sustainability of these fisheries.

In a similar way, it can be argued that fisherfolk’s perception of the impact of mobile phones has an effect on whether these services are used and long-term developmental outcomes are increasing in choice. Therefore, in this study, MAS impact is defined as the perception of how MAS is perceived to affect their lives in terms of increasing capability to catch more as well as good quality fish and thus improve their sense of choice.

3.17 IMPACT ASSESSMENT OF MOBILE ADVISORIES
CAPABILITY APPROACH

For Sen (1999), functions are the capacity of individuals to act upon a set of choices, irrespective of whether those functions are realized. He makes a distinction between capabilities and realized functions. What functions are actualized in the world depend on the how the individual chooses to exercise the choice. But the capacity to exercise those choices rests with the individuals and the resources that are required to enhance the capabilities. Sen views the freedom to choose and the capacity to follow through the choice as an end in itself. While individual’s wellbeing is critical for such capabilities, those are not in themselves an end, as suggested by the utilitarian philosophies (Clark 2005).

Capability approach is applied to evaluating MAS. The definition of communication technology adopted by Jackson (1996) is relevant to the way Capability Approach conceives technologies. Jackson locates the dual issue of materiality of the technological artifact and its point of introduction into a social system as the theme around which theorizing how technology should occur. For her, the idea of functionality, defined as the ability of an artifact to be used to accomplish a social task is central. Technological
artifacts are simultaneously social and material. ICTs are identified as social constructions, which are value laden. Thus, by definition ICTs can be viewed as a set of practices linked together by values (Hodas 1993). The Capability Approach recognizes this functional-materiality and provides a choice-based framework for analyzing consequences of technology use (Gigler 2015).

Mobile advisories contribute to development through conversion of expert knowledge into usable information. This is achieved by converting mobile advisories into personal and explicit knowledge (Polyini 2000). The value of information is realized in its use and to the extent the fisherfolk are capable of using these in support of their livelihood which is a significant opportunity created for empowerment.

The information made available through mobile advisories such as PFZ, OSF, Government schemes and other needs articulated by fisherfolk serves as a catalyst for knowledge acquisition which, in turn, facilitates empowerment simply by virtue of expanding the choices (e.g. is it worth taking the risk of going on a trip today), freedom from risk of accidents, freedom from losses due to difficulty in locating fish, freedom to access their entitlements from the state.

For Sen, these freedoms are of intrinsicall worth, irrespective of whether they are realized. This argument rests on the claim that ultimately it is the individual fisherfolk who has to decide which of these choices he or she values enough to be act upon. To be clear, Sen does not undermine the functional realization of capabilities, but only those realizations that are valued within the lived experiences of the individuals. Thus by creating a sense of choice, mobile advisories contribute to development. The extent to which this sense is actualized is an empirical question that constitutes impact perception. In this way, the Capability Approach provides a framework for impact assessment of ICTs in general and mobile advisories in particular.
Capability Approach till date does not specify the mechanisms by which ICTs contribute to increasing choice. Kliene (2013) observes that “An additional complication in this respect is that the openness and conceptual richness of Sen’s Capability Approach makes it hard to operationalize. This could well be a reason why its impact on the development practice and evaluation so far is limited”.

This study fills this gap by specifying a mechanism which can account for how MAS impacts development. In terms of development outcome, PFZ service can be considered as a tool that can increase the choice of the fisherfolk-location of new zones for fishing. It can also be considered to increase the choice in managing uncertainty and risk. For example, the OSF service can be thought of increasing the choice available for fisherfolk to venture into the sea. The risk can now be better managed with accurate data on wind speed, direction, and early warnings. Expanding sense of choice is central to the Capabilities Approach (Kleine 2013).