

# Use of Global Position System (GPSs) for Information, that Impact on the Economic Efficiency in Offshore Fishery in Sri Lanka

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## Abstract

*The purpose of this paper is to assess the use of ICT on GPS for Information by fishers in Offshore Fishery in Sri Lanka. This paper is to identify the technologies for information gaps to enhance the economic efficiency of GPS. A questionnaire survey, data was collected from multiday fishing crafts landings of Trincomalee, Negombo and Tangalle fishery harbors. The major finding was that fishers (78%) do not have adequate knowledge use the GPS appropriately. It found that GPS systems with advance applications are available only in 24% of fishing crafts due to inadequate financial of the fishermen in the off show fishery. It can be provided GPS facilities by governmental or nongovernmental organizations to fishermen with a proper training.*

**Keywords:** Use of Global Position System (GPSs) for Information, Impact of Information, Offshore Fishery in Sri Lanka.

## Introduction

Global Position System is used for long distance time and frequency time application it provides current location and time information of all-weather condition to all type of navigators around the world. In this system is to develop latitude, longitude, velocity, altitude, the name of the current location, it has changed the way of the world operates and this is particularly true for marine operations, including search and rescue. GPS provides the fastest and most accurate Information and method for mariners to navigate, measure speed, and determine location. The information allows increased levels of safety and efficiency for mariners worldwide. It is more important in marine navigation for the multiday fishing crafts, that can be identify the craft position while in open sea and also in congested harbors and waterways.

Fishery of Sri Lanka can be broadly categorized into two sectors such as coastal and offshore fishery. Deep sea fishing refers to the fishing beyond the territorial waters extending up to the Exclusive Economic Zone (EEZ) and fishing beyond EEZ known as offshore fishing. Although the country has a narrow continental shelf with an extent of 30,000 km<sup>2</sup> which is 5.8% of country's ocean area. Sri Lanka has an extensive sea area to engage in Offshore fishing activities (MFAR, 2016).

The aim of the government is to increase the consumption rate from 17.2kg to 22kg by 2016. Sri Lanka has considerable fisheries potential in coastal water where 50% of the production

taking and reached the level of maximum utilization (MFAR, 2010). Therefore high seas, inland fisheries and aquaculture are main concerned areas for further developments. However the fishing sector contributes around 1.2 percent to GDP and employs over 650000 people directly and indirectly in fishery related activities (MFAR, 2016).

Tremendous pressure on agricultural and fishery resources has been increasing with the demand for foods for high population growth rate. However, fish exploitation has not met the demands of increasing consumption rates due to low production. Therefore, it is important to investigate the factors of use of GPS for navigation Information that can be mainly affected for fishing efficiency.

### **Literature Review**

The functions of GPS for fishing industry have been promoting and developing under the Ministry of Fisheries and National Aquatic Resources Research and Development Agency (NARA) in Sri Lanka. The research of fisheries and marine science are being directly conducted by NARA. The Agency is apex national institute which is vested in the responsibility of carrying out and coordinating research development and management activities in Sri Lanka. Related literature is limited in Sri Lanka and research titles of "Deep sea fishing vessels in Sri Lanka" and "Tuna fishing in Sri Lanka" published by NARA and that indicated requirement of fishing crafts development with navigation equipment of GPS and information service.

The research sites, registered and operating multiday fishing crafts been slightly increasing from 1980-1991, it is mainly focused scheme of Abu Dhabi Trust Fund. That was subsidized 35 % of the capital expenditure for initiate the 70 numbers of fishing crafts to fisheries industry in Sri Lanka (Maldeniya, 1998). The number of operating crafts registered since 1996 - 2003 stable and after the year 2004, the number of operating crafts are reduced that is effected from tsunami. It was estimated that 195 crafts were destroyed and 402 were damaged due to the tsunami devastation (DFAR, 2007). Since 2005 to 2007, 66% of crafts increased that depend the national international donation schemes in Sri Lanka (MFAR, 2007).

There is lot of number of research done by foreign researchers which is the utilization of GPS for marine navigation. Singh et al (2016) cited that GPS is providing major information facilities to worldwide navigators for land navigation, marine navigation, aeronautic navigation, and space navigation. Use of ICT on GPS for Information and that have been changed navigators role on the craft around the world. That required studying available situation of use of ICT on GPS for Information by fishing crafts in Sri Lanka.

### **Objectives**

**Overall objective:** This paper is identify the gaps for use of ICT on GPS for Information by fishers in offshore fishery, it enhance the economic efficiency in Sri Lanka.

**Specific objectives:** Identify the current status of the technology and information gaps on GPS that affect the economic efficiency of the offshore fishery sector. Identify fishers can be

improved through awareness and training programmes which are the extended skills for new technology and information on GPS. Level of information needs fulfilled through GPS and problems faced by the fishers in seeking information through GPS.

**Research methodology**

**Population and Sample:** Tangalle, Negombo and Trincomalee fishery harbors, was selected and the survey method was adopted. The target population belongs to skippers of registered fishing craft at above three fishery harbors. The Krejcieand Morgan Table (1970) was used to select the sample size [TangalleFishery Harbor (TFH) N= 53, NegomboFishery Harbor (NFH) N = 53 andTrincomaleeFishery Harbor (TFH) N= 53] of Sri Lanka. The data gathered on period of one month duration from 159 (multiday fishing crafts landings of Trincomalee, Negombo and Tangalle fishery harbors respectively. Size of the crafts varied from 38 – 55 feet at selected three fishery harbors(Table 1).

Table 1: Sample Selection

Fishery harbors	No of registered active vessels	Selected sample size
Trincomalee	86	53
Negombo	91	53
Tangalle	93	53
<b>Total</b>	<b>270</b>	<b>159</b>

**Source**

**District Fisheries Office of Trincomalee, Negombo and Tangalle in Sri Lanka**

**Data Analysis:** Data collected by questionnaire from skippers of multiday fishing crafts. Data were analyzed using SPSS version 20 descriptive statistical analyses were carried out in all instances when necessary. The refined data were also analyzed as percentage. Results of the analysis were represented in forms of tables.

**Results and Discussion**

**Response Analysis:** Out of the 159 questionnaires and face to face discussions with all skippers completed all the questionnaires by me.

**Availability:** Every fishing crafts have equipped, multi applications with different type of GPS, however the skippers are not aware of fully utilization of this instrument for safety of navigation. Considering the total respondents of Tangalle, Negombo and Trincomalee fishery harbors, 76% of fishing crafts use normal applications with GPSs, 24% of fishing crafts use advanced application with GPSs (Table2).

Table 2: Availability of GPS in multiday fishing crafts

Fishery harbor	With advance applications	With normal applications
Tangalle	20%	80%
Negombo	30%	70%
Trincomalee	25%	75%
<b>Total</b>	<b>24%</b>	<b>76%</b>

**Education background:** Considering the total respondents of Tangalle, Negombo and Trincomalee fishery harbors, Table 3: indicate that only 10% of respondents are educated to grade 10, 13% of respondents are educated to grade 8 and 10% of respondents are indicated, they improved their skills and knowledge use on GPS from awareness programmes. 77% of respondents are indicated their education level is lower than grade 6.

Table 3: Education Background of Trget Group

<b>Fishery harbors</b>	<b>grade 6 &gt;</b>	<b>To grade 8</b>	<b>To grade 10</b>
Tangalle	80%	14%	04%
Negombo	70%	17%	14%
Trincomalee	80%	10%	10%
<b>Total</b>	<b>10%</b>	<b>77%</b>	<b>13%</b>

**Use of GPS:** Use on the GPS as navigation equipment, that are being used to safe navigation for measure speed and determine the location , weather condition, environmental temperature, wave condition, and traffic condition. GPS ensure that are reach to fishing ground and fishery harbors with safety condition and in reasonable time duration. Evaluating the collected information from skippers, it has shown that the skills on the GPS has been obtained by experience while it is less than 10% considered three fishery harbors are having professional skills of the skippers who engaged in offshore fishery in Sri Lanka (Table 4).

Table 4: Use of available GPS

<b>Fishery harbor</b>	<b>Professional skills based</b>	<b>Experience based</b>
Tangalle	04%	96%
Negombo	14%	86%
Trincomalee	10%	97%
<b>Total</b>	<b>10%</b>	<b>90%</b>

**Duration of the experience:** The skippers operate their fishing activities with their experience by having involved fishing for longtime. Table 5: shows the distribution of express of the skippers, samples of Tangalle, Negombo and Trincomalee fishery harbors. However accordingly data, 21% of skippers are fall 10 or less than 10 years' experience and are 10% falls to the maximum category that is from 26 or above years. In the figure there are 31% skippers who have experience between16-20 and 12% of respondents are indicated that they have experience between 21-25.

Table 5: Duration for fishing experience of target group

<b>Fishery harbor</b>	<b>&gt;10</b>	<b>11-15</b>	<b>16-20</b>	<b>21-25</b>	<b>26&lt;</b>
Tangalle	17%	30%	37%	14%	02%
Negombo	27%	14%	27%	17%	17%
Trincomalee	20%	34%	30%	04%	12%
<b>Total</b>	<b>21%</b>	<b>26%</b>	<b>31%</b>	<b>12%</b>	<b>10%</b>

**Use purposes:** Use of GPS by fishing craft navigators with their experience by having involved fishing for longtime and 78% of respondents are indicated, they confident only use for normal functions of identification the general applications of determine the location and measure speed. 22% of respondents are indicated that they confident to use of advance applications of measure speed and determine the location / way point, weather condition, environmental temperature, wave condition, and traffic conditioned (Table 6).

**Table 6: Use for GPS by target group**

Fishery harbor	Advance applications	Normal applications
Tangalle	14%	86%
Negombo	30%	70%
Trincomalee	22%	78%
<b>Total</b>	<b>22%</b>	<b>78%</b>

**Fishing duration and cost per trip:** Cost involved in fishing operations are mainly for fuel, baits, food, ice and maintenance of the fishing craft and gears. These expenditures are depends on the craft size or the capacity. The highest cost consisted with fuel and bates that similar to all other fishing crafts. Cost for fuel is higher than compared with others. Fuel cost can be reduced by providing accurate information using ICT on GPS and that reduce durations of the fishing trips. As the findings, duration of the fishing trip is from 2-6 weeks and number of trips per year of 87% is limited to 8-9. The fishing dates can be reduced follow the valuable information from GPS and those information are help to safe navigation which are the place of fishing ground and fishery harbors in limited time durations (Table 7).

**Table 7: Average cost of fuel for a fishing trip**

Fishery harbor fuel	Use of technology fishing trip	Duration of the (LKR)	Average cost for Tangalle
Advance applications	14%	from 2-3 weeks	99,300.00
Normal applications	86%	from 4-6 weeks	197,000.00
<b>Negombo</b>			
Advance applications	30%	from 2-3 weeks	99,900.00
Normal applications	70%	from 4-6 weeks	190,600.00
<b>Trincomalee</b>			
Advance applications	22%	from 2-3 weeks	99,600.00
Normal applications	78%	from 5-6 weeks	199,600.00

**Income and ownership of the fishing crafts**

The relationship between income and ownership of the fishing crafts is more important in the offshore fishing industry. As findings, the cost of fishing trip (fuel, baits, ice, foods and others) is deducted from total income. Subsequently, the owner of the boat is paid 1/3 of the balance that remains after the cost of the fishing trip has been deducted, the final 2/3 are divided equally among the skipper and crew. Findings show that 13% of respondents have indicated that they

own the fishing crafts while 87% of respondents have indicated that they do not own the fishing crafts and that, in actual fact, outsiders own the fishing crafts. Hence more than 30% from the second balance income should be released to the owners of the fishing crafts.

### **Conclusion**

Fisheries of the open-access considered with natural resources, which could be exploited with moderate levels of technological training and investment. Almost countries endowed with these resources have hundreds of years' experience in harvesting them. The findings show that same in Sri Lanka. This fishing segment of Sri Lanka is characterized with inadequate investments for new technologies of ICT and human resources developments to enhance the fishing skills. Lack of education and knowledge in the industry hampered the development of this fishery sector which involves fishing technology and modern equipment to enhance the fishing efficiency. Inadequate finance of the skippers it let by them ownership of fishing crafts to the outside person and that reducing their income and they should be training save their earning money step by step and get the fishing craft ownership with government support. As other countries, inadequate education of fishing community are same problem in Sri Lanka and human resources should be aware important of develop their educational background.

### **Recommendations**

Development of the fisheries sector is a challenging task as it deals with the changing attitudes of fishing community. However, it is an essential to overcome the situation to compete with the developed fishing nations, therefore the recommendations furnished here are compulsory to achieve with some policy decisions. Establishment of a certificate course for offshore fishing to develop professional skills of fishers is recommended. The course may consist of all the area of navigation and ICT on GPS, course should be compulsory to issue a license for fishers who can drive fishing craft and conduct fishing operations in offshore. Fishing craft development programme is recommended to initiate to use new technologies for safety of navigation and also recommended to initiate some loan scheme without interest for craft development. Skippers have problems of fishing craft ownership and their earning and expenses method it should be recommended initiate the awareness programme importance of save their money and reduce their unnecessary expenses and introduce the awareness programme to fishing community importance of education for future generations.

### **References**

1. Amaralale L. (2010). Deep sea fishing vessels in Sri Lanka. *Journal of National Aquatic Resources Research and Development Agency(NARA) in the Sri Lanka*.
2. Coast Guard of United State. (2013). GPS for mariners: Instructor's guide.
3. Department of Fisheries and Aquatic Resources. (2013). National plan for the safety of fisheries and fishing vessels at Sri Lanka.
4. Maldeniya, A. (1998). Tuna fishries in Sri Lanka. *Journal of National Aquatic Resources Research and Development Agency(NARA) in the Sri Lanka*.

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5. Ministry of Fisheries and Aquatic Resources in Sri Lanka. (2017). Annual Report.
6. Ministry of Fisheries and Aquatic Resources in Sri Lanka. (2007). Annual Report.
7. Ministry of Fisheries and Aquatic Resources in Sri Lanka. (2010). Strategic Planning for 2016.
8. Singh, J., Kaur, K., Kumari, P., & Swami, A. K. (2016). Condition Assessment of Power Transformer Using Dissolved Gas Analysis. *International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering*, 5(4), 1111–1116. <https://doi.org/10.15662/IJAREEIE.2015.0501001>