

Problems in Use of Information and Communication Technology Tools among Fishermen

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ABSTRACT

Information and communication technologies have increased the knowledge and information among different peoples and similarly have enhanced the capacity building of communities in developing countries. Most of the developing countries are trying to provide good facilities to their people and spread the network of communication technologies in remote areas that poor people can get good benefit from these technologies for their development. However, it was showed that in developing countries there are still lack of services and infrastructure in remote areas which are facing big challenges for government to provide communication technologies facilities in rural areas. In the perspective of fishermen many developing countries did not provide good facilities of such technologies in their working places and due to that fishermen are facing many difficulties to get information about weather, market, communicate with family and friend when they are at sea. Information and communication technologies can reduce the time, money, energy as well as risk of fishermen when they go at sea. Fishermen are getting more problems in use of mobile phones, television, radio, GPS, sonar, radar and wireless in their areas because there is no electricity available in their areas and facility of mobile phones in their working places. Governments of developing countries and other sectors should take the initiatives for the development of this community which can enhance the economy of the country.

KEYWORD mobile phones, GPS, radio sonar and fishermen problems

1. INTRODUCTION

Information and communications technology (ICT) could play a vital role in national as well as international development. In third world countries governments have taken initiatives to boost up the economy, agriculture, health and education through use of ICT. Different countries have investments in ICT and have come to view it as significant contributor to industrialisation and economic development (Sein & Harindranath, 2004). ICT could support in the communication and correlation among societies and their development similarly by use of ICT people share and exchange the knowledge and information among each other. It was cleared that ICT in past was separate fixed components of data and technologies combined with new communication methodologies and technologies. Now ICT could therefore unit of networked systems as opposed to older technologies. ICTs have brought a revolutionary change in different sectors of the world (Rijsenbrij, 1997, Herselman & Britton, 2006).

ICT could provide a new opportunities and approaches to different communities and organisations for increase the productivity of agriculture which cultivated successfully and could provide new knowledge. ICT could deliver a knowledge and information itself about technology for agricultural development. Recently agricultural extension has changed the world and ICT has given essential mechanism for disseminating knowledge and information as an input for modern farming (Jones & Garforth, 1997).

ICT has given new technology packages to transferring knowledge or information. It could obtain through use of ICT. ICT become more expanded further knowledge intensive, and more demand this technology provide a new approach and thinking to farmers about utilization technology in farming practice. ICT has many possible applications in agricultural extension (Zijp, 1994). Information and Communication Technologies (ICTs) could define as technologies that help in communication, processing, spread of information and knowledge through electronic devices. This interpretation covers all range of ICT from radio, television, telephones, computers and the Internet. Furthermore it is broadly regarding communication systems it could

electronic or not. There is the combination of electronic media with other media that people already like to use and know how to control (Ramírez, 2003).

2. Problems in use of Mobile phone among fishermen

The lack of knowledge and information among people regarding the use and acceptance of communication has also challenge communities (Tariq Saeed Mian, 2013). Fishermen were unaware about use of mobile phone to contact with their family members and friends. Even fishermen have no proper knowledge about mobile phones to contact market for sell their goods. In different places where fishermen use mobile phones were getting good benefit to direct contact with their customers either who were not using mobile phones. Still there were many fishermen have no access of mobile phones in their area. Mobile phones one of the best source of communicating with fisheries department for obtaining a weather report but due to unawareness and illiteracy fishermen were away from this technology in remote areas (Donner & Escobari, 2010).

It was showed that fishermen were not knowledge and information regarding ICT tools and their uses. The main problem among fishermen was illiteracy and most of them use their traditional and old method to catch the fish in sea. Most of fishermen were unaware about latest technologies. Fishermen mostly depend on their old traditional sources and communicate with buyers face to face. In this situation fishermen were not getting good price of their produce. Fishermen were unaware about weather information due to that many causalities were occurred (Njoku, 2004). The use of ICT tools in developing countries is very low. Fishermen were facing many issues and hindrances in use of communication technologies in remote areas. Fishermen were not using mobile phones because there is lack of infrastructure and its utilization for poor people in their areas. It was also indicated that these technologies are very expensive and poor community have no access to purchase and use it. The fishermen community almost spent their time in sea therefore it is need to provide a facilities such kind of technologies that this people could contact with their family and similarly with market to sell their product in good price and make their life easy. The result findings indicated that more than 85% of the fishermen live in rural areas of Nigeria and most of fishermen have no idea how to use mobile phones and contact with their family members. The main problem among this community is illiteracy according to findings more than 90% of people are illiterate in these areas of Nigeria (Levy & Banerjee, 2008).

Bono, et al (2010) ICT could bring a lot of changes in the life of fishermen. In the Indian context fishermen have many complications to use technology in rural areas. There is no accessibility of technology to fishermen to communicate with their family, friends as well as get latest information about market and weather. Fishermen have no access of mobile phones in their remote areas and in shore. The levels of education among fishermen were low in India. Therefore most fishermen were unaware about importance of mobile phones in their business. Nowadays in these areas local brokers were getting benefit from illiterate fishermen and buying fish in low price on the spot and sell in market with high margin. Furthermore the government should take initial steps to aware this community regarding the use of ICTs as enablers of development (Joshi, et al., 2010).

It was indicated that very few fishermen adopt mobile phones while rest of them use traditional way to catch fish in sea. It was also observed that fishermen were not interested to use mobile phone technology because it was expensive for fishermen to purchase. There were some who expressed unwillingness to try new methods in their profession (Mittal, & Tripathi, 2009). In the Sri Lankan perspective fishermen have no idea how meet with local fisheries department and their cooperative societies due to lack of knowledge of ICT. Fisheries Cooperative societies were trying to inform fishermen about benefit and use of these technologies but unfortunately most of fishermen were uneducated and have no information about how to use it. In many third world countries fishermen unaware and many have no facility of electricity to use such kind of technology in their business (Qureshi & Davis, 2007).

Fishermen were used mobile phones to talk with market buyers but fishermen are facing especially electricity and signals problems in remote areas. In this situation fishermen were not getting good price of their produce. Some fishermen were not familiar about mobile phones and other communication technology tools in area (Ichikawa, et al., 2005). The proper knowledge and information in use of mobile phones among fishermen can increased their business and good market price of their produce. Widespread use of mobile phones by fishermen could reduce the markets risk and uncertainty. Through providing the trainings as well as formal education could enhance the capacity building, reduces transaction costs, facilitate communication with relatives, and extend market effectiveness to rural sectors (Abraham, 2006).

The lack of knowledge about proper usage of communication tools of technology among fishermen were big issue. Especially old fishermen were totally unaware about these technologies. However it was observed that young fishermen were little bit aware about mobile phones and its use. These fishermen have no knowledge of communication and technologies even some of them have no idea about how to operate computer and mobile phone. Fishermen have faced many problems in use of mobile phones in their working place. Fishermen were mostly uneducated and have no one to guide and provide knowledge about use of mobile phones and other new technologies tools at sea (Roman & Colle, 2003). One of main problem in different remote areas was that farmers, fishermen and small entrepreneurs have no knowledge about prices of their produce to sell in market.

The reason was lack and poor communication facilities in rural areas. As mobile phone were increasing day by day in third world countries there has also been an increase in the extent of research on mobile phone usage. Furthermore fishermen were unaware about use of this latest technology phone. However there are many problems farmers and fishermen were facing in use of mobile phone in agricultural development for their benefit. Mobile phones as a tool could solve many problems and difficulties in their social and economic impact (Rashid & Elder, 2009).

In the perspective of Tanzania mobile phones provided an opportunity to fishermen for taking measures to decrease the risks in the time of emergency at sea. However, most of fishermen were taken a negative this technology in their business. Most fishermen understand that their old sources are better than mobile phones while some of them were uneducated and have no knowledge about proper use of this technology at sea. Fishermen spent a lot of time far away from their families and friends by that many fishermen could not contact with customers due to non-availability of mobile phone. Fishermen still find areas of fish through their old method due to lack of this technology fishermen waste their time, energy and money to reach over there. The lack of facilities in these areas was main problem among fishermen to not use of mobile phone in their work places (Myhr, & Ståhl, 2006).

In the context of Ghana study indicated that due to limited network and signals in the area have made problems among fishermen to communicate with their friend and inform them about their location at sea. Fishermen use other alternate sources to contact with their friends and families by message to each other. Even in the time of emergency fishermen lost their lives. The use of mobile phones could increase the income and save their life at sea similarly could contact to market sell their catches. The lack of related information is a major problem to rural development (Salia, et al., 2011). The mobile phone services were not available in many rural areas. Fishermen were not only facing transport problems to send their produce in market as well as have no any contact with their customers. Fishermen, herders, migrant workers, and indigenous people these people have common problem their lack of access and communication to relevant information and knowledge services. In this circumstance the fishermen income were very low. There was need to provide opportunities and availability of communication tools to fishermen that could sell their catches in market within a time and in good price (Bhavnani, et al., 2008). There are many factors are involve among fishermen who not use the mobile phone first main barrier is illiteracy most of the fishermen were not knowledge about such kind of technology and their usage. The second main problem was poverty fishermen could not afford to buy a mobile phone and other related technology in their related field. However some fishermen and ordinary people were using mobile phones to perform a number of activities (Dholakia & Kshetri, 2002). Farmers and fishermen keep up to date to each other from latest information which they receive from television or radio but the main problem among this community that there is no access of mobile phone in their areas to immediate communicates with their family and friends when they were at sea. For example fishermen need information about fish price in market and need urgent call to their customers to save their produce from wastage (Kaduskar, et al., 2009)

Fishermen in different states of India mostly depend on local brokers and were expecting good price of their fishes. Non-availability of mobile phone among fishermen of Indian have obtained very low price. Fishermen have no access to contact with different market and call the customers to sell their produce in good rates in market. Fishermen were rarely to find good prices in their local market. It was also observed that many times their fishers were wastage due to late contact by brokers (Dutta & Mia, 2011). ICT could play very important role in the agriculture development as well as farmers and fishermen life. Especially mobile phone has one of the main sources of easy communication with each other. In recent years where there is lack of information among fishermen have reduced their income and productivity of fishing. The main reason of access among fishermen was there were no such kind of facilities was provided fishermen in their areas. In Indian context there were many areas where there was no electricity and access of mobile companies in rural areas. Most of the fishermen use old method to catch the fish at sea (Mittal & Tripathi, 2009).

The cost of mobile phone call was very expensive that is why most fishermen were not using mobile phone to communicate with fisheries department to get information regarding weather and similarly could not talk with their customers therefore fishermen were not getting good price of their produce. It was possible that fishermen could obtain information directly about price from market through their mobile phones. Fishermen were facing challenges with mobile phones due to poor infrastructure such as electricity availability to charge phones batteries and network availability in rural remote areas (Melchioly & Sæbø, 2010). The mobile phones are very expensive and fishermen could not afford it because their income was low. The most fishermen want to use mobile phone but they do not have knowledge about how to use it what is its importance how could contact with family, friends and market by mobile phone (Du et al., 2010).

3. PROBLEMS IN USE OF GPS, SONAR AND OTHER TECHNOLOGY

GPS first time was introduced in 1990. It was used only for particular places in different sectors. Nowadays most of fishermen use this technology and are getting benefit from it. Still most of the fishermen have many problems in use of this technology because majority of them are illiterate and have no idea how to

use it at shore. The lack of skills and information most of the fishermen could not use this technology in their working place. The map was also provided to fishermen about their location and matches this with GPS system among fishermen. Unfortunately all method was failure because most of fishermen were illiterate and few of them were not interested in this technology. The fishermen use GPS information for seeking their main spot of fishermen at sea. GPS helps fishermen in searching the fisheries department building in particular areas of cities. However, fishermen even educated have also confused to use this technology. There was a need of capacity building through providing the trainings to fishermen in their business places. The GPS system could make a positive effect in their business (McKenna, *et al.*, 2008, Fujita *et al.*, 2007).

There were many financial problems in dissemination of the ICT information among different communities such as farmers and fishermen. In India fishermen nowadays still use traditional sources and not depend on information communication technology tools. For instance, fishermen have no idea about sonar GPS and radar system that how to use it and what are their functions. There was a main factor among fishermen not to use technology was poverty and aged group people who were not interested in use of such technology in their business (Yonah & Salim, 2005). The illiteracy was also a big problem among fishermen to use communication technologies in their business and work place. Fishermen felt very difficulties and problems to use GPS, radar and sonar technologies for increase their knowledge and skills. Fishermen mostly could not reach on their right direction and destination due to lack of GPS and many fishermen cross border of different places. Even fishermen could not contact and inform their families about their correct destination at sea. Fishermen were unaware about GPS system (Rahim & Padhy, 1994).

Practically fishermen not involve in use of new technologies which specify the location and destination. Only few fishermen keep little bit information about GPS most of fishermen have no idea of technology and how it is beneficial for their business and could provide a safety before leaving to sea. GPS technology echo sounder and sonar could bring change in the life of fishermen but still most of fishermen were not ready to use this technology at shore. There was lack of interest to learn about this system were cause which have increased their problems (Murray, *et al.*, 2006). The GPS was good option for fishermen to locate their specific place of fishing. Furthermore, fishermen avoid using this because GPS is out of approach from this community. Similarly maintenance and replacement, was big problem for fishermen at time of shore some of fishermen understand that GPS advantage were low for fishing (Du *et al.*, 2010).

The fishermen could not identify their location without any technology at sea it was very difficult for small boat fishermen. In the different places GPS system was introduced but fishermen still were facing many problems to identify their exact location the main reason was almost fishermen education was very low and they could not read the content of GPS on mobile phone. Most fishermen serve whole day and nights at sea. However, fishermen still have no knowledge and information regarding this technology. It was indicated during the research that most of the fishermen were unaware about GPS system and it function similarly fishermen were using their traditional method in catching fish in their area. There was need of some knowledge and information regarding this technology among fishermen in particular areas of fishing community especially at Greek Naval Saloon where such as GPS systems could introduce in use their boats and fishermen may be equipped (Mittal, & Tripathi, 2009, Fouskas, *et al.*, 2002).

Turkish fishermen claimed that sonar system technology usage is not common among fishermen most of fishermen understand that sonar not provided accurate information but it keeps alert the fish or some time kills fish. This technology was not common in Turkish fishermen. While researcher claimed that sonar has no good result in fishing. Furthermore fishermen view that use of sonar in fisheries is one of the modern technologies in fisheries industry. Most of the fishermen were not aware about this technology. The sonar recently uses and provide an extensive range of the choice containing the measure and weight of a school of fish. The sonar could connect to an autopilot. However fishermen use almost none of the risks for numerical information that the sonar deliver and response on their own readings of the changing fields of colour on the display the code (Knudsen, 2003).

The community internet access centres were provided good opportunities to people for the latest information regarding weather and market prices. This approach could focuses on the major number of decentralized initiatives where in different rural areas the fishermen are getting benefits. This was proved the successful local government initiatives and international experiences served as examples and encouragement for the dissemination of internet centres through the country. Similarly the GPS system was also introduced among fishermen to identify the location and could find easy access to reach their destination. Furthermore due to lack of proper use of ICT among fishermen was an also big problem. Therefore the access to sell their fish in market was challengeable for the development of fishermen. Fishermen were also facing problems in sell of their product in market even fishermen do not have information about cost and price (Mori & Assumpção, 2007).

The education levels among fishermen were low and the system of social barring based on caste and class were major problem against impact of ICT. Ideally ICTs such as radar, wireless, sonar and GPS could bring revolutionary changes in this community but unfortunately fishermen could not adopt these technologies in their business. There were need to create awareness among fishermen and access of infrastructure to provide related

and appropriate information and trainings to fishermen. Furthermore knowledge about ICT could ensure success and sustainability among fishermen. There were also observed that there is need for a general approach in terms of social acceptance, technical feasibility, economic viability and organizational effectiveness to the use of ICTs as enablers of development. There could enhance the knowledge and provide training to fishermen about use of ICT that how this community able to get information on fish market rates in different ports and weather prediction on all current fishes species in area (Joshi et al., 2010).

GPS is useful device for safe destination especially for fishermen. By use of this technology fishermen could identify the demarcation of different areas. It was observed that fishermen in Sri Lanka and India have many problems regarding the boundary of the country due to unawareness last many years fishermen were arrested or shot by different people in different countries borders. Through use of GPS such accidents could reduce in different countries (Kumar & Kumar, 2010).GPS could play very important role in the fishing development of fishermen and could make strong economically. Unfortunately most of fishermen were no knowledge of usage of this technology some have no access and others were illiterate such kinds of the problems have created lot of problems for fishermen at sea and in remote area. The use of these technology fishermen could save their money, time, fuel as well as energy. There was need of investment for the development of fishermen in different places especially in third world countries. Furthermore a majority of the fishermen have need of jobs and access to market for sell their produce to customers in good price (Peseckas, 2008).The fishermen use sonar and try to find the availability of fish at sea this technology could bring change in the life of fishermen. However this technology was not familiar among fishermen and most fishermen focus on their traditional ways to catch the fish. Sonar tool were mostly effective to show that where fish is but fishermen not use it proper due to lack of skills and knowledge (Liawatimena, et al., 2007).

4 Problems in use of radio and television among fishermen

The fishermen were facing different problems and obstacles in use of communication technology there have no proper access of information due to many reasons such as no coverage of radio transmission and its frequencies at sea. Fishermen were unaware and have no idea about whether either they should leave for fishing or not while due to non –availability of electricity have mad another problem fishermen could not watch television in their areas. Context there is need of capacity building of fishermen community to provide radio and other communication facilities that fishermen could improve their condition and living standard. Furthermore the price of technologies was high and fishermen could not afford such kind of technology and obtain latest information regarding market price weather updates and fishing related information. Through using this technology fishermen community have get good profit in their business. Such kind of technology not only introduced in rural and remote areas for fishermen community but similarly there is need to encourage this community for the use of technology which could make their lives better (Rahim & Padhy, 1994)

In the Lake Victoria Kenya fishermen have no access of radio it was indicated that 40% of fishermen said that due to lack of information and knowledge about fishing activities in market and weather problems many fishermen have been missing in sea. There is need of access of radio in lake side. While 30% of fishermen said that the radio could play a vital role in the enhancement of fishermen community and radio producer should produce fishermen related news and stories where fishermen could get benefit from that technology. The authorities should take initiatives to establish the radio and television station in those areas where fishermen could connect with different communities. There is necessity, availability and accessibility of the radio on surround. Furthermore it was also observed that fishermen need more communication technologies facilities to connect with market as well as with their customers to sell their produce (Omweaga, 2006).

One another study indicated that 44% of fishermen were unaware about where and how to obtain information on modern fishing. Could radio and television provide such kind of information about fishing market price and weather updates. This was not surprising because most of the fishermen were illiterate and depend on friends, relatives. Mostly in remote areas radio was also not playing important role in disseminate information about weather and fishing related information. However, only 20% of respondents to listen radio and their home while radio waves not reach in sea (Njoku, 2004).The lack of skills fishermen have no knowledge about ICT importance many fishermen have absence about radio and television. Fishermen were not watching the television and listen the radio fishermen mostly were using their traditional methods in fish catching. By using radio frequency identification information obtained to build the basic elements of a successful seafood tracking program and could provide latest information to fishermen regarding weather and market (Bono, et al., 2010).

The study was conducted by the Federal Government of Nigeria and UNESCO in 2004 the results shows that fishermen were improved their knowledge and skills though using radio and Television in Nigeria. The 37% of the nomadic fishermen have radio and only 1% of fishermen have television. From the findings study indicated that radios were available than television. But still have many problems in access of communication technology tools such as radio and television in Nigeria where through the media could make the socialization and provide information about weather and market by media to fishermen. Nowadays radio and television

playing very important role in enhancement and capacity building of the farmers and fishermen about latest news weather updates and agriculture development. But it has also been observed that in different remote areas people have no accessibility, signals and connections of media to obtain information about agriculture development current information especially fishermen in the third world countries (Aderinoye, et al., 2007).

It has been observed that most of the fishermen were not interested to listen the radio and watch the television at their working places. It was revealed that 16% of the fishermen were listen the radio and only 8% of the fishermen watch television programmes. All India radio station broadcast very small number of programs regarding agriculture and fisheries therefore fishermen have no interest about these programs. The main reason was illiteracy among Indian fishermen while number of fishermen understands that there is problem of signals and electricity in remote area where fishermen have no access of watching the television and listen radio programs (Basavakumar, et al., 2011).The interviews were taken from fishermen about use of ICT technologies such as radio and television. The response of fishermen was no proper access and availability of ICT tools among fishermen most fishermen were familiar about technologies but there was no use of this listening radio and watching television commonly. Mostly fishermen were poor and have no approach to buy television or radio due to various constraints the expenses involved (Burrell, 2010).

5 Conclusion

Information and communication technology could play a vital role in enhancement of the different communities. There is need to reduce the difference among developed and under developing countries government should provide access and easy approach of ICT tools to fishermen. There is also need of education and trainings about use of ICT and it importance in their business. Similarly ICT companies launch a program and provide access in remote area where fishermen could easily communicate with customers and contact with their family and friends. Lack of infrastructure, electricity and illiteracy are common problem among fishermen. Therefore it needs to provide facilities of ICT tools to fishermen that this community could play important role in the economy of the country. It is also need to reduce the gap among villages and cities by communication technologies.

REFERENCES

1. Abraham, R. (2007). Mobile phones and economic development: Evidence from the fishing industry in India. *Information Technologies and International Development*, 4 (1), 5-17.
2. Aderinoye, R. A., Ojokheta, K., & Olojede, A. (2007). Integrating mobile learning into nomadic education programme in Nigeria: Issues and perspectives. *The International Review of Research in Open and Distance Learning*, 8 (2), 1-17.
3. Basavakumar, K., Devendrappa, S., & Srenivas, S. (2011). A study on profile of fishing community of a village in Karnataka. *Karnataka Journal of agricultural sciences*. 24 (5), 684- 687.
4. Burrell, J. (2010). Evaluating Shared Access: social equality and the circulation of mobile phones in rural Uganda. *Journal of Computer-Mediated Communication*, 15 (2), 230-250.
5. Bhavnani, A., Chiu, R. W. W., Janakiram, S., Silarszky, P., & Bhatia, D. (2008). The role of mobile phones in sustainable rural poverty reduction. ICT policy division global information and communications department.
6. Bono, G., Cusumano, S., Badalucco, C., Pipitone, V., & Vitale, S. (2010). A semi-automatic system for labelling seafood products and obtaining fishery management data: A case study of the bottom trawl fishery in the central Mediterranean Sea. *African Journal of Biotechnology*, 9(19), 2811-2815.
7. Donner, J., & Escobari, M. X. (2010). A review of evidence on mobile use by micro and small enterprises in developing countries. *Journal of International Development*, 22(5), 641-658.
8. Dholakia, N., & Kshetri, N. (2002). The global digital divide and mobile business models: identifying viable patterns of e-development. Retrieved from <http://ritim.cba.uri.edu/working%20papers/Global-Digital-Divide-eDevelopment-Models-v7%5B1%5D.pdf> Dated. 28. 07 2012.
9. Dutta, S., & Mia, I. (2011). The global information technology report. World Economic Forum.
10. Du, W., Zhengxin, M., Bai, Y., Shen, C., Chen, B., & Zhou, Y. (2010). Integrated Wireless Networking Architecture for Maritime Communications. In proceeding international conference of Software Engineering Artificial Intelligence Networking and Parallel/Distributed Computing. June 9-11. London
11. Fujita, S., Sugawara, K., Konno, S., Watanabe, Y., Tomioka, K., & Itou, T. (2007). Agent-based Recognition of Relations among People using GPS Data. In the proceeding of 6th IEEE International Conference on Cognitive Informatics. August 6-8. Lake Tahoe, California.
12. Fouskas, K., Pateli, A., Spinellis, D., & Virola, H. (2002). Applying contextual inquiry for capturing end-users behaviour requirements for mobile exhibition services. *M- Business* 1 (0), 1-23.
13. Herselman, M., & Britton, K. (2006). Analysing the role of ICT in bridging the digital divide amongst learners. *South African Journal of Education*, 22 (4), 270-274.

14. Ichikawa, F., Chipchase, J., & Grignani, R. (2005). Where's the phone? A study of Mobile Phone Location in Public Spaces. In the proceeding of mobile technology, applications and systems, 2nd International Conference held on 15-17 November.
15. Jones, G.E. and Garforth, C. (1997). The History, Development, and Future of Agricultural Extension. In Swanson, B.E. (ed.) *Agricultural Extension: a reference manual*. Rome, Food and Agricultural Organization of the United Nations, 3-12
16. Joshi, H., & Ayyangar, G. V. (2010). ICT: A boon for fishermen community. *Journal of Global Communication*, 3 (1), 8-13.
17. Kaduskar, M., Nair, V., & Ashok, A. (2009). Understanding mobile usage in rural India-'09. Retrieved from http://www.bcs.org/upload/pdf/ewic_ihci10_paper11.pdf Dated 28.07 2012.
18. Knudsen, S. (2003). Situating Technology: Confrontations over the Use of Sonar among Turkish Fishermen and Marine Scientists. *Perspectives on Global Development and Technology*, 2 (1), 94-123.
19. Kumar, K. S., & Kumar, M. K. S. (2010). Design of low cost maritime boundary identification device using GPS system. *International Journal of Engineering Science*. 2 (9), 4665-4672.
20. Levy, M. R., & Banerjee, I. (2008). Urban entrepreneurs, ICTs, and emerging theories. A new direction for development communication. *Asian Journal of Communication*, 18 (4), 304-317.
21. Liawatimena, S., Susanto, A., & Yunus, A. (2007). Analysis and design of fishing ground marking and fisherman guidance system. In *Proceedings of the International Conference on Electrical Engineering and Informatics Institute Teknologi Bandung, Indonesia*, June 17-19
22. Mittal, S., Gandhi, S., & Tripathi, G. (2009). Impact on small farmers and fishermen through use of mobiles in India. In *proceedings of European Association of Agricultural Economists*. From June 26-27 Canterbury, UK.
23. Myhr, J., Nordström, L., & Ståhl, B. (2006). Livelihood Changes enabled by mobile phones—the case of Tanzanian Fishermen. (Bachelor Thesis. Uppsala University).
24. McKenna, J., Quinn, R. J., Donnelly, D. J., & Cooper, J. A. G. (2008). Accurate mental maps as an aspect of local ecological knowledge (LEK): a case study from Lough Neagh, Northern Ireland. *Ecology and Society*, 13(1), 1- 13.
25. Murray, G., Neis, B., & Johnsen, J. P. (2006). Lessons learned from reconstructing interactions between local ecological knowledge, fisheries science, and fisheries management in the commercial fisheries of Newfoundland and Labrador, Canada. *Human Ecology*, 34 (4), 549-571.
26. Melchioly, S. R., & Sæbø, Ø. (2010). ICTs and Development: Nature of Mobile Phones usage for SMEs Economic Development-An Exploratory Study in Morogoro, Tanzania.
27. In proceeding of ICT and Development - Research Voices from Africa. International Federation for Information Processing (IFIP), Technical Commission 9 Relationship between Computers and Society. Workshop at Makerere University, Uganda. March 22-23.
28. Mori, C. K., & Assumpção, R. O. (2007). Brazilian digital inclusion public policy. Achievements and challenges. *The Journal of Community Informatics*, 3 (3), 1-6.
29. Njoku, I. F. (2004). The information needs and information-seeking behaviour of fishermen in Lagos State, Nigeria. *The International Information & Library Review*, 36 (4), 297-307.
30. Omwega, R. N. (2006). Community involvement in fish harvesting around Lake Victoria (Kenya). In *Proceedings of the 11th World Lakes Conference Nairobi, Kenya*.
31. Omar, S. Z., Hassan, M. A., Shaffril, H. A. M., Bolong, J., & D' Silva, J. L. (2011). Information and communication technology for fisheries industry development in Malaysia. *African Journal of Agricultural Research*, 6 (17), 4166-4176.
32. Peseckas, R. (2008). Dividing the waters: Resource use, ethnic relations, and community-based management among Fishermen on the Southern Haitian Dominican Border. University of Florida. (Master Thesis University of Florida).
33. Qureshi, S., & Davis, A. (2007). Overcoming the digital divide through electronic commerce. Harnessing opportunities in IT for development. In *Proceedings of 40th annual Hawaii international conference on system sciences (HICSS'2007)*.
34. Rahim, K.M.B. & Padhy, M. (1994). Scope and constraints of inland pisciculture in West Bengal: A case study of Birbhum district (eds) *The publication of S. Giriappa., Daya house, New Delhi*, pp. 141-158.
35. Ramírez, R. (2003). Bridging disciplines: The natural resource management kaleidoscope for understanding ICTs. *Journal of Development Communication*, 14 (1), 51-64.
36. Rashid, A. T., & Elder, L. (2009). Mobile phones and development: An Analysis of IDRC supported projects. *The Electronic Journal of Information Systems in Developing Countries*, 36(0).

37. Rijsenbrij DBB. (1997). the design, development and deployment of ICT Systems in the 21st Century. <http://www.cs.vu.nl/~d aan/progx/eng/contents.htm>.
38. Roman, R., & Colle, R. D. (2003). Content creation for ICT development projects. Integrating normative approaches and community demand. *Information technology for Development*, 10 (2), 85-94.
39. Salia, M., Nsowah-Nuamah, N. N. N., & Steel, W. F. (2011). Effects of mobile phone use on artisanal fishing market efficiency and livelihoods in Ghana. *The Electronic Journal of Information Systems in Developing Countries*, 47 (6), 1-26.
40. Sein, M. K., & Harindranath, G. (2004). Conceptualizing the ICT artifact: Toward understanding the role of ICT in national development. *The Information Society*, 20(1), 15-24.
41. Tariq Saeed Mian M.R. (2013). Determinants of Customer Intention to Use Mobile Banking: An Empirical Research Based on Extended Technology Acceptance Model. *Journal of Basic And Applied Scientific Research*
42. Yonah, Z., & Salim, B. A. (2005). ICTs as tools for poverty reduction. In *Proceeding of the discourse on engineering contribution in poverty reduction*. March, 18th -19th Tanzania.
43. Zijp, W. (1994). *Improving the transfer and use of agricultural information: A guide to information technology*. World Bank Publications.