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COST STRUCTURE AND PROFITABILITY OF TRAMMEL NET FISHERY IN SEMARANG MUNICIPALITY, INDONESIA

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by

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Abstract of the thesis presented to Senate of Universiti Pertanian Malaysia in partial fulfilment of the requirements for the Degree of Master of Science.

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Faculty : Economics and Management

Trammel net is one of the fishing gears operated by small scale fishermen along the coast of Java, in particular in the Semarang Municipality. For the past seven years, trammel net has been developed into the main gear used to exploit shrimp resource in waters around the municipality

This study aims to examine the economics of trammel net fishery in the Semarang Municipality with an emphasis on cost structure analysis and determination of profit. In addition, the study also attempts to determine factors responsible for the continued existence of resource rent and factors affecting variations in catch among fishermen.

The cost structure analysis examined the cost incurred for every factor of production and its importance to total cost as expressed in cost indices. The profitability of the gear was determined by means of cost and return analysis. The factors affecting variations in catch among fishermen were determined by means of a regression analysis.

Of the two trammel nets, i.e. the medium and the small scales, the latter net was found to be more profitable. Owners of small trammel nets earned the largest rent and non-family labour of medium trammel net earned the smallest rent.

The number of net and time spent fishing were two variables found positively related to catch per trip in the peak season. Cost of buying boat and engine were found to be negatively related to catch for the medium trammel net but positively related to catch for the small trammel net. Size of fishermen household was negatively related to catch for both the medium and small trammel nets. In addition, fishing experience was also found to be significantly related to catch for the medium trammel net and the relationship was positive.

The small trammel net was recommended for development in Semarang waters especially during the peak season. In order to achieve a rational exploitation of shrimp resource in the

areas, appropriate management mechanisms should be instituted following a more intensive effort to assess resource availability and potential.

ABSTRAK

Abstrak tesis dikemukakan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi sebahagian daripada syarat-syarat untuk mendapatkan Ijazah Master Sains

STRUKTUR KOS DAN TINGKAT KEUNTUNGAN PERIKANAN JARING TIGA LAPIS DI PERBANDARAN SEMARANG, INDONESIA

Oleh

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January 1989

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Jaring tiga lapis adalah salah satu jenis alat penangkapan ikan yang digunakan di pesisiran pantai pulau Jawa, khususnya di perairan sekitar Perbandaran Semarang. Sepanjang tujuh tahun yang lepas, jaring tiga lapis telah digunakan sebagai alat utama untuk menangkap udang.

Kajian ini bertujuan untuk meneliti aspek ekonomi perikanan jaring tiga lapis di Perbandaran Semarang dengan penekanan pada analisis struktur kos dan penentuan tingkat keuntungan alat penangkapan itu. Kajian ini juga bertujuan menentukan faktor faktor yang mempengaruhi keuntungan sumber yang berterusan dan faktor faktor yang mempengaruhi variasi hasil tangkapan diantara nelayan.

Analisis struktur kos mengkaji setiap kos yang dikenakan dan menentukan betapa pentingnya kos-kos tersebut dalam kos keseluruhan seperti ditunjukkan oleh indeks kos. Keuntungan alat tangkapan ditentukan melalui analisis kos dan pulangan modal. Pengaruh faktor faktor terhadap tangkapan ditentukan dengan menggunakan analisis regresi.

Diantara jaring tiga lapis jenis saiz sederhana dan jenis kecil, didapati jenis saiz kecil lebih menguntungkan. Pemilik-pemilik jaring tiga lapis bersaiz kecil memperolehi keuntungan sumber yang terbesar. Sementara keuntungan sumber terkecil diperolehi oleh nelayan jaring tiga lapis berzais sederhana.

Jumlah jaring dan masa yang diperuntukkan untuk penangkapan ikan adalah dua angkubah yang telah menunjukkan hubungan positif terhadap tangkapan musim banyak ikan. Kos membeli bot dan enjin juga didapati mempunyai hubungan yang negatif terhadap tangkapan untuk jaring tiga lapis bersaiz sederhana tetapi mempunyai hubungan yang positif terhadap tangkapan untuk jaring tiga lapis bersaiz kecil. Saiz keluarga nelayan mempunyai hubungan yang negatif terhadap tangkapan untuk kedua-dua saiz jaring tiga lapis. Kajian juga mendapati bahawa pengalaman nelayan mempunyai hubungan positif yang signifikan terhadap tangkapan bagi jaring tiga lapis bersaiz sederhana.

Jaring tiga lapis bersaiz kecil adalah dicadangkan untuk pembangunan seterusnya di perairan Semarang terutama di musim banyak ikan. Untuk mencapai eksploitasi yang rasional terhadap sumber udang di perairan Semarang, satu mekanisma pengurusan yang baik sewajarnya dilaksanakan sebagai langkah lanjutan dari usaha untuk membuat penaksiran kedapatan dan keupayaan sumber.

CHAPTER 1

INTRODUCTION

The Indonesian archipelago is located between two continents, Asia and Australia, and two oceans, the Pacific and the Indian Oceans. It is situated between 94° E and 141° E and between 4° N and 11° S. It consists of 13,677 islands, of which 944 are inhabited (Koesoebiono, et al. 1982). The main islands are Java, Sumatra, Kalimantan, Sulawesi, and Irian Jaya. Of the total population of 168 million people in 1985 about two-thirds live in Java, Madura, and Bali, on a land area which is only about 7% of the total area of Indonesia (Anon, 1986). The main reason for this high concentration of population is the high fertility of soil in Java. Only one-third of the irrigated ricefields in Indonesia are found off these three islands (Koesoebiono et al. 1982). Java is also Indonesia's most important island as Jakarta,the seat of the central government, is located in the island.

General Features of the Indonesian Fishery

Like in many other developing countries, Indonesia has comprehensive Five Year Development Plans beginning in 1968 as follows: Plan I (1968 - 1973), Plan II (1973 - 1978), Plan III (1978 - 1983), and currently the fourth plan (1983 - 1988). These plans consist of development programmes and projects, which vary from physical infrastructure to non physical ones,

such as providing extension and training schemes. The Directorate General of the various Departments are responsible for the development of projects in their respective departments. For example, the Directorate General of Fisheries (DGF) of the Department of Agriculture is responsible for the development in the fisheries sector. Fisheries projects implemented in the provincies are coordinated through its subordinate offices namely the Provincial Fisheries Service.

The following are the general objectives of the national fisheries development programmes.

1. To increase income of fishermen and fishfarmers through the increase of fish production and productivity.
2. To increase fish consumption.
3. To increase fish exports and to reduce imports.
4. To improve resource management and supervision.

The total annual fish production for the whole country in 1985 was around 2.4 million metric tons (mt). About 1.82 million mt originated from capture fisheries and about 0.58 million mt came from culture fisheries. The production from culture fisheries can be broken down according to sub sectors as follows: brackishwater ponds, 0.156 million mt; freshwater ponds, 0.361 mt; and paddy fields, 0.063 million mt. Fisheries production in total has shown a continously increasing trend in the last 15 years (Table 1.). In 1984 the fisheries sector also contributed about 1.6% to Gross National Product (GNP).

TABLE 1

Fish Production of Indonesia, 1970 1985

Year	Production (million mt)	Index (1970 = 100)
1970	1.23	100
1971	1.24	100.8
1972	1.27	103.3
1973	1.28	104.1
1974	1.34	108.9
1975	1.39	113.0
1976	1.48	120.3
1977	1.57	127.6
1978	1.65	134.1
1979	1.75	142.3
1980	1.85	150.4
1981	1.91	155.3
1982	2.00	162.6
1983	2.21	179.7
1984	2.26	183.7
1985	2.40	195.1

Source: Fisheries Statistics of Indonesia, 1985. DGF. Ministry of Agriculture. 1987.

There are altogether 1.29 million fishermen directly involved in the fishery sector. They comprise 0.63 million full-time fishermen and 0.66 million part-time fishermen. The total number directly involved in the sector make up 2.0% of the total workforce or 3.7% of the total agricultural workforce. Taking into account all labour directly or indirectly involved in the fishery sector, there are around three million people whose livelihood depend on fishery (Naamin Nurzali, 1987).

A great variety of fishing gears and fishing methods are employed by fishermen. Gill net, trammel net, cast net, traps, payang (seine net) are applied by small-scale fishermen in coastal waters, while long lines, poles and lines, and purse seine are widely used offshore mostly by industrial fisheries. Although trawl fishing has been abolished by law since 1980, there are modified shrimp trawls equipped with By-catch Excluder Device (BED), operating in particular in Arafura Sea, in the eastern part of the country.

At present throughout the Indonesia Archipelago, there are about 316 thousand fishing boats in operation, comprising 220 thousand non-powered boats and 96 thousand powered boats. About 61 thousands of the powered boats have outboard engine. Fishermen using inboard engine boats normally operate in offshore waters while the rest operate in the inshore waters.

In terms of fishermen population, the Northern Coast of Java, the Southern Coast of Sulawesi, and the coastal areas facing the Straits of Malacca are the more densely populated. These three areas have about 137 thousand fishing enterprises or 3% of all fishing enterprises in the country. In addition, they produce about 54% of the total fish production.

It is estimated that the potential exploitable marine fishery resources is about 6.6 million mt, of which 4.5 million mt come from territorial waters while the remaining 2.1 million mt is found in the Exclusive Economic Zone waters. The average rate of exploitation of the above resources was estimated at 22.5% in 1982. The rate of exploitation, however, varies greatly from area to area. For instance in 1982, the rate of exploitation of demersal and pelagic resources in South Sulawesi were 88.9% and 96.3%, respectively, whereas the exploitation rate of the same kinds of resources in Mollucas and Irian Jaya were only 6.9% and 4.8%, respectively (Panjaitan, 1985).

Among the species caught, shrimp, skipjack, and tuna are for export. Skipjack and tuna are fished mostly in the eastern waters by using long lines, pole and lines, and purse seine whilst shrimp were hauled by using trawl with BED at Arafura Sea and trammel net at around Java. The export earnings of

Indonesia from fisheries are sizeable, amounting to about US $341 million in 1985. Among the fisheries products, frozen shrimp is the major export item.

The national average per capita consumption of fish in 1984 was 13.5 kg. It is very much below the national goal of 22.5 kg per capita. The consumption however varies greatly from one island to another ranging from the lowest in Java at 6.3 kg per year to the highest in Kalimantan at 41.1 kg per year. In general fish provides about 62% of total domestic protein supply whilst the rest comes from poultry and other meats (Naamin Nurzali, 1987).

Marine Fisheries in Semarang Municipality

Semarang, situated in the nothern coast of Java, is the capital of Central Java Province and is one of the most important cities in Indonesia besides Jakarta and Surabaya. As a capital city, Semarang is not only the centre for provincial government, it is also the centre for industry, trade, and education for the province.

Semarang also has several institutes of fisheries such as the Marine Fisheries Research Institute, Fisheries Training Institute, and Faculty of Fisheries and Animal Husbandry of Diponegoro University. In addition, the Provincial and Municipal Fisheries Services are also located in Semarang and

about a hundred kilometers away to the east of the city, is where the Brackishwater Pond Research Institute is located

Geographically, Semarang extends from 6° to 7° South of the Equator and from 109° to 110° East of the Meredian. It is bordered by Java Sea, Semarang, Kendal, and Demak regencies, in the north, south, west, and east, respectively.[1]

In 1986, the population of Semarang Municipality was 1.1 million distributed in 177 villages. About 1,502 of the population were fishermen, concentrated mainly in north Semarang at Tambak Lorok, Tawang, and Banjir Kanal Barat.

Prior to the total ban on trawl fishery in Indonesian waters, Semarang was one of the biggest trawl ports in Java. The trawl fishery, at that time, attracted attention of not only fishermen but also those who had no experience in fishery. Collier et al. (1979) reported that many textile (batik) producers invested in trawl fishery. Some of trawlers from Sumatra also moved their operation to Java Sea with Semarang as their home base.

Being the more productive gear, trawl fishery was able to increase marine fish production substantially over time before it was banned. The total fish production of central Java of 57

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[1] Maps of Indonesian archipelago and Java islands are shown in Appendix C.

mt in 1976 went up by 14% to 65 mt in 1977. For the following year, the production increased to 79 mt or 22% higher than the previous year. In 1979, the year when trawl existence began to be perceived as to evoke social friction between trawlers and small fishermen (Collier. et al. 1979), the production soared to 107 mt or an increase of 35% from the 1978 production. The trawling activities were able to create the backward and forward likage industries. Fishermen cooperatives, auction market, cold storage, and cool room facilities were established and most of them were operating at full capacity. These, however, were very much reduced after the implementation of the presidential decree to ban trawl fishery in 1980.

At present, though unlike before the trawl ban, marine fisheries continues to provide occupation for about 2,500 fishermen households. Many of the present fishermen are former trawl crewmen while others are genuine small-scale fishermen who continue to rely on traditional and primitive gears. The fishery sector also contributes income to Semarang Municipality through the deduction (including tax) on fishermen yield executed at the auction market. The amount, however, is quite small.

The 1985 data shows that Semarang Municipality had a fishing fleet which was generally traditional in nature. The fishing fleet consisted of 239 outboard engine boats, 3 inboard engine boats whose size ranges between 10 and 20 gross tonnage,

and 78 non powered boats. The most dominant gear was the trammel net (144 units), followed by gill net (98 units), boat/raft nets (50 units), scoop nets (24 units), and unidentified/others (40 units).

Due to the relative calmness of the sea around the municipality, all of the above mentioned gears can be operated throughout the year. However the wet season from January to April, is the peak period for trammel net and the dry season from May to December, is its slack period although it is the peak period for the gill net. The other gears can be operated at any time of the year while those having more than one type of gear can use their gears interchangeably.

There are three fish landing centres in Semarang Municipality namely : Tambak Lorok, Banjir Kanal Barat, and Boom Lama. Tambak Lorok, situated in Tambak Lorok fishermen village, is by far the largest landing centre accounting for about 90% of the total fish landings in Semarang. The other landing centres are only opened occasionally depending on weather conditions.

It is also important to note that there are many small purse seiners from neighboring areas such as Lamongan and Gresik in East Java who land and sell their catch in Tambak Lorok. The popularity of Tambak Lorok as a fish landing centre is presumably attributable to the higher price of fish in

Semarang than that prevailing in their respective home bases and the readily available supply of fuel and ice at the landing place. It can generally be said that the facilities for fishermen at Semarang are much better as compared to those found in the adjacent areas.

The fish landing places in general are equipped with an auction hall and fresh water reservoir. Ice, fuel,lubricant, and foodstuff are also easily available at the landing places. These goods must be bought directly from stalls runned by brokers around the landing places. Price of the goods at the stalls however is considerably higher than that prevailing outside the landing places. The local fishermen, however, are attracted to buy from the brokers because payment can be done after coming back from the sea.

During the slack period when fishermen often return with an empty hand, the goods that have been consumed are charged with an interest of 10% per month. Borrowing money from the brokers at the landing places in order to meet their daily needs is also not uncommon.

Fishermen are required to sell their catch through the auction system managed by the local fishermen's coopereative. The auction carried out at the auction places is an open bid system, where the auctioneer offers the price-up gradually to