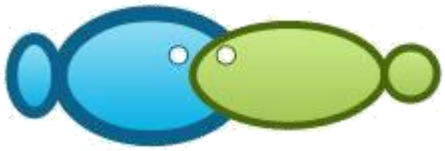

Prime fish commodities as industrial raw materials in fish processing in Northern Coast of Java, Indonesia

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Abstract. Prime commodities are expected to provide greater revenue compared to other commodities. In determination of prime commodities it is needed to know what commodities are considered prime and what commodities are not prime. This study aims to analyze the prime commodities in the capture fisheries sector in the waters of the Northern Coast of Java. The method used in this research is descriptive method using primary and secondary data. The data analyzed are secondary data, namely data on fisheries production in the waters of the Northern Coast of Java in 2011-2016. Analysis of the data used is Location Quotient (LQ) Analysis, Shift Share Analysis (ASS) and Specialization Analysis (SI). The fish composition that was caught dominantly from each group type of fish resources was 32,763 tons of *Auxis thazard* (large pelagic), 90,194 tons of fish *Decapterus* sp. (small pelagic), 39,821 *Leiognathus* spp. (demersal), *Epinephelus* sp. 5,006 tons (coral), *Portunus pelagicus* 14,878 tons (Crustaceae) and *Loligo* spp. 77,225 tons (Mollusca). The price of fish based on the type of fish caught predominantly from each type of fish resource is the 1.83 USD/kg (25,500 IDR /kg) *A. thazard* (large pelagic), 1.22 USD/kg (17,000 IDR/kg) fish *Decapterus* sp. (small pelagic), 0.25 USD/kg (3,500 IDR/kg) *Leiognathus* spp. (demersal), 5.38 USD/kg (75,000 IDR/kg) *Epinephelus* sp. (coral), 5.74 USD/kg (80,000 IDR/kg) *Portunus pelagicus* (Crustaceae) and 2.15 USD/kg (30,000 IDR/kg) *Loligo* spp. (Mollusca). The prime fish commodities found on the Northern Coast of Java are fish *Decapterus* sp., *Sardinella fimbriata*, *Leiognathus* spp., *Upeneus moluccensis*, *Priacanthus tayenus* and *Loligo* spp.

Key Words: prime commodities, capture fisheries, Location Quotient (LQ) Analysis, Shift Share Analysis (ASS), Specialization Analysis (SI).

Introduction. A prime fishery commodity is that if the products produced meet several important criteria, which are in great demand from consumers, affordable prices, production throughout the year, production is continuous and the production value of these commodities is higher than the entire economically important fish fisheries landed in a region fishing port. Determination of prime fish commodities in an area is the first step towards development and management of capture fisheries that rests on the concept of efficiency to achieve comparative and competitive advantages in the face of trade globalization (Irnawati et al 2011).

Prime commodity means that a country is able to produce products with distinctive attributes which among them are caused by the presence of domestic resource factors. Provision of quality products must be carried out followed by increased productivity and efficiency so that these commodities have high competitiveness (Kohar & Paramartha 2012).

Prime commodity is a type of commodity that is most in demand and has a high selling value and is expected to be able to provide a large income compared to other type of products (Irnawati et al 2011).

The purpose of this study is to analyze the prime commodities of capture fisheries on the Northern coast of Java, including: (1) determining the composition of the catch caught predominantly for each group of fish resources; (2) determine the value of catch production from each dominant group of fish resources caught; and (3) determine the prime commodity catches that are dominantly caught for each group of fish resources.

Material and Method

Method of data collection. This research was conducted using descriptive methods that are case studies. Data collection in this study is the collection of primary data and secondary data.

Primary data needed includes types of fish resources, fish prices and fish production on the Northern Coast of Java. The primary data was obtained by direct observation and interviews with the port managers on the Northern Coast of Java which included the Ocean Fishing Port (Nizam Zachman), the Archipelgo Fishing Port (Karangantu, Muara Angke, Kejawanan, Pekalongan and Brondong) and the Coastal Fisheries Port (Ciparage, Belanakan, Eretan Wetan, Bondet, Tegal Sari, Asem Doyong, Tawang, Bajo Mulyo and Paiton). Data obtained from the port manager is then verified against fishermen.

Secondary data taken in the form of data from the Directorate General of Fishing in the period 2011-2016. Data obtained include data on production and value of production per species of fish each year on the Northern Coast of Java. Secondary data was also obtained from library research, which included the amount of fish production, fish composition and fish prices.

Data analysis method

Catch composition. The catches were analyzed descriptively. Each fish resource is calculated based on the number of dominant fish caught each year. This analysis is intended to provide a detailed picture related to the composition of catch amounts according to fish resource groups (large pelagic, small pelagic, demersal, coral, crustaceae and mollusca).

Production value of catches. The catch production value was analyzed descriptively. Each fish resource is calculated based on the dominant production value captured every year. This analysis is intended to provide a detailed description of the value of production according to fish resource groups (large pelagic, small pelagic, demersal, coral, crustaceae and mollusca).

Prime commodities. The Prime commodity of capture fisheries on the Northern coast of Java is obtained using the results of analysis of Location Quotient (LQ), Shift Share (SS), and Specialization (SI).

a. Location Quotient Analysis

Location Quotient (LQ) is an index to compare the share of fish on the Northern coast of Java in capture fisheries activities with a total share of these activities in the total activities at the national level. More operationally, LQ is defined as the ratio of the percentage of total capture fisheries activity in the-i sub region to the percentage of total activity in the observed area.

According to Naya et al (2017), the formula for calculating LQ (Location Quotient), is as follows:

$$LQ = \frac{Y_{ij} / Y_j}{Y_i / Y}$$

Where :

Yij : total production of type-i fish is at the level of the Northernern coast of Java

Yj : total production of capture fisheries at the level of the Northernern coast of Java

Yi : total type-i fish production at the national level

Y : total production of capture fisheries at the national level LQ>1,
Type-i fish is a Prime commodity in the Northern coast of Java LQ<1,
Type-i fish is not a Prime commodity in the Northern coast of Java

b. Shift Share Analysis

According to Woyanti (2008), the formula used for Shift Share analysis is as follows:

$$G_j = Y_{jt} - Y_{jo}$$
$$N_j = Y_{jo}\,(Y_t/Y_o) - Y_{jo}$$
$$(G-N)_j = Y_{jt} - (Y_t/Y_o) - Y_{jo}$$
$$D_{jt} = \{(Y_{ijt} - (Y_{it}/Y_{io})Y_{ijo})\}$$

Where :
Gj : growth in total fishery production on the Northern coast of Java
Nj : regional component Share on the Northern coast of Java
(G-N)j : net shift component on the Northern coast of Java
Dj : component differential shift on the Northern coast of Java
Yij : total production of type-i fish at the level of the Northern coast Java
Yj : total production of capture fisheries at the Northern coast Java level
Yi : total type-i fish production at the national level
Y : total production of capture fisheries at the national level
o: initial period (2011)
t: end period (2016)
Gj-Nj<0 : fisheries growth in j area (Northern coast Java) is slower than national
Gj-Nj>0 : fisheries growth in j area (Northern coast Java) is faster than national
Djt>0 : fish species-i in j area (Northern coast Java) growth is faster compared to the growth of the same type of fish in Indonesia
Djt<0 : fish species-i in j area (Northern coast Java) growth is slower compared to the growth of the same type of fish in Indonesia

Djt shows the differential shift component used to measure the amount of net shift caused by certain types of fish that are faster or slower in growth in the area concerned.

c. Specialization Analysis

Specialization analysis (SI) serves to look at the specialization of fisheries production in districts or cities for certain types of fish. According to Yurliana & Selamet (2015), SI values are obtained by the formula:

$$SI = \left[\frac{Y_{ij}}{Y_j} - \frac{Y_i}{Y}\right] x\ 100\%$$

Where :
Yij : total production of type-i fish at the level of the Northern coast Java
Yj : total production of capture fisheries at the Northern coast Java level
Yi : total type-i fish production at the national level
Y : total production of capture fisheries at the national level
SI>1 : specialization of fisheries production on the Northern coast of Java is relatively compared to the national production
SI<1 : no specialization of fisheries production on the Northern coast of Java is relative compared to the national production

Results and Discussion

Catch composition. The composition of the catch is based on the type of fish caught predominantly from each type of large pelagic fish, small pelagic, demersal, coral,

crustacean and mollusca. In the type of large pelagic fish resources *Katsuwonus pelamis* dominated with 39.44 tons but these fish were caught from the waters of the Indian Ocean and the Indonesian Ocean landed at the Nizam Zachman oceanic fishing port located at the port on the Northern coast of Java, while fish caught from the Northern coast of Java was dominated by *Auxis thazard* with 32,763 tons. The resources of small pelagic fish were dominated by *Decapterus* sp. of 90,194 tons, demersal fish are by *Leiognathus* spp. of 39,821 tons, coral fish are dominated by *Epinephelus* sp. with 5,006 tons, crustaceans were dominated by *Portunus pelagicus* with 14,878 tons and molluscs dominated by *Loligo* spp. with 77,225 tons.

Based on Figure 1, the largest number of fish catches on the Northern coast of Java was *Decapterus* sp. (small pelagic fish group) equal to 90,193 tons and the smallest was the type of coral fish namely *Epinephelus* sp. with 5,006 tons. The size of the catch of small resources of pelagic fish is likely due to the level of suitability of the aquatic environment and the use of fishing gear used are active in small pelagic fishing activities. The dominance of active fishing gear in small pelagic fishing on the Northern coast of Java has been reported by Putra et al (2017). The influx of low temperature and high salinity water from the Flores Sea and Makassar Strait in the east to the Java Sea season has an impact on catches resulting in high CPUE of *Decapterus* sp. and *Rastrelliger kanagurta* (Putra et al 2017). However, the development of the number of purse seines that have developed rapidly on the Northern coast of Java has affected the symptoms of more catch, especially of small pelagic fish (Prihartini et al 2007).

The relatively small amount of catch for groups of coral fish resources is probably caused by damage to the aquatic environment. Yusuf (2013) reported that the condition of coral reefs in Karimunjawa waters was mostly damaged in the medium category (coral cover 25-49.9%) and only a small proportion were still in good condition (50-74.9% coral cover).

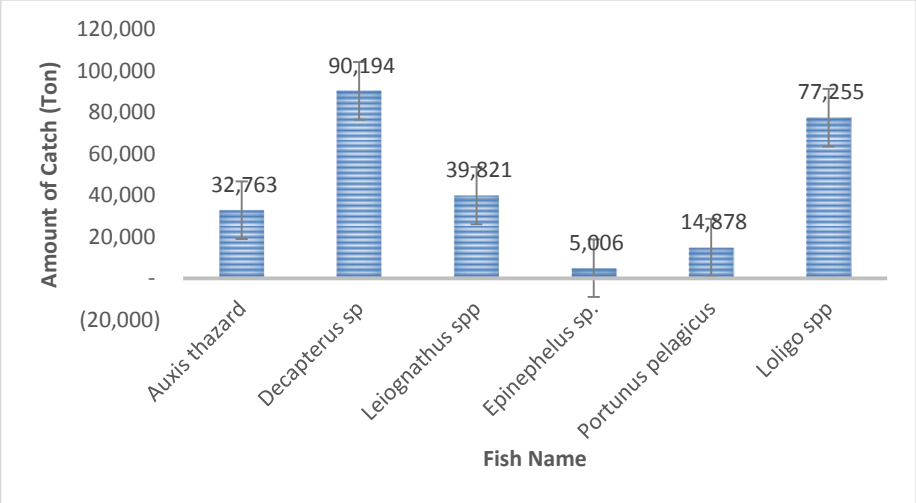

Figure 1. The composition of the dominant fish catches caught in the Northerner coast of Java in 2011-2016.

Fish commodity prices. Price is the value of an item and service measured by a sum of money. The high and low price of fish will reflect the value of the commodity when it is marketed. The price of fish is one of the important criteria in a fishery business, so this criterion is also determined to establish prime commodity fisheries on the Northern coast of Java. The price of prime commodities is formed from the interaction of several factors including the amount of fish production, the number of large baskets of fish, fish quality and the price of substitute fish (Larasati et al 2013). The price of fish based on the type of fish caught dominantly from each type of large pelagic fish, small pelagic, demersal, coral, crustaceae and mollusca can be seen in Figure 2.

Based on Figure 2, the highest price was for the type of crustacean resource, namely *P. pelagicus*, with 5.74 USD/kg (80,000 IDR/kg) while the lowest price was for

the type of demersal fish, namely *Leiognathus* spp at a price of 0.25 USD/kg (3,500 IDR/kg). If we consider the price and total production of each fish resource (Tables 1 and 2), *Loligo* sp. is the highest fish resource with a value 166,348.46 USD (2,317,652,959,365 IDR). The price of fish commodities as an important criterion in determining prime commodities, and is influenced by several factors such as quality, quantity of production and consumer interest in these commodities. For the types of commodities that are in demand, consumers will be willing to give high prices to get it such as *P. pelagicus*, *Epinephelus* sp., *Loligo* spp. and other types. The level of ease and difficulty in capturing existing fish commodities also affects the price of the commodity itself.

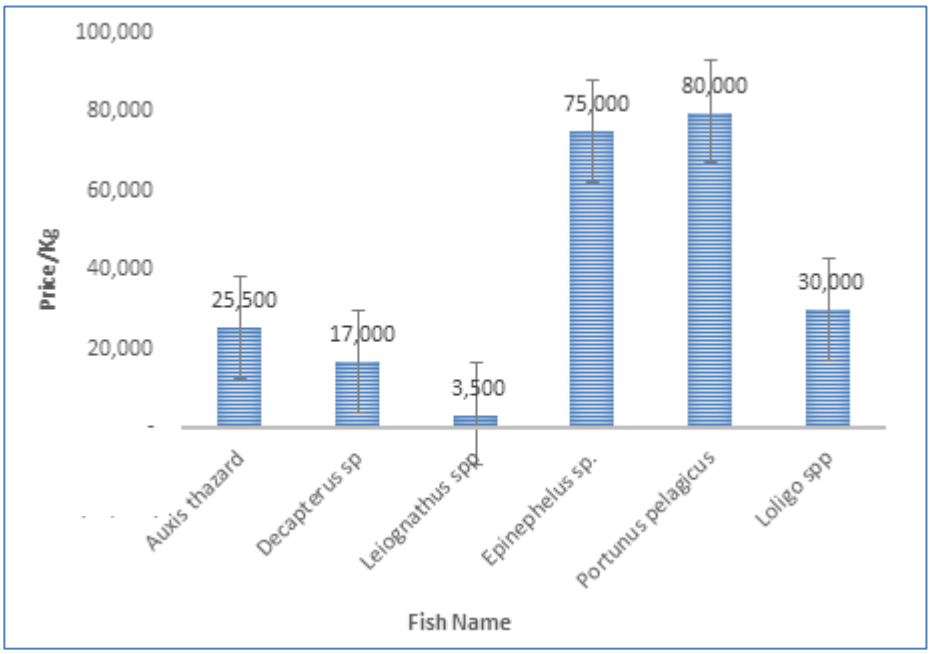

Figure 2. The average price (IDR) chart for the dominant type of catch fish caught on the Northern coast of Java in 2011-2016.

The high economic value of *P. pelagicus* in the economy encourages an increase in fishing in the wild, prime to overfishing. *P. pelagicus* is a fishery commodity that has a high selling value, both as a local commodity and an export commodity (Shalichaty et al 2014). The use of traps has several advantages compared to other fishing gears, which is a selective and environmentally friendly fishing gear; the catch has a high level of freshness; capture power is reliable; and can be operated in places where other fishing gear cannot be operated (Setiyowati 2016).

The high dominance of *Leiognathus* spp. is thought to be caused by various factors. The first factor is the aquatic environment. With a temperature range between 27-29ºC and a salinity range between 31-34‰ in water depths between 0-30 m, the aquatic ecosystem in Northerner Cirebon is thought to be a suitable area for the development of *Leiognathus* spp. (Wiyono 2012). Research carried out in the waters of Northern Semarang-Tegal showed that *Leiognathus* spp. dominated fish species in coastal waters (Ernawati 2017).

With the information on the relationship of oceanographic parameters with the spatial data of *Loligo* spp., it is expected that fishermen can use it as information about the location of catches based on good environmental conditions for *Loligo* spp. in the Karimata Strait and the Java Sea. So that fishermen can increase their catches and be more efficient in sailing and reduce the consequences of high fuel usage (Prasetyo et al 2014). The average composition of catches of *Loligo* spp. in Rembang waters has not acceded 5% of the total catch per year, however, because of the high selling prices that cause *Loligo* spp. to also play an important role for small pelagic fisheries in Rembang (Puspasari & Triharyuni 2016).

Prime commodities. The interconnection or connectivity between fishing ports can be a solution to meet the needs of fish raw materials for processing entrepreneurs (Hamzah et al 2016).

Determining prime commodities is by examining the comparative advantage of an area, namely the ability of a region to produce commodities that are relatively prime compared to other regions or it can be said that there is an abundance of resources owned by a region so that it can distribute its resources to other regions (Fadillah & Yusalina 2011).

Location Quotient Analysis. Location Quotient (LQ) analysis was used to find out a capture fishery commodity on the Northern coast of Java, whether the type of fish is a base or non-base commodity by comparing it to a wider area, namely national. The results of LQ calculation of capture fisheries production data are divided into groups of large pelagic fish, small pelagic fish, demersal fish, coral fish, crustaceans and mollusca.

The LQ value for large pelagic fish landed on fishing ports located on the Northernern coast of Java is presented in Figure 3.

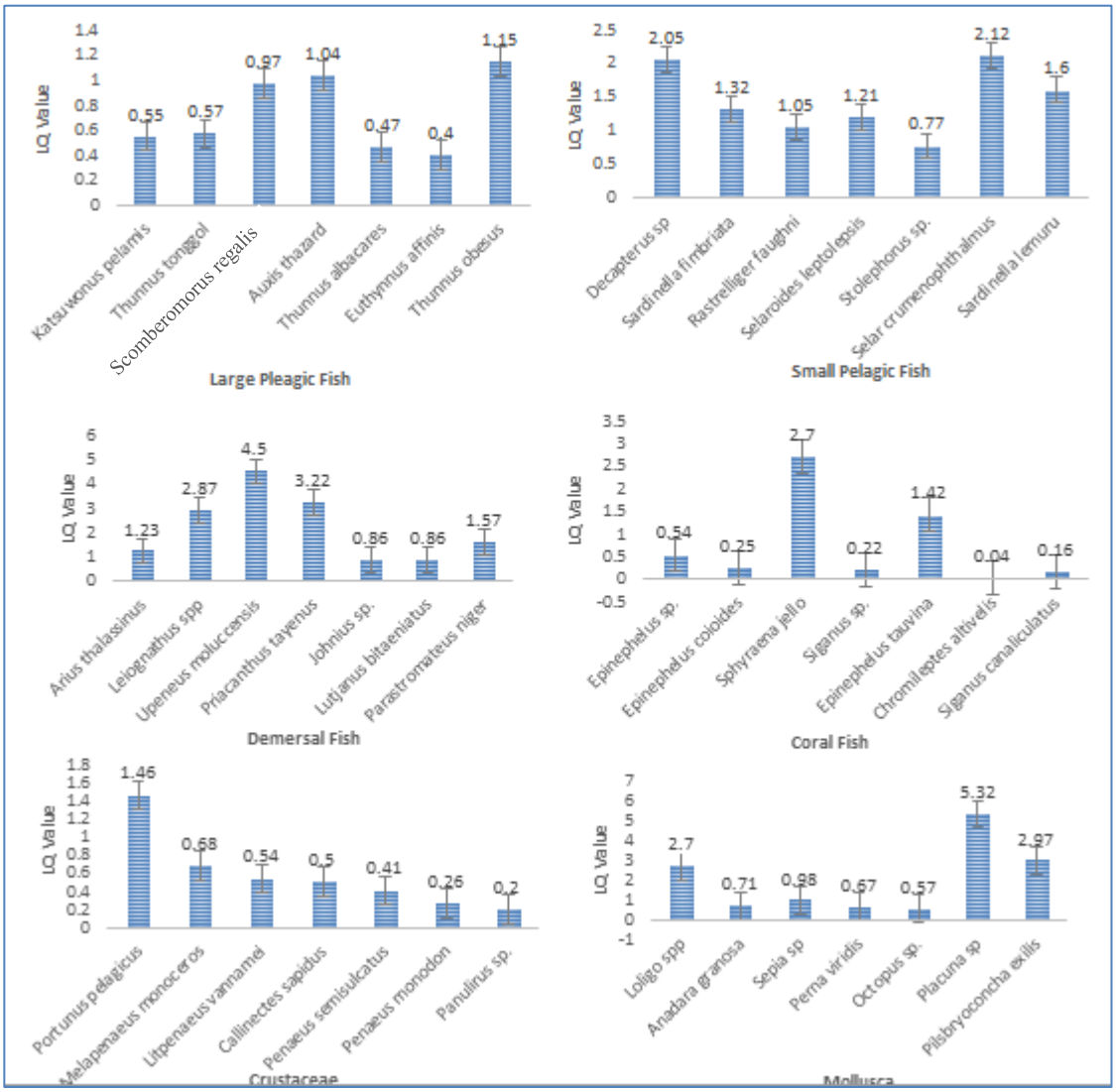

Figure 3. LQ value for fish resource groups.

There are 7 major types of pelagic fish that are dominantly caught with the largest LQ values, which are *Thunnus obesus* and *A. thazard*, while the other 5 types of fish, namely *Euthynnus affinis*, *Thunnus albacares*, *K. pelamis*, *Thunnus tonggol* and *Scomberomorus regalis* has LQ values of 0.40 to 0.97. These types of tuna (*T. albacares* and *T. obesus*

and *K. pelamis*) are caught not from the waters of the Northern Java coast but from the Indian Ocean waters and Indonesian oceans which are landed at the ocean fishing port of Nizam Zahman. Fish caught from the waters of the Northern Java coast are only the types of *E. affinis*, *T. tonggol* and *A. thazard*.

The LQ value for small pelagic fish landed on fishing ports located on the Northern coast of Java, showed 7 types of small pelagic fish that are dominantly caught with the smallest LQ value of 0.77 which is in the type of *Stolephorus* sp., while 6 other types of fish were *Decapterus* sp., *Sardinella fimbriata*, *Rastrelliger faughni*, *Selaroides leptolepis*, *Selar crumenophthalmus* and *Sardinella lemuru* has a LQ value of more than 1. Thus indicating that *Stolephorus* sp. has a relatively smaller share than other types of small pelagic fish in the waters of the Northern coast of Java.

The LQ value for demersal fish landed on fishing ports located on the Northern coast of Java, for the 7 types of demersal fish that were dominantly caught with the smallest LQ value of 0.86, namely *Johnius* sp. and *Lutjanus bitaeniatus*, while 5 other types of fish were *Nethuma talassina*, *Leiognathus* spp., *Upeneus moluccensis*, *Priacanthus tayenus*, and *Parastromateus niger* has a LQ value of more than 1. Thus indicating that *Johnius* sp. and *L. bitaeniatus* have a relatively smaller share than other demersal fish species in the waters of the Northern coast of Java.

The LQ value for the type of coral fish that was landed on the fishing port located on the Northern coast of Java, there were 7 dominant types of coral fish caught with a LQ value of more than 1, namely in the types of *Sphyraena jello* and *Epinephelus tauvina*, while 5 other species were *Epinephelus* sp., *Epinephelus coioides*, *Siganus* sp., *Chromileptes altivelis* and *Siganus canaliculatus* has a value of LQ less than 1. Thus it shows that the *S. jello* and *E. tauvina* have a relatively larger share than other types of coral fish in the waters of the Northern coast of Java.

The LQ value for the type of crustacean landed on the fishing port located on the Northern coast of Java, showed 7 type of crustaceans that are dominantly caught with a LQ value of more than 1, namely the *P. pelagicus* while the 6 other types are *Metapenaeus monoceros*, *Penaeus vannamei*, *Callinectes sapidus*, *Penaeus semisulcatus*, *Penaeus monodon*, *Panulirus* sp. has an LQ value of less than 1. Thus, it shows that the *P. pelagicus* has a relatively larger share than other types of crustaceans in the Northerner coast of Java.

Concerning the LQ value for the types of mollusca that were landed at the fishing port located on the Northern coast of Java, there were 7 types of mollusca that were dominantly caught with LQ values of more than 1, namely *Placuna* sp., *Pilsbryoconcha exilis* and *Loligo* spp. while 4 other types of mollusca were *Tegillarca granosa*, *Sepia* sp., *Perna viridis*, *Octopus* sp. has an LQ value of less than 1. Thus indicating that the *Loligo* spp. had a relatively larger share than other types of mollusca in the waters of the Northern coast of Java.

The results of the LQ analysis whose value was >1, shows that the concentration of fisheries production on the Northern coast of Java has a production surplus, and the commodity is a base sector. The occurrence of a production surplus is most likely due to the large use of purse seine vessels and fishing gear. This is supported by the research of Kohar & Paramartha (2012) saying that capture fisheries commodities in Rembang Regency that have positive LQ values (LQ>1) include *Decapterus russelli* with LQ index of 1.41, then *R. faughni* with 1.53, *S. leptolepis* with 1.44, *P. niger* with 1.33 and *P. tayenus* with 1.45.

Shift Share Analysis. Shift share (SS) analysis is a very useful technique in analyzing the growth of production of capture fisheries on the Northern coast of Java compared to national fisheries production. Shift share analysis is a very useful technique in analyzing changes in regional economic structure compared to the national economy (Mangilaleng et al 2015). The purpose of this analysis is to determine the work performance or productivity of the regional economy by comparing it with larger regions (regional/national).

The SS values based on resource groups on the Northern coast of Java has different patterns (Figure 4).

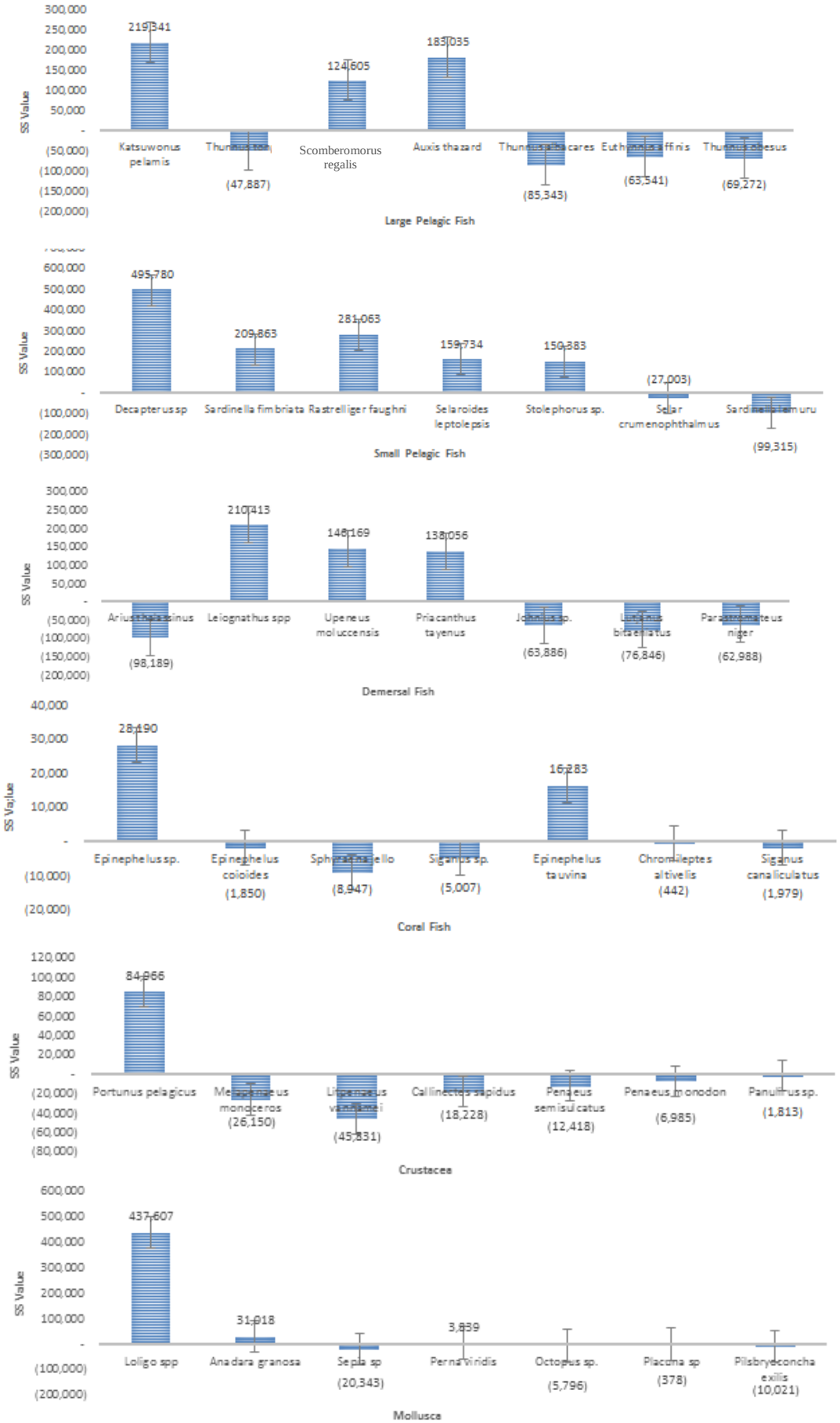

Figure 4. SS value for fish resource groups.

There were several capture fisheries commodities in the large pelagic resource group experiencing faster growth compared to the same commodity at the national level, which means the value of Shift Differential (Djt)>0. The large pelagic fishery commodities are *K. pelamis*, *S. regalis* and *A. thazard*. The highest Djt value is in *K. pelamis* amounting to 219,340.92. *K. pelamis* does not originate from the waters of the Northern Java coast, these fish are only landed in the ocean fishing port of Nizam Zachman originating from the waters of the Indian Ocean. So the biggest value (Djt) for large pelagic fish originating from the Northern coast of Java is *A. thazard*.

Based on Figure 4, on the Northern coast of Java there were several capture fisheries commodities in small pelagic fish resource groups whose differential shift (Djt)>0 which are *Decapterus* sp, *S. fimbriata*, *R. faughni*, *S. leptolepis* and *Stolephorus* sp. The highest Djt value was in *Decapterus* sp. of 495,779.57. This happens because the production of *Decapterus* sp. is the largest compared to other fish species in the Northern coast of Java and the production of *Decapterus* sp. in the waters of the Northern Java is the largest in Indonesia when compared to the production of *Decapterus* sp. in other waters.

Demersal fish resource group whose differential shift value (Djt)>0 was *Leiognathus* spp., *U. moluccensis*, *P. tayenus*. The highest Djt value was in *Leiognathus* spp. of 210,412.53. This happens because the production of *Leiognathus* spp. was the largest compared to other fish species in the waters of the Northern coast of Java and the production of *Leiognathus* spp. in the waters of Northern Java is the largest in Indonesia when compared to the production of *Leiognathus* spp. in other waters.

The coral fish resource group whose differential shift value (Djt)>0 was *Epinephelus* sp. and *E. tauvina*. The highest Djt value was in *Epinephelus* sp. at 28,189.75. This happens because the production of *Epinephelus* sp. was the largest compared to other fish species in the Northern coast of Java and the production of *Epinephelus* sp. in the Northernern coast of Java was the largest in Indonesia compared to the production of *Epinephelus* sp. in other waters.

The crustacean resource group whose differential shift value (Djt)>0, was *P. pelagicus*. The highest Djt value was in *P. pelagicus* with 84,965.87. This occurs because the *P. pelagicus* production was the largest compared to other fish species in the Northern coast of Java and the production of *P. pelagicus* in the largest waters of the Northern coast of Java in Indonesia when compared to the production of *P. pelagicus* in other waters.

The group of mollusca resources was *Loligo* spp., *T. granosa*, and *P. viridis*. The highest Djt value was on *Loligo* spp. with 437,607.37. This occurs because the production of *Loligo* spp. was the largest compared to other fish species in the waters of the Northern coast of Java and the production of *Loligo* spp. in the largest waters of the Northern coast of Java in Indonesia when compared to the production of *Loligo* spp. in other waters.

In Figure 4, the capture fisheries commodities including *E. affinis*, *Decapterus* sp., *Leiognathus* spp., *Epinephelus* sp., *P. pelagicus*, *Loligo* spp. on the Northern coast of Java experience faster growth compared to the same commodity at the national level, which means the value of differential shift (Djt)>0. Faster fish growth is likely caused by an aquatic environment that is in accordance with the needs of these species. The results of the research by Naya et al (2017) concluded that capture fisheries commodities in Central Java Province include *Decapterus* sp., *R. faughni*, *S. leptolepis*, *S. fimbriata*, *Stolephorus* sp., *E. affinis*, *K. pelamis*, *S. regalis*, *Leiognathus* spp., *Epinephelus* sp., and *Loligo* spp. with a differential shift value (Djt)>0.

Specialization Analysis. The analysis of specialization index (SI) is one way to measure the behavior of the dynamics of overall economic activity. For example, how is the distribution or distribution of capture fisheries production in an area. This model is useful for analyzing the level of concentration of the activity sector in relative terms, especially when compared to a broader area (province/national). If SI>1, then there is a specialization of fishery production on the Northern coast of Java relative to the national, whereas SI<1, there is no specialization of fishery production on the Northern coast of Java relative to the national.

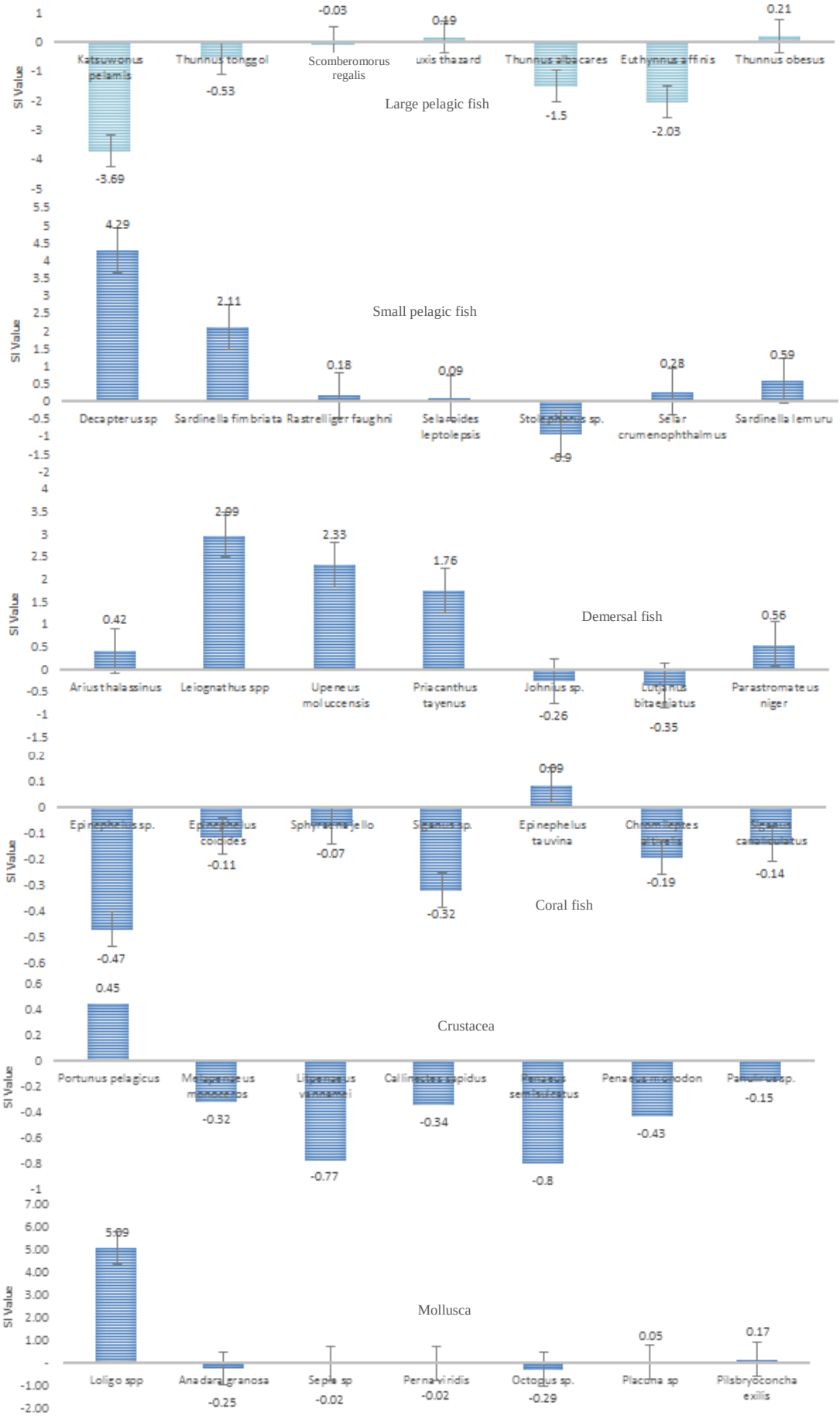

Figure 5. SI value for fish resource groups.

Based on Figure 5, there is no large pelagic fish resource group that has specialized in fisheries production because the value of SI<1, then large pelagic fish species on the Northern coast of Java do not have specialization in capture fisheries activities compared to national production.

Small pelagic fish resource groups that are specialized in fisheries production with a value of SI>1, including *Decapterus* sp. and *S. fimbriata*. *Decapterus* sp. has the highest specialization value (SI) among other fish species, with 4.29%. Fish species with a specialization value (SI)<1 such as *R. faughni*, *S. leptolepis*, *S. crumenophthalmus*, *S. lemuru*, and *Stolephorus* sp., therefore do not experience fisheries production on the Northern coast of Java compared to national production.

Demersal fish resource groups that specialize in fisheries production with a value of SI>1, includes *Leiognathus* spp., *U. moluccensis*, and *P. niger*. *Leiognathus* spp. has the highest specialization value (SI) among other fish species, with 2.99%. Fish species with specialization value (SI)<1 such as *Netuma thalassina*, *Johnius* sp., *L. bitaeniatus* and *P. niger*, are not specialized in fisheries production on the Northern coast of Java compared to national production.

There is no group of coral fish resources that have specialized in fisheries production because the value of SI<1, then the type of coral fish on the Northern coast of Java does not have specialization in capture fisheries activities compared to national production.

There are no crustacean fish resource groups that specialize in fisheries production because the value of SI<1, then the species of crustacean on the Northern coast of Java do not specialize in capture fisheries activities compared to national production.

The Mollusca fish resource group experienced specialization in fishery production with a value of SI>1, namely *Loligo* spp. by 5.09%. The types of mollusks whose specialization value (SI)<1 such as *T. granosa*, *Sepia* sp., *P. viridis*, *Octopus* sp., *Placuna* sp., and *P. exilis* are not specialized in fisheries production on the Northern coast of Java when compared to national production.

The results of SI>1 shows that fishery commodities on the Northern coast of Java have high competitiveness when compared to other waters in Indonesia. The specialization of fisheries commodities is most likely due to the use of fishing gear and appropriate environmental conditions. This is supported by the study of Kohar & Paramartha (2012) who concluded that fish with SI>1 had three fish species, namely *Decapterus* sp. with an average specialty of 10.19%, *R. faughni* 3.63%, and *S. leptolepis* 3.07%.

Determining prime commodities. A prime commodity category of a fish type can be shown by the positive LQ, SS, and SI values, which means that the type of fish is a base commodity because the value of LQ>1 produced can meet the needs in its own area and can be able to supply out of territory. A commodity is said to be non-prime if the value of LQ, SS and SI is negative, which means that the type of fish is a non-base commodity because the value of LQ<1 produced cannot meet the needs of the region itself and is unable to provide supply outside the region. Based on research of Kohar & Paramartha (2012) a commodity is considered to be potential if there are two positive values out of LQ, SS and SI, so the production can fulfill the needs in its own area but is not be able to provide supply out of the region.

The positive Djt value indicates that the prime commodity of the fishery is a fast growing one, in the waters of the Northern coast of Java and the positive value of SI indicates its specialization.

Based on Table 1 for 6 years (2011-2016) data's showed that for large types of pelagic fish landed on fishing ports located on the Northerner coast of Java, only *A. thazard* was included in the potential category. That the fish has faster production growth compared to the same type of fish at the national level so that it has competitiveness when compared to other regions.

Table 1
Results of LQ, SS and SI analysis of fishing fish commodities in the waters of Northern Java in 2011-2016

Specification	*LQ*	*Djt*	*SI*	*Category (Prime/Non-prime*
Large pelagic				
Katsuwonus pelamis	-	+	-	Non-Prime
Thunnus tonggol	-	-	-	Non-Prime
Scomberomorus regalis	-	+	-	Non-Prime
Auxis thazard	+	+	-	Potential
Thunnus albacares	-	-	-	Non-Prime
Euthynnus affinis	-	-	-	Non-Prime
Thunnus obesus	+	-	-	Non-Prime
Small pelagic				
Decapterus sp.	+	+	+	Prime
Sardinella fimbriata	+	+	+	Prime
Rastrelliger faughni	+	+	-	Potential
Selaroides leptolepis	+	+	-	Potential
Stolephorus sp.	-	+	-	Non-Prime
Selar crumenophthalmus	+	-	-	Non-Prime
Sardinella lemuru	+	-	-	Non-Prime
Demersal fish				
Netuma thalassina	+	-	-	Non-Prime
Leiognathus spp.	+	+	+	Prime
Upeneus moluccensis	+	+	+	Prime
Priacanthus tayenus	+	+	+	Prime
Johnius sp.	-	-	-	Non-Prime
Lutjanus bitaeniatus	-	-	-	Non-Prime
Parastromateus niger	+	-	-	Non-Prime
Coral fish				
Epinephelus sp.	-	+	-	Non-Prime
Epinephelus coioides	-	-	-	Non-Prime
Sphyraena jello	+	-	-	Non-Prime
Siganus sp.	-	-	-	Non-Prime
Epinephelus tauvina	+	+	-	Potential
Chromileptes altivelis	-	-	-	Non-Prime
Siganus canaliculatus	-	-	-	Non-Prime
Crustacea				
Portunus pelagicus	+	+	-	Potential
Metapenaeus monoceros	-	-	-	Non-Prime
Penaeus vannamei	-	-	-	Non-Prime
Callinectes sapidus	-	-	-	Non-Prime
Penaeus semisulcatus	-	-	-	Non-Prime
Penaeus monodon	-	-	-	Non-Prime
Panulirus sp.	-	-	-	Non-Prime
Mollusca				
Loligo spp.	+	+	+	Prime
Tegillarca granosa	-	+	-	Non-Prime
Sepia sp.	-	-	-	Non-Prime
Perna viridis	-	+	-	Non-Prime
Octopus sp.	-	-	-	Non-Prime
Placuna sp.	+	-	-	Non-Prime
Pilsbryoconcha exilis	+	-	-	Non-Prime

Small pelagic fish landed on fishing ports located on the Northerner coast of Java including prime categories are *Decapterus* sp. and *S. fimbriata*, and then *S. leptolepis* and *Stolephorus* sp. are included in the potential category, which means that the fish exhibits a faster growth than the same fish at the level of production. National so that it has competitiveness when compared to other regions.

Demersal fish types that are landed on fishing ports located on the Northernern coast of Java including prime categories were *Leiognathus* spp., *U. moluccensis*, and *P. tayenus*, which means that the fish has faster production growth than the same species at the national level so that they have competitiveness when compared with other regions.

Coral fish species landed on fishing ports located on the Northerner coast of Java, including potential categories was *E. tauvina*, which means that the fish production growth is faster when compared to the same type of fish at the national level so that it has competitiveness compared to other regions.

The types of crustaceans landed on fishing ports located on the Northerner coast of Java, including potential categories was *P. pelagicus*, which means that the type of crustaceans has faster production growth compared to the same type of fish at the national level so that it has competitiveness compared to other regions.

The type of Mollusca which was landed on fishing ports located on the Northerner coast of Java, including the prime category, was *P. pelagicus*, meaning that this type of Mollusca have faster production growth compared to the same type of fish at the national level so that they are competitive compared to other regions.

Decapterus sp. One of the prime capture fisheries commodities in the province of Central Java is *Decapterus* sp. (Naya et al 2017). The waters found in the province of Central Java are located in the waters of the Northern coast of Java. The results of the analysis showed that the Location Quotient (LQ) of *Decapterus* sp. was 2.05, which means that the fish is the basis of capture fisheries in the waters of the Northern coast of Java. Differential Shift (Djt) value of *Decapterus* sp., with 495,779.57, shows that fish production is faster when compared to the same type of fish at the national level so that it has competitiveness compared to other regions. The level of Specialization (SI) of *Decapterus* sp. in the waters of the Northern Java coast reached 4.29%, which means that the fish experienced relative production specialization in the waters of the Northern coast of Java.

Decapterus sp., includes fast swimmers, pelagic, sedentary and clustered species. This type of fish is classified as stenohaline, living in waters with high salinity (32-34 ppm) and enjoying clear waters. *Decapterus* sp. is caught in waters that are 20-30 miles from the coast. Scarce information is available about fish migration, but there is a tendency that during the day a group of fish moves into deeper layers of water and evenings over more waters. It is reported that these fish are often found at a depth of 45-100 m (Naya et al 2017).

The area of spreading fish is very broad, namely in tropical and subtropical waters. Most of these fish populations are found in the Northernern Atlantic Ocean to Cape Cod and south to Brasilia. In the Java Sea *Decapterus* sp. are scattered following the movement of salinity and food supplies that are suitable for their necessities (Genisa 1998).

Based on the estimation of the value of the maximum sustainable catch (MSY) and total allowable catch (TAC) of *Decapterus* sp. from the waters of the Northern west Java, the level of exploitation is still below the total allowable catch (TAC), 8,309 tons/year. Then the management of elevated fish fisheries resources in the territorial waters of the Northern west part of Java, namely the waters of the South China Sea is still likely to be developed (Prihartini et al 2007).

Decapterus sp. has a fairly affordable price of 1.22 USD/kg (17,000 IDR/kg). The total production of *Decapterus* sp. in the waters of the Northern coast of Java in 2011-2016 had an average of 90,194 tons with a production value of 110,051,892.03 USD (1,533,298,000,000 IDR).

Sardinella fimbriata. *S. fimbriata* is a type of pelagic fish whose existence depends on plankton which is the main food of the species (Putra et al 2017). The results of the analysis show that the Location Quotient (LQ) value of *S. fimbriata* was 1.32, which means that the fish is the basis of capture fisheries in the waters of the Northern coast of Java. The value of Differential Shift (Djt) of *S. fimbriata*, of 209,863.35, shows that fish production is faster when compared to the same type of fish at the national level so that it has competitiveness compared to other regions. The level of Specialization (SI) of *S. fimbriata* in the waters of the Northern Java coast reaches 2.11%, which means that the fish experiences a relative specialization of production in the waters of the Northern coast of Java.

In the transitional season the fluctuations in plankton abundance are followed by the number of *S. fimbriata* catches. Plankton abundance increases so the number of fish also increases and vice versa (Rahardjo 2017).

S. fimbriata as one of the fisheries resources obtained in Ujung Pangkah waters is generally consumed by local people in the form of salted fish. The area of the spread of fish is quite extensive in almost all territorial waters of Indonesia, especially in the areas of South Kalimantan, Java Sea, Malacca Strait, South Sulawesi and Arafuru (Sulistiono et al 2011).

In the management of MSY the number of catches was 2,337.62 tons per year, the effort amounted to 2,729 trips per year and the economic rent was 230,114.25 USD/year (3,206,066,795 IDR/year). While in the management of MEY the number of catches was 2,134.24 tons per year, the effort amounts to 1,924 trips per year and the economic rent was 278,939.51 USD/year (3,886,324,795 IDR/year) (Salmah et al 2017).

S. fimbriata has a fairly affordable price of 1.36 USD/kg (19,000 IDR/kg). The total production of *Sardinella gibbosa* in the waters of the Northern coast of Java in 2011-2016 recorded an average of 51,706 tons with a production value of 63,089,538.26 USD (878,995,000,000 IDR).

Leiognathus spp. *Leiognathus* spp. is the dominant demersal fish resource caught in the waters of the Sunda Strait landed at the Labuan Coast Fishing Port (CFP) Labuan, Banten (Boer & Kamal 2017). *Leiognathus* spp. live clustered in sandy or muddy sand at a depth of 10-50 m. In addition, *Leiognathus* spp. has high growth and recruitment. The results of the analysis show that the Location Quotient (LQ) value of *Leiognathus* spp. was 2.87, which means that the fish is the basis of capture fisheries in the waters of the Northern coast of Java. The value of Differential Shift (Djt) of *Leiognathus* spp., which was 209,863.35, shows that the fish has faster production growth compared to the same type of fish at the national level so that it has competitiveness compared to other regions. The level of Specialization (SI) of *Leiognathus* spp. in the waters of the Northern coast of Java reached 2.99%, which means that these fish experienced relative production specialization in the waters of the Northern coast of Java.

Leiognathus spp. contributes quite high to the exploitation of demersal fish resources in the waters of the Northernern coast of Java. *Leiognathus* spp. is the most demersal fish caught in the waters of the Java Sea which is equal with 60% (Prihatiningsih et al 2016a).

Leiognathus spp. has an affordable price of 0.25 USD/kg (3,500 IDR/kg). The amount of *Leiognathus* spp. production in the waters of Northern Java coast in 2011-2016 recorded an average of 39,821 tons with a production value of 10,003,432.31 USD (139,372,822,000 IDR).

Upeneus moluccensis. Genus *Upeneus* includes demersal fish from the Mullidae family which are commonly found in tropical and subtropical seas and usually in the area around coral reefs (Iswara et al 2014). *Upeneus moluccensis* is a demersal fish commonly found in tropical and subtropical seas and usually in the area around coral reefs. There are around 50-60 *Upeneus* species known in the world. These fish are generally red, yellow, and silver. The results of the analysis showed that the Location Quotient (LQ) value of *U. moluccensis* was 4.50, which means that the fish was the basis of capture fisheries in the waters of the Northern coast of Java. Differential Shift (Djt) value of *U. moluccensis*, of

146,169.07, showed that the fish has faster production growth compared to the same type of fish at the national level so that it had competitiveness compared to other regions. The level of Specialization (SI) of *U. moluccensis* in the waters of the Northern coast of Java reaches 2.33%, which means that these fish experienced relative production specialization in the waters of the Northern coast of Java.

The peak fishing season takes place in March and October. Between May and July it is not the fishing season (Sumiono & Nuraini 2017).

U. moluccensis is included in the demersal fish group which has economic value and is spread throughout Indonesian waters, one of which is in Kendal Waters (Abdullah et al 2015). The level of utilization of *U. moluccensis* in Kendal waters in the last 5 years was in 2009 with 77.48%, in 2010 amounted 98.72%, in 2011 amounted 95.59%, in 2012 77.24%, and in 2013 84.95% (Abdullah et al 2015).

U. moluccensis had a fairly affordable price of 0.39 USD/kg (5,500 IDR/kg). The total production of *U. moluccensis* in the waters of the Northern coast of Java in 2011-2016 recorded an average of 25,856 tons with a production value of 10,202,807.08 USD (142,150,611,000 IDR).

Priacanthus tayenus. *P. tayenus* has great potential in supporting the fulfillment of food needs. *P. tayenus* was originally not the main catch, but later landed in fishing ports as one of the commercial catches and made this fish an export commodity (Prihatiningsih et al 2016a). The results of the analysis show that the value of Location Quotient (LQ) of *P. tayenus* was 3.22, which means that the fish was the basis of capture fisheries in the waters of the Northern coast of Java. Differential Shift (Djt) value of *P. tayenus*, of 138,055.58, showed that the fish has a faster production growth compared to the same type of fish at the national level so that it had competitiveness compared to other regions. The level of Specialization (SI) of *P. tayenus* in the waters of the Northern Java coast reached 1.76%, which means that these fish experienced relative production specialization in the waters of the Northern coast of Java.

P. tayenus is one of the fish that is consumed by the people of Kendal, because of its affordable price. As morphological characteristics presents pink pigmentation, has large eyes, on the pelvic fins there are spots which are blackish in color and is included in the demersal fish category (Agustiari et al 2018).

The level of exploitation of (E) *P. tayenus* in Banten waters is 0.33, which means that its utilization can still be increased by around 34.0% of current conditions (Prihatiningsih et al 2016b).

P. tayenus had a fairly affordable price of 0.5 USD/kg (7,000 IDR/kg). The amount of production in the waters of the Northern coast of Java in 2011-2016 reached an average of 22,038 tons with a production value of 11,072,384.61 USD 154,266,000,000 IDR.

Loligo spp. Kendal Regency waters are one of the potential *Loligo* spp. distribution areas in the waters Northern of Central Java, with a production of 50,454 kg in 2011 (Theresia et al 2013). *Loligo* spp. carry out a vertical distribution at night, where move towards the surface to look for food, while during the day they are at the bottom of the water. *Loligo* spp. are included as pelagic species, but sometimes are classified as demersal organisms, because they are often in the bottom of the waters. The results of the analysis showed that the value of Location Quotient (LQ) of *Loligo* spp. was 2.70, which means that the fish was the basis of capture fisheries in the waters of the Northern coast of Java. The Shift (Djt) Differential value of *Loligo* spp., which was 437,607.37, showed that the fish had faster production growth compared to the same type of fish at the national level so that it had competitiveness compared to other regions. The level of Specialization (SI) of *Loligo* spp. in the waters of the Northern Java coast reached 5.09%, which means that the fish experienced a relative specialization of production in the waters of the Northern coast of Java.

The level of *Loligo* spp. resource utilization in the waters of Rembang in 2008-2012 had an average value of 63% (Prakasa et al 2014).

Loligo spp. has a fairly affordable price of 2.15 USD/kg (30,000 IDR/kg). The total production of *Loligo* spp. in the waters of the Northern coast of Java in 2011-2016 had an average of 22,038 tons with a production value of 166,348,676.65 USD (2,317,652,959,000 IDR).

Conclusions. The fish composition that was caught dominantly from each group type of fish resources was 32,763 tons of *A. thazard* (large pelagic), 90,194 tons (small pelagic) *Decapterus* sp., 39,821 tons (demersal) *Leiognathus* spp., *Epinephelus* sp., 5,006 tons (coral), *P. pelagicus* 14,878 tons (crustaceans) and *Loligo* spp. 77,225 tons (Mollusca).

The price of fish based on the type of fish caught predominantly from each type of fish resource was 1.83 USD/kg (25,500 IDR/kg) *A. thazard* (large pelagic), 1.22 USD/kg (17,000 IDR/kg) *Decapterus* sp. (small pelagic), *Leiognathus* spp. 0.25 USD/kg (3,500 IDR/kg) (demersal), *Epinephelus* sp., 5.38 USD/kg (75,000 IDR/kg) (coral), *P. pelagicus* 5.74 USD/kg (80,000 IDR/kg) (crustacean) and *Loligo* spp. 2.15 USD/kg (30,000 IDR/kg) (Mollusca). The prime fish commodities found on the Northern coast of Java were *Decapterus* sp., *S. fimbriata*, *Leiognathus* spp., *U. moluccensis*, *P. tayenus* and *Loligo* spp.

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