Technology Adoption among Fishermen in Malaysia

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Abstract: Technologies have been improved as a crucial tool in developing the agriculture industry. Fisheries, one of the agriculture branches have benefited a lot from the technologies invention. Advanced tools such as sonar, echo sounder and GPS for example have been proven to have impacts on the fisheries industry particularly on the fishermen socio-economic aspects. As the technologies adoption is crucial among the fishermen, it is important to understand the factors that determine their adoption of technologies and this study attempts to reveal a number of potential impingement factors. This is a qualitative study where the discussion is made based on literature and documents analyses. Data gained have revealed that factors such as level of education, finance, extension workers' roles, fishermen future expectation and prediction, behavioral factors and other demographic factors. It is recommended that relevant agencies to accentuate on these factors on their planning strategies and expectantly it can assist in enhancing technologies adoption among the fishermen.
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Introduction

1. Fisheries Sector in Malaysia.

Malaysian marine areas are generally divided into four sub-areas which are the west coast of Peninsular Malaysia, the east coast of Peninsular Malaysia, the coast of Sarawak and the coast of Sabah. The marine capture fisheries can be categorized into two main types, namely coastal or inshore fisheries, and deep-sea fisheries. In 2010, the fisheries sectors which include marine capture fisheries, general water and seaweed aquaculture, including fish, produced a total of 2,014,534.84 tones valued at RM9,495.28 million. Of the total national fish production, sub-marine capture fisheries sector, which includes coastal and deep sea have been accounted for 1,428,881 tones or 70.93% worth RM6,651.89 million, an increase of 2.56% from the previous year. Under this sub-sector, coastal fisheries remained the main contributor with a production of 1,108,897 tones valued at RM5,362.97 million or 77.61%. Whilst deep sea fishing has contributed by 319.984 tones valued at RM1,288.92 million.

Malaysia claims an Exclusive Economic Zone (EEZ) with a total area of 548,800 km^2. Peninsular Malaysia is the biggest EEZ in Malaysia which encompasses 55% of the total area. Other than that, Sabah area is 16% and 29% of Sarawak state. The EEZ represent about 69% of Malaysia's coastal waters. The Fisheries Comprehensive Licensing Policy (FCLP) divides Malaysia fishing waters into four zones:

Zone A: 0-5 miles from shore, reserved for traditional fisheries;
Zone B: 5-12 miles from shore, for commercial fisheries that uses gear such as trawls and purse-seines below 40 GRT (Gross Registered Tonne);
Zone C: 12-30 miles from shore, for commercial fisheries that uses boats above 40 GRT;
Zone C2: 30 miles from the shore and beyond, for commercial fisheries that uses - boats 70 GRT and above.

The number of deep-sea fishing vessels is not that big compared to the offshore vessels. In 2010, there were 48,589 units of fishing vessels licensed to fish in coastal waters. There are only 1167 units of licensed fishing vessels at sea in 2010, increased by 11.57% from 1046 units in the year 2009. The deep-sea fishing vessel does not include 70 GRT vessel size and on the licenses for tuna, anchovy purse seine seiner, anchovies and process vessels trawl vessels over 70 GRT and operations, long-line tuna and fish traps.

Zone B fishermen is actually well equipped compared to fishermen in Zone A in terms of fishing gears and equipment. In Zone A, they only use traditional equipment such as gill or drift net, seine net, hook and line, bag net, traps, stakes. The trawlers are restricted to operate in designated zones depending on the tonnage of the vessels. The establishment of the management zones is to reduce conflict among the fishermen and to ensure an equitable allocation of resources between the fishing vessels of the different

sizes and capacities. In order, to upgrade the vessel they need financial suppport and of course guidance from extension workers.

On the whole, a total of 129,622 fishermen were recorded working on licensed fishing vessels in 2010 compared with 125,632 in 2009, an increase by 3.18%. A total of 54,334 (41.92%) fishermen worked on board commercial fishing vessels using trawl, fish purse seine and achovies purse seine nets while the remainder 75,288 (58.08%) fishermen worked on board fishing vessels operating traditional fishing gears (Tables 1 and 2).

Table 1: Number of registered fishermen and vessels of Malaysia

Zone	Number of registered fishermen			Number of registered vessels		
	2008	2009	2010	2008	2009	2010
Northern	19,294	23,629	23,535	5,556	7,469	7,937
East Coast	24,139	27,069	29,956	5,747	6,819	7,169
Central	17,715	19,230	20,602	8,516	9,356	9,820
Southern	11,348	13, 945	14,149	5,657	6,854	6,666
Sabah/ Sarawak	37,185	41,759	41,380	15,483	18,247	18,164
Overall Total	**109,771**	**125,632**	**129,622**	**40,959**	**48,745**	**49,216**

Sources: Department of Fisheries Malaysia (2008 – 2010).

Table 2: Number of Fishermen Working on Licensed Fishing Vessels by Fishing Gear Groups

Fishing Gear Group	Number of Fishermen Working on Licensed Fishing Vessels by Fishing Gear Groups
Grill/Drift nets	52,094
Trawl nets	28,705
Fish purse seine	22,875
Hooks and lines	11,397
Anchovy purse seine	2,754
Portable traps	2,352
Lift nets	1,463
Miscellaneous	1,363
Bag nets	1,259
Kenka two boats	1,226
Crab traps	953
Fish aggregate device	829
Marine culture system	596
Shellfish collection	388
Stationary traps	316
Kenka one boat	285
Barrier nets	272
Other seines	260
Push/scoop nets	165
Fish carriers	50
Anchovy boiler	20
Total	**129,622**

2. Fisheries Development Agencies

Malaysian government has established two responsible agencies in developing the fisheries sector which are Department of Fisheries (DOF) and Fisheries Development Authorities (LKIM). These two agencies are put in Ministry of Agriculture and Agro-based Industry (MAAI). DOF is entrusted with the role of developing, managing and regulating the fisheries sector. The objectives of the Department of Fisheries are to increase the national fish production, manage the fisheries resources in a sustainable basis, develop a dynamic fisheries industry, intensify the development of fish-based industries and maximise the income of the fishing industry.

Subsequently, LKIM is given the responsibility on supervising the fish landing ports throughout the country and ensuring at least minimum compliances accorded to as a fish landing port. On top of it, this agency have to assure in the implementation of Good Handling Practice in all complexes or landing ports as the basis to ensure the supply of fresh and high quality processed fishes that are safe for consumption. Next, LKIM as one of the agencies that endorsed competent authority to determine the market access for fish products, and is able to execute its duties effectively. Last but not least, they have collaboration with the Ministry of Health and Malaysian Fishery Department in ensuring that the export market access for the country's fish produce are not obstructed.

3. Factors affecting technology adoption among fishermen

3.1 Level of education

In recent years, many governments and researchers have endeavored to improve the efficiency of technology transfer and cost effectiveness of various stages of production of fishery production. Adoption refers to the decision to use new technology or practices by economic units or practice. Among the factors limiting the transfer of technology among the fishermen in Malaysia is due to illiteracy which is highly associated with their education achievement. According to Sule et al. (2009) fishermen with lower education achievement seem to face problem to adopt fishing technologies compared to fishermen with higher education achievement. Furthermore, SENDI (2007) states that the highest educational level among the fishermen is primary school which is 34.3 % of the population. As such, level of education affect their ability in other languages particularly English, the language used in tools such as Global Positioning System (GPS), sonar, and wireless set is not suitable with the local fishermen. Eventually, such unsuitability will result in more time consumption for the fishermen to adopt technologies in the fishing routines. Furthermore, according to Weterenge (2009), besides formal education, extension education need to be exposed to the potential fishermen on various aspects of fish farming as this shall embolden them to adopt the technology.

3.2 Finance

Finance is one of the main factors that impinge fishermen's adoption on technology. Income inequality will result in fishermen with better income to adopt technology positively in their fishing routine while comparatively fishermen with low income will do the different way (Gine and Klonner, 2005). In Malaysia, studies done by Shaffril et al. (2011) and Omar et al. (2011) have indicated that majority of fishermen in Malaysia earn monthly income between RM500-RM1000. As in the modern day, such income is inadequate and probably will prohibit them from buying or adopting technologies in their fishing operation. Furthermore, according to Gine and Klonner (2006), exposure to the technologies impact on fishermen income will impinge fishermen adoption of technologies. Remarkably, both of them have identified that factors of debt have something to do with fishermen's decision whether to use the fishing technologies or not.

3.3 Extension workers' roles

Other than that, Truong Thi Ngoc Chi (2008) said that the factors that influence the use of new technology include extension workers' knowledge, ways of organization and management of extension programs, and physical conditions of the area. Among the most effective ways of influencing the fishermen to adopt the technologies in their fishing routine is by establishing technology demonstration centers. Such establishment will provide opportunities for fishermen to learn and expose to the functions and benefits of fishing technologies. In another study conducted by Ohajianya et al. (2003), factors such as extension educational contacts with fishermen, regularity of the contacts and provision of needed fisheries input can be the main impingement factors for fishermen's adoption of technologies.

3.4 Fishermen future expectation and prediction

Findings by Levine and McCay (1987) have revealed that decisions to adopt technologies are associated with their expectations and prediction with regard to the future fishing opportunities and assessments of current profits gained from their fishing operation, as well as to vessel replacement value.

3.5 Behavioural factors

There are some studies that tried to relate a number of behavioural factors on fishermen's adoption of technologies. Shaffril et al. (2012) for example have applied Unified Theory of Acceptance and Use of Technology (UTAUT) whereby they managed to reveal that behavioural factors such as performance expectancy, effort expectancy, social influence, facilitating condition, behavioral intention and voluntariness of use have something to do with fishermen's adoption of technology. Comparatively, Bolong et al. (2012), in their study have found three behavioral factors that can impinge fishermen usage of technologies namely performance expectancy, voluntariness of use, and behavioral intention. Interestingly, Bolong et al. (2012) have confirmed that by having these three factors, it shall have an impact on the fishermen's income.

3.6 Other demographic factors

There are abundance of literatures that try to relate a number of factors that predispose or prohibit technology usage. According to Omar et al. (2011), increasing age and little exposure to the technology are among identified factors that inhibit fishermen from using the technologies. From the statistics, the highest age group of fishermen in Malaysia is between 45-49 years old (Sendi, 2007). At this point, for them, it would be pointless to learn something new. Even the statistics show that the income of fishermen in Zone A income is much more higher than Zone B which is RM 16,591 and RM 3,275 respectively. So, why do they need to improve the technology as at the same time by using the traditional method they can get a higher income than their colleagues in Zone B fishing area. In a study done by Wetengere (2009), gender has something to do with technologies. Surprisingly, within their study female fishermen were found to have higher technologies adoption compared to male fishermen and this happens due to several factors such as commitment and attention. Interestingly, a study done by Wetengere (2009) also found that religious beliefs can impinge the adoption of technologies.

4. Conclusion.

Doubtlessly, technologies are an important part of fisheries industry nowadays. To further develop this industry, the sucess is not just relying on the development of the technolgies itself, but it also must be focused on why fishermen want or hesitate to use the technologies. To understand the impingement factors of technolgies adoption is crucial as it shall assist the relevant agencies in constructing their strategies to embold fishermen to utilize and adopt technologies within their fishing operation. Under the radar of this study, a number of factors that influence technologies adoption among fishermen have been identified namely level of education, finance, extension workers' roles, fishermen's future expectation and prediction, behavioral factors and other demographic factors. Probably, by emphasizing all of these factors within agencies planning, technologies adoption among fishermen can be pushed towards a higher level.

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References

1. Adesehinwa AOK, & Bolorunduro PI. Existing fisheries technologies and approaches for dissemination in two maritime states of Nigeria: Effectiveness and constraints. American Eurasian Journal of Agriculture and Environment Science, 2007; 2 (3), 231-239.
2. Bolong J, Omar. SZ, Shaffril HAM, D'Silva JL, & Abu Hassan M. Communication technologies and fishermen: lesson learned from Langkawi Island and Kuala Besut. Science Series Data Report, 2012; 4 (5), 2-12.
3. Davis FD. Perceived usefulness, perceive ease of use and user acceptance of information technology. MIS Quarterly, 1989; 13 (3), 319-340.
4. Department of Fisheries Malaysia Statistic on Fisheries Sector in Malaysia. Retrieved from: http://www.dof.gov.my/buku_perangkaan_tahunan_perikanan.
5. Gine X, & Klonner S. Credit constraints as a barrier to technology adoption by the poor lessons from South-Indian small-scale fishery. World Bank Policy Research Working Paper 3665, July 2005.
6. Gine, X., & Klonner, S. Technology adoption with uncertain profits: The case of fibre boats in South India. 2006. Retrieved on 29 June 2012, from: http://www.icrier.org/pdf/14-15dec06/Paper_XavierGine.pdf
7. Fisheries Development Authority Malaysia (LKIM). Retrieved from: http://www.lkim.gov.my/sendi2007;jsessionid=3805B6CB33B26414A62681FBF3723C4E.
8. Levine EB, & McCay B. Technology adoption among Cape May fishermen. Human Organization, 1987; 46 (3), 243-253.
9. Naresh K, Raduan CR & D'Silva, J.L. A review on factors impinge computer usage in education. J. Social Sciences, 2008; 4 (2), 146-157.
10. Shaffril HAM, Omar SZ, Bolong J, D'Silva JL, & Abu Hassan M. Measuring ICT usage among west coast fishermen: Pre-test results from Port Dickson, Negeri Sembilan. American Journal of Agriculture and Biology, 2012; 7 (1), 21-27.
11. Sule AM, Sanni AO, Olowosegun T, Agbelege OO, & Olabanji M. Socio-economic factors influencing the adoption of "Gura" fish trap technology in Nigeria. Continental Journal of Fisheries and Aquatic Science, 2009; 3, 12-19.
12. Ohajianya DO, Onu DO, & Echetama JA. Evaluation of the effectivenessof the Imo State fisheries extension programme. Journal of Agriculture Science Research, 2003; 3 (2), 108-125.
13. Omar SZ, Abu Hassan M, Shaffril HAM, Bolong J, & D'Silva JL. Information and communication technology for fisheries industry development in Malaysia. African Journal of Agricultural Research, 2011; 6 (17), 4166-4176.
14. Truong, TNC. Factors affecting technology adoption among rice farmers in the Mekong Delta through the lens of the local authorial managers: an analysis of qualitative data. Omonrice, 2008; 16, 107-112.
15. Wetengere K . Socio-economic factors critical for adoption of fish farming technology: The case of selected villages in Eastern Tanzania. International Journal of Fisheries and Aquaculture, 2009; 1 (3), 28-37.

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