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Supply Chain of Pelagis Catch Fisheries in the New Normal Era Case Study of PPS Bitung Province of North Sulawesi, Indonesia

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Abstract:
This study aims to identify the pelagic capture fisheries supply chain and financial flows during the new normal period of the COVID-19 pandemic in Bitung City. The research data was taken in Bitung City with 30 respondents consisting of 3 marketing actors, namely fishermen, collectors, and retailers. The method used is a case study. The research sample was taken by purposive sampling. Data was collected by interview using a questionnaire list and direct observation. Respondents were taken for fishermen as much as 40%, traders, collectors and retailers each 30%. This research is qualitative so that qualitative data is processed by qualitative methods while quantitative data is processed by simple quantitative methods to calculate the value of margins and profits of each business actor. The results of the study describe 2 supply chains that are formed, namely from fishermen directly to consumers, namely processing factories and fishermen through collectors and retailers then to consumers. Types of small pelagic fish and large pelagic fish are dominated by skipjack tuna and tuna. The formed marketing margin shows an efficient distribution flow.

Keywords: *Supply Chain, collectors, retailers*

1. Introduction

Bitung City is often referred to as the Maritime City, because the regional economy is developing through the maritime sector. It is not an exaggeration if the city of Bitung is the prima donna of North Sulawesi Province because it is the center of the largest capture fisheries industry in the eastern part of Indonesia. Located at latitudes 1023'23'' North Latitude and 12501'43-125018.18' East Longitude with the northern and western boundaries bordering the northern Minahasa district and the Maluku Sea, while the South and East are bordered by the Maluku Sea (BPS Bitung, 2020). As a coastal city, Bitung city has one international port which is managed by the Ministry of Transportation and one other port is managed by the Ministry of Fisheries and Marine Affairs with the function of a fishing port called the Bitung Ocean Fishery Port (PPS Bitung). In this city, there are dozens of private companies engaged in the fishery business, both in fishing activities, as well as in processing and exporting activities. Even though it has experienced a downturn due to the implementation of government policies by the implementation of the Decree of the Minister of Maritime Affairs and Fisheries Numbers 56, 57, and 58/2014, regarding the moratorium on licensing, transhipment and illegal fishing, it finally rose and actually felt the positive impact of the policy. For small fishermen and even fishermen in general, fishing activities become easier and the catch increases so that it directly also has a positive influence on the marketing chain of fishery products. (Longdong, et al. 2020)

Judging from the fisheries resource management map, the city of Bitung is flanked by two Fisheries Management Areas, namely WPP-715 and WPP-716 which are well-known for having strategic paths in the utilization of fishery resources, especially large and small pelagics. The number of areas covered are the waters of the Sulawesi Sea, Tomini Bay, the Maluku Sea, and the Halmahera Sea. Seram Sea and Berau Bay, (KKP, 2014) The allocation of resources that has been determined by the government is the largest in its territory, compared to other provinces. Based on the provisions of the Directorate General of Capture Fisheries, regarding the calculation of the allocation of the North Sulawesi Catching business using the SDI allocation application, for large pelagics 26,515.02 and for small pelagics 120,690.89 Tons (KKP, 2019). positive effect on business activities from all lines that form a marketing agency as a major player in fish supply in Bitung city.

Fishery is an activity that utilizes fish resources, an important natural resource that is abundantly available in Indonesian waters, both in the sea and in public waters. This definition is limited to a generally accepted scientific definition. In the legal context, Indonesia defines fisheries through the meaning set forth in the laws and regulations.

UUno.31 of 2004 chapter 1, article 1 paragraph 1 concerning Fisheries as amended in Law No.45/2009, namely: 'all activities related to the management and utilization of fish resources and their environment starting from pre-production, production, processing to marketing in one fishery business system. (Fauzi, 2010)

Considering that fishery commodities have distinctive characteristics, which are perishable, non-uniform, seasonal, producing areas are generally in remote/coastal areas and require a wider and refrigerated space, the marketing of fishery products in general has the potential to be inefficient. Therefore, the institutional approach through the role of marketing actors as institutions involved as providers of marketing services is very important to be able to generate shares that are proportional to the efforts that have been made (Abidin, 2017).

Supply chain is a series of activities carried out by a company to produce products or services (Wikipedia, 2016). The theory about the supply chain (supply chain or value chain) which is very well known by Michael Porter in his book 'competitive advantage: creating and sustaining superior performance'. (Porter, 1985) states that; The value of a product is created in the product created in the company's activities and distributed to the final consumer. So, the supply chain is a model that helps companies analyze certain activities that allow companies to create value and competitive advantage.

Indrajit and Djokopranoto (2002) define supply chain as a system used by organizations to distribute goods and services produced from producers to consumers, or more specifically to customers. The supply chain is also a group of approach tools to integrate the efficiency of suppliers, processors, distributors and retailers so that they can produce and distribute products in the right quantities and locations and at the right time as a condition to maintain the level of customer satisfaction.

Furthermore, Heizer and Rander (2004) simplify supply chain management, which is a management activity in order to obtain raw materials, carry out processing processes into semi-finished goods and finished goods and then send these products to consumers through the distribution system. (Abidin, 2017) Marketing institutions that provide these services are intermediary traders, collectors/tibo traders, and retailers.

Chopra and Meindl (2007) suggest that the supply chain includes all actors involved in the production system as well as distribution and marketing of a product. In line with Indrajit and Djokopranoto (2001), the supply chain is a concept where there is a regulatory system related to the flow of products, information and financial finance.

The supply chain of capture fisheries products is an interesting object to study because apart from the reasons for the distribution flow that is formed, it also contains risks that can hinder the production process, especially at this time Indonesia is still at the level to always be ready for the COVID-19 emergency response status based on the Presidential Decree. 12, 2020 as a National Non-Natural Disaster for the Spread of Corona.Rules that require all lines to always comply with health protocols.

2. Research Methods

2.1. Research Location and Time

This research was conducted from March to June 2021 with the location of data collection at PPS Bitung in the Aertembaga village, both primary data and secondary data. Data collection was also carried out from traditional and modern markets in Bitung City through field observation techniques.

2.2. Collection Method

The types of data are primary data and secondary data. Primary data is obtained directly in the field, while secondary data is obtained directly or online at the relevant government office.

This research is descriptive qualitative, where the explanation of the object is described clearly using the author's own words as it is so that it can be understood into a unified explanation (Bungin, 2010) Using the case study method, (Bungin, 2010) because in general for research that is Qualitative research uses a case study format where the number of people involved is not large.

Data collection by sampling is purposive sampling (Maleong, 2010). The population determined are all marketing institutions involved in marketing distribution which then form a fish supply chain from producers to consumers at PPS Bitung. A total of 30 respondents were sampled with 40% of fishermen as producers, 30% of collectors and 30% of retailers.

The technique of collecting data is through direct interviews with structured written guidelines so that the questions asked are systematic and directed to each respondent. In addition to interviews with predetermined respondents, researchers also collect additional information to strengthen research data through other sources of information around the research location, such as ship crews temporarily loading and unloading ships, recording and weighing officers and potential customers who are not included as respondents.

The observation method was also carried out to complete the primary data collection process because here the researcher was involved as an instrument in the study. Observations were made at research sites, traditional markets and modern markets. Qualitative data collected was analyzed by qualitative methods, while there was also quantitative data obtained and analyzed in simple quantitative terms, namely by looking at the amount of margin obtained in the formed distribution channel. Analysis of supply chain performance can be known through the calculation of the costs incurred by each marketing agency, both in the form of profit margin percentages, marketing margins, profit ratios and cost ratios, all of which can describe the level of supply chain efficiency with the formula according to Nasikh et al, 2019:

Marketing margin value can be calculated using:

MP = Pf-Pr

description

MP= Marketing margin at Marketing agency
Pf = Fisherman level selling price
Pr = Final selling price/retailer
Share Margin Marketing:MP / Pr x 100%
SMP = Share price at the level of the marketing agency
MP = Marketing Margin
Pr = Price at the consumer level
Share Price of Fishermen = Pf / Pr x 100%
SPf = Share price at fisherman level (%)
Pf = Price at fisherman level (Rp/kg)
Pr = Price at the consumer level (Rp/kg)

3. Results and Discussion

3.1. Characteristics of Respondents

The population that is used as the respondent is the marketing actors and the producers in this case are fishermen. Respondents consisted of fishermen from large vessels such as purse seines measuring 28-30 GT and small boats similar to katinting with outboard motors measuring 7 HP, and 2 marketing institutions, namely: middlemen and retailers. The age of the respondents is in the range of 30-55 years, where the age group is included in the productive category so that it can be said that these three professions are included in the criteria of productive age. For fishermen, all of them are 12 men, middlemen consist of 8 men and 1 woman, while for retailers they meet are dominated by women as many as 3 men and 6 women.

The level of education is only a small proportion of high school graduates, the remaining 5 are junior high and elementary school graduates.

3.2. Work activities at PPS Bitung

The time to go to sea from the fishermen is usually done in the afternoon until the evening. Fishing operations will vary according to the type of catch being targeted. If the catch is small pelagic which also uses a small boat size, the time to go to sea for 1-week ranges from 1-3 times. As for the catch target is large pelagic in the form of Tuna and Skipjack, then the time needed to go to sea is about 1 month or even more. The vessels used are 7 pk - 30 GT using fishing gear in the form of nets, stones, fishing rods, pool and line, and circular nets.

The catches obtained by fishermen are of various types, namely Tuna, Cakalang, Malalugis, Baby Tuna, Deho and Tude. The number of fish obtained for skipjack, Malanggis, Tude, Deho and Baby Tuna fish species ranged from 2 - 20 tons while for Tuna fish species ranged from 5 - 10 tons. These catches are then sold to collectors, and some are directly sold to companies and of course by setting aside for needs for personal consumption.

The loading and unloading activities of fishing boats that take place at PPS Bitung are carried out in the morning at 04.00 WITA at TPI and in the afternoon at 16.00 which are only carried out on the edge of the pier. Activities in the morning are mostly carried out by fishermen with small pelagic fish catches due to the type of fishing net, with the size of a katinting type boat using 2 machines with an engine size of 18 pk. Only a few large pelagic catches, such as tuna, are obtained by fishermen, and are usually caught when fishermen cast nets. Usually, for ships with a size of GT, the fishermen concerned can catch Tuna with a size of around 40kg-60 kg with a maximum of 5 fish per trip. By fishermen, this catch will be sold at the factory through intermediary traders. Most fishermen with this size boat, even though they use nets, have also provided fishing gear on the grounds that there are many opportunities to catch tuna in the sea, even in small quantities. In one trip, tuna catches are obtained with sizes above ranging from 2-6 tails. It is a very meaningful blessing for the fishermen concerned when on the fishing trip while getting small pelagic catches in the form of tuna, malalagis, selar fish, baby tuna, and baby skipjack.

The fishermen go to sea or carry out fishing operations 1 week 1-3 times, 1 week more at sea, and there are 1 month at sea. The vessels used are 7 pk - 30 GT using fishing gear in the form of nets, stones, fishing rods, pool and line, and circular nets. The catches obtained by fishermen are of various types, namely Tuna, Cakalang, Malalugis, Baby Tuna, Deho and Tude

Activities at loading and unloading in the afternoon began with a queue of fishing boats that would unload the catch, while buyers had also queued in accordance with the agreed form of cooperation through communication via cellular phones that had been carried out beforehand.

Type of Fish	Name of Fish	Number of Catches (kg) on		
		2019	2020	2021 Juli
Small Pelagic	Selar (Trevallies)	380,959	256,635	380,959
	Kuwe (Jack trevallies)			7,500
	Layang (Scad)	9,549,213	9,457,062	40,800
	Sunglir (Rainbow runner)	143,177	11,682	19,835
	Siro (Spotted sardinella)	205,498	130,359	40,800
	Lemadang (Commond dolphin fish)			52,713
	Teri (Anchovies)	12,680	35,073	75,750
	IkanPedang (Swordfish)			18,972
	Kembung (Short-bodied mackerel)	305,430	472,012	121,498
	Sunglir	143,177	11,682	19,835
	Julung-julung	-	145	-
Big Pelagic	Tongkolkomo (Eastern little tuna)	-	3,820	15,047
	Tongkolkrai (Frigate tuna)	3,196,021	5,820,557	1,789,709
	Lemadang (Commond dolphin fish)	52,713	8,847	2,840
	Cakalang (Skipjack tuna)	16,167,242	20,236,960	11,275,872
	Madidihang (yellowfin tuna)	17,389,976	16,328,593	8,335,033
	Tuna matabesar (Bigeye tuna)	84,812	161,594	78,530
	Tenggiri (Narrow barred Spanish mackerel)	32,049	20,874	19,355
	Tongkolpisangcerutu (BLT)	-	3,630	-
	IkanPedang (SWO)	18,972	90,003	97,064
	Tongkolabu-abu (Longtail tuna)	1,300	12,700	17,850
	Ikanlainnya (other fishses)	208,597		
	Total	228,869.00	43,171,417.00	114,914.00

Table 1: Production of Pelagic Fish Catches at PPS Bitung
Source: Bitung Fisheries and Marine Service 2021 (Processed)

Tuna, Tongkol and Skipjack are the dominant types of catch obtained by fishermen in North Sulawesi, especially fishermen who land their boats at PPS Bitung. This shows that the description of the biological and physical properties of these three types of fish is compatible with the waters around the island of Sulawesi, which has a tropical climate throughout the year to get sufficient light intensity. They both want temperatures between 16º C - 30º C, move actively, and like to migrate to get food or because of environmental factors (Sudirman et al, 2017)

In transactions that occur between collectors and retailers, sorting for small pelagic fish against large pelagic fish such as tuna, pork tuna and baby skipjack is usually no longer carried out, with the reason that the same price is calculated based on kilograms. Sorting for Tuna and Skipjack tuna is done first to maintain the freshness of the fish, because usually these two types of fish take longer to reach the final consumer, besides the containers needed are different. Especially for Tuna, there is a price difference from Cakalang.

Pricing for tuna is different from skipjack, tuna and other pelagic fish. The use of categories or more is known by fishermen as Grade, where Grade A has the highest price, which is around Rp. 78.000/kg, Grade-B is around Rp. 71.000/kg while for Grade-C it is Rp. 45.000/kg. While those who do not have a contract with the company, the company determines the price, namely: Grade A: Rp. 60.000/kg, Grade B: Rp. 50.000/kg and Grade C: Rp. 40,000/kg.

3.3. SupplyChain

Distribution channels that apply to the production of pelagic capture fisheries in Bitung PPS occur through several links. This link occurs in 3 marketing institutions, namely TPI, collectors and retailers. The path formed can be illustrated by the scheme in Figure 1. The auction process is carried out at the TPI which is located in the Bitung PPS area. The transaction process occurs as usual, the buyer will follow the rules in the auction, but in the initial session the buyer in this case the collecting trader can approach the fisherman's boat, so they have the opportunity to estimate the price at the time of the auction based on the size of the fish and the level of freshness of the fish that can be purchased. visual detection. This action is certainly intended to maintain the economic value of an item, especially fishery products are known to be easily damaged so that the quality of fish decreases. when not handled immediately before it is in the hands of consumers.

In line with Lewaikabessi et al, (2021) which states that marketing channel activities as a process of creating economic value, it is clarified by (Apituley et al, 2013) that the close relationship between fishermen and intermediary traders has existed for a long time to create economic value.

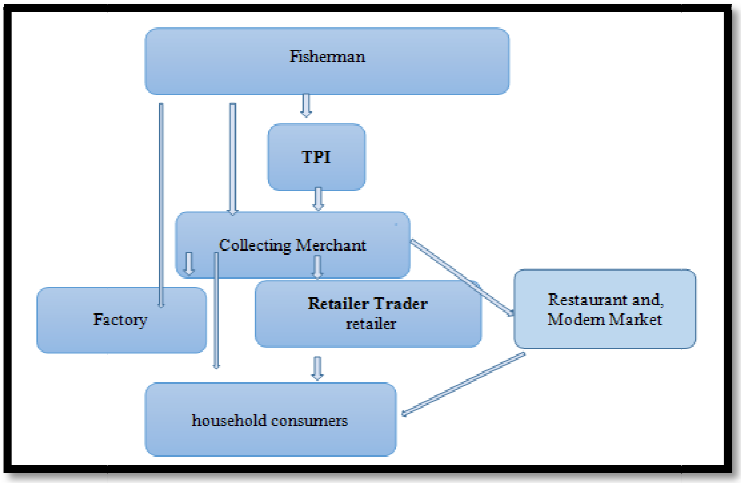

Figure 1: The Schematic of the Pelagic Fish Supply Chain at Bitung PPS

This scheme also applies to demersal fish and crustaceans. The three marketing institutions involved are: TPI, collector traders and retailers to consumers, restaurants and modern markets.

Determination of the price of fish at the producer or fisherman level, is usually measured in Kg, using a small bucket estimated at ±15 kg/bucket. The types of fish are: Selar Fish, Flying Fish, baby tuna, baby skipjack and tuna and other types of small fish that are caught. Price variations are not too conspicuous, ranging from Rp. 14,000 to Rp. 16,000 per kg from the hands of fishermen. This price is taken during the normal season and will be different when there is a scarcity of fish where most fishermen do not go to sea because of the choppy season.

Types of Fish	**Fisherman -Factory**	**Fisherman-Gatherer**	**Collector -Retailer**	**Retailer to**			**Collector-Factory**
				Traditionnal Market	**Modern Market**	**Restaurant Hotel**	
mackerel	-	15.000-16.000	17.000-18.000	20.000-21.000	23.000	23.000	
Cobs	14.000	14.000	15.000	18.000	20.000	-	16.000
baby skipjack		14.000	15.000	18.000	22.000	21.000	16.000
big skipjack	20.000	21.000	22.000	25.000	27.000	25.000	21.000
Yellowfin tuna	Grade A/B/C 78.000/ 71.000 /40.000	Grade A/B/C 79.000/ 73.000 /40.000	Grade A/B/C 80.000/ 75.000 /42.000	-	Grade A/B/C 82.000/ 77.000 60.000	Grade A/B/C 82.000/ 77.000 60.000	Grade A/B/C 79.000/ 72.000 /40.000
Big Eye Tuna	Grade	Grade	Grade		Grade	Grade	Grade
flying fish	15.000	14.000	15.000	18.000	20.000		15.000
Baby Tuna	14.000	14.000	15.000	18.000	20.000	-	16.000

Table 2: Applicable Price (Rp) from Producer to Consumer Based on the Type of Fish
Primary Data, 2021

Marketing costs that are formed from a pelagic fish supply chain from PPS Bitung to consumers include:

Cost (Rp)	Merchant Collector (6 tons)	Retailer Trader (250 kg)	Factory (6 tons)
Transportation/ 10 trips	1500000		1.500.000
General rates at TPI/at the Market	37500	20.000	
unloading workers/ transporting	500.000	200.000	500.000
Cool box/ Ice	200.000	30000	200.000
Others	62.500	20000	100.000
Total	3.000.000	270000	2.800.000

Table 3: Cost Component
Primary Data, 2021 (Processed)

Description	Price before Covid-19	Difference(s)& Profit (u)	Time price New Normal	Difference (s) & Profit (u)
1. Fisherman to collector	15.000 2000 (s)		15.000 3000 (s)	
2. Collector to retailer	17.000 9.000.000(u)		18.000 15.000.000(u)	
Average purchase 6 tons	2000*6000=		3.500*6.000=	
Profit	12.000.000- 3000.000= 9.000.000 (u)	1000	18..000.000- 3000.000= 9.000.000 (u)	1000
3. Collector to Factory	16.000		16.000	
Average Buy 18 tons	1000*18.000=	3000 (s)	1000*18.000=	4000
Profit	18.000.000- 9.000.000=		18.000.000- 9.000.000=	730.000
4. Retailer to consumer	20.000		18.000	
average buy 250 kg	250*3000=	480.000 (u)	22.000 250*4000=	
Profit	750.000- 270.000=		1.000.000- 270.000=	

Table 4: Profit Levels for Collectors and Retailers for Pelagic fish instead of Tuna before the Covid-19 Pandemic and New Normal
Source: Primary Data (processed) 2021

Respondents' income as marketing institutions shows that there is no difference in profits between the pandemic period and before on transactions between collectors and factories or UPI, meaning that the price request does not change. the possibility of this being triggered by a temporary cessation of production throughout UPI in Bitung city. Meanwhile, a significant increase occurred in the marketing channel from collectors to retailers, where the profits obtained were quite significant for the same number of requests. This is due to the increasing preference and interest of the public as consumers to prefer fish as a side dish compared to meat during the pandemic. There are several respondents as retailers who offer buyers using delivery services in the form of online motorcycle taxis or regular motorcycle taxis.

Marketing chain/supply chain	Price	Margin by (Grade) Overall			Overall Marketing Margin (6 Tons)
		A	B	C	
1. Fisherman to Factory	Have a contract Grade A/B/C:78.000/71.000 /45.000 no contract Grade A/B/C:65.000/50.000 /40.000				
2 Fishermen to collector	Grade A/B/C 62.000/55.000/40.000 Grade B/C		10.000	10.000	B) 12.000.000 C) 60.000.000
3. Collector to Retailer	65.000/50.000 Grade A/B/C		6.000	10.000	A) 76.000.000
4. Collector to Factory	78.000/75.000/45.000 Grade B/C				B) 36.000.000 C) 60.000.000
5 Retailers to Consumer	75.000/60.000	13.000	12.000	20.000	B) 72.000.000 C)120.000.00
% Margin			100	100	233

Table 5: Profit Rates for Collectors and Retailers for Pelagic fish Big/ Tuna
Source: Primary data, 2021

Chain no. 1 does not have a marketing margin because it is carried out directly by the producer to the final consumer, namely the processing plant or UPI. The table above shows the amount of difference that is obtained by collecting traders when buying from fishermen and selling them to retailers, the largest margin is at this level, because usually the collectors will charge the same price as the price set at the factory, because they already have temporary contracts, most of these fishermen with small catches do not have a contract with the factory so the price is determined by the collectors. This most often happens to small fishermen who use katinting boats whose fishing targets are not tuna, but when they go to sea, they also find tuna. The number of catches is around 2-4 fish, depending on the size of the boat, which is obtained with a fishing rod and of course with technique, experience and even courage because the average weight of fish ranges from 30-60 kg per head. Some of these catches are sold to collectors or to factories, depending on the communication between them. Communication is done via cell phone, so fishermen will be free to choose who will buy their catch at the best price.

Both purseine, pole and line and hand line vessels that catch Tuna and Skipjack that land their fish at PPS Bitung, are mostly owned by processing factories or UPIs throughout Bitung city. own dock for landing and unloading fish. The operating time is ±3 months with an average production of 2-60 tons per trip.

	Fish Type			
	Small Pelagic + Skipjack		Large Pelagic Tuna	
	Rp	%	Rp	%
Marketing Margin	5000		13.000	
Share Fisherman	75		82,66	
Share margin Marketing	25		17,33	

Table 6: Marketing Margin (Rp) and Fisherman Price Share (%) at Marketing Institutions before the Covid-19 Pandemic

There is a difference in the price determination of large pelagics, namely Tuna and Skipjack, the price of skipjack tuna is the same as other small pelagics. These prices are valid before the COVID-19 pandemic, while the prices that apply during New Normal are:

	Fish Type			
	Small Pelagic + Skipjack		Large Pelagic Tuna	
	Rp	%	Rp	%
Marketing Margin	6000		13.000	
Share Fisherman	68,18		82,66	
Share margin Marketing	31,81		17,33	

Table 7: Marketing Margin (Rp) and Fisherman's Share Price (%) at New Marketing Institutions Normal

Whether or not the distribution channel is efficient can be seen from the comparison between the fisherman's share and the marketing margin share. If the fisherman's share is greater than the marketing margin share, then the distribution channel is efficient. On the other hand, if the fisherman's share is less than the marketing margin share, the distribution channel is inefficient (Nasikh et al, 2019). The amount of share in the two tables above shows that it is formed in small pelagic fish and skipjack tuna.

4. Conclusion

The pelagic capture fishery supply chain at PPS Bitung has been formed through an integrated system that is implemented by adjusting the suitability of the wharf to land fish, the financial capacity of marketers and the habits of fishermen to choose the required marketing channels. The type and amount of fish are dominated by Tuna, Skipjack, Tongkol and Layangfish, these fish products most often enter the factory. The variation of margins for each marketing actor ranges from Rp. 18.000, meaning from the initial purchase to the fishermen until the sale to the consumer. There were no significant differences that affected demand and supply between the COVID-19 pandemic and before. Secondary data obtained from the Department of Fisheries and Marine Affairs for the city of Bitung for 3 years which is used as a comparison, shows numbers that vary normally without showing significant differences in numbers

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