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ICT Utilisation and Its Impact on the Income of Young Fishermen in Malaysia

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ABSTRACT

In order to meet the increasing demand for marine sources, superior offshore technologies have begun to be utilised. This study aims to discover the impact of ICT utilisation on the income of young fishermen. This is a quantitative study wherein a multi-stage random sampling approach was used to select a total of 121 registered fishermen as respondents. The data were collected using a pre-tested questionnaire. Mobile phones emerged as the most-used piece of ICT equipment among young fishermen, followed by GPS and echo sounders. Further analysis confirmed that usage of GPS and echo sounders is related to the income of young fishermen. Surprisingly, however, the study concluded that mobile phones – the most-used ICT device among young fishermen – have no significant association with the income of these young fishermen. This paper suggests a number of recommendations, and these can aid concerned parties to strategise more consistent methods to encourage young fishermen to use ICT.

Keywords: Fisheries Industry Development, ICT, income, socio-economic development, young fishermen

INTRODUCTION

Although arguments abound that the fisheries industry has a detrimental effect on the environment (Kennelly, 2003; Knudsen, 2003), there is considerable speculation on the positive impact of ICT in developing the fisheries industry. Recent statistics show

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that there are 129,622 registered fishermen in Malaysia (DOF, 2010), and this number is currently increasing. We expect the growing availability of ICT will benefit fishermen economically (Abu Hassan *et al*., 2011; Singh & Bharati, 2010).In Malaysia, agricultural industries, including fishing, are facing inadequate support from the younger generation (Hassan *et al*., 2009; Man, 2008). According to Shaffril *et al*. (2010), only 33% of fishermen in Malaysia are considered "young". Nevertheless, despite the small number of young fishermen, they are expected to be the main beneficiaries of ICT, as according to the MCMC (2011), young people are the main users of ICT in Malaysia.ICT has long been widely utilised across the country, and its contribution towards the productivity of the fisheries industry is undeniable. ICT has a lot to offer the industry, particularly in terms of strengthening fishermen's socio-economic status. In previous studies (Abissath, 2005; Salia *et al*., 2011; Ifejika *et al*., 2007), ICT has been proven to increase fishermen's productivity and income, enhance their safety, widen their markets, ease information-sharing and exchange processes among them. This study attempts to shed light on the potential impact of ICTs, such as geographical positioning systems (GPS), sonar, radar, echo sounders, mobile phones and wireless sets, on the income of young fishermen.

LITERATURE REVIEW

Rapid technological evolution has enabled ICT to be adapted to fishing activities. Advanced tools such as GPS, sonar, echo sounders, radar, mobile phones and wireless sets are crucial for the fishing industry today.

Though ICT is typically related to the internet and the computer, it actually covers a wide range of tools. Noor Sharifah (2006) stated that ICT involves processes such as accessing, recording, organising, handling and presenting information by utilising appropriate and suitable tools and software. Within the scope of this definition, doubtlessly, devices such as GPS, sonar, echo sounder, radar, wireless sets and mobile phones can be labelled as ICT tools.

GPS is one of the most popular tools used by Malaysian fishermen (Omar *et al*., 2011). Previously, most local fishermen employed indigenous skills, such as utilising flags and mountains, to mark their fishing spots; however, with the availability of GPS, the marking process has become very easy. GPS offers vital information such as latitude, longitude, and altitude, and guides fishermen to the exact marked location, day or night. In addition, this tool is able to provide information on surface speed and sunrise and sunset times and contains an odometer and accuracy warning system.

The popularity of echo sounders and sonar among local fishermen is gradually increasing (Ghee-thean *et al*., 2012). Both sonar and echo sounders are vital tools in detecting schools of fish. Sonar provides information relating to the extent, density, depth, movement, species and size of all fish shoals. In addition, information regarding the sea bottom, such as depth, contours, slopes and stones, can easily be gained. Such

information helps fishermen to steer clear of any underwater obstacles. Echo sounders are another ICT tool used to detect fish, though they provide a smaller map of the fishing area compared to sonar. According to the Department of Fisheries Malaysia, local fishermen have been using echo sounders since the 1960s. In the current market, echo sounders cost less than sonar, and this has made them more popular with fishermen. Echo sounders are capable of examining the depth of the water, the condition of the sea bed and the location of fish.Typically, the radar is embedded within big ships, particularly C0 and C2[1] boats. The radar is vital in the sense that it can improve the fishermen's safety while they are at sea. It offers a warning system which is capable of picking up any environmental threats. Moreover, it navigates clear of underwater hazards and notifies fishermen of any approaching vessels that are navigating the same route. Some advanced radars are also able to function exactly as sonar and echo sounders.

Mobile phones are another crucial tool in the modern fishing industry, and local fishermen should utilise their advantages. Most Malaysian fishermen own this tool due to its affordable price and beneficial functions. According to Omar *et al*. (2011), among the major benefits of mobile phones within the fishing industry is that they can enhance the fishermen's safety when the men are at sea. In addition, mobile phones are commonly used by fishermen to exchange information with their dealers and colleagues as well as with fisheries officers.

IMPACT OF ICT ON FISHERMEN'S INCOME

ICT has been proven to significantly enhance agricultural productivity (Hassan *et al*., 2009; Samah *et al*., 2009). As one of the branches of agriculture, the fisheries industry has utilised the advantages of ICT as it develops. Undoubtedly, ICT is one of the catalysts for improving the quality of life and eradicating poverty among fishermen (Toluyemi and Mejabi, 2011; Mogothlhwane *et al*., 2011). The use of sonar and echo sounders, for example, ease the search process. Typically, ships installed with such tools return to the jetty with fully loaded marine catches. Sonar and echo sounders function as fish detectors, since they can detect schools of fish and guide fishermen to the precise fishing spots. This ability results in higher productivity and lower consumption of fuel, since fuel is not wasted during the process of identifying a suitable fishing location. In addition, such technologies will minimise the time and energy required for fishing itself, which will result in lower costs in terms of crew members' salaries. These advantages thus reduce operational costs and eventually increase the fishermen's income.

GPS can also boost fishermen's income. Previously, most fishermen used flags, mountains/hills and birds to mark their location and identify fishing spots, but they are now able to use GPS, which works at

[1]C0 and C2 boats refers to deep-sea boats; they are operated within the range of >12.1 miles nautical

the touch of a button to navigate them to an exact spot. Although GPS cannot detect schools of fish, it offers similar socio-economic advantages as sonar and echo sounders in terms of minimising fuel, time and energy consumption, which in turn reduces operational costs and increases their income (Abu Hassan *et al*. 2011).

Possessing good and timely knowledge is crucial in meeting market demands; consequently, mobile phones and wireless sets also have a fairly strong impact on fishermen's income (Salia *et al*., 2011). These tools enable collaboration and knowledge management between the fishermen and their dealers and colleagues as well as with fisheries officers (EMCC, 2004). Regardless of time and place, mobile phones and wireless sets help fishermen to strengthen their marketing activities and respond to market and customer demands (Abraham, 2007). In addition, such tools enable fishermen to contact their dealers either by voice call, MMS or SMS even before they arrive at the jetty; this provides them early opportunities for bargaining. In addition, a study conducted by Mittal *et al*. (2010) identified that mobile phones and wireless sets assist fishermen to exchange information regarding market prices and fishing locations with their colleagues and fisheries officers. Again, this will reduce their expenditure on fuel as they can obtain information on the exact fishing location from their colleagues or fisheries officers. In addition, these tools allow fishermen to reach the best spots and the people who offer the best prices for their catch.

METHODOLOGY

This is a quantitative study in which a total of 121 registered young fishermen were selected as respondents. This study employed a multi-stage simple random sampling approach. In the first stage, out of five zones in Malaysia, four zones were randomly selected, namely the northern zone, southern zone, central zone and east coast zone. In the second stage of the sampling, based on the selected zones, a state was randomly selected to represent each state; the selected states were Kedah (northern zone), Johor (southern zone), Perak (central zone) and Terengganu (east coast zone). In the third stage of the sampling, based on the selected states, a fishery district was also randomly selected to represent each state where a total of four fishery districts, namely Langkawi Island (Kedah), Larut-Matang (Perak), Mersing (Johor) and Kuala Besut (Terengganu), served as points of focus. The instrument used for this study is a questionnaire, which was developed based on past studies and has already been pre-tested. The pre-test resulted in a Cronbach alpha value of .949, which exceeds the requirement suggested by Nunally (1978). Originally, the instruments for this study consisted of four parts, namely demographic factors, ICT usage on the ships/boats, variables affecting ICT usage among fishermen on the ships/boats and variables affecting ICT usage among fishermen at home. However, for the purpose of accomplishing the objective of this paper, the study focussed on the demographic factors and ICT usage

on the ships/boats. To facilitate the data collection process, a number of trained and experienced enumerators were hired. This study employed the survey method to obtain the information needed. For each respondent, the enumerators took an average of 30 minutes to complete the survey. Assistance given by fisheries officers, jetty leaders and village leaders eased the data collection process. To fulfil the objectives of the study, the research team employed suitable and relevant analyses such as frequency, percentage, mean, standard deviation and Pearson correlation.

RESULTS AND DISCUSSION

The fisheries industry is often dominated by those over 40 years old, and few under this age are involved. This study identified only 121 fishermen who are younger than 40 (Table 1). The number of young fishermen in Malaysia is still considered as relatively low; in fact, nearly half (43.8%) of the fishermen are below 40, aged between 35 and 40 years, and only a few (9%) are very young (15-19 years). For young fishermen, the average income from fishing is around RM881 per month and this is considered low. However, some fishermen earn more than RM1,500, while others earn as much as RM10,000. It is possible that the young fishermen who earn this higher income use ICT, and this paper will discuss that possibility.

Although these fishermen are young, they are relatively highly experienced in fishing. This study found that 42.1% of them have worked for 11-20 years as fishermen. The majority (76.9%) are active in Zone A and often stay out at sea for 16-30 days a month.

TABLE 1
Profile of Young Fishermen (N=121)

Profile	Percentage
Gender	
Male	97.5
Female	2.5
Race	
Malay	95.9
Chinese	4.1
Age (years)	
20-24	9.1
25-29	20.7
30-34	26.4
35-40	43.8
Mean	32.45
Standard deviation	5.54
Min.	20
Max.	40
Fishing income (RM)	
<500	34.7
501-1000	52.9
1001-1500	7.4
>1500	5.0
Mean	881.16
Standard deviation	1251.04
Min.	200
Max.	10,000
Fishing experience (years)	
<5	11.6
6-10	32.2
11-20	42.1
>21	14.0
Mean	13.46
Standard deviation	6.97

cont'd Table 1

Average days spent at sea per month	
1-15	24.0
16-30	76.0
Mean	19.6
Standard deviation	4.80
Fishing zone category	
Zone A[1]	76.9
Zone B[2]	14.0
Zone C0	9.1
Zone C2	0.0

Use of Communication Technology Among Young Fishermen

Table 2 shows the level of usage of communication technology among the young fishermen. The study categorises the level of usage into three categories namely low (only using it for 1-2 days in a week in their fishing operation), moderate (only using it for 3-5 days in a week in their fishing operation) and high (using it 6-7 days in their fishing operation). Generally, the usage of GPS, sonar, wireless sets, echo sounders and radar is low. Only mobile phones are used extensively (80.2%). Thus, this study gives the impression that ICT has yet to receive full support from young fishermen. This can have negative implications on their catch. The young fishermen also depend on traditional systems for activities such as weather forecasting, detecting areas with a lot of fish and networking. This is a worrying situation because the current fisheries sector will fail to thrive to its full potential if fishermen do not use ICT extensively. Although many young fishermen use mobile phones, usage is very limited in terms of enhancing their catch; instead, mobile phones are primarily used for messaging and communication, and are not adequate for detecting weather conditions and fish locations, or for enhancing safety at sea and marketing. This low usage of ICT also has implications on the young fishermen's income (Table 3).

TABLE 2
Usage of Communication Technology Among Young Fishermen

Communication technology	Usage Level (%)		
	Low	Medium	High
GPS	73.6	1.7	24.8
Sonar	86.8	1.7	11.6
Wireless set	85.1	3.3	11.6
Echo sounder	82.6	1.7	15.7
Radar	96.7	.8	2.5
Mobile phone	2.5	17.4	80.2

Relationship Between ICT Usage and the Income of Young Fishermen

This analysis identified significant and positive correlations between GPS usage and young fishermen's income. It indicates that frequent usage of GPS enables fishermen to earn more (Table 3). Therefore, there is a possibility that a low income can be improved with minimum usage of GPS. Further analysis has shown that there are two young fishermen in the study who earn RM10,000 per month: both are active users of GPS; this shows that GPS usage can have a positive impact on young fishermen's income. The results gained are unsurprising, as they agree with those found by Abu Hassan *et al*. (2011). As mentioned earlier, GPS enables fishermen to mark out and navigate to selected fishing locations.

This gives them the chance to maximise their catch, thus generating more income. In addition, GPS minimises the cost of fuel due to its ability to guide the fishermen to the exact marked fishing location. This ability reduces the time spent on the fishing operation; less time wasted means less fuel consumed.

In addition, the usage of echo sounders was found to have a significant and positive relationship to the young fishermen's income, which again is unsurprising as it is in tandem with the study by Ghee-Thean *et al*. (2011). As clarified earlier, echo sounders are fish detectors. Like GPS, they enable fishermen to navigate to an exact location and thus maximise their catch, which in turn generates more money.

Although most of the respondents have mobile phones, the study revealed that, surprisingly, this tool has no significant correlation with income, despite the fact that this technology is popular among fishermen (Abraham, 2007; Ifejika *et al*., 2007), has superior capabilities for exchanging information and provides enhanced marketing opportunities. everal aspects contribute towards this finding; for instance, Omar *et al*. (2011) emphasised that local fishermen do not have enough knowledge of the marketing functions of mobile phones, and use them mainly for safety purposes. According to Omar *et al*. (2011), Malaysian fishermen need mobile phones as mobile phones can act as communication tools if the fishermen face any emergencies (such as engine break-downs, natural threats etc.). In Malaysia, many fishermen still rely on traditional means of selling their catches i.e. they use the services of intermediaries (locally called "taukes"), and hence, fail to use the mobile phone for marketing purposes.

TABLE 3
Correlation Test Between ICT Usage and the ncome of Young Fishermen

ICT	r	P
GPS	0.194*	0.033
Sonar	-0.081	0.375
Wireless set	-0.059	0.521
Echo sounder	0.209*	0.021
Radar	0.023	0.800
Mobile phone	0.017	0.849

RECOMMENDATIONS

Based on the findings of this study, a number of recommendations are highlighted here. As the mobile phone is the most-used ICT device among young fishermen, these fishermen will need more exposure to the marketing functions of this technology. This is crucial, as several previous studies have confirmed that the mobile phone impacts fishermen's income significantly (Abraham, 2007; Abissath, 2005); however, a similar result was not found in this study, and among the possible reasons for this is the fishermen's ignorance of the multi-functions of the mobile phone, particularly to assist them to market their catch.

As GPS was found to have a positive correlation with young fishermen's income, its utilisation should also be encouraged and promoted. This can be done through

courses and seminars; as stressed by Abu Hassan *et al*. (2009), frequent participation in ICT courses and seminars will create consistent ICT usage among members of the community. In addition to courses and seminars, a specific institute could be established in which the main aim would be to educate and expose fishermen to offshore technologies, particularly GPS.

CONCLUSION

In almost any career, development is impossible if the rapid progression of ICT is not taken into account. ICT can assist in daily activities, especially in terms of improving work efficiency that can subsequently increase revenue. This also applies to the fisheries industry. Fishermen, especially young fishermen, should embrace ICT to help them increase their monthly income. This study concludes that the relatively low-income earned by young fishermen at present is due to the low usage of ICT in their daily fishing activities. There is a significant positive correlation between ICT usage (specifically GPS and echo sounders) and the monthly income of young fishermen. However, this study has also identified that not all ICT usage has a significant relationship to fishermen's income: sonar, wireless sets, radar and mobile phones are insignificant in terms of affecting the monthly income of young fishermen.

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ENDNOTES

[1]Zone A fishermen are also known as coastal fishermen, small-scale fishermen operating within the range of 0.1 to 5.0 nautical miles.

[2]Zone B fishermen are also known as coastal fishermen but they operate within the range of 5.1 to 12.0 nautical miles.