

The role of mobile phone among small scale fishermen for life improvement and community support tool in Indonesian coastal area

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Abstract. In this paper, we provide an illustration of the role of mobile phone for small scale fishermen in coastal area. Poverty in coastal area has been a severe problem for decades in Indonesia, and has been one of the main focuses of Indonesian Government. Meanwhile, Information and Communication Technology (ICT), especially mobile phone, has penetrated almost all citizens of Indonesia. Many studies have been conducted to describe the function of mobile phone for marketing the catch. Yet, we theorize that the function of mobile phone is not only for marketing the catch, but also for life improvement, poverty reduction and community support tool. This study aims to discuss the role of mobile phone for small scale fishermen in coastal area. Moreover, ICT, especially mobile phone has the potential to solve poverty problem in Indonesia. This study was conducted in North Jakarta, Indonesia, by using primary and secondary data. This report provides the illustration of marketing channels of small scale fishermen in target area and mobile phone utilization for marketing and for increasing fishermen's income. Another point which is worthy of consideration is the role of mobile phone for community support tool of small scale fishermen, notably, for information sharing between fishermen and emergency tool during the fishing trip.

Key Words: mobile phone, small scale fishermen, marketing, information sharing, emergency tool, Jakarta.

Introduction. Alongside with agriculture, coastal fishery is one of the most important primary industries in an archipelagic country like Indonesia where more than 70% of the nation area is sea (IBP USA 2013). The 99,093 kilometer shoreline is one of the longest in the world (BIG 2015), and approximately 150 million Indonesians live within 60 kilometers of the coast (Dahuri & Dutton 2000). Many of these people live within the large coastal cities that occupy a predominant position in the national economy. Although the coastal areas are considered one of the most important regions in Indonesia, several problems remain, especially in fisheries sector, such as, fishermen poverty; illegal, unregulated, unreported (IUU) fishing, overfishing, human resource capacity, technology as well as new policy dissemination and so on. The Indonesian government has realized a great potential that has not been fully utilized in fishery sector, especially after the presidential and ministry change in September 2014, and has been trying to face those problems (Indonesian Government 2014; KKP 2014a; BAPPENAS 2015). At the present time, poverty reduction as well as fishermen's life improvement, IUU fishing and overfishing are the main priority problems to be solved by the Ministry of Maritime Affairs and Fisheries (KKP 2014b).

Poverty has been a severe problem for decades in Indonesia, and has been one of the main focus of Indonesian Government, especially since the signing of the Millennium Development Goals (MDGs) in 2000 (UN 2008; BAPPENAS 2010). However, World Bank (2013) stated that about one-third to nearly half of the population in many coastal regions of Indonesia still existed below the poverty line. Such kind of condition indicates that poverty is still a serious problem to be solved, even after the final year of MDGs in

2015. Therefore, the poverty in coastal area is one of the main targets of the new government (Indonesia Government 2014, KKP 2014a). Most of low-income people in Indonesian coastal areas are small scale fishermen (KKP 2011). According to Government regulation (Act) No: 31/2004 and Act No: 45/2009, small scale fisherman in Indonesia is defined as a person whose livelihood is fishing by using fishing vessel less than 5 gross ton (KKP 2014a). Small scale fishermen are very important for Indonesian fisheries, as the ministry estimated that more than 80% of the total national catch was produced by small scale fishermen (KKP 2013). Therefore, in this study, we focus on small scale fishermen.

Meanwhile, Information and Communication Technology (ICT) is generally defined as a set of equipment that enable to strengthen and accelerate the dissemination and information sharing, facilitate communication process, regardless of geographical characteristics (Meng et al 2013). In other words, it is a term that includes any communication tool or application such as radio, television, mobile phones, computer and network hardware and software, satellite systems and so on. Access to telecommunications services has been substantially expanding in coastal and rural areas, especially through the spread of the Internet and mobile phones ~~in~~ all over the world (Jensen 2007). According to Quibria & Tschang (2001), Waverman et al (2005), and Qiang (2009), ICT penetration can positively impact the economic growth of developing countries in general aspect.

MCIT (2014) reported that the utilization of ICT, especially mobile phone, has penetrated almost all the citizenry of Indonesia, including the low-income, and even the below-poverty-line people in remote or coastal areas. Major challenges of Indonesian fishery sector, including poverty reduction and the life improvement of small scale fishermen could be handled by applying ICT, especially mobile phone. It is because using mobile phone can increase the income through the better marketing of the catch (Chhachhar & Omar 2012). Yet, we theorize that the main factor of fishermen life improvement, especially in Indonesia, is the information sharing among fishermen as a community with mobile phone as a tool to make it more effective. Moreover, the function of mobile phone is not only for life improvement economically, but also as a community tool.

Despite the fact that the benefit of ICT penetration in developing countries has been frequently reported, few detailed studies of detail study of ICT utilization, especially mobile phone among small scale fishermen in coastal areas have been conducted. Specifically, the objectives of this study are: (i) to investigate mobile phone as the information sharing tool among fishermen; (ii) to identify the utilization of mobile phone for emergency communication tool; (iii) to understand the marketing channels of small scale fishermen; and (iv) to discuss the increase of fishermen's income through information sharing with mobile phone as the media. This paper provides an illustration of the role of mobile phones as community support tool in coastal areas. The target area of this study is small scale fishermen in North Jakarta coastal area, Indonesia.

Material and Method

Target area. The study area was located in North Jakarta, which contains the entire coastal area within Jakarta special district, Indonesia. The area was chosen because Jakarta is the capital city of Indonesia, close to the governmental and economic center and has the best infrastructure in Indonesia. It can be assumed that the ICT infrastructure is better than other areas in Indonesia, so that Jakarta can be a role model for other areas in the future. All fishermen in Jakarta reside in North Jakarta due to its direct access to the sea. Currently, there are over 20,000 fishermen in North Jakarta with 12,000 of them not having Jakarta identity card, and are considered as temporary fishermen who come to Jakarta for only several weeks or months and then go back to their own region (outsider fishermen). Meanwhile, the rest of 8,000 people live in Jakarta and have Jakarta identity card, approximately 70% of them are classified as small-scale fishermen (North Jakarta Government 2015).

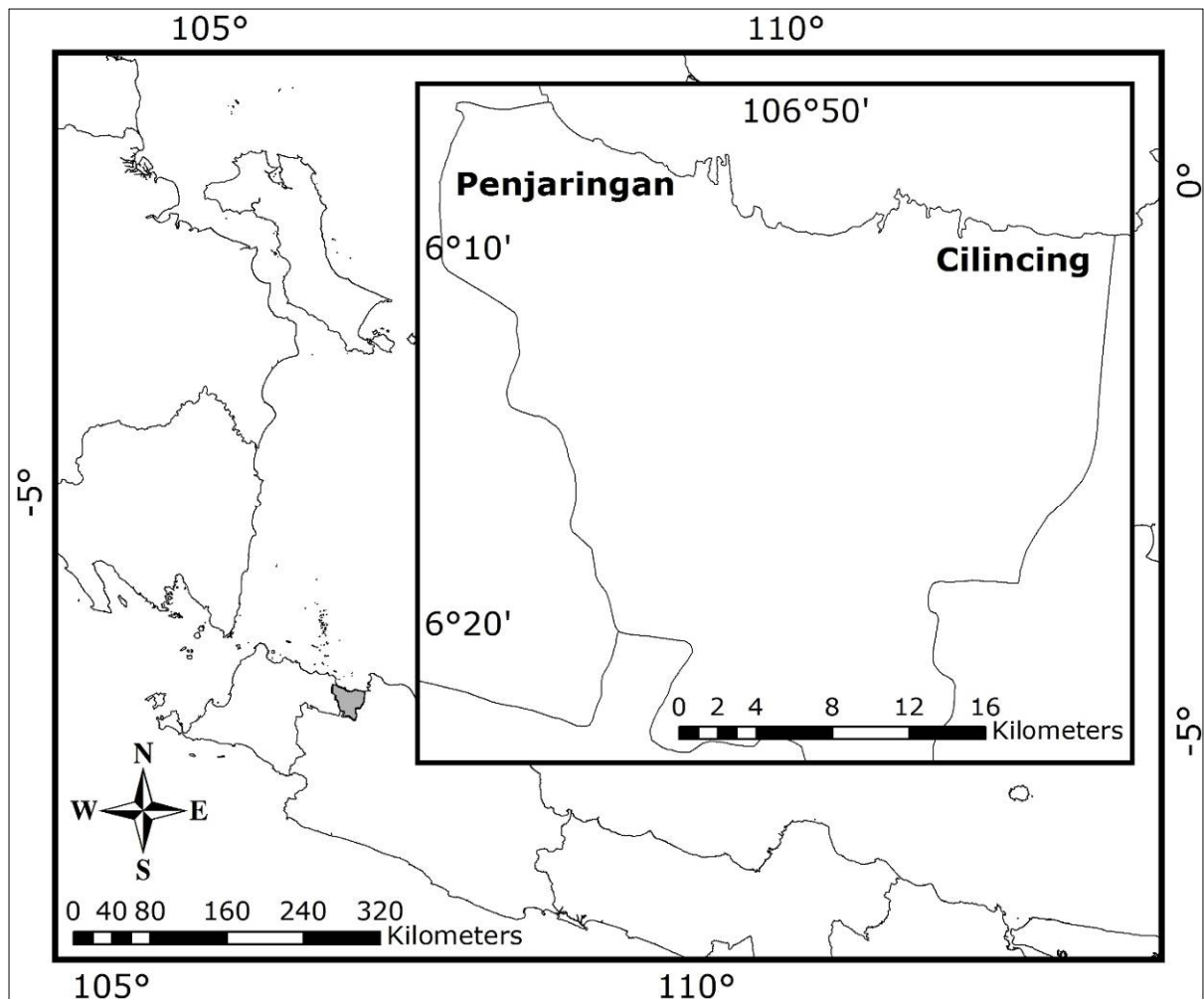


Figure 1. Jakarta as the target area in this study is shown in the shaded part.

North Jakarta is subdivided into 6 sub-districts, namely, Cilincing, Koja, Kelapa Gading, Tanjung Priok, Pademangan and Penjaringan. In Jakarta there are six official ports for fishermen (Muara Angke, Kamal Muara, Muara Baru, Marunda, Kalibaru, and Cilincing), all located in Cilincing and Penjaringan sub-district. Based on the interview with the people in charge in fisheries department of North Jakarta in September 2014, small scale fishermen mostly live around Muara Angke and Cilincing port. The target were small scale fishermen near the area of Muara Angke, in Penjaringan sub-district and Cilincing port, in Cilincing sub-district, North Jakarta, as shown in Figure 1. Penjaringan sub-district is located in the western part of North Jakarta and Cilincing sub-district is in the eastern part of North Jakarta.

Data gathering. The study was conducted using primary and secondary data. Primary data was obtained from random interview and questionnaires survey of small scale fishermen in North Jakarta (Annex 1). Moreover, another primary data was also collected from the interview with the people in charge in fisheries department of North Jakarta and experts in this sector. The primary data gathering was conducted in September 2014, February and March 2015. On the other hand, the secondary data was gathered from government official reports, books and journals. For instance, annual income record of fishermen in target area.

The questionnaire consisted of a demographic part and an assessment the frequency of mobile phone usage. Respondents used a five-point scales, 1 defines 'never' to 5 that defines 'very frequently', to indicate the frequency of mobile phone utilization to a specific question. The data gathered were then analyzed using statistics, e.g., frequencies, percentages, mean scores, interquartile (IQR), t-test and regression

analysis. In addition, a multiple regression analysis of income difference between 2014 (after) and 2010 (before introduction of mobile phones) will be performed between the variables of education, age, mobile phone possession, fishing ground sharing, bonded middleman and utilization of mobile phone for marketing. However, inflation rate and economic growth rate, will not be considered, in this study, because the target is to measure how important mobile phone is for income increase, not the value of the money itself.

Results and Discussion

Demographic data of small scale fishermen in North Jakarta. After going to field survey, we interviewed 79 small scale fishermen in the target area, yet, we cut 11 of them, because their record were not available in the official report gathered from the sub-districts offices. In order to check and derive income data of the respondents, we matched every respondent with the record from sub-district offices. Yet, the available income record is the record from 2010 to 2014. Therefore, we assume that 2010 record indicates the income before mobile phone possession, and 2014 record is the actual income after utilizing mobile phone.

During the field survey, we found that all respondents were male with the average age of 39.2 years old; consisting 30 to 39 year old (49%), 40 to 49 year old (34%), 50 to 60 year old (10%), 20 to 29 year old (6%) and 10 to 19 year old (1%), in decreasing order of occurrence. In other word, most of them are generally categorized in the peak of productive age. Most of them have been educated in elementary school (59%, $n = 40$). Their average total catch of 2014 was 2,713 kg per person, and the annual income was Rp. 35 million (roughly equal to 2,900 USD during that time). Ninety percent (90%) of them ($n = 61$) possess a mobile phone, most of them (66%) had been using mobile phone since 2009, 29% of them, from 2010 while 4% started using mobile phone no later than 2011.

Mobile phone as the information sharing tool among fishermen. Mobile phone information sharing can be determined from question about the fishing ground information sharing. In this case the respondents answered in a five point likert scale, 1 indicates 'never', 2 is 'rarely', 3 is 'occasionally', 4 is 'frequently' and 5 defines 'very frequently'. Sixty six percent (66%) of the respondents ($n = 45$) indicated that they frequently or very frequently share the information of fishing ground (mode = 4, median = 4, IQR = 2), with z-score = 0.43. Fishermen in North Jakarta are most likely to share the information of good fishing ground (67%) and polluted area (33%). This result indicates that fishermen in North Jakarta are most likely to share the information of fishing ground through their mobile phone.

Pattern of information sharing among fishermen in North Jakarta is as follows, in an event when there is a fishermen who catch a lot of fish, the fishermen will share the information of place to several of his fishermen friends via mobile phone, by either calling or sending short message service (sms). Then those people will forward the information the other fishermen. This kind of information sharing also occurs in sharing the polluted fishing ground area. According to the interview with the fishermen during the survey, a polluted fishing ground is also a place that needs to be avoided. The fishermen stated that the waste usually exist in a depth of 0-15 m. When there is waste polluting the fishing ground, dead fish will float, while the rest of live fish will usually swim deeper or swim further off shore, making it very difficult to catch. Hence, the small scale fishermen in Jakarta keep sharing these two pieces of information.

This kind of information sharing is very unique, because usually fishermen do not want to give the information about the fishing ground, which is considered as their privileged information. Even though, the Jakarta government (2015) reported that the catch decreased from 2000 to 2012, the fishermen still shared the information. According to the fishermen, the information sharing in North Jakarta has been habitually practiced for several decades. In the previous days, they shared information of good fishing grounds from mouth to mouth, and such habit continued after introduction of mobile

phones. We found that, the fishermen became more satisfied after possessing mobile phone, because the fishing ground information sharing runs more smoothly. Under these circumstances, it is clear that mobile phone in coastal area acts as a community support tool.

The utilization of mobile phone for emergency communication. The result shows that 85% of the respondents (n = 58) indicated that they frequently or very frequently used mobile phones in emergency occasions during the trip (mode = 4, median = 4, IQR = 1, and the z-score = 0.89). Consequently, it can be concluded that the fishermen in North Jakarta apparently utilize mobile phone to during emergencies and to communicate emergency situations.

All respondents who utilize mobile phone in an emergency occasion answered that they contact their family first either by calling or sending sms, in order to let their family know that they are safe, yet will be home late. Results also indicate 69% of them use mobile phones to contact a friend for help, when they have mechanical problems while 31% use mobile phone to seek help in a bad weather. Previously, the fishermen in the target area used to help each other in an emergency during the trip incidentally, for instance, when they find other fishermen that need help, they usually help voluntarily. With the existence of mobile phone the fishermen have the option to take actions, especially in case of emergencies when fishermen were at sea.

Marketing channels of small scale fishermen in North Jakarta. Before analyzing the role of mobile phone to improve fishermen's life, we need to look at the marketing channels in the target area. Marketing channels of small scale fishermen in North Jakarta can be divided into four categories (Figure 2). The survey reveals four types or modules of marketing fish in the study area. In type 1, the marketing chain is controlled by a bonded middleman, who lends money to fishermen, on the condition that, the fishermen sell all of the catch exclusively to that middleman. In type 2, fishermen can compare fish prices and choose whom (middleman) to sell the catch to. While in type 3, fishermen sell their catch directly to the consumer at the fish market, without going through any middleman. Type 4 is categorized when fishermen sell the catch directly to the consumer. The survey also reveals 28 out of 68 respondents (41%) stated they were bonded to certain middlemen; whereas, the rest of them were free to choose the type of marketing channels for their catch.

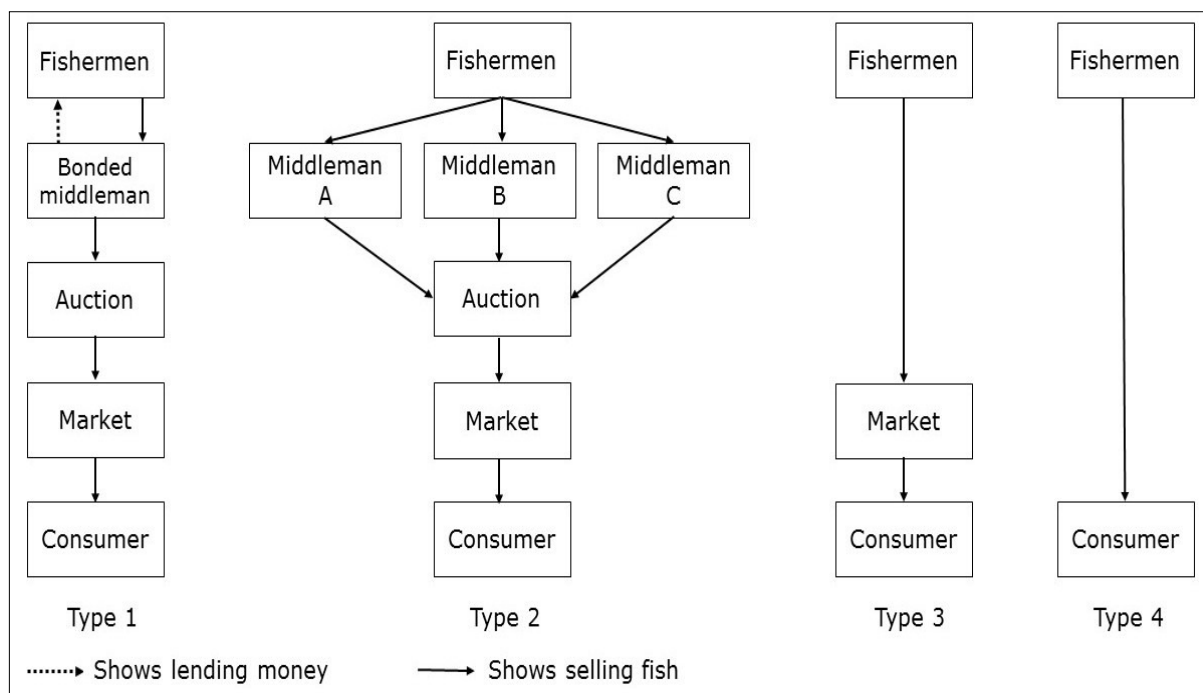


Figure 2. Marketing channels of small scale fishermen in North Jakarta.

The utilization of mobile phone for fishermen`s life improvement. As reported above, 41% (n = 28) of the respondents are bonded to middlemen, with no choice of marketing channel, as in type 1 (Figure 2). The rest of 59% (n = 40) can choose their own path of marketing channels, namely types 2, 3 or 4. On this basis, the marketing channels could be divided into type 1 and non-type 1. The survey reveals 33 out of those 40 respondents in non-type 1, or 83%, answered that they frequently or very frequently used mobile phones to sell the catch (mode = 5, median = 5, IQR = 1), and the z-score = 1.75. This result indicates that they are in likelihood of using mobile phone for marketing. Seven (7) respondents in non-type 1 did not utilize mobile phone for their marketing simply because they did not have mobile phones. This paper gives evidence that mobile phone is used by the fishermen in target area for marketing.

As noted above, most of the fishermen in North Jakarta started to use mobile phones before 2011. Therefore, we assume that 2011 is the time indicator in this study, namely comparison of income before and after 2011. In order to identify the income difference of 2010 and 2014, by subtracting the income in 2014 and 2010, based on marketing channel, we conducted t-test. The p-value of t-test was 4.02×10^{-9} , which means, the null hypothesis is rejected. In other words, the study indicates that fishermen who are independent or not bonded to middlemen have more income than those bonded to middlemen. Next, we also checked the income difference of 2010 and 2014 based on mobile phone possession using t-test. P-value of t-test was 3.93×10^{-5} , which means, the null hypothesis is rejected. To put it another way, we can state that fishermen who utilize mobile phones in the conduct of fisheries business tend to have more income-increase than those without mobile phones. In short, mobile phone has given ways of communication to fishermen for selling their catch in different places of market. Such kinds of information not only have increased the income of small scale fishermen but also have provided access to connect with community and market for selling their catches at better prices. This paper agrees with the supposition of Chhachhar & Omar (2012) that utilization of mobile phones enhances marketing of catch among fishermen and provides them with viable options or choices for sales point or market of their produce.

We then calculated the multiple regression analysis of income difference between 2014 and 2010 (y) with several variables from the questionnaire. The regression is conducted to examine influential factors of income increase in study area. The regression is determined in Eq. (1),

$$y = x_1c_1 + x_2c_2 + D_3c_3 + x_4c_4 + D_5c_5 + x_6c_6, \quad (1)$$

where x_1 indicates education variable, x_2 is age, D_3 is a dummy variable for mobile phone possession, x_4 is fishing ground sharing, D_5 is a dummy for bonded middleman and x_6 is mobile phone utilization for marketing. While c is the coefficient of each variable.

Results of multiple regression analysis of income difference between 2010 and 2014 is shown in Table 1.

Table 1

Results of multiple regression analysis

| <i>Coefficients:</i> | <i>Estimate</i> | <i>Std. Error</i> | <i>t value</i> | <i>Pr(> t)</i> | <i>α</i> |
|----------------------------|-----------------|-------------------|----------------|--------------------|----------|
| Education | 187124 | 384928 | 0.486 | 0.62859 | |
| Age (experience) | 53557 | 19802 | 2.705 | 0.00882 | ** |
| Mobile phone possession | 4069969 | 1675803 | -2.429 | 0.01807 | * |
| Fishing ground sharing | 2896136 | 372659 | 7.772 | 9.86E-11 | *** |
| Bonded middleman | 764181 | 1630251 | 0.469 | 0.64089 | |
| Mobile phone for marketing | 810437 | 474556 | 1.708 | 0.09268 | . |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1; Residual standard error: 2040000 on 62 degrees of freedom; Multiple R-squared: 0.9775, Adjusted R-squared: 0.9754; F-statistic: 449.6 on 6 and 62 DF, p-value: < 2.2e-16.

The multiple regression analysis of income difference before and after introduction of mobile phones indicates the significance level (α) of fishing ground sharing was below 0.001, age was 0.001 and mobile phone possession was 0.005, with the multiple R^2 at 0.98. It points out that fishing ground information sharing via mobile phone was the most dominant factor that dictates increase in income of fishermen in North Jakarta. Next, age (or experience) and mobile phone possession were also dominant factors in this study. Hence, the factor of income increase is not only mobile phone utilization for marketing the catch as reported by Chhachhar & Omar (2012), but also the effective information sharing via mobile phone, in which plays an immense role to increase the income of small scale fishermen in North Jakarta coastal area.

Conclusions. This paper presents evidence of the role of mobile phones as a community support tool in improving the lives of small scale fishermen in coastal areas economically, particularly, in sharing information between fishermen, for marketing and during an emergency situation during the fishing trips. The results also provide the modules of marketing channels exploited by small scale fishermen in target area and the impact of information sharing and phone utilization in increasing fishermen's income. In cognizance of this potential, governments should support and encourage information sharing and acquisition of mobile phones by small scale fishermen in Indonesia to improve livelihood, reduce poverty and challenge the problems of the fishery sector. Government should also build the capacity and know-how of fishermen in utilization of mobile phones for profit and provide training for community business and management skills, improve fishermen incomes.

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Questionnaire

- Date :
 Code : 1. Penjaringan 2. Cilincing
- 1 Name : Fishery association:
 2 Sex : 1. Male 0. Female ()
 3 Age :
- 4 Education : 1. No education 4. Senior highschool
 2. Elementary school 5. College
 3. Junior highschool
- 5 Mobile phone possession : 0. No (stop here) 1. Yes (continue to 6)
- 6 When did you start use a mobile phone : ()
- 7 How often do you use mobile phone for fishing ground information sharing?
 1. Never 4. Frequently
 2. Infrequently 5. Very frequently
 3. Occasionally
- 8 What kind of information do you usually share?
 1. Never share any 4. Both of (2.) and (3.)
 2. Good place 5. Other, specify
 3. Polluted place ()
- 9 How often do you use mobile phone for an emergency during your fishing trip?
 1. Never 4. Frequently
 2. Infrequently 5. Very frequently
 3. Occasionally
- 10 In what kind of emergency?
 1. Never 4. Both of (2.) and (3.)
 2. Mechanical problem 5. Other, specify
 3. Bad weather ()
- 11 Are you bonded to a middleman? 0. Yes 1. No (continue to 12)
- 12 How often do you use mobile phone for marketing your catch?
 1. Never 4. Frequently
 2. Infrequently 5. Very frequently
 3. Occasionally