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Exploring Intellectual Capital

# Profiling GPS Users among Small Scale Fishermen in Malaysia

## [1]Hayrol Azril Mohamed Shaffril, [2]Azimi Hamzah, [2]Bahaman Abu Samah

[1]Institute for Social Science Studies, Universiti Putra Malaysia
[2]Faculty of Educational Studies, Universiti Putra Malaysia

**Abstract**
This study aims to profile the GPS users among small scale fishermen in Malaysia. The study is quantitative in nature whereby a total of 400 respondents from 12 fisheries districts were involved. The analysis have confirmed that older fishermen with PMR/SRP level of education formed the majority of GPS users. On average, the fishermen surveyed had about 19 years of experience in fishing activities and they have utilised the GPS for 5 years. Their level of GPS usage was high and in general, most of them has been relying on this technology for two main purposes – navigation and safety. The findings from this study can assist the concerned parties in understanding the background of GPS users and their pattern of usage, which later allows them to strategize several efforts to encourage GPS usage among non-users through future programs that are in line with their needs, abilities and interests.
**Keywords:** Fisheries Technology Usage, Community Development, Rural Development

**Introduction**
The fisheries sector in Malaysia is a growing contributor to the national revenue. In 2014, the sector had generated a total of RM8.79 billion in revenue compared to RM6.65 billion in 2010 (Department of Fisheries Malaysia, 2014).  Furthermore, the sector provides  employment opportunities, especially in rural areas whilst the number of registered fishermen across the country is 144,019 (Department of Fisheries Malaysia, 2015).
There are four groups of fishermen in Malaysia, namely Zone B fishermen, Zone C0 fishermen, Zone C2 fishermen and the smaller scale group known as Zone A fishermen.  Although there is no official record of a definite SSFM number, previous studies by Shaffril et al. (2013), Osman et al. (2014), Ramli et al. (2013) and Omar et al. (2012) have somewhat confirmed that SSFM constituted more than 65% of the fishermen population in Malaysia. There are several common characteristics of SSFM such as conducting fishing operations at a subsistence level, relying on a smaller vessel, their boat is equipped with a smaller engine power, operating on a daily fishing operation (usually between five to nine hours), relying on nets, fishing rods, portable traps and rawai as their main catching tools and using mobile phones as their basic communication device during fishing operations.

Similar to other agricultural communities, SSFM currently faces several problems that appear to threaten their socio-economic well-being. Their main socio-economic problem are their lower income (Shaffril et al., 2013),their characteristics (smaller vessels, smaller boat engine capacity, smaller catching tool capacity), illegal bottom trawling activities, over fishing and pollution (Shaffril et al., 2013; Omar et al., 2013; Shaffril et al., 2016). The most prevalent threat to the SSFM is climate change. This phenomenon have result in lower income among SSFM as it lessens their fishing operation days and reduces the quantity and quality of the marine resources (CSIRO Australia, 2007, Rijnsdorp et al., 2009; Ottersen et al., 2009). Furthermore, climate change threatens the safety and security of SSFM as the size of their vessels and engine power could expose them toward the impacts of climate change (e.g. extreme weather).

In response, the concerned parties have initiated a number of endeavours, including the use of fisheries technologies such as Geographical Positioning System (GPS). This technology offers a superior navigating function which later produces several other benefits to SSFM such as minimizing their operation cost, increasing their income and lessening the risks caused by extreme weather. Although GPS offers these benefits, the current number of GPS users among SSFM was only 29.1% (Omar et al. 2012) and therefore supplementary efforts are needed to encourage non-users and non-active users to embrace GPS usage within their fishing operation. To increase the number of GPS users among SSFM, conducting a profiling study is a recognized effort. The findings can assist any concerned parties in understanding the background of GPS users and their pattern of usage, which later allow them to plan strategized efforts to encourage GPS usage among non-users via future programs in line with their needs, abilities and interests. Albeit its importance, the number of existing profiling studies related to fisheries technology users are insufficientand there is a mounting need to increase it. In response to the gap, this study aims to profile GPS users among SSFM in Malaysia by focusing on their general demographic background, their fisheries related background, their level of GPS usage and their purposes of using GPS.

**Methodology**

This study is quantitative in nature and a developed questionnaire was used as the main data collection tool. Originally, the instrument contained three main parts, namely demographic factors, GPS usage and behavioural factors, yet , to answer the objective of this paper, the present article focuses on two parts; the demographic factors and GPS usage. The instrument was developed based on reviews of literature and questions from past studies by Omar et al. (2012), Osman et al. (2014) and Ramli et al. (2013). The research team tried to develop items related to SSFM's demographic factors and their GPS usage to ensure that all items included are consistent and in line with the aim and criteria of the study. The instrument was then validated via a series of instrument development meetings between the researchers.

The demographics section consisted of 17 items whereby five of it focus on the respondents' general background and the remaining 12 items focus on their fisheries operation background. For the section of GPS usage, the items developed focus on the purposes of using it and there are eight items. Details regarding of the items are presented in Table 1.

Table 1: The questionnaire

| Part | Option of answers | Example items include |
|---|---|---|
| Demographics (general background) | Open-ended and closed ended | Age, educational achievement, income per month |
| Demographics (Fisheries operationbackground) | Open-ended and closed ended | Experience as a fisherman, experience in using GPS, type of vessel |
| GPS usage | Five Likert-like scale – ranged from 1 (never) to 5 (always) | To ease my fishing operation <br><br> To navigate me to the marked fishing location <br><br> To navigate me safely to the jetty during bad weather |

The pre-test for the study was conducted at Kuala Pahang, an area in the East Coast zone of Peninsular Malaysia. It was conducted among 30 SSFM. The resulted Cronbach alpha value for GPS usage was .687 which didn't exceed the recommended value of .700 by Nunnally (1978). To enhance the reliability, several efforts had been made. Based on the discussion with the enumerators (on items that may have confused the respondents) and the reliability analysis, several items were re-phrased to further enhance its clarity. Subsequently, the instrument was disclosed to several experts for further validation process. Such efforts resulted in a success as the Cronbach alpha value recorded for the actual data collection was .828.

Based on a multi-stage cluster sampling, a total of 400 GPS users among the SSFM were selected as the respondents. The respondents were selected from 12 fisheries districts on behalf of thefour states in Malaysia (Table 2).

Table 2: Areas of data collections

| Fisheries Districts | Study locations | Number of respondents |
|---|---|---|
| P. Pinang | Seberang Perai Utara | 33 |
| | Seberang Perai Tengah | 33 |
| | Seberang Perai Selatan | 34 |
| | **Total** | **100** |
| | | |
| Perak | Manjung | 33 |
| | Manjung Selatan | 33 |
| | Lumut | 34 |
| | **Total** | **100** |
| | | |
| Johor | Batu Pahat | 33 |
| | Mersing | 33 |
| | Pontian | 34 |
| | **Total** | **100** |
| | | |
| Terengganu | Kuala Terengganu Selatan | 33 |
| | Dungun | 33 |
| | Kemaman | 34 |
| | **Total** | **100** |
| **Overall total** | | **400** |

Prior to the data collection process, the researchers had visited the selected locations for three main purposes – first, to ensure that the selected locations had the required numbers of SSFM; second, to ask permissions from the village leaders and jetty leaders as the data collection was taking place in their administrative areas; thirdly, the visit was intended to ask the villager's assistance to identify therespondents worthy for the study. The data collection process went on for four months starting from April 2015 and ended on July 2015. Assistance from trained and experienced enumerators were employed during the process. The survey was the main data collection technique and the enumerators took between 20-30 minutes to complete each survey session. Data were analysed through descriptive analyses such as frequency, percentage, mean score and standard deviation.

## RESULTS AND DISCUSSION
### General Background
Within this part, the discussions focus on the GPS users' age, educational achievement, income per month (from non-fisheries activities) and the number of household members.

*Age*
The mean score recorded was 43.0 and about 58.5% of them were aged above 40 years old. This fact have confirmed that older SSFM began to embrace fisheries technologies as opposed to findings by Venkatesh et al. (2003) and Hassan et al. (2011), who associated older people

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with a propensity towards technology usage hesitance due to the decline in their learning and memory capabilities, development of psycho physiological restructuring and technophobia.

*Educational achievement*

A majority of them (95.5%) have obtained a lower education certificate (SPM[1]/SPMV[2] and below). Furthermore, a total of 27.7% of them hold a PMR/SRP[3] certificate while another 25.7% hold a primary school certificate. Although an individual's educational achievement has been long associated with better technology acceptance, however, it seems among these GPS users education have no influence. This might be related to the simplicity of usage as Bolong et al. (2014) stated, just by a click on the GPS, it can accurately navigate them to their desired fishing location.

*Income per month (from non-fishing activities)*

A total 108 GPS users were seen to conduct alternative income generating activities – most of them were related to technical and entrepreneurship activities. On average, SSFM managed to earn an extra of RM1, 174.10 per month whereas 22.2% of them earned more than RM1, 501 per month.

*Number of household members*

On average, the respondents had 5 members in their house. About 37.3% of them had 6 or more household members, another 37.3% of them had 3-5 household members while the remaining respondents (25.4%) had less than 3 household members.

**Fisheries activities background**

Within this part, the discussion focuses on the GPS users' experience as a fisherman, their vessels and fishing tools, their fishing operation, their pattern of GPS usage and their economic side.

*Experience as a fisherman*

The mean score recorded for living experience as a fisherman was 18.8 years with the majority of them (32.5%) had at least 21 years or more of experience within the fishing industry. As most GPS users were among the elders, it was expected that most of them would possess as much experience in the industry.

*Their vessels and fishing tools*

A majority of them (86.7%) used fibre boats while the remaining relied on traditional vessels (sampan). As the SSFM in Malaysia are commonly characterized by basic fishing tools, it was no surprise that most of them were found to utilize seines, fishing rods and portable traps in their fishing operation.

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[1] Malaysia Education Certificate
[2] Malaysia Vocational Education Certificate
[3] Malaysia Lower Education Certificate

*Their fishing operation*

The average mean score recorded for days spent in fishing operation in a month is 19 days and this is similar to findings from previous studies by Osman et al. (2014) and Ramli et al. (2013) which focused on the non-users. Understandably, the result provides an indication that having a GPS had no influence on the number of days these SSFM spent for their fishing operation. On average, the users spent 8 hours of fishing operation with 21.0% of them spent 11 hours or more for each of their fishing operations.

*Pattern of GPS usage among the respondents*

Most of them (93.4%) used a Garmin GPS and on average they have used this technology for 5.1 years. About 36.2% of them were less familiar with GPS usage as they have only used it for 1-2 years while another 29.8% have used the device for 6 years or more. Nearly three quarters (74.2%) of the SSFM learned to use the GPS from their fishermen colleagues while another 2.4% relied on their family members. Furthermore, 5.7% of them have relied on the trial and error technique. Only 5.8% of these GPS users gained their technology knowledge and skills via offered courses.

The resulted mean score on GPS usage was 4.33, thus reflecting a high level of usage among the SSFM. Generally, most of them had been using the GPS for two main purposes – for navigation and to enhance their safety aspects. The resulted analysis concluded that the mean scores for each item were ranging from 3.75 to 4.77; the item 'to ease my fishing operation' recorded the highest mean score while the item 'to avoid dangerous coral at the sea' scored the lowest.

*Their economic side*

The majority of GPS users (87.0%) have targetted fishes as a prime catch while another 9.0% focused on catching prawns. The remaining users have targetted other sea species such as crabs, cockles and cuttlefishes.

On average, the GPS users spent between RM136.00 (roughly, equal to USD35) for each of their fishing operations. The foremost cost of fishing operation is the fuel and it is added by other miscellaneous costs such as ice and food.

The recorded mean score for their catch productivity in a week was 148.9kg with 19.8% of them managed to catch more than 200 kilos. Comparatively, previous studies by Omar et al. (2013) have inferred that most traditional fishermen were not able to land more than 80 kilos of catches in a week while some of them only managed to land 30 kilos of catches per week.

The average on income per month (generated from fishing activities) was RM1, 231.60 (roughly equal to USD400) and this result have confirmed that GPS users earned more money compared to non-users. Data from Osman et al. (2014) confirmed that non-users were only able to earn RM941 (roughly equal to USD235), meanwhile, both Ramli et al. (2013) and Shaffril et al. (2015) concluded that non-users only earned RM922 per month (roughly equal to USD230).

**Recommendations**
More technology related courses need to be conducted as the data gained from this study have confirmed that only 5.8% of these SSFM had attended such courses. This effort is expected to provide more opportunity for the SSFM and widen their access to knowledge on fisheries technology (Abu Hassan et al., 2011). Although the SSFM preferred to learn from their colleagues, the provided courses or seminars allows them the opportunity to learn about GPS usage from technology experts. One of the main obstacles to realize this is to identify suitable date and time to conduct the courses. Unlike the East Coast zone SSFMs who are available during the monsoon season, to conduct courses for the West Coast zone SSFMs is a bit challenging due to their unseasonable fishing operation. Understandably, weather on the West Coast zone are more stable and less affected by the monsoon, which allows their SSFM to continue conducting their fishing operation over the year. Detailed planning with jetty leaders and skippers will open up opportunities for the concerned parties to schedule an early planning with SSFM, especially those living in the West Coast zone.

None of the GPS users in this study would refer to extension officers in order to learn how to operate a GPS and therefore their roles need to be rendered a new synergy and further empowered. Extension officers can offer a buffer against technology ignorance among the SSFM in Malaysia. They should play an active role in conveying GPS simplicity and the advantages it offers, particularly on its ability to reduce their operation time, to increase their income and to enhance their safety and security aspects. Instead of awaiting the visit from SSFM at their office, there is ample time for extension officers to take proactive roles by spreading the knowledge on technology  directly among SSFM places of interests such as Waqfs (a small shelter- usually found around coastal villages) and coffee stalls. It is important indeed that the extension officers take part with SSFM instead of apart.

**Limitations and Future Studies**
This study is constrained by several limitations. First, it focused only on small scale fishermen. In the future, the focus should be placed on deep sea fishermen as they constitute the biggest portion of GPS users. Furthermore, the current study focused on GPS solely although there are other fisheries technologies such as sonar, echo sounder and remote sensing. It is foreseen that the extension of this study is applicable to other fishermen's group and technology devices, hence it will significantly contribute to existing knowledge.

**Conclusion**
Similar to other agriculture community groups, the SSFM face several critical issues such as lower income and threats from climate change. In response to this, the government further stressed on the usage of fisheries technologies as these tools are able to assist SSFM in solving their socio-economic issues. Despite the benefits offered by GPS usage, only 29% of the SSFM have embraced GPS usage in their fishing operation. To increase the number of GPS users among SSFM, conducting a profiling study is a recognized effort. This can assist the concerned parties to understand GPS users, which later allows them to strategize efforts to attract GPS usage among non-users through future programs planned in line with the needs, abilities and

interests of SSFM.  The data gained demonstrated the profiling of GPS users among SSFM. Most of them used this technology for navigation and safety purposes. Regardless of their age and educational achievement, the SSFM in this study faced no problem in handling a GPS – possibly due its simplicity in usage. With regard to their economic aspects, comparisons with previous studies have concluded that GPS users were able to earn RM1, 231.60 (roughly equal to USD400) of extra income.

**References**

Abu Hassan, M., Shaffril, H.A.M., D'Silva, J.L., Omar, S.Z., & Bolong, J. (2011). Fishermen and ICT: Towards creating knowledgeable fishermen in Malaysia. Australian Journal of Basic and Applied Science, 5 (9), 457-469.

Bolong, J., Osman, N., Omar, S.Z., D'Silva, J.L., & Shaffril, H.A.M. (2014). Knowledge, training and access to global positioning systems: Views of young fishermen in Malaysia. Asian Social Science, 6, 19-23.

CSIRO Australia. (2007). Fish growth changes enhanced by climate change. Science Daily. Retrieved on 1 May 2014, from: http://www.sciencedaily.com-/releases/2007/04/070427120433.htm.

Department of Fisheries Malaysia (2015). Landings of marine fish by state and fishing gear group, 2014. Retrieved on November 2015, from: http://www.dof.gov.my/c/document_library/get_file?uuid=b689fb38-36c3-4dd7-bcb1-21e25af3055a&groupId=558715

Hassan, M.S., Yassin, S.M., Shaffril, H.A.M., Othman, M.S., Abu Samah, B., Abu Samah, A., & Ramli, S.A. (2011). Receiving agriculture information through mass media and interpersonal sources among the rural community. American Journal of Agricultural and Biological Science, 6, 3, 451-461.

Man, N. (2008). Youth agro-based entrepreneurs' perceptions towards agriculture and the needs for agriculture education. Journal of Youth Development, 1, 99–114.

Nunnally, J.C (1978). Psychometric theory. 2nd Edition. Mc-Graw Hill, New York.

Omar, S.Z., Shaffril, H.A.M., Bolong, J., D'Silva, J.L., & Abu Hassan, A. (2012). Usage of offshore ICT among fishermen in Malaysia. Journal of Food Agriculture and Environment, 10 (3-4), 1315-1319.

Omar, S. Z., Shaffril, H. A. M., Kamaruddin, N., Bolong, J., & D'Silva, J. L. (2013). Weather Forecasting as an early warning system: Pattern of weather forecast usage among coastal communities in Malaysia. Life Science Journal, 10(4), 2200–2215.

Osman, N., Omar, S.Z., Bolong, J.L., D'Silva, J.L., & Shaffril, H.A.M. (2014). Readiness of young Malaysian fishermen to use global positioning system within the fishing operation. Asian Social Science, 10 (14), 1-7.

Ottersen, G., Kim, S., Huge, G., Polovina, J.J., & Stenseth, N.C. (2009).Major pathways by which climate may force marine fish populations. Journal of Marine Systems 79, 343–360.

Ramli, S.A., Omar, S.Z., Bolong, J., D, Silva, J.L., & Shaffril, H.A.M. (2013). Influence of behavioral factors on mobile phone usage among fishermen: The case of Pangkor Island fishermen. Asian Social Science, 9, 5, 162-170.

Rijnsdorp, A.D., Peck, M.A., Engelhard, G.H., Mollman, C., & Pinnegar, J.K. (2009). Resolving the effect of climate change on fish populations. ICES Marine Science, 66 (7), 1570–1583.

Shaffril, H.A.M., Abu Samah, B., D'Silva, J.L., &Yassin, S.M. (2013).The process of social adaptation towards climate change among Malaysian fishermen. International Journal of Climate Change Strategies and Management, 5 (1), 38-52.

Shaffril, H.A.M., Omar, S.Z., Bolong, J., & D, Silva, J.L. (2015). Mapping the patterns of mobile phone usage among fishermen in Malaysia. Information Technology for Development, 21 (4), 543-554.

Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User acceptance of information technology: toward a unified view. MIS Quarterly, 27 (3), 425-478.