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Usage Level of ICT and Its Impact on Income among Mechanised and Motorised Marine Fishermen in Kerala, India

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ABSTRACT

A new technology and its application in any field brings more benefits to its users, if it is timely adopted and successfully used. New information and communication technologies (ICTs) like Global Positioning Systems (GPS), echo-sounders, mobile phones, wireless sets and beacons in the fisheries sector, from capturing to selling process, play an important role in enhancing both the productivity and standard of living of fishermen in Kerala. This study aimed to interpret the period and level of usage of ICT tools and compute the relationship between income and current usage of ICTs among the mechanised and motorised fishers of Kerala, India. The study showed that most of the mechanised and motorised boats use GPS, echo-sounders, mobile phones and wireless sets. GPS, mobile phones and echo sounders had been used for more than 15 years, but the usage of wireless sets and beacons were recent adopted ICT tools in the marine fisheries sector. The study shows a positive correlation between the use of ICTs and the income of fishing communities. The values of correlation coefficient ranges from 0.053 – 0.124, where GPS and mobile phones have more connection with the improvement of income, while ranking the ICT tools graph the preference of GPS and wireless sets among other gadgets.

Keywords: ICT, mechanised and motorised boats, correlation coefficient

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INTRODUCTION

The use of a new Information and Communication Technology (ICT) is perceived as a catalyst for economic growth. Investing in ICT is widely regarded as having enormous potential for reducing costs, enhancing productivity and

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improving living standards (Farahani, 2010). ICT is used across the fisheries sector; from resource assessment, capture or culture to processing and commercialisation (FAO, 2007). Timely and responsible use of ICTs can contribute constructively both to cost reduction in fishing and to the enhancement of livelihoods of fishers. Access to ICT and the exchange of key information can assist the fishing communities in making informed decisions on a variety of matters from whether to engage in specific fishing operations, trade at a local market or to participate in a meeting that can help to reduce their vulnerability and improve their opportunities (Marciniak, 2010). ICT is considered as a general purpose technology due to its functional nature. In the fisheries sector, the general purpose technologies are Global Positioning Systems (GPS), mobile phones, wireless sets, and beacons. Besides that there are specialist applications such as the Echo-sounders. These technologies have been used in the marine fisheries sector of Kerala since 1990s, except for the wireless sets and beacons which are adopted recently. In this context, the present study aims to find out the correlation between the monthly income and the usage of ICT tools among the mechanised and the motorised [1] fishermen in general, with a special focus on both its ranking and usage level at different coastal regions in Kerala. The study hypothesises that there exists a positive correlation between income and usage of ICT tools in the Kerala marine fisheries sector.

Kerala is an important maritime state in India, with more than 1,000,000 of its population engaged in the fishing industry (GoK, 2012), with almost 200,000 of active fishermen (GoI Census, 2011). The total marine fish landings along the Kerala coast during 2012 was 841,000 tonnes, crossing 800,000 tonnes for the first time as against 743,000 tonnes of the previous year (CMFRI, 2013). The contributions of mechanised, motorised, and artisanal sectors were 68.2%, 30.3% and 1.5% respectively (CMFRI, 2013) and in the case of mechanised boats, it has been increasing year by year. The mechanised and motorised fishing boats in Kerala use GPS and echo- sounders along with mobile phones (Srinivasan & Burrel, 2013). CMFRI census report 2010 states that the total number of boats using ICTs in Kerala as follows: GPS – 3,288, mobile – 36,965 and other ICT tools – 2,354 which is 13%, 18% and 0.1% with respect to that of India. The district-wise contribution of new ICTs corresponding to the number of boats is shown in Table 1. It shows a significant improvement compared to the previous CMFRI census report in 2005 (i.e., 4,224 electronic gadgets) and it

[1] Any craft with engine permanent fitted to the hull which uses machine power for propulsion/ fishing operation like casting and putting net, operating lines etc is identified as a *mechanised craft*. Mainly they are; trawler, dolnetter, purse seiner, gillnetter, liner, etc. Any craft that has an engine fitted temporarily outside the craft which is used only for propulsion and not for fishing operations is identified as a *motorised craft*. Mainly they are; Catamaram, Plank built boat, Dugout canoe, Plywood boat, Fibre glass boat, etc

highlights the important role of ICT and its diffusion in fishing. It is clear that once the ICT tools are appropriately adopted and properly used by the fishermen, it can have a positive impact on fish catch and income.

TABLE 1
Use of ICT tools in the Kerala marine fisheries sector in 2005 and 2010

	2005		2010	
District	Electronics gadgets	Mobile phone	GPS	Other ICT tools
Trivandrum *	1354	5703	1851	820
Kollam	304	5862	412	357
Alappuzha	191	10454	221	547
Ernakulam*	539	2411	229	410
Thrissur	247	1575	382	126
Malappuram	626	3099	26	57
Kozhikode*	770	3435	112	36
Kannur	85	1361	55	0
Kasaragod	108	3065	0	1
Total	4224	36965	3288	2354

NB: *They are the selected coastal regions for the study
Source: CMFRI (2007) and CMFRI (2012)

REVIEW OF LITERATURE

Some theoretical concepts of technological diffusion are important to understand and to answer the questions of how and why the process of technology adoption occurs. Rogers (1995) states in his *Diffusion of Innovation* that a technology diffusion depends mainly on four important factors; new ideas (innovation), communication channels, time and social system. The adoption of a new idea (i.e., innovation) does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt innovation than others. The categories of adopters are the innovators, early adopters, early majority, late majority and laggards. General conceptual framework, proposed by Karshenas and Stoneman (1993), describes how adoption (or diffusion) of a new technology happens by four sub-models, i.e., the *epidemic effect* (a traditional model, where diffusion of a technology is based on passing of information from users to non-users*), rank effect model* (where, adoption is based on heterogeneity of firms), stock effect (where, profitability of adoption is determined by the number of other users, and thus for a given cost of acquisition only some firms and adoption profitable)

and *order effect* (where, reflecting advantages of first moving and early adopting). Within this general framework, our approach is based on an epidemic pattern of adoption of new ICT tools in the Kerala marine fisheries sector.

Based on the theoretical view, many studies have been conducted empirically on ICTs and its benefits in various areas. Bolong *et al*. (2013) found that the usage of Geographical Positioning Systems (GPS) has been recognised as one of the ways of increasing productivity by measuring the young fishermen's readiness in their fishing operations. GPS is the most preferred ICT for enhancing the productivity and livelihood in the sector (Omar *et al*., 2011; Omar *et al*., 2012) and there exists a significant positive correlation between usage of GPS and echo-sounders with income of young fishermen in Malaysia (Bolong *et al.*, 2013). The existence of mobile phones among the artisanal fishermen in the Effutu Municipality of Ghana shows that its usage has enhanced the efficiency of input and output markets for artisanal fishing and it improved their business relations and livelihoods (Salia, 2011). However, new ICT tools such as GPS, Sonar system, wireless sets, fisheries remote sensing, computer, internet and mobile phones have indeed offered huge benefits to fishermen (Hassan *et al*., 2011). Shaffril *et al*. (2012), on the basis of a pre-test analysis among Malaysian fishermen, concluded that the use of GPS, sonar, echo sounders, wireless sets and mobile phones helped the fishermen in saving their time, money, life and energy.

The potential use of ICT tools, especially mobile phones, has increased the income as well as the remote connectivity of fishermen to their family and fellows (Joshi *et al*., 2010). Similarly, fishermen in Muttom region, Kanyakumari, use mobile phones as a significant tool in communication and selling processes (Mary, 2011). All studies summarise that mobile phones have improved the life styles of fishermen by increasing their income. Thus, the national level studies on ICT concentrated on the usage of mobile phones and its impact on income and other related aspects. Studies on the comparison of various ICT tools, its preference with respect to income, are very limited.

Studies on the new ICTs in Kerala marine fisheries sector among mechanised and motorised sector are also very limited. The use of mobile phones has a significant role in enhancing productivity and economic efficiency in the Kerala marine industry, especially, in the south-western part of India (Sreekumar, 2011). A pioneering study by Jensen (2007) based on empirical analysis pointed out that the price dispersion was drastically reduced with the introduction of mobile phones in Kerala; the mean coefficient of variation of price across markets declined from 60–70 to 15 percent and 5–8 percent of daily catch fish waste was completely eliminated. Similarly, Abraham (2007) noted in his study that the major benefits

of mobile phones are for merchants, transporters and agents (whose waiting time is 70 per cent decreased by this). Here again, very limited studies have been conducted regarding mobile phones and its impact than the study on ICT tools with income or significance of ICT tools for generating income to Kerala fishermen. It is not yet explored. Thus, this study contemplates to fill this gap.

METHODOLOGY

The study includes both qualitative and quantitative methods for data collection. For the study, primary and secondary data were collected from 60 registered mechanised and motorised vessels, as the respondents. It was based on a multi-stage simple random sampling method. Out of the nine coastal districts in Kerala, three coastal regions; the northern region – Kozhikode (KZD), the central region-Ernakulam (EKM) and the southern region - Thiruvananthapuram (TVM) were selected based on systematic sampling. In the second stage, random selections were made of each coastal area from those chosen regions; Beypore (northern region), Munambam (central region) and Pozhiyoor (southern region). A total of 20 samples of the registered fishing boats from each selected three coastal areas were collected for the comparative study. The data were collected with the help of a well structured questionnaire, which is developed on the basis of past studies and discussions with experts. A pre-test, to check the reliability of ICT tools, was conducted with the help of Cronbach alpha test[2], which showed alpha coefficient between 0.721 - 0.800. It reveals that ICT helps to improve the performance and efficiency level of fishing in Kerala. For the deep analysis of the problem, key informant interviews and focus group discussions among fishermen were also conducted. The study has been conducted from February - March 2014. Meanwhile, secondary data were collected from various reports and research studies. Basic descriptive statistical analysis and comparison between the average monthly income and usage of ICT tools were prepared with the help of a well-equipped statistical software, called SPSS.

RESULTS

Descriptive Data Analysis

For the last two decades, some of the new information and communication technologies like GPS, echo-sounders and mobile phones have been used in Kerala fisheries sector, whereas wireless sets and beacons are the recent adopted technologies in the sector. Functions of each tool are

[2]The authors have already measured the Cronbach Alpha coefficients for other research purpose. It is a measure of squared correlation between observed scores and true scores. Cronbach's basic equation for alpha is given as; $\alpha = \frac{n}{n-1}\left(1 - \frac{\Sigma Vi}{Vtest}\right)$ Where n is the number of questions, Vi = variance of scores on each question, Vtest = total variance of overall scores (not %'s) on the entire test (Cronbach, 1951). Normally, the higher the Alpha is, the more reliable the test is. Usually 0.7 and above is acceptable (Nunnally, 1978).

different in nature (Table 2). Majority of the fishermen are aware of the presently available ICT tools except the beacons. Only a few use beacons for life safety in Kerala due to the lack of availability and their knowledge of it.

TABLE 2
ICT functions at sea and its benefits

ICT tools	Functions/benefits
GPS	It helps to locate shoals of fish. It aids the fishermen to come back accurately to the spotted location whether its day or night.
Echo-Sounder	It helps the fishermen to identify the accurate fishing area, density, depth movement, species and size of the fish shoal.
Wireless-set	It helps the fishermen to communicate either with other vessels or related agencies, so that immediate action can be taken. Moreover, through wireless sets they can get better price deals with the dealer even when they are still at sea.
Mobile	To search, distribute and share fisheries related information such as market price, online applications, weather conditions, professional advices, loan service, business opportunity etc among or between colleague and related agencies.
Beacon	Marine VHF radios or Distress Alert Transmitter (Beacon) can be used for a wide variety of purposes, including summoning rescue services and communicating with other vessels or users.

Source: Shaffril (2012), Jayamani, M. (2012) and FAO (2007)

The mechanised and the motorised crafts are dominated by fishers of age group ranging from 25 to 55 years old. Majority of the fishermen, who own boats and *shrank*[3], have basic school education. Most of the mechanised and the motorised fishermen also have minimum primary education (53% on an average) and only a small per cent are illiterate and are secondary educated (Table 3). The average monthly income[4] of the mechanised and motorised fishermen of Kerala is around Rs.15,000 ($241). Fishermen get around Rs15,000–Rs.20,000 ($241-$321) in the season (August, September and October), while during non-season, it is around Rs.5,000–Rs.10,000 ($80- $161) only. The average income of fishermen of Thiruvananthapuram is Rs.14,600 ($235), which is less compared to that of those in the other regions. This is due to the different types of gadgets, vessels and methods of fishing. The majority of fishermen have 10-15 years of experience with the usage of ICT in deep sea, while their fishing experience is more than that. The maximum period of fishing experience with the new ICT tools is 20 years in the study areas (Table 3).

[3] The fishermen who have control over the technology used in the boats.

[4] The study has been conducted among the boat owners of the motorised boats and *shrank* of mechanised boats.

All the mechanised and motorised boats (IBM and OBM)[5] use ICT tools with a different combination of gadgets to increase productivity and safe travel

OBM craft uses all ICT gadgets, except echo-sounders. Thiruvananthapuram is dominated by OBM boats, where majority of the gadgets used are GPS, wireless sets, and mobile phones. However, only a few use beacons along with other ICT tools. In Kozhikode, all mechanised boats use GPS, echo-sounders, wireless set and mobile phones, while it is 95 per cent in Ernakulam and only 15 per cent in Thiruvananthapuram (this is due to the low percentage of mechanised boats in this region) and the remaining fishing boats (i.e., motorised boats) in TVM use beacons, along with other available technologies (see Table 3).

TABLE 3
Basic profile of the mechanised and motorised fishermen in the study areas

Profile (N=60)	TVM (%)	EKM (%)	KZD (%)	Total (%)
Male	100	100	100	100
Single	0	5	5	10
Married	100	95	95	90
Age				
Mean	41	38.5	37	39
Standard deviation	1	9	8.7	8
Min	32	25	25	25
Max	55	53	54	55
Education				
Illiterate	20	5	10	12
Primary	55	70	35	53
Secondary	20	25	50	14
Higher secondary	5	0	5	3
Usage of ICT				
GPS, Echo-sounder, Wireless set and Mobile	15	95	100	70
GPS, Wireless set and Mobile	55	5	0	20
GPS, Echo-sounder, Wireless set, Mobile and Beacon	30	0	0	10
Average monthly income (in Rs/-)				
Mean	14600	16100	16650	`15783
Standard deviation	6683	7290	5193	`6399
Min	3000	5000	8000	`5000
Max	34000	30000	30000	`34000
Fishing experience with ICT (in Yrs)				
Mean	8.6	9	7	8.2
Standard deviation	9.3	5	3	6.4
Min	1	1	1	2
Max	20	20	16	20

Source: Primary Study (2014)

[5]Any craft that has an engine fitted temporarily outside the craft is called Outboard Motor (OBM) and if it inside the craft is called Inboard Motor (IBM) used only for propulsion and not for fishing operations. All the outboard motorised boats in the study are plywood boats.

Distribution of the gadgets in the study area is different in nature. In the Kozhikode region, the fishermen use more mechanised boats (85%), the remaining 15% use IBM boats, whereas the use of mechanised boats in Ernakulam and Thiruvananthapuram is 65% and 5%, respectively. Those fishermen in Thiruvananthapuram mostly used (90%) Outboard Motorised Boat (OBM), whereas Ernakulam had 35% of IBM. The average cost of a boat in Thiruvananthapuram is around Rs.10,00000 ($16055) and the average cost of a fishing boat in Kozhikode and Ernakulam is Rs.56,00000 ($89909). The mean boat size in Thiruvananthapuram is 35 feet and in the other two regions, the mean boat size is 65 feet. The average days spent per trip in the sea for fishing is 10 for both the Mechanised and OBM while the former one covers an average nautical mile[6] of 100-200, the latter 200-300. Meanwhile, 25 to 30 days is spent by IBM per trip for fishing, contributing to an average of 200-400 nautical miles for fishing. Seventy percent of the fishermen in Kozhikode spent around 5-10 days per trip on an average for fishing. The remaining 30 per cent spent around 25-30 days per trip for fishing. In Ernakulam, around 55% of the fishermen spent 5-10 days per trip for fishing and the remaining (45%) spent 15-30 days per trip for fishing. In Thiruvananthapuram, majority of the fishermen spent 5-10 days per trip (Table 4).

TABLE 4
Profile of the vessels in the study areas

Vessel details	TVM (%)	EKM (%)	KZD (%)	Total (%)
Mechanised Boat	5	65	85	52
Motorised Boat (IBM)	5	35	15	18
Motorised Boat (OBM)	90	0	0	30
Total days of work				
5-10	85	55	70	70
10-15	15	20	0	12
20-25	0	30	30	20
Cost of vessel (in Rs/-)				
Mean	1052100	5655300	5600000	4102466
Standard deviation	1836100	2812110	1900000	2182736
Min	325000	350000	2000000	891666
Max	8500000	9500000	8600000	8866666
Total labours (in No.)				
Mean	6	10	12	9
Standard deviation	2	1	2	1.6
Min	5	6	8	6
Max	15	13	16	15
Size of the boat(in feet)				
Mean	35	64	65	55
Standard deviation	10	12	10	11
Min	28	36	50	38
Max	70	96	86	84

Source: Primary Study, 2014

[6] 1 nautical mile = 1.852 kilometre

Usage Levels of ICT among Mechanised and Motorised Fishermen

The study focuses on the usage level and period of using of each ICT tools in the selected coastal regions of Kerala. While the majority of fishermen of Kozhikode and Thiruvananthapuram have been using ICT for less than 10 years, in Ernakulam, they have been using it for 10-15 years (Table 5). In Kozhikode, the northern region of Kerala, the majority of fishermen use ICTs for more than 10 years, including wireless sets. But there is no evidence of the usage of satellite based technology i.e. beacon in the Kozhikode and Ernakulam regions (Table 5). The central region of Kerala uses GPS for more than 15 years. Majority of the fishermen of Ernakulam use wireless set for more than 5 years for fishing. But interestingly, no one from this region uses beacon for life safety purposes. In the case of southern region - Thiruvananthapuram, the majority of fishermen use GPS and mobile phone over a period of 5-10 years. 55% of fishermen have been using wireless set for 5 years. Less than 35% use beacon while they go to deep sea for fishing (Table 5).

TABLE 5
Usage level of ICT in the three regions (in per cent)

No. of Year	GPS	Mobile phone	Echo-sounder	Wireless set	Beacon
KZD					
1-5	30	25	40	60	-
5-10	65	70	55	40	-
10-15	5	5	5	-	-
15-20	-	-	-	-	-
ERN					
1-5	20	30	20	50	-
5-10	30	25	25	40	-
10-15	40	40	45	10	-
15-20	10	5	10	-	-
TVM					
1-5	30	20	5	55	35
5-10	60	75	10	30	-
10-15	5	5	5	15	-
15-20	5	5	-	-	-

Source: Primary Study (2014)

Ranking of ICT Tools in the Study Areas

Ranking of the usage of ICT tools helps to understand the performance level of each tool. Stoneman's *Probit model or the rank model* (2001) indicates that population is heterogeneous so different members of the population benefit differently when they acquire technology. Acquisition of the technology depends on comparison of gross benefit against the cost (in the

absence of uncertainty). This observation predicts that the acquirer will buy the required technology if the gross benefit is greater than the cost. The present study also follows the same approach in studying the adoption of ICT tools among the fishermen.

GPS and wireless sets are the most preferred ICT tools for fishing in the study areas. The cost of a GPS varies from Rs.15,000-Rs.55,000 ($241-$884) and a wireless set costs around Rs.8,000–Rs.15,000 ($129-$241). Many mechanised boats use two wireless sets due to the natural technical vulnerability of the gadgets. It is observed that although mobile phones are less preferred compared to other advanced gadgets, they still play an important role in the selling process (Jensen, 2007). Except in Thiruvananthapuram, all the other regions use beacons as the least preferred tool. Concurrently, the ranking of the ICT tools in both Ernakulam and Kozhikode is the same. In Thiruvananthapuram, however, mobile phones come at the 3rd rank in comparison with echo-sounders (4th) for almost all who use them in OBM (see Table 6).

TABLE 6
Most useful and preferred ICT tools (Rank)

ICT tools	TVM	EKM	KZD
GPS	1(75)	1(95)	1(90)
Wireless set	2(90)	2(70)	2(75)
Echo-sounder	4(65)	3(85)	3 (90)
Mobile	3(70)	4(65)	4(70)
Beacon	5(55)	-	-

NB: Given parasyntheses are percentages of respondents
Source: Primary Study (2014)

Relationship Between ICT Usage and Income

Compared to other variable coefficients, GPS and mobile phones (0.124, 0.113) have a significant relation with income. ICT tools like wireless sets, echo-sounders and beacons show very low coefficient values compared to the value of other tools as, 0.059, 0.053, 0.046, respectively, are less significant with income or contributing less in the fish catch (Table 7).

TABLE 7
Correlations between ICT tools and average monthly income of fishermen

Tools	r	Sig.
GPS	0.124	0.173
Wireless set	0.059	0.326
Echo-sounder	0.053	0.376
Mobile Phone	0.113	0.208
Beacon	0.046	0.267

Source: Primary Study (2014)

The findings show that frequent usage of GPS helps the fishermen to earn more. GPS and mobile phone have positive correlations with income compared to other ICT tools. This shows that income in fishing can be improved with the use of GPS and mobile phones. GPS helps the fishermen to improve their income by enabling them to point out fish shoals and area locations for planned fishing, which reduces fuel cost and time. This gives them maximum fish catch and thus contributes more income to the sector.

DISCUSSION

ICT enables easy dissemination of requisite information at the right time and in a cost effective manner. In fact, ICT has many potential and viable applications in agriculture, especially in the fisheries sector. ICT tools such as global positioning systems, echo-sounders, wireless sets, mobile phones and beacons play significant roles in enhancing productivity making the current fishing methods more effective. According to Jensen (2007), Abraham (2006) and Srinivasan and Burrel (2013), the usage of mobile phones has positive and effective contributions to the income of mechanised and motorised fishermen. Mobile phones are mainly used to contact relatives and agents to understand the fish market price inside and outside the destination region. This helps the fishermen to identify affordable fish prices in the various fish landing centres and for safe return from the sea. Other tools like wireless sets and echo-sounders, however, show less significant correlations with income. Nonetheless, they were found to contribute indirectly by enhancing fish catch and helping the fishermen to communicate with each other when they are at sea and fathoming the depth of the sea (now GPS is used to fathom it more effectively). Compared to other tools, beacon shows a less significant correlation with income, for only a negligible per cent of boats use it for fishing.

Social system and communication channels are the two other important factors for diffusing a technology (Rogers, 1995). The present study shows that, Ernakulam coastal region has a well-structured communication channel with good social interaction between fishermen and NGOs compared to other areas. This coastal region has been using GPS for two decades. It has adopted GPS and mobile phones quite earlier than others and the theoretical percentile of adopter in this region is as follows: innovators (8%), early adopters (33%), early majority (30%) and late majority (31%). The adoption has elicited better results compared to other coastal regions. On average, the coastal regions of Thiruvananthapuram and Kozhikode have been using ICT tools quite late, i.e. by five years, than Ernakulam. Technology is preferred when it is user friendly and cost effective. Wireless set is the recent adopted communication technology, which is used by a larger section of the Kerala fishermen due to its easiness and effectiveness. Mobile phone, one of the low priced ICT tools, has reached its maximum adoption in

the fisheries sector. Three regions showed that GPS and wireless sets as the most preferred ICT tools (86% on an average) compared to other gadgets. Ernakulam and Kozhikode, however, placed only 3rd preference to echo-sounder than mobile phone (after choosing GPS and wireless set), indicating the importance of echo-sounder in fishing.

The study also suggests that all the fishermen, especially the traditional fishermen of motorised fishing boat, should be provided with new good quality ICT tools at subsidised rate with the help of certain NGOs or by the government departments. Well-furnished fish landing centres should be maintained with Village Knowledge Centre (VKC) to link other information hubs and research centres. It can promote the effective use of ICT tools for responsible fishery and disseminating information about seasons and new technologies. At present, INCOIS's (Indian National Coastal Information Service) fish potential zone data are not communicated properly to fishermen. It should be urgently taken care by concerned government department.Measuring the impact of ICT on productivity is very limited in the marine fisheries sector. Fish catch depends on several factors including the usage of ICT tools. Assuming this statistical limitation in the study, the correlation coefficients of GPS (0.124) and mobile phone (0.113) are very small. Accurate measurement of the impact of ICT tools for increasing the fish catch (productivity) is yet to be explored by further research.

CONCLUSION

Proper use or adoption of ICT tools brings development to any sector. ICT helps in many ways, especially to improve productivity, efficiency and revenue. This is the same for the marine fisheries sector. Fishermen, especially the traditional motorised fishermen, use the available technology more efficiently to improve their monthly income compared to mechanised fishermen. This study summarises that when the available ICT tools are adopted, it would result in a relatively better income to mechanised and motorised fishermen. There is a significant positive correlation between ICT usage (especially, GPS) and monthly income of the mechanised and the motorised fishermen in the study areas. This is the reason for ranking GPS as the preferred ICT tool than any other tools. However, this study also found that not all available ICT tools have a significant role with income. Though wireless set is preferred as the second best ICT tool because it helps to share information each other when fishermen are at deep sea, echo-sounder and beacon are more frequently used in selected coastal regions. However, they are insignificant in terms of affecting the monthly income, especially for the motorised fishermen.

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