



# Individual Anchoveta (*Engraulis ringens*) Fishing Quota and the Administration and Control of Fishing Activity in a Region of Peru

Iván Saldaña Estrada<sup>1\*</sup>

<sup>1</sup>Postgraduate School, Universidad César Vallejo. Trujillo, Perú.

## **Author's contribution**

The sole author designed, analyzed, interpreted and prepared the manuscript.

## **Article Information**

DOI: 10.9734/AJESS/2021/v17i330420

### Editor(s):

(1) Dr. Ana Sofia Pedrosa Gomes dos Santos, Universidade de Lisboa, Portugal.

### Reviewers:

(1) Zunuwanas Bin Mohamad, Politeknik Bagan Datuk, Malaysia.

(2) Uday Kumar Udit, ICAR-CIFA, India.

(3) Rakesh Gothwal, Madhav University, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/67995>

**Received 17 February 2021**

**Accepted 26 April 2021**

**Published 14 May 2021**

**Original Research Article**

## **ABSTRACT**

**Aims:** The research was carried out with the objective of determining whether the individual anchoveta (*Engraulis ringens*) fishing quota for direct human consumption constitutes a regulatory alternative for the administration and control of fishing activity to the extent that it allows greater efficiency of the industry, the increase in value total fisheries, the improvement in the safety of fishing and the sustainability of the hydrobiological resource.

**Methodology:** The research is applied, non-experimental type and descriptive correlational design. The sample consisted of 50% of National and Comparative Legislation, Doctrine, Jurisprudence and Specialized Records on fishing issues; and by 30 experts in fisheries: lawyers 25% and representatives of fishermen 25%, from the District of Chimbote; Two questionnaires were developed to collect the data of the variables under study.

**Results:** The results are presented in tables and statistical figures. The results showed that the individual quota of anchoveta (*E. ringens*) fishing for direct human consumption constitutes 43.3% a regulatory alternative to administer and control the fisheries administration, Chimbote, 2018.

**Conclusion:** It was evidenced that the individual quota for fishing for direct human consumption allows a greater efficiency of the industry, the increase in the total value of the fisheries, the improvement in the safety of fishing and the sustainability of the hydrobiological resource. The individual fishing quota is a system that deserves to be seriously evaluated in Peru, with a broad participation not only of fishing entrepreneurs, but also of the various actors of civil society.

**Keywords:** Individual fishing quota; direct human consumption; administration and control of fishing activity.

## 1. INTRODUCTION

It is estimated that in Latin America and the Caribbean there are more than 2 million fishermen, with a production level greater than 2.5 million MT of hydrobiological resources, and a production value of approximately US \$ 3,000 million per year. In Peru, artisanal fishing is an activity with high levels of impact on the local economy, especially in the coastal regions, due to its contribution to employment rates and to the food security of the population. In recent years there has been a problem of great magnitude in the Peruvian fishing sector, such as the oversizing of the fleet and industrial plant that catches fresh anchoveta (*E. ringens*) for fishmeal, which has serious negative consequences, such as; instability of employment, informality in the sector, risk of sustainability of the resource and serious ecological damage. One of the problems in studying artisanal fishing in the country has been the lack of quantitative information. The First National Census of Artisanal Fishing (FNCAF), estimated the number of artisanal fishermen at 44,161 and the number of artisanal shipowners at 12,400. At the regional level, Piura has a greater number of fishermen (13,248 - 30%), more than a quarter at the national level work in that region, followed by Ica (5,731 - 13.0%) and Lima (5,613 - 12.7%). Furthermore, it is known that artisanal fishing activity is predominantly male: 97% of artisanal fishermen are men, while only 3% are women. This distribution may be associated with the abundance of resources throughout the country, since it is recognized that the northern part of the country has a significant percentage of the existing fishery resources in the Peruvian sea. In the south, Arequipa stands out, with 9.1% of the total number of artisanal fishermen, since in this region there are a significant number of ports and coves [1]. The General Fisheries Law (GFL), Decree Law No. 25977, and its Regulations (GFLR), Supreme Decree No. 012-2001-PE4, establish the general parameters that govern fishing activity in Peru. Although both norms include the common regime, this does not prevent, through special regulations, the fishery is regulated in a specific area, such as the Regulation of Fisheries Management of the Amazon, Ministerial Resolution No. 147-2001-PE, or a particular fishery, such as the Regulation of Fishery Management of the anchoveta (*E. ringens*)

resource for direct human consumption, Supreme Decree No. 010-2010-PRODUCE [2].

In principle, it is possible to differentiate between the access and the development of the extractive activity itself. The system of Individual Fishing Quotas (IFQ) consists of granting each fisherman the right to extract a certain amount of hydrobiological resources from the available biomass in a period of time [3]. From an economic point of view, Hidalgo [4] points out that one of the fundamental objectives of the IFQ system is to eliminate the possibility of competition and rivalry between fishermen, since each of them has an assigned individual quota and its potential to The catch will not be affected by the actions of the other fishermen, which will try to minimize costs and maximize benefits by seeking a higher quality of the species it catches. Indeed, the IFQs are administrative rights because through them the Public Administration organizes the extractive activity of hydrobiological resources. They are rights granted by the public powers by virtue of the administrative powers granted by the Constitution and specific regulations [4]. Individual quotas are determined based on the global catch quota available for a given time. Therefore, individual quotas grant the right to exclusively exploit a proportion of that global quota in a specific period. The correct functioning of an individual quota system depends closely on the State's ability to control that quota holders respect the catch limit that it has assigned to them. Fishing rights contribute to financing hydrobiological resource conservation activities in general (including research, surveillance and control), therefore it must be determined if there is a need to reform the amount and calculation formula of fishing rights [5].

The entities with competence to grant fishing rights are the Ministry of Production and the Regional Governments, in accordance with the process of transfer of functions initiated by the Executive Power. One of the outstanding elements of the IFQ system is to be able to transfer the participation in the global quota, but it is also correct that the transfer cannot be ignored by the Administration, since it has the obligation to monitor that the global quota of authorized capture for the period of time in question. In this sense, the transfer of individual quotas must have the express recognition by the

Administration, which can be made feasible through the establishment of an administrative procedure for prior evaluation [6]. The fisheries exploitation system included in the GFL and the GFLR is mainly aimed at protecting hydrobiological resources above all else. This end is valid, however, in light of the principle of sustainable development, it is not enough. The current situation of the fishing sector, the Peruvian State does not assume responsibility for the solution for the oversize of industrial fishing that is directly damaging artisanal fishing and direct human consumption of fish. There is an imbalance between the amount to be paid for fishing rights and the operating costs incurred by the industrial anchovy fleet (labor, fuel, maintenance, among others). It also points out that the amount paid does not take into account that the costs of extraction and industrial processing of anchoveta (*E. ringens*) directly harm the marine ecosystem and artisanal fishing. The way in which the anchovy fishery is controlled presents deficiencies and that it is necessary to improve the surveillance mechanisms of vessels at sea and of anchovy unloading points, the classification of sanctions that discourage sea users from not complying with the quota system and the imposition of said sanctions when there are cases of non-compliance [7]. In this sense, the objective of this research is to determine whether the individual anchoveta (*E. ringens*) fishing quota for direct human consumption constitutes a regulatory alternative for the administration and control of fishing activity to the extent that it allows greater efficiency in the industry, the increase of the total value of the fisheries, the improvement in the safety of the fishing and the sustainability of the hydrobiological resource.

## 2. MATERIALS AND METHODS

The research is applied, with a correlational descriptive design. The population in the present investigation, given its design and type, is made up of legalprinted material (Legislation, Jurisprudence, Doctrine), graphic, virtual and with Web content, as well as lawyers and representatives of fishermen from the Chimbote District. The sample is made up of 50% of National and Comparative Legislation, Doctrine, Jurisprudence and Records specialized in fishing issues; and by 30 experts in fisheries: lawyers 25% and representatives of fishermen 25%, from the District of Chimbote. A questionnaire was applied to the sample of lawyers and representatives of fishermen from the Chimbote

District in order to collect information regarding the individual quota of anchovy fishing for direct human consumption and the regulation to manage and control fishing activity. For the collection and analysis of legal material, documentary analysis (files, judgments, parliamentary acts, legal norms, etc.), hemerographic analysis (specialized magazines and newspapers) will be used. Similarly, the legislative technique will be used to capture data contained in the Constitution, Laws, Codes and Regulations.

In this research, two variables were considered: Individual anchovy fishing quota for direct human consumption (independent variable) and regulation and control of fishing activity (dependent variable). Information related to the variable Individual anchoveta (*E. ringens*) fishing quota for direct human consumption, was collected through a questionnaire with four dimensions (greater efficiency of the industry, increase in the total value of fisheries, improvement in the safety of fishing, sustainability of the hydrobiological resource), with 24 items measured on a likert scale. The variable regulation and control of fishing activity was collected through a questionnaire with four dimensions (fishing property rights, fishing management and direction, inspection and surveillance of the operation of the fleet and inspection and surveillance of landings and fish), with 20 items measured on a likert scale.

For the statistical analysis of the data, the contingency coefficient of the Kendall Tau-b test statistic was used, in order to establish whether there was a causal relationship between the individual anchovy fishing quota for direct human consumption and the administration and control of fishing activity.

## 3. RESULTS

In Table 1 it can be observed that of the sample of lawyers and representatives of the fishermen of the Chimbote district, 60% consider that greater efficiency is necessary in the industry of the individual quota of anchoveta (*E. ringens*) fishing for direct human consumption; therefore, the regulation of the administration and control of the fishing activity is regularly efficient, 46.7% consider that an increase in the total value of the fisheries of the individual quota of anchovy fishing for direct human consumption is necessary; consequently, the regulation of the administration and control of fishing activity is

regularly important, 33.3% consider that an improvement in the safety of fishing of the individual quota of anchoveta (*E. ringens*) fishing for direct human consumption is regularly important; Therefore, the regulation of the administration and control of the fishing activity is regularly important, 36.7% consider that the sustainability of the hydrobiological resource of the individual quota of anchoveta (*E. ringens*) fishing for direct human consumption is necessary; and consequently, regulation of the administration and control of fishing activity is regularly important.

Table 2 shows the contingency coefficients of Kendall's Tau-b test statistic to determine the relationship between the individual anchoveta (*E. ringens*) fishing quota and its characteristic dimensions with the regulation of the administration and control of fishing activity in the district. from Chimbote, Peru. There it is observed that in general the individual anchoveta (*E. ringens*) fishing quota and its dimensions are

significantly related ( $P < 0.01$ ) with the regulation of the administration and control of fishing activity in the district of Chimbote, Peru. Specifically, greater efficiency in the industry, the total value of the fisheries, an improvement in the safety of fishing and the sustainability of the hydrobiological resource as characteristics that determine the individual quota of anchoveta (*E. ringens*) fishing for direct human consumption constitutes a regulatory alternative for manage and control of the fishing activity.

#### 4. DISCUSSION

According to Mizzari [8], the individual fishing quota system implies the determination of a maximum allowable catch, set by the enforcement authority, based on the maximum sustained yield, and the right of individual shipowners or fishermen to catch a proportion her. This system is generally seen as opposed to that of common property.

**Table 1. Description of characteristic dimensions of the individual anchoveta (*E. ringens*) fishing quota as a regulatory alternative to manage and control fishing activity**

Dimension	Level	Regulation of the administration and control of fishing activity			Total
		Frequency	Regularly important	Important	
Highest efficiency in the industry	Unnecessary	Nº	1	2	3
		%	3,3%	6,7%	10,0
	Regularly needed	Nº	0	2	2
		%	0,0%	6,7%	6,7
	Necessary	Nº	18	7	25
		%	60,0%	23,3%	83,3
Increase in the total value of fisheries	Unnecessary	Nº	1	2	3
		%	3,3%	6,7%	10,0
	Regularly needed	Nº	4	1	5
		%	13,3%	3,3%	16,7
	Necessary	Nº	14	8	22
		%	46,7%	26,7%	73,3
Improved fishing safety	Unnecessary	Nº	4	6	10
		%	13,3%	20,0%	33,3
	Regularly needed	Nº	10	3	13
		%	33,3%	10,0%	43,3
	Necessary	Nº	5	2	7
		%	16,7%	6,7%	23,3
Sustainability of the hydrobiological resource	Unnecessary	Nº	1	2	3
		%	3,3%	6,7%	10,0
	Regularly needed	Nº	7	2	9
		%	23,3%	6,7%	30,0
	Necessary	Nº	11	7	18
		%	36,7%	23,3%	60,0

**Table 2. Relationship between the individual anchoveta(*E. ringens*) fishing quota and its characteristic dimensions as a regulatory alternative for manage and control of the fishing activity**

Variable	Regulation of the administration and control of fishing activity	
	Kendall's Tau-b statistic ( $\tau$ )	P value
Individual anchovetafishingquota	0,81	0,001
Dimension		
Highest efficiency in the industry	0,77	0,001
Increase in the total value of fisheries	0,80	0,001
Improvedfishing safety	0,62	0,001
Sustainability of the hydrobiological resource	0,69	0,001

Therefore, it is expected that by granting an exclusive right to a fraction of the maximum allowable catch, the incentives for overinvestment in capacity will be eliminated, since as the volume of fishing that corresponds to each user is predetermined, it would no longer make sense to extreme competition that occurs when such a limit does not exist. In this sense, it is presumed that each economic agent will optimize its capital investment without exceeding its fishing capacity, as has generally happened when there has not been an individual distribution and the management and control methods that have been implemented for the administration of the resources. The anchoveta (*E. ringens*) provides many benefits to the country, from being the main food for many marine species, sustenance of industrial and artisanal fishing, which implies a great contribution to food security, to being a source of income and work, one of the main sectors economy of the country. However, it is a species vulnerable to environmental changes and fishing pressure. Its ecological and economic value explains why more efforts have been made to regulate its exploitation compared to other species, therefore the individual fishing quota represents a necessary instrument for the regulation and sustainability of fishing activity. In this sense, it is necessary for the Fisheries Administration to make decisions about objectives and take actions to implement measures to achieve them, even when the information and the results of the analysis on the resource, the fishery and the users are not complete [9].

The individual fishing quota system is efficient to the extent that the incentives for the oversizing of the industry disappear by eliminating the Olympic race between the operators of a fishery that resulted from common property and free access to it. In principle, it prevents the overexploitation

of the resource from continuing, and eliminates the possibility of competition and rivalry between fishermen, since each of them has an assigned individual quota and their catch potential will not be affected by the actions of the fishermen. other fishermen (as long as they all respect the limits imposed by their respective quotas). In fact, this system leads to a change in the relevant time horizon for the optimization of decisions of the agents that operate in a certain fishery, going from maximizing short-term profits to considering long-term benefits, thus generating incentives consistent with the biological sustainability of the resource [10].

Kisner [11] argues that as long as the Peruvian fishing industry has a capture capacity greater than the rate at which ecosystems can reproduce, hydrobiological resources, as well as capital, will not be used effectively. The individual quota system increases the value of property rights in fisheries by improving their characteristics. These characteristics are: i) duration, ii) exclusivity, and security [12]. Individual catch quotas assign a property right for greater efficiency. Unlike free access, this regime allows the resource rent to be maximized, because a percentage of the global quota is assigned to each vessel. One of the main challenges that the anchovy fishery must have is to obtain the certification of the Marine Stewardship Council (MSC), which is currently one of the few globally recognized environmental certifications. The certification process is based on a set of performance indicators and an evaluation methodology based on scoring guidelines, previously defined in a protocol, which allow certification bodies to evaluate fisheries management, as well as to approve the use of the MSC seal for products from fisheries that demonstrate responsible fisheries management [13].

There are fishing seasons and closures for industrial exploitation in order to protect reproduction and the fish that have not yet reached the minimum catch size (12 cm), that is, they have not yet grown enough to reproduce. This includes spawning fish, which are in the midst of breeding. An important effect of the definition of Maximum Catch Limits per Vessel (MCLV) has been the rationalization of resources, since there are no longer 1,200 vessels in a 50-day 'Olympic race' to fish the entire global quota, but now it has a more orderly fishing, with fewer vessels and a fishing period of approximately 170 days, which means a reduction in fishing effort [14]. In this sense, one of the objectives in fishing matters must be the inclusion and establishment of principles in accordance with the norms of international and national law, so that anchoveta (*E. ringens*) fishing and its related activities are carried out in a responsible manner, developing policies aimed at conserving fishery resources, the management and development of fishing in a responsible manner, as well as the elimination of black fishing and illegal fishing [15].

Through the individual fishing quota, the recovery of aquatic ecosystems and the sustainable use of biodiversity are achieved, the establishment of fishing quotas and the regulation of the number of boats, closed seasons and fishing seasons have made it possible to protect hydrobiological resources, marine products, improve supply and generate new investments and innovations in processes and products in favor of the consumer and the economies. However, an open access fishing system can cause a tragedy to the sustainability of hydrobiological resources, because when there is open access to fishing, the presence of many boats behind few fish is generated. The establishment of access limits and quotas for extraction in favor of companies that had already been fishing generated benefits for sustainability and economies. (Paredes, 2010). The long-term fishing quota system has been more beneficial for the sector, since it is a sector that already inherently has a lot of uncertainty, such as climatic and oceanographic aspects, among others. Only with permanent rights are the expected results achieved in terms of sustainability, as well as innovation and efficiency in fishing activity. According to the results obtained, it can be stated that under certain conditions; Individual fishing quotas are an efficient method of managing fisheries that allows eliminating a series of cost overruns caused by overinvestment that other common

property systems lead to. Furthermore, if the IFQ system has a correct structure of incentives and supervision, it contributes to the objective of ensuring the sustainability of the resources. Indeed, by assigning IFQ of anchoveta (*E. ringens*) for direct human consumption, it is expected that fishing seasons will be prolonged and safer fishing practices will be promoted.

## 5. CONCLUSIONS

It was evidenced that an individual quota of anchoveta (*E. ringens*) fishing for direct human consumption is necessary, since individual quota systems are the most successful models worldwide, and have contributed to reducing overfishing, as well as a lower risk in fishing operations, higher quality and value of the catches; and finally, better conditions for the sustainability of the resources. Similarly, it was observed that greater efficiency in the industry is necessary, an increase in the total value of the fisheries, an improvement in the safety of fishing and guarantee the sustainability of the hydrobiological resource of the individual anchoveta (*E. ringens*) fishing quota and, in turn, the importance of regulating the administration and control of fishing activity was evidenced. In general, the individual anchoveta (*E. ringens*) fishing quota and its dimensions are related to the regulation of the administration and control of fishing activity in the district of Chimbote, Peru. Likewise, it is concluded that greater efficiency in the industry, the total value of the fisheries, an improvement in the safety of fishing and the sustainability of the hydrobiological resource constitute a regulatory alternative to manage and control the fishing activity.

## CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Author has declared that no competing interests exist.

## REFERENCES

1. INEI. I National Census of Artisanal Fishing (Cenpar): Developed at the national level. Peru; 2012.
2. Ministry of Production. Supreme Decree No. 019-2011-PRODUCE - Supreme Decree that approves the Single Ordered

- Text of the Regulation of Fisheries and Aquaculture Inspections and Sanctions - RISPAC. Peruvian Legal Information System; 2011.
3. Arias M. The evolution of legal instruments and the sustainability of the Peruvian anchovy fishery, Lima, Peru; 2011.
  4. Hidalgo J. Individual fishing quotas. 2010;. 1:32-36. Lima, Peru.
  5. Yonashiro C, Balbín N. Individual transferable quotas in the Stock Norte - Centro fishery for Peruvian anchovy (*Engraulis ringens*). Working Document 001- 2016-PRODUCE / DECHI. 2016;1-19. Peru.
  6. Paredes C. Against the current: The Peruvian anchovy and the challenges for its sustainability. WWF, Lima, Peru; 2013.
  7. Bengoa C. Article History and Balance: How has anchovy fishing been managed in Peru ?, Actualidad Ambiental Magazine. Lima, Peru. 2017;1.
  8. Mizzari E. Characteristics of the system of individual transferable fishing quotas in Argentina. National University of Mar de Plata. Argentina; 2000.
  9. Meléndez L. Strategic diagnosis of the Peruvian fishing sector. Pedro Ruiz Gallo National University. Lambayeque, Peru; 2014.
  10. Hidalgo J. Individual fishing quotas: policy proposal for fishing efficiency and conservation of hydrobiological resources. Peruvian Society of Environmental Law. Peru; 2002.
  11. Kisner BM. The horse mackerel fishery in the Southeast Pacific Ocean. Fishing Magazine. Lima; 2010.
  12. Scott A. Introducing property in fishery management. In R. Sholton (Ed.), Use of Property Rights in Fisheries Management. Rome: FAO; 2000.
  13. Paredes E, Gutiérrez E. The Peruvian anchovy industry: costs and benefits. An analysis of its recent evolution and the challenges for the future. World Bank to the Institute of Peru. University of San Martín de Porres; 2008.
  14. Peña J. Debates on Individual Transferable Quotas: "Privatizing" the sea? Subsidies? o Announced death of extractive fishing in; 2002.
  15. Galarza. Economics of natural resources. CIUP; 2010.

© 2021 Estrada; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:  
<http://www.sdiarticle4.com/review-history/67995>*