

A Concept Paper on Potential Behavioural Factors That Influence the Global Positioning System (GPS) Usage in Small-Scale Fishing Operation

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Abstract

The main objective of this study is to review potential behavioral factors that influence the use of The Global Positioning System (GPS) in small-scale fishing operations. This study is based on three main problems. First, although the GPS 'marking' function can help fishermen overcome their two main issues, namely low income and the threat of climate change, they still do not use this technology satisfactorily. Second is the need for review to understand the GPS use in small-scale fishing operations. Third, the need to provide ideas to improve further the Fishermen's Transformation Program developed by the government. The present review explained factors in models or theories such as the Extended Technology Acceptance Model, the Unified Theory of Acceptance and Usage of Technology, and a couple of previous studies that explain certain potential factors that can influence GPS usage in fishing activity. To review of what factors influence fishermen's usage of GPS is very important because it can then be used by the parties concerned in devising strategies to encourage the embrace of advanced technology usage within fishing operations and to ensure that the fishermen are not left behind in using the latest technology which in turn provides excellent benefits to their lives.

Keywords: Small-scale Fishermen, Behavioural Factors, Usage of Global Positioning System

Introduction

Fishermen are one of the most influential groups in the community. Their role is significant in ensuring the continuity of the supply of marine resources to consumers. Generally, fishermen can be divided into two main groups: small-scale and deep-sea fishermen. Although there are still no concrete statistics regarding the number of small-scale fishermen, however, the findings of a previous study by Shaffril et al (2022); Makame et al (2023); Adeleke and Luetz

(2023); Abu Samah et al (2019), consistently show that more than 65% of registered fishermen are small-scale fishermen.

Like other agricultural community groups, small-scale fishermen in Malaysia face serious problems related to low-income levels and exposure to the threat of climate change (Abu Samah and Shaffril, 2020). These two problems are potentially caused by the characteristics of small-scale fishing operations themselves, namely, smaller boats (often 22 feet and under), lower engine power (usually 40 horsepower and below), short duration of fishing operations (daily operation), non-commercial fishing gear and use of basic communication tools (cell phones). Aware of this situation, the Malaysian government has inspired several initiatives, and among them is the use of fishing technology such as The Global Positioning System (GPS) (Abu Samah et al., 2019).

GPS offers several benefits to its users. In the context of the fishing industry, GPS assists small-scale fishermen to go accurately to the fishing areas that have been marked. This accurate GPS navigation can help fishermen reduce their most significant operating cost, gasoline. Compared to the past, the fishermen refer merely to the less effective and time-consuming method of referring to the position of hills and stars to determine the fishing area that has been marked, now with GPS, the fishermen save a lot of time on searching efforts and thus, reduce their gasoline consumption and enable the fishermen to enjoy more profits from their catches (Shaffril et al., 2021). Furthermore, GPS can assist small-scale fishermen in lowering the risk of climate change threats. In bad weather conditions, for example, where the level and visibility are not so good, GPS can help fishermen safely return to the jetty or go to a nearby island for temporary shelter (Bolong et al., 2014; Osman et al., 2014).

The Need to Conduct the Present Review

This review aims to identify potential factors that influence GPS utilization in small-scale fishing operations, and it needs to be developed due to several needs. First, although GPS can help small-scale fishermen face their two main problems, which are low-income levels and the threat of climate change, a study by Omar et al (2012) stated that only 29.1% of small-scale fishermen actively use GPS and a study by Shaffril et al (2021) noted that average of experience in using GPS among fishermen was only 5 years. This situation raises a question – why do small-scale fishermen not or less use GPS even though it provides excellent benefits? This problem can be understood from various perspectives, one of which is to look at the ability of certain behavioral factors to explain the different levels of technology use in society. Venkatesh et al. (2012) said too much focus is placed on physical technology development without looking at behavioral factors that will contribute to the failure of technology use. This situation has led to a need to identify behavioral factors that can influence GPS use among small-scale fishermen.

Second, there is a knowledge gap where there is a need to develop a concrete understanding of how certain models or theories can be used to explain fisheries technology among specific community groups such as small-scale fishers. Despite the active steps taken by scholars across the globe who provide various models or theories related to the use of technology among agricultural communities (Li et al., 2023; Savari et al., 2023; Irwin et al., 2023; Abadi and Haghaninia, 2023), however, not much focus has been given to the use of GPS technology as well as agricultural communities such as small-scale fishermen. This situation requires a reliable review to develop more understanding of GPS use among small-scale fishermen in Malaysia. Such effort is highly encouraged by scholars. Venkatesh et al (2003), the creators of UTAUT theory, for instance, have emphasized the need to expand the scope of this theory to diverse community groups. Until today, UTAUT is widely used in the context of professionals,

education, and consumerism (Parayil et al., 2023; Haneefa, 2023; Bhati et al., 2023; Wijaya & Weinhandl, 2022). However, the same scenario cannot be seen in agricultural communities.

Potential factors that influence GPS usage among small-scale fishermen

A study by Bolong et al (2014) focused on the development of an instrument that measures the willingness of fishermen (who are not technology users) to use GPS technology which is based on the Extended Technology Acceptance Model (ETAM) (see Figure 1). The ETAM consists of factors relevant to subjective norms, voluntariness, image, experience, job relevance, output quality, perceived usefulness, perceived ease of use, and intention to use. In addition to this model, Bolong et al (2014) placed their focus on additional factors such as knowledge, readiness, problems, and attitude factors and, at the same time, looked at the possibility of particular demographic factors influence (e.g., age, experience, education achievement, income etc.) on GPS usage among small-scale fishers.

Omar et al (2012) conducted a study on fishing technology such as sonar, echo sounder, and GPS among fishermen. The study is quantitative and based on a staged cluster sampling technique, and their study has involved a total of 400 fishermen. In this study, they found that only 11.3% of fishermen actively use sonar, 18.6% of fishermen actively use echo sounders, and 29.1% of fishermen actively use GPS. Omar and colleagues (2012) used ETAM (Extended Technology Acceptance Model) as the primary model of their study. They have done some modifications; among them is adding a new dimension to the original model, attitude. Another improvement is that no moderating or mediating measurements were studied, where they only focused on the direct relationship between ETAM dimensions and the use of fishing technology. They explained that three dimensions have a significant and positive connection with the help of fishing technology among fishermen: the perception of ease of use, perception of usefulness, and social influence. The strength of this relationship is moderate. A new factor that was included, namely attitude, was found to have no association with the use of technology among fishermen.

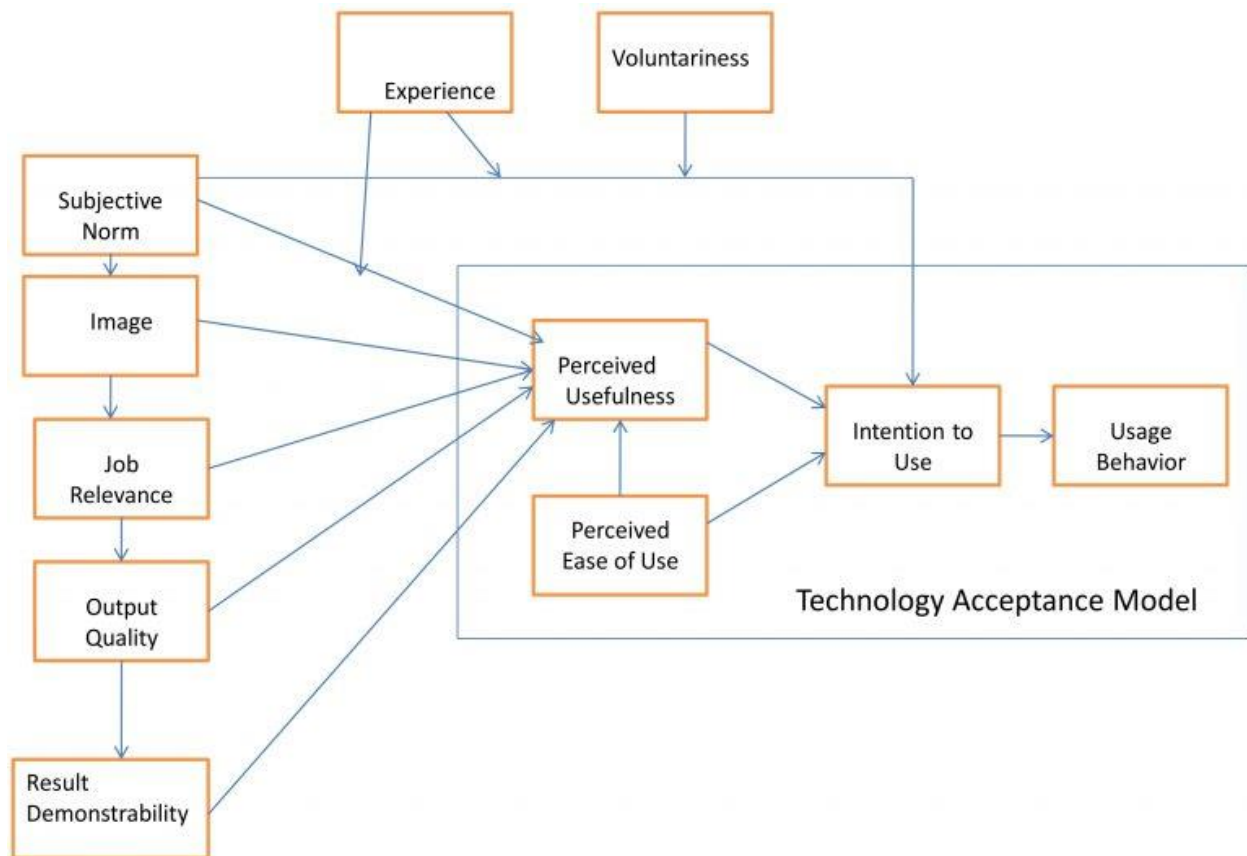


Figure 1: Extended Technology Acceptance Model (Venkatesh & Davis, 2000).

Unified of Technology Acceptance and Use Theory (UTAUT) is one of the potential models to explain GPS usage among small-scale fishermen (see Figure 2). This theory was created by Venkatesh et al. (2003). UTAUT tries to understand the use of technology in the community from the perspective of four factors: performance expectations, perceived ease of use, social influence, and facility support. This model also emphasizes that the use of technology in the community will be influenced by one mediator dimension, which is the intention, and four moderator dimensions which are gender, age, experience, and voluntariness of use. UTAUT has many strengths in the study of community technology use, and one of them is its ability to explain up to 50% of the variation in technology use among communities and can define up to 70% of the variation in the intention to use technology among communities. Due to this strength, it is no wonder why this model has been widely used in various contexts of technology use, such as the internet, computers, mobile phones, and online services, and in the context of different community groups such as farmers, rural communities, health professionals, pharmacists, bank officers, teachers, students, consumers, and employers (Parayil et al., 2023; Haneefa, 2023; Bhati et al., 2023; Li et al., 2023; Savari et al., 2023; Irwin et al., 2023; Abadi & Haghaninia, 2023; Wijaya & Weinhandl, 2022).

Within the context of fishermen, UTAUT has been tested for its significance by Shaffril and Hamzah (2016). Their study has made some modifications to the initial UTAUT model. To ensure that UTAUT suits the fishermen's context, they have added new dimensions, such as compatibility and learning culture, and removed one original dimension, facilitating conditions. Furthermore, to suit the analysis purpose, the two moderating dimensions of gender and voluntary use were removed from his study. Based on the analysis results, Shaffril and Hamzah (2016) explained that four factors, namely social influence, perceived ease of use, compatibility, and learning culture, have a moderate and significant relationship with

using GPS. They further concluded that experience has a moderating effect on the relationship between social influence and learning culture to use GPS, and age is also found to have a moderating impact on the relationship between compatibility and social influence to use GPS. The study also explains that intention mediates the relationship between compatibility and learning culture with the use of GPS.

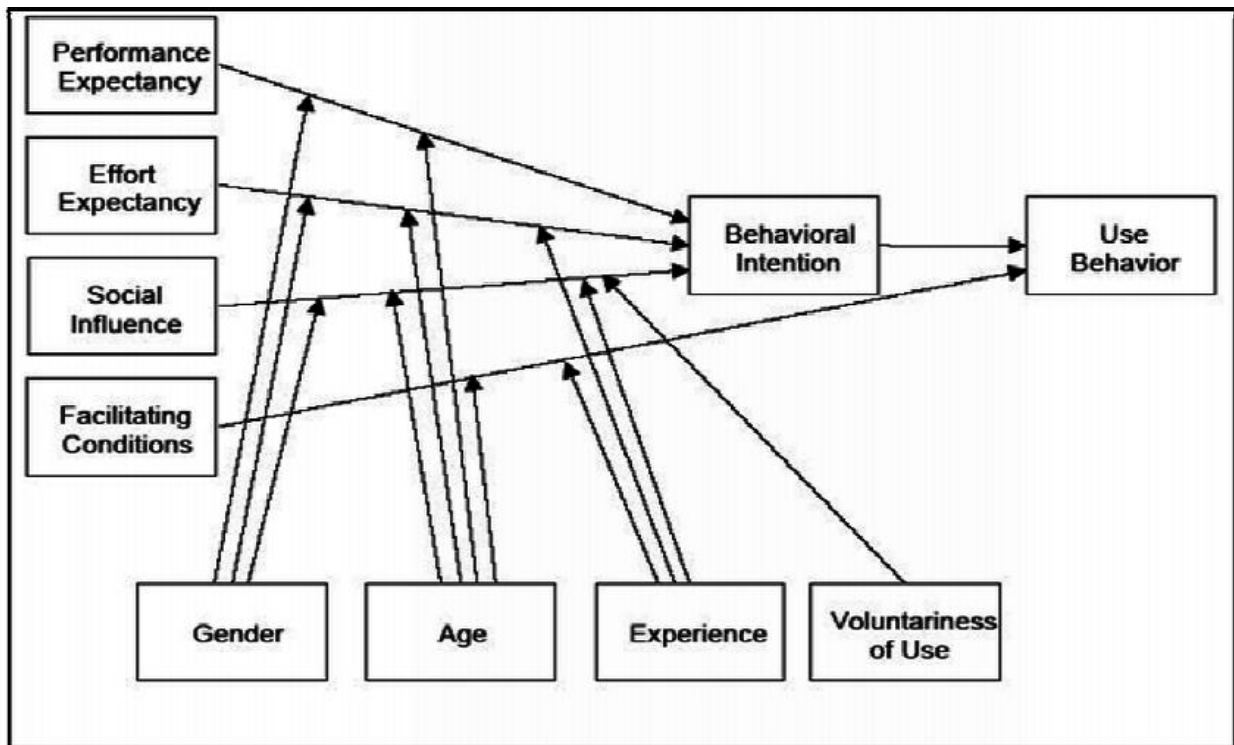


Figure 2: Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh et al., 2003).

A study by Lestang (2007) focused on forming policies related to increasing the safety level of small-scale fishermen in Seychelles. In this study, Lestang (2007) concluded that safety is one of the main reasons fishermen embrace GPS in their fishing operations. They also found that the level of GPS use among fishermen still needs to be more satisfactory, although it offers many benefits. They suggested that the exposure program to the use of GPS must be given to small-scale fishing groups. Furthermore, they concluded that GPS utilization is essential in the fishing industry, significantly to determining fish catch locations and accurate navigation services. Nevertheless, the major obstacle to realizing this endeavor is the need for shops selling these tools in Seychelles. Another study by Robins et al (2000) examined the influence of certain factors, such as productivity, experience, and risk reduction, on fishermen's decision to use GPS technology. The study concluded that fishermen who use GPS have 4% higher productivity than those who do not. An additional 7% productivity is for fishermen who use other fishing technologies such as echo-sounder and sonar. The study also concluded that for experienced fishermen, the use of GPS can give them an increase of up to 12%. Apart from increasing productivity, GPS has also been found to reduce the risk of loss of life and injury and save time for fishing activities.

Conclusion

The review achieves its primary objective by identifying the potential factors that can influence the use of GPS among fishermen. The present review concluded that theory and models such as UTAUT and ETAM can be expanded their scope to a new research context, which is the use of GPS among small-scale fishermen. The review can be referred to by the relevant agency in formulating strategies to encourage the use of technology among fishermen. Furthermore, based on this review, strategies can be planned in line with the interests and abilities of small-scale fishermen. The main implication of the study is that its findings are expected to produce new knowledge and information about fishing technology's strengths and weaknesses, such as GPS among small-scale fishermen. This, in turn, can benefit related agencies and the community, opening up more space for new studies regarding the use of fishing technology.

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