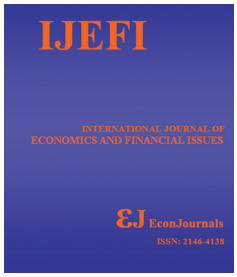

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The Contribution of Subsidies on the Welfare of Fishing Communities in Malaysia

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ABSTRACT

Subsidies can reduce the cost of fishing operations and enhance revenues that make fishing enterprises more profitable. However, in Malaysia, overcapitalization and excessive fishing capacity leading to the overexploitation of fishery resources. The study obtained information about the type of fishing subsidies that has been given to fishing communities, benefits earned from these subsidies and views on the best possible policy directions for fisheries subsidy that will redirect funds towards promoting sustainable livelihoods and food security. Data collected for the study from three fishing districts of Peninsular Malaysia (Kedah, Perak, and Terengganu) through face to face interview. A total 246 fisher respondents were selected through a random selection process from the list of fishers with the Department of Fisheries. This study used institutional analysis and development model, which is explaining the importance of community factor characteristics (attributes of community) such as fishing communities. The results also showed that subsistence allowance is less effective for the livelihoods of fisher because it makes fisherman more dependent on subsidy. The termination of this allowance will not affect fishermen's livelihoods. However, both A and B boat participants put importance on this monthly allowance as they found it very useful during the crisis time. The results demonstrated that fuel subsidy was the most important item for the fisher as it reduced fishing operation costs. The fuel subsidy has important implication for fisheries resource sustainability. Most fisherman families depend solely on fishing for their livelihood. The government should undertake effective fisheries management to reduce fishing pressure in the sea.

Keywords: Subsidies, Fisheries Resources, Marine Resources, Malaysia
JEL Classifications: Q22, O123, P35

1. INTRODUCTION

Subsidies to the fisheries sector in Malaysia has existed for many years. Various categories of subsidies have been provided to the fisherman in Malaysia which include fuel subsidy, monthly allowance, fishing equipment,installation of the automatic identification system on fishing boats, build a jetty for fish landing, construction of fishing boats, direct capital grants for port improvements, creation of marine protected areas (MPA), artificial reefs and special housing funds to build and refurbish houses of fisherman (LKIM, 2014).

Various types of subsidies can contribute to the well-being of fishing communities. However, subsidies may contribute to capacity enhancement of fisheries sectors contribute to overcapacity and create the situation depletion of fishery stocks (Clark et al., 2015; Lindebjerg et al., 2015). Some peoples were concerned about sustainability of fishery resources, especially on the impacts of these subsidies on fishery stock. In their opinion, fishery subsidies that can be harmful to sustainable fishery such as fuel subsidy and construction of fishing boats should be banned. These groups against all types of harmful subsidies because they hope the fishery stocks will be remain healthy and effective management are being practiced. They said policy makers should practice good fishery management, which included count their fish stocks, doing science-based limits on capture and bycatch, count their fishing boats, using

licenses and fishing right to limit fishing capacity, and enforce the rules.

Government should encourage subsidies that will add value to the fishing products such as processing plants and fishery marketing channels. It was important for the government to ensure that fishery manages effectively before they are giving financial assistance to the fishing community. Fishery industry, government and consumers must realize that fishing industries are now at the unsustainable level, and needs for controlling of subsidies should be given a main priority. Discipline in fishery subsidy is extremely important because a large part of our future life depended on the oceans. The subsidy should redirect towards enhancing fish-stock, or towards restoring fish-stock. The government should recognize the problems and identifies solutions for the problems of fishery subsidies (Ofori-Danson et al., 2013; Steenblik, 1998).

One of the important factors that researchers' concern with subsidies is that the impact of this policy on the behavior of the individual, firm or industry. Since subsidies will reduce the cost of operation or make the operation more efficient. In the context of fisheries, increased profits will generally lead to an expansion in the fishing activities. In the context of fisheries, increased profits will generally lead to an expansion in the activity of the industry and, if the effect is strong enough, ultimately to the decimation of the fish stocks.

Subsidies play two additional roles: To the degree that they stimulate fishing, they may also increase the national income of the nation. As long as the fishery is underdeveloped, i.e. as long as fishing is at a level less than that which can be safely sustained, then subsidies which encourage fishing may be useful.

2. MALAYSIAN GOVERNMENT EXPENDITURE ON SUBSIDIES

Overall, reliable data on impact of fisheries subsidy schemes on a small scale and artisanal fishing communities are scarce. In Malaysia, LKIM estimate that the government spent about 715 million on fisheries subsidies in 2012 (Table 1). Among the subsidy components, fuel subsidy accounts for more than 66% (RM473.9 million) of the total value of subsidies in the year 2012.

Living allowances are the next highest subsidy which accounts for 24% (RM172.8 million). The purpose of living allowances was to address the issue of unstable income among fishers, especially during the monsoon season, as well as in a less conducive environment in fishing villages. For the year 2015, the Malaysian government has increased the living allowance for fisher in Zone A to RM300 from RM200 a month. For the fisher in Zone B and C, the living allowance will be increased to RM250. This policy certainly will increase the government expenditure on the fishery sectors.

Fisherman in Zone A, B and C are entitled to receive fish catch incentives at RM0.10/kg, while fisherman from Zone C2 receive a RM0.20/kg catch incentive. The maximum catch incentive for fisherman in Zone A is RM150 per month, 750 per month for Zone B, RM1,500 per month for Zone C and RM5,000 per month for Zone C2. However, trash fish is excluded from landing incentives (for boat Zone B, C and C2), although this is quite important as a significant proportion (close to 40%) of fish landings by trawlers are now considered trash fish consist of juvenile fish of valuable commercial species, inedible fish of low market value and consumer preference. In 2012, government spends about RM63.7 million on catches incentives.

Models based on economic rationality predict that entry to and exit from fisheries are influenced by the profitability of fishing (McManus, 1997; Steenblik, 1998). However, empirical studies have shown that fisherman may reluctant to exit even when it is not profit anymore to get involved in the industry because cultural and socioeconomic factors.

2.1. Motivation for Study on Fishermen Subsidies

Studies on impact of fisheries subsidies, especially on fuel subsidies in Malaysian fisheries was important for three reasons. First, the fisheries sector plays an important role in providing fish as the largest single source of protein. It contributes about RM11, 440 million to the gross domestic product (GDP) and provides direct employment to 166,008 fishers. To ensure the fishery sector can be maintained as the main source of protein, contribute to GDP and employment opportunity, it is important to ensure that fishery resources can be maintained at a sustainable rate. If giving a range of subsidies to the fisheries sector motivate fisher to exert more fishing pressure, than the attainment of sustainability goals will be almost impossible to be achieved.

Second, studied by (Park, 2012) and (Sumaila et al., 2012), subsidies can be categories into three main categories:

i. Beneficial subsidies, which enhance natural capital assets, such as enhancing the growth of fish stocks through conservation, monitoring the catch rates through controlling

Table 1: Malaysian government spending on subsidies, 2011-2012

Type of subsidy	2011		2012		Classification	Valuation
	Amount RM (millions)	Percentage	Amount RM (millions)	Percentage		
Fuel subsidy	445.9	66.79	473.9	66.32	Capacity Enhancing	Bad
Living allowances	82.9	12.42	172.8	24.18	Beneficial	Good
Catch incentives	53.1	7.95	63.7	8.91	Capacity enhancing	Bad
Other support programs	69.3	10.38	4.2	0.59	Ambiguous	Good and bad
Infrastructure development	16.43	2.46	NA	NA	Beneficial	Good
Total	667.63	100	714.6	100.00	-	-

Sources: LKIM

and surveillance, stock assessment and resource surveys, fisheries habitat enhancement programs (such as MPA and artificial reef) and fisheries management;

ii. Capacity-enhancing subsidies, which lead to disinvestment in natural capital assets. These programs will make fishing capacity expands to a point where resource overexploitation. When fishing capacity develops, then it is impossible to achieve maximum sustainable yield target (Milazzo, 1998). Capacity-enhancing subsidies include all forms of capital inputs and assistance from the government that enhance revenue and reduce cost. Example of these types of subsidies are price and marketing support, fuel subsidies, boat and fishing port construction programs, processing and infrastructure programs, or provisional of institutional support and services; and

iii. Ambiguous subsidies, whose impact on fish stocks are undetermined because they may lead to either enhance or reducing the natural capital assets (resource overexploitation). Example of these types of subsidies are payments to fisherman to stop fishing temporarily or to maintain their income during bad times (recession or catches decline), unemployment insurance, fishers retraining programs, and boat buyback programs (Holland et al., 1999; Clark et al., 2005).

The overall objective of the study is to evaluate the socioeconomic and environmental impacts of fisheries subsidies in Malaysia. Subsidies refer to government transfer payments either direct or indirect from the public sector to the fishing sector, which aims to help the sector to make more profit or reduce the level of poverty in the sector. The study will explore the real contribution of subsidies on the welfare of fishing communities. The results of the study would contribute valuable policy inputs that help in rationalizing the fuel subsidies for fisheries in Malaysia.

3. LITERATURE REVIEW

Fisheries subsidies have gained worldwide attention because of their relationship with ecological sustainability and socioeconomic development (Munro and Sumaila, 2002). The evidence from studies suggests that fisheries subsidies contribute to the overexploitation of resources through excessive fishing effort. The evidence also suggests that subsidies if effectively utilized can improve resource conditions and livelihood of those depend on this resource (OECD, 2003). The positive contribution from subsidy towards resource conservation and livelihoods of fisherman are important policy tools for rural development of coastal communities in many countries, including Malaysia. However, studies on the impacts of subsidy on resources and fisherman wellbeing in Malaysia are yet to be demonstrated.

The main motivation for reform of subsidy in fisheries is that the present scheme contributes to resource overexploitation. Economic literature on subsidy shows that fisheries subsidies lead to increasing fishing effort and overexploitation of fisheries resources (Milazzo, 1998; FAO, 2000; Munro and Sumaila, 2002; Sumaila et al., 2012). The crucial issue is that subsidies generally motivate fisher to exert more fishing pressure and therefore the attainment of sustainability and conservation goals almost impossible to achieve (Sumaila et al., 2012; World Summit on Sustainable Development [WWSD], 2002).

Milazzo (1998) has drawn a distinction between "good" subsidies which lead to reductions in fishing capacity, "bad" subsidies are those that add directly to capacity and "ugly" subsidies are defined as subsidy programs that lead to either investment or disinvestment in the fishery resource. He highlighted that ineffective management is the fundamental cause of over-fishing. However, there is considerable debate on what can be considered a "good" subsidy (Arnason, 1998; Munro and Sumaila, 2002). A number of empirical studies investigated different categories of subsidies. Khan et al. (2006) identified and categorized the various types of fishery subsidies with a focus on the worldwide fisheries policy. They estimated that out of a total of US$26 billion worth of subsidies, about US$15 billion were bad subsidies that increased fishing capacity, approximately US$7 billion were good subsidies and the remaining US$4 billion were ugly subsidies.

Generally subsidies are provided directly to fisherman in various forms, including grants, loans and loan guarantees, equity infusions, tax preferences or exemptions, and price or income support programs (Schrank, 2000; Clark et al., 2005; Khan et al., 2006). The effect of different categories of fisheries subsidies is difficult to measure. The effect of fuel and non-fuel subsidies on fisheries has been widely discussed in the literature. Most of the study relates the role of subsidies to the problem of overcapacity and overfishing, such as has been discussed at the WWSD in Johannesburg (WWSD, 2002). Several countries, including Malaysia increased fuel subsidies due to a rise in fuel prices. However the decision to provide fuel subsidies is mostly influenced by political and social conditions.

Fishery stock is a complex and precious resource. Knowledge about a fishery stock and factors that can influence fish stock is required in order for fisheries to be managed in a sustainable manner. However, management of the fishery is made difficult by the fact that the resources are largely invisible until harvested, impacts are frequently long-term, and the causes of the problem can be hard to identify (Gjertsen, 2005; Oro et al., 2013; Sumaila et al., 2012). Additionally, marine species may be migrating and stocks may be shared between countries.

To explain this concept of sustainable fisheries, we have to understand the factors that influencing changing of the fish stocks. Actually fishery stocks in next period are influenced by the stock at this period, net growth (plus recruitment and less natural mortality) and catch by fisherman.

Stock next period (X_{t+1}) = Stock this period (X_t) + net growth ($F(x)$) – catch (h_t)

$$X_{t+1} = X_t + F(x_t) - h_t$$

From the above equation, we know that apart from the catch, the fisheries sector could also face the challenge of "recruitment fishing" and "growth overfishing." The challenge of "recruitment fishing" happens when fisherman deplete fishery stocks before they

have a chance to spawn, effectively removing all future offspring from the fishery. While, the challenge of "growth overfishing" occurs when fisherman harvest species before they have grown to their full, adult size, disrupt the growth of fish. The use of gear such as trawls will not discriminate the type of fish species that will be caught.

Through a proper fishery management, fishery stock can be enhanced, the abundant stocks of fish in the sea will make fisherman easier to do fishing activities. Enhancement of fishery stocks also enables time savings in fishing operations and hence cost of fishing. In common property resources, fishers from diverse background participate in fishing (Meliadò, 2012). In the lucrative fisheries, fishers also come from outside the country and operates their fishing activities in local waters. Effective fisheries regulation is necessary in such a situation. The lack of enforcement of fisheries regulation fails to control overfishing. This situation means that when profits are positive, more trips are made and less trips are made while there is no profit. The problem with fisheries is that fisherman will not stop their fishing effort when the rents (profits) are maximized.

According to the assumption of the Gordon Model (Gordon, 1954), used as a basis for constructing the model for open access fishery (Figure 1). As shown in the Figure 1, the revenue corresponds to the fish stock in a fishery is an inverse u-shaped curve, because an increase in fishing effort beyond a certain level does not allow the stock enough time to replenish itself and leads to a situation where the last fish is caught. As the stock falls to zero, the potential revenue also equal to zero. At point E* (maximum net economic yield level) quantity of fishing efforts, revenue more than costs, the fisherman will get profits (rents) from their fishing activity (Meliadò, 2012). Instead, seeing that other fisherman are making money, more boats will enter the fishery, pushing effort beyond E^m (maximum sustained physical yield [MSY] level). The MSY is the point at which the marginal productivity of fishing effort is zero, corresponding to the peak in the revenue cure in Figure 1. This process will continue until all the rents have been eliminated, i.e., at E^0 (breakeven point level) quantity of fishing efforts. This is called the open-access equilibrium. The phenomenon is known as the tragedy of the commons.

With the fishery subsidy, cost curve can shift to the right side and this will make the quantity of fishing efforts increase since the rents (profits) has been increased due to the subsidy. This situation will encourage fisherman to increase their fishing efforts (Figure 2). Normally the government trying to reduce the impacts of the "tragedy of the commons" through fishery regulation, such as restrictions on equipment, limit sizes of fish one can catch, throwback policy, minimum net size and limitation on the type of gear the fisherman can use in their fishing activities.

4. METHODOLOGY

4.1. Data Source

The study obtained information about the type of fishing subsidies that has been given to fishing communities, benefits earned from

Figure 1: Rent elimination in an open access fishery (a.k.a. the tragedy of the commons)

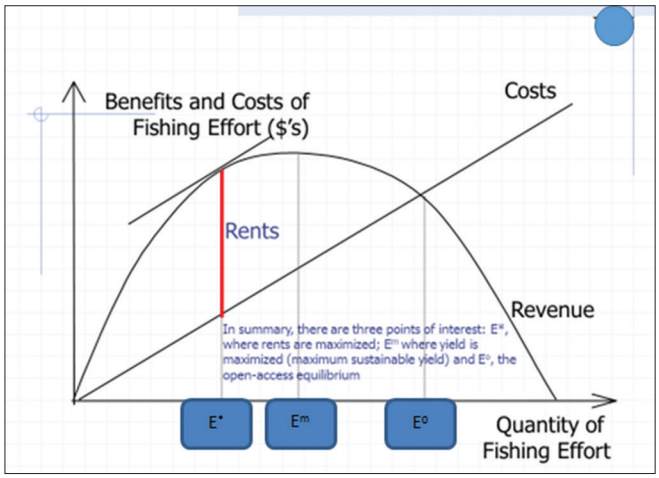
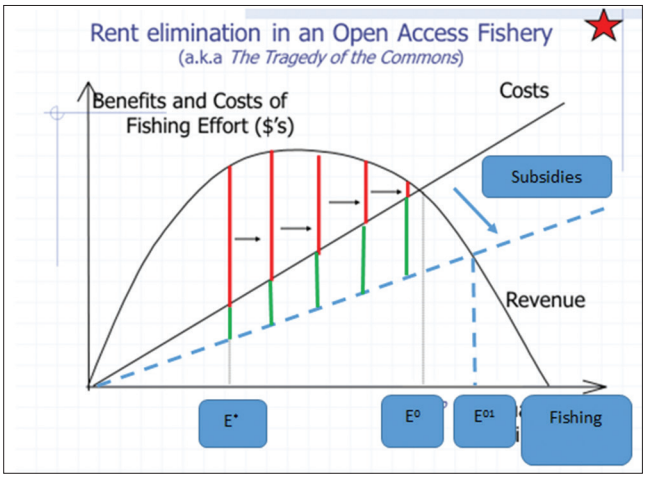


Figure 2: Revenues, fish stock, fishing efforts and subsidies



these subsidies and views on the best possible policy directions for fisheries subsidy that will redirect funds towards promoting sustainable livelihoods and food security. Data collected for the study from three fishing districts of Peninsular Malaysia (Kedah, Perak, and Terengganu) through face to face interview. A total 246 fisherman respondents were selected through a random selection process from the list of fishers with the Department of Fisheries. In order to test hypothesis, several data collection steps were undertaken.

First, focus group discussions were conducted with several stakeholder groups: Resource users (fishers – captain and fishing crew), Non-government Organization (NGO), and fisheries administrator (DOF and LKIM officers) to explore the subjective experience of well-being of these resource users and their relationship to the fishery. Second, long-term fisheries data (catches, value of fish, number of boats, and number of fishers) and subsidies data were collected to understand about fishery and subsidies. Third, face to face interview was conducted with fisherman to get information about their perceptions on subsidies and policy. Fourth, various stakeholders were consulted to get their opinions on the finding of the study and to evaluate policy implications of the study.

The research also collected the information on issues such as involvement of stakeholders, communications, the flow of information and trust on perceptions towards subsidy and rationalization of subsidies. It was expected that all these factors are among the human organization factors to predict the success of common-pool resource management (Ostrom and Hess, 2011; Epstein et al., 2014). Changes of policies by using authoritarian policing often not acceptable by stakeholders and can suffer from the perceptions of illegitimacy (Ali et al., 2013). It is within this situation that the perceptions of fisher (resource users) and fisheries administrators (DOF and LKIM officers) are considered an important step in understanding fisherman desires and potential their suitability with the fisheries administrator desires (Ainsworth and Sumaila, 2005).

There are more reports stated that new policies will be more successful if all stakeholders know about the status of the resource, easy to get the data and the implementation of good governance (Cinner et al., 2009; Fischer et al., 2015; Lindebjerg et al., 2015). Some researchers suggest information from various interest groups (stakeholders) are necessary because the stakeholder's profession and position in the economy and their perception of the current situations are a critical consideration on any implementation of the new policy.

The hypotheses of this study were as follows:

i. The type of fisherman or resource users (boat size, fishing gears, location, economic status) would be strongly related to respondents' perceptions of the benefits of subsidizing;
ii. The type of fisherman or resource users (boat size, fishing gears, location, economic status) would be strongly related to respondents' perceptions of policy for rationalizing the fuel subsidies;
iii. Stakeholders in the management profession (DOF and LKIM officers) will have more positive views of all rationalizing subsidy policies comparable to resource users (fisherman').

4.2. Institutional Analysis and Development (IAD) Model

This study used IAD model. This model can explain the importance of community factor characteristics (attributes of community) such as fishing communities, and the state of stocks of biological or fishery (biophysical conditions) on the success of a new program implemented by the policy makers. IAD model does not depend on the applicable rules (rules-in-use) in ensuring a successful of a program, but more towards understanding of the purpose of the program and whether they are suitable to be implemented in particular situations.

Community factors include how communities interact, for example, between fisheries in the same zone (Zone A); or fishers in the different zone (a Zone A fisherman with a Zone B and Zone C fisherman), experience, area and so on which are used as user attributes. There are also external factors (external variables) that affect a particular program that may affect the action (action situations) and the next occurrence of interactions and outcomes. Evaluation criteria want to show how the assessment was made on the outcome and interactions.

This model shows how a successful program, and the factors that influences the success of this program (Figure 3). Overall, we want to determine influences of the involvement of all stakeholders (such as NGOs, university, fishers, wholesalers, retailers, government), in the formulation of the new policy will make the program more successful.

5. RESULTS

5.1. Impacts of Subsidies

The fisheries ecosystems in Malaysia are facing problems of overexploitation, degradation and pollution. The issue is whether programs that provide subsidies to the fisheries sector further worsen these problems or reduce the impacts of these problems. The data to undertake a detailed analysis of the environmental impact of subsidies on fish stocks is not available and this study just provides an overview of the impact using references to other studies and basic data on landings and resource composition.

5.2. The Overcapitalization Effect

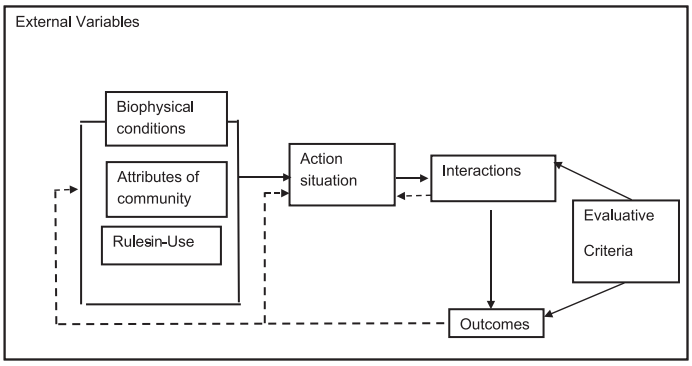
There is an excessive fishing effort and overcapacity especially on the west coast of Peninsular Malaysia. The few research studies undertaken by the Department of Fisheries indicate that resources are heavily stressed and are being currently fished beyond their maximum sustainable yield. Biomass estimates are said to be down to 6% of original stock levels. Analysis of standardized fishing effort and yield indicate that the 1996 effort is 135-200% of the level needed to harvest the MSY.

These findings are further demonstrated in the increasing fishing effort arising from the increase in the number of trawlers and purse seiners and the number of power boats. Table 2 shows that the number of outboard-powered boats increased by 38% between 2008 and 2009. The total number of licensed boats increased by about 6% between 2012 and 2013. This represents a significant increase in fishing capacity (more fishing boats) in an already stressed fishing environment.

5.3. Catches of Fish Effects

The overcapitalization effect can also be determined by looking at information on landing of marine fish by different types of fishing boats. Table 3 shows landings of marine fish by trawlers in Malaysia, namely in Perlis, Kedah and Perlis according to the size

Figure 3: A framework for institutional analysis



Adapted from Ostrom and Hess, 2011

Table 2: Total number of licensed fishing boats by tonnage, 2007-2013

Year	Non-powered	Outboard-powered	% Δ	Inboard-powered	% Δ	Total	% Δ
2007	113	11,908	-	12,140	-	24,161	-
2008	100	13,247	11.24	12,129	−0.09	25,476	5.44
2009	109	18,270	37.92	12,119	−0.08	30,498	19.71
2010	89	19,255	5.39	18,248	50.57	37,592	23.26
2011	52	19,761	2.63	11,661	−36.10	31,474	−16.27
2012	71	19,841	0.40	11,685	0.21	31,597	0.39
2013	66	21,493	8.33	11,917	1.99	33,476	5.95

Source: Annual fisheries statistics, Department of fisheries Malaysia (various issues)

Table 3: Landings of marine fish by trawlers, 2011-2013

State	Year	Boat size (gross tonnage, GRT)	Landings (tones)	% Δ from 2011-2013
Perlis	2011	25-39.9	13,642	−18.0%
	2012		11,193	
	2013		10,333	
	2011	40-69.9	38,530	−46.4%
	2012		31,216	
	2013		20,668	
Kedah	2011	25-39.9	18,187	+3.8%
	2012		15,571	
	2013		18,876	
	2011	40-69.9	17,845	+4.4%
	2012		18,664	
	2013		18,629	
Perak	2011	25-39.9	18,394	−9.3%
	2012		22,356	
	2013		16,681	
	2011	40-69.9	70,916	+18.1%
	2012		77,811	
	2013		83,739	

of the boat. In Perlis, catches of trawlers that operate using trawls size 25-39.9 GRT and 40-69.9 decreasing in the last 3 years (2011 to 2013). Trawl fishing boats of 25-39.9 GRT catches 13,642 tons of fish in 2011, but dropped to 10,333 tons in 2013, a decrease of 18.0%. Similarly, the trawlers with fishing boat 40-69.9 GRT catches 38.53 tones of fish in 2011, but fell to 20.67 tonnes in 2013, a decrease of 46.4%.

In Kedah, the catch is stable, there is an increase around 4% by both size of fishing boats, 25-39.9 GRT and 40-69.9 GRT. However, in Perak, the landing of fish by trawler fishers that use 25-39.9 GRT fishing boats experiencing declines in catches of 9.3%, but trawlers that use 40-69.9 GRT fishing boats experiencing increases in catches by 18.1% in the past 3 years.

5.4. Fishing Costs Effects

Subsidies affect the cost of fishing. In this section the impact of the different types of subsidies on the fishers operating in Zones A (traditional gear), B, C and C2 (trawlers and purse seiners) is explored. Some simulations are carried out to examine the impact of the withdrawal of the subsidies on the income of fishers.

The first item in Table 4 shows the calculations of the total value of catch. The total quantity of catch, was reporting on a per trip basis. To compute the monthly value of catch these trip quantities are first multiplied by the reported number of trips made per month and further multiplied by the current price of fish for the respective quantities. This incentive is given only for the quantity of food fish in the catch and the rate is set at 10 cents per kg for A, B and C boats and 20 cents for C2 boats. The maximum payment allowed for boat A is between RM150 to RM300 per month. The maximum for the B, C and C2 boats are RM750, RM1500 and RM5000 respectively. The boat C has the highest monthly catch per trip, about 8528 kg. This is followed by boat Zone B at 2463 kg, and the traditional boat (boat A) has a catch of around 122 kg per trip.

The number of catches, and coupled with the subsidy, the monthly income is estimated at RM2, 118 fishing boats for a fisher from Zone A, RM8018 for Zone B, and RM20,881 for Zone C. Fishers from boat B is found most likely to benefit from fuel subsidies since fuel cost as percentage of operating cost was 67%, followed by boat C 64%, and boat B33%. If all subsidies such as fuel subsidy, catch incentives and livelihood subsidy is not provided to fishers, fishing boat A most affected because without the subsidies, their monthly income just to RM212 a month compared to boat B RM1945 and boat C as much as RM10,676 a month.

Finding from the survey has been supported by finding from focus group discussion with participants from various types of fishers to elicit their perceptions of the impacts of subsidies on their livelihoods and fisheries. The results show that fuel subsidy is the most preferred subsidy for all types of fishing. For the artisanal fisherman (boat A), fishing inputs such as boat, nets, engine, GPS, life jackets are the second preferred subsidy (grants) followed by monthly allowance subsidy.

The participants of boat B had similar preferences with boat A, while boat C participants preferred catch incentive subsidy next to the fuel subsidy. The large boats (C) participants said that subsistence allowance is less effective for the livelihoods of fisher because it makes fisherman more dependent on subsidy. They thought that termination of this allowance will not affect fisherman' livelihoods. However, both A and B boat participants put importance on this monthly allowance as they found it very useful during the crisis time (Table 5).

6. CONCLUSION

There are a number of issues presented by fisher which should be reviewed for better management of subsidies. The results of the survey showed that fisherman has a good understanding of fisheries trend and impact of fisheries subsidies on fisheries resources and their socioeconomic conditions over the past 5 years. The results demonstrated that fuel subsidy was the most important item for the fisher as it reduced fishing operation costs. Fisher received

Table 4: Characteristics of fishing operations, selected boats by fishing zone

Zone	A	B	C
Gear	Traditional		
Trip/month	18	13	8
Income/month	1319	2737	15,116
Catch and revenue			
Catch (kg/trip)	122	2463	8258
Value of fish (RM)	18,892	424,660	1,528,733
Catch incentive (RM)	142	668	584
Livelihood subsidy/ month (RM)	220	225	200
Brim	54	54	0
Fuel subsidy/month (RM)	382	4334	4981
Total gross income (RM)	2118	8018	20,881
Percentage income from fuel subsidy	18.05	54.06	23.86
Percentage income from subsidy	37.69	65.87	27.61
Fuel as percent of operating cost	66.79	32.94	63.69
Operating expenses			
Cost of fuel price (RM/ month)	7250	11,600	40,455
Cost of ice (RM/month)			
Cost of food (Rm/month)	20	150	200
Cost of bait (RM/month)	7250	11,600	40,455
Total monthly operating expenses (RM/month)	427	513	641
Miscellaneous (RM/month)	90	400	500
Net income (RM)	211.64	1,945.45	10,676.27

Source: Fieldwork-survey

Table 5: Ranking of subsidies priorities by fishers

Fisheries subsidy	Rank			
	Boat A	Boat B	Boat C	Boat C2
Fuel subsidy	I	I	I	I
Living allowance	III	III	VII	VII
Catch subsidy	IV	IV	II	II
Maximum catch subsidy	VII	VII	IV	V
Support programs, net, boat, engine	II	II	VI	VI
Grants	V	VI	III	III
Soft loans	VI	V	V	IV

subsidies over the past 5 years. It appears that fuel subsidy has important implication for fisheries resource sustainability. There is a pressing need to monitor the fuel distribution procedure and utilization of fuel.

The findings showed that fisheries resources have been declining significantly over the years. The government has deployed a number of artificial reefs, and fisherman has proposed protection of some artificial reefs from fishing. The results suggest that the socio economic condition of artisanal fisherman has not improved significantly. Most fisherman families depend solely on fishing for their livelihood. The government should undertake effective fisheries management to reduce fishing pressure in the sea. There is a need to examine alternative livelihood enhancing activities for fisherman. The institutional capacity has to be developed to increase their ability to undertake various activities for alternative livelihoods such as sustainable tourism, aquaculture and seafood processing and the production value added seafood products.

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