Global Advanced Research Journal of Management and Business Studies ISSN: 2315-5086 Vol. 6(4) pp. 072-080, June, 2017
Available online http://garj.org/garjmbs

Full Length Research Paper

Cleaner production and the management of effluents in the Ecuadorian craft fisheries sector

Ramiro Enrique Cepeda Luna[1], Gabriel Arturo Pazmiño Solys[2]*, Washington Marcelo Gallardo Medina[3], Juan Enrique Ramos Guevara[4], Mónica Paulina Espinoza Guano[5], Luis Leonardo Guerrero Garcés[6]

[1]Magister in Cleaner Production. Food engineer. Technical University of Ambato, Technical University of Ambato - Ecuador.
[2]Doctor in Industrial Engineering, Master in Socio Productive Projects, Mechanical Engineer, Business Engineer. Lecturer at the Technical University of Ambato - Ecuador, Technical University of Ambato – Ecuador.
[3]Master in Business Administrator, Strategic Management, Technical University of Ambato, Faculty of Administrative Sciences Ambato, Ecuador.
[4]Magister in Business Financial Management, Food Engineer. Lecturer at the Technical University of Ambato. Technical University of Ambato - Ecuador.
[5]Engineer in Food. Lecturer at the Technical University of Ambato. Technical University of Ambato - Ecuador.
[6]Master in Costs and Financial Management. Master in Teaching University. Civil Engineer. Professor of the Faculty of Administrative Sciences of the Technical University of Ambato, Ambato - Ecuador.

Accepted 02 July, 2017

The application of environmental strategies such as cleaner production within the operations of the Ecuadorian artisanal fishing sector has allowed a significant reduction of pollution to the marine environment through the recovery of valuable compounds present mainly in effluents that were returned To the sea and are now introduced into the main process, thus improving not only environmental performance but also increasing productivity and contributing positively to the image of the organization before the various stakeholders. This research was based on the analysis of the processes of artisanal fishing production and the management of efuentes of these processes in the artisanal fishing ports of Ecuador, considering that the Ecuadorian government through the denominated Ecuadorian Artisanal Fishing Revolution, has contributed to the Repowering and improvement of the main artisanal fishing ports, as well as rules and regulations for the sector as a state policy and to support local development and the change of the country's productive matrix. The methodology applied in this work was initially to identify the current production systems of the Ecuadorian artisanal fishing sector, using a questionnaire structured and validated through the expert method and with the help of bibliographic material related to the subject, followed by interviews with the presidents Associations of the main artisanal fishing ports of Ecuador and representatives of fish processing plants that have been favored with development projects by governmental organizations based on the analysis of the data obtained. Secondary data were collected through a survey administered to 392 fishermen in the five main artisanal fishing ports of Ecuador, Puerto Aconcito and Santa Rosa in the province of Santa Elena, Puerto Jaramijo and San Mateo in the province of Manabí and Puerto La Poza Of the Province of Esmeraldas, which have been restructured thus improving the fishing facilities by the government of the citizens' revolution. As a result of this research, it is concluded that the cleaner production processes improves the quality and efficiency standards in the elaboration of products made with seafood. The legislation concerned focuses on the recovery of solids and fats, so it is expected that investment in environmental technology will lead to better productivity, thereby improving the access of fish products and by products to national and international markets for the benefit of associations of artisanal fishermen,

through the implementation of adequate organizational systems, market conditions, production systems, associative processes, technical labor training, legal structures, thus giving a global strengthening of the artisanal fishing sector of Ecuador, through the application of clean technologies in the industrial sector among them in the handling and elaboration of products the fishing and capture of marine species has been gradually being carried out with the adaptation of equipment and installation of new stages of the main productive process in order to reduce the polluting effect of the emissions soda S and particulate matter, solid waste and effluents in the environment. The implementation of cleaner production systems based on recovery methods but all based on the principles of prevention and conservation of the marine environment, in order to achieve a business eco-efficiency in the fishing sector are led by companies that are implementing measures coefficients in order to encourage the efficient use of natural resources and promote the protection of environmental quality, thus contributing to the country's competitiveness and facilitating its transition towards sustainable development.

Keywords: Cleaner production, effluent management, artisanal fisheries sector, Ecuador.

INTRODUCTION

In Ecuador artisanal fishing and its processing is a source that has had a great rise, and together with industrial fishing is the largest source of pollutants in the marine - coastal environment, which highlights the dumping of effluent discharges the processing residues and the process of slaughtering and processing of the captured fish. This is clearly reflected since, in recent years in the main artisanal fishing ports of Ecuador, they showed a high level of pollution due to the reduction of the organic matter present in the effluents.

But although some plants in the sector have submarine emitters, pollutants continue to be discharged into the sea at greater or lesser distances from the coast, hence the need for these effluents to be treated before being dumped into the sea.

In addition, as the marine environment is the source for production in this sector, there is a need to achieve the sustainability of the fishery resources by maintaining the health of the ecosystem through the regulations given by the state to the industrial fishing sector, which are seen promoted by private initiatives through the application of environmental strategies such as cleaner production, which in addition to bringing direct benefits to the environment, improve environmental performance in the sector and contribute positively to the image of the organization in this case the main fishing ports Crafts of Ecuador before the various interest groups.

According to the United Nations Environment Program (UNEP), 1992, the principles of cleaner production are: The Precautionary Principle: Precaution is not simply a matter of avoiding legally harmful situations, but also ensuring that workers are protected against irreversible health problems and that the plant is protected from irreversible damage. The precautionary principle points to the reduction of anthropogenic agents in the environment, and this essentially involves a substantial redesign of the industrial production and consumption system, which hitherto depends on a strong processing of materials.

The principle of prevention: Prevention is equally important, especially in cases where the damage caused by a product or process is known. The preventive principle indicates the anticipated search of changes in the chain of production and consumption. The preventive nature of Cleaner Production requires the new solution to reconsider product design, consumer demand, material consumption patterns, and certainly the complete material basis of its economic activity.

The principle of integration: Integration involves the adoption of a holistic view of the production cycle, and a method to introduce such an idea is the life cycle analysis. One of the difficulties with the preventive solution is the integration of environmental protection measures across systemic boundaries. Traditional end-of-pipe regulation is generally applied to a specific point where integrated process measures for reducing pollutants are in place. By reducing the need for emissions of such substances into the environment, these measures then provide integrated protection for the whole environment.

The artisanal fishermen in Ecuador are not a homogeneous group but a group of diverse groups for geographic reasons, by income or by the activity that each one develops. This feature directly affects the informality that occurs in the sector, since a significant percentage of the artisanal fishermen registered in the register of artisanal fishermen are not affiliated to the different forms of organization; In addition, the sector turns out to be a sum of work and employment in situations of crisis in other productive activities, implying that a significant number of people carry out the activity without being formally enrolled in it. Pazmiño (2016).

*Corresponding Author Email: ga.pazmino@uta.edu.ec, gapasrio@gmail.com

THEORETICAL FRAMEWORK

Cleaner production

One of the ways to protect the environment is Cleaner Production (PML), which seeks to eliminate or reduce toxic raw materials, reduce emissions, dumping and waste and the efficient use of resources. That is, the PML in addition to thinking about "what to do with waste", think of "what to do not to generate them".

Sustainability implies the technological reconversion to return the most efficient processes in the use of materials, inputs and natural resources. This reconversion implies the use of technologies as part of a clean production system that minimizes waste and environmental product designs that allow reprocessing. (Arroyave, J., & Garcés, L. 2007).

Cleaner Production was introduced by the Office of Industry and Environment of the United Nations Environment Program (UNEP) in 1989 as the "continued implementation of an integrated preventive environmental strategy for productive processes and services to improve Eco-efficiency2 and reduce human and environmental risks"

What is wanted with the cleaner production process is to avoid an excessive generation of waste, since on the one hand it is considered an economic loss as a product of the poor use of the resources and inputs used, and on the other, the waste is polluting and affect health and the environment, so that their reduction allows to prevent negative environmental impacts. (Cleaner Production Center, Chile 2014)

In this sense, the cleaner production has as main objective to achieve the reduction of the environmental impacts of the productive process, focusing on the improvement of processes and products in order to avoid environmental problems before it occurs. (Badillo, T. 2009).

If we compare cleaner production and eco-efficiency we have that the latter is a more comprehensive concept that includes not only prevention of pollution (Pollution Prevention), but also reduction in the origin, reduction of the intensity of materials And a series of practices and systematic searches of alternatives, "Continuous Improvement" and cleaner production methods, avoiding and surpassing the end-of-pipe practices, or at the end of the pipe, by modifying And giving a new approach to processes, ie "reinventing" processes. (Dalila, G., 2012).

Cleaner production practices include good operating practices, substitution of inputs, improved process control, equipment modification, technology change, reuse, on-site recovery and recycling, production of useful by-products and Reformulation and redesign of the product. (Estrucplan 2006).

The benefits that can be gained by cleaner production can be summarized by the benefits of cleaner production in that it allows process optimization and cost savings through the reduction and efficient use of raw materials and inputs in general, The operational efficiency of the plant, the improvement of the quality of the products and consistency because the operation of the plant is controlled and therefore more predictable; allows the recovery of some materials from the by-products, reduction of waste, and therefore, reduction of the costs associated with their correct disposal, also allows to minimize emissions and / or discharges at the source, reducing risks to human and environmental health And simultaneously increasing competitiveness and finally allows the improvement of the company's image to customers, suppliers, partners, community, financial entities, etc. (Rodríguez, J., Hleap, J., Estrada, F., Clavijo, J. & Perea, N. 2011).

Cleaner production as a business strategy

At present, cleaner production is not seen by most companies in the industrial sector as an economically viable strategy, so these companies opt for the adoption of corrective environmental strategies called end-of-process treatments (or at the end of the tube). However, comparing the changes that are generated in the total cost structure, when it is decided to invest in cleaner production and when not, it is necessary that with time the costs decrease significantly, due to the benefits generated from the increase in the Efficiency of processes, savings in the consumption of raw materials and energy, and the reduction of waste and pollutant emissions.

All this savings from the total cost structure without clean production versus that with clean production and even more with clean technology makes cleaner production seen as a business strategy oriented towards productive processes, products and services, to strengthen business competitiveness through technological innovations, reduction of costs, and reduction of risks in aspects of security, human health and environment. The essence of this preventive strategy is the efficient use of energy, water and inputs, as well as the use of waste, while integrating economic, environmental and social benefits.

It is considered that the strategies of cleaner production initially only require a change in cultural practices or small instrumental changes (BPM, BPA, among others) until a time comes when these options are exhausted, making it necessary to invest in new technologies known as "clean technologies". The clean technologies contribute to the improvement of the efficiency of the process as it decreases the operation time, making a smaller and

better use of raw material, inputs and service; although it requires a high investment cost. (Rodríguez, J., Hleap, J., Estrada, F., Clavijo, J. & Perea, N. 2011).

Increasingly, the countries and companies that are most competitive are not those that access the lowest costs of resources, but those that use the most advanced technologies and methods to use those resources.

More and more countries are interested in the implementation of clean technologies and practices that are sustainable with the environment, because environmental awareness has grown in recent years; although the process is slow, companies increasingly adopt efficient processes and technologies, subject to cleaner production, which contributes not only to compliance with regulations, but also to the requirements of access to different markets and to the increase of productivity and competitiveness, so cleaner production is an effective and efficient strategy to reduce the environmental impacts of a company, as it promotes the sustainability of business.

Effluent management and PML

Currently, the implementation of cleaner production measures is the first step that must be taken when managing effluents in a company, the advantage of applying cleaner production practices is that it promotes the efficient use of raw materials, Water and energy, among other inputs, in order to eliminate or reduce in the sources of origin the amount of unwanted waste that is generated during the production processes. In this way, in addition to reducing the unit costs of production, the requirements for the final treatment of waste are reduced, if this is necessary, and, therefore, reduces the cost of acquisition of a treatment plant and its consequent costs operation and maintenance.

Therefore, to reduce production costs, it is necessary to reduce waste streams; or that, in order to reduce waste flows, it is necessary to increase production efficiency, which also leads to lower production costs. A logical conclusion of this statement is that the option of introducing cleaner production practices should be considered as a priority and in a comprehensive way before addressing "end-of-process" treatment solutions.

According to the Center for the Promotion of Sustainable Technologies (USAID / Bolivia, 2005), PML techniques can be applied to any industrial process, ranging from relatively easy to implement operational changes to deeper changes such as substitution of inputs, the modification of processes or unit operations, or the use of cleaner and more efficient technologies.

In general, the resources used to introduce cleaner production practices into an enterprise are considered as an investment, usually short-term, since they generate economic returns and environmental benefits simultaneously. Contrary to this, the resources used to make waste management as waste at the end of the productive process (treatment plants) are considered as an expense, since they do not generate economic returns, except for the benefit that results from avoiding the generation of impacts Environmental benefits, which for the company has an intangible nature in most cases.

Cleaner Production for the recovery of effluent solids from artisanal fish processing plants.

The Ministry of the Environment declares the need to promote private investment in productive processes that use clean technologies and inputs and the development of processes of conversion of polluting industries. To this effect, a double strategy is established. The first is based on the consolidation of the command and control mechanisms (laws, regulations and auditing). And the second, is based on the promotion of voluntary measures stimulated by the development of the market.

In general, the resources used to introduce cleaner production practices into an enterprise are considered as an investment, usually short-term, since they generate economic returns and environmental benefits simultaneously. Contrary to this, the resources used to make waste management as waste at the end of the productive process (treatment plants) are considered as an expense, since they do not generate economic returns, except for the benefit that results from avoiding the generation of impacts Environmental benefits, which for the company has an intangible nature in most cases.

Government control mechanisms

Considering that the main forms of contamination of fish processing plants come from gaseous emissions, solid wastes and effluents, and since the control of the latter has become more relevant in recent years, Table 1 presents the Maximum Limits (LMP) for effluents from the Indirect Human Consumption (CHI) fishing industry which were approved under the Environmental Management Act and the Regulations to the Environmental Management Act for the Prevention and Control of Environmental Pollution and submitted To the provisions of these, is mandatory and applies throughout the national territory of Ecuador.

Table 1. Permissible maximum limits for effluents from the fishing industry

Contaminants Settings	I Limits Maximum Permissible The effluents That will be Poured in Of the area of protection Coastal environmental (to)	II Limits Maximum Permissible The effluents That will be Spills out Of the area of protection environmental Coastline Limits	III Limits Maximum Permissible The effluents That will be Spills out Of the area of protection Environmental Coast (b)	Analysis method	Format
Oils and fats (A y G)	20 mg /l	1,5*103 mg/l	0.35*103 mg/L	Standard Methods for Examination of Water and Wastewater.	The values consist of the average of a minimum of three samples of a compound as established in the Standard for the Prevention and Control of Environmental Pollution of Water Resources in Port Enclosures, Ports and Port Terminals, R.O. 41-S, 14-III-2007. Annex 1C.-III.
Total Suspended Solids (SST)	100 mg/l	2,5*103 mg/l	0.70*103 mg/L	Standard Methods for Examination of water and wastewatwer	
pH	6 – 9	5 - 9	5 – 9	Monitoring Protocol Approved by the Norm for the Prevention and control of the Environmental Pollution of the Water Resource in Port Enclosures, Ports and Port Terminals, R.O. 41-S, 14-III-2007. Annex 1C.-III.	
Demand Biochemistry Of Oxygen (DBO5)	< 60 mg/l	(c)	(c)	Standard for the Prevention and Control of Environmental Pollution of Water Resources in Port Enclosures, Ports and Port Terminals, R.O. 41-S, 14-III-2007. Annex 1C.-III.	

(A) The Coastal Environmental Protection Zone established in this standard is for fishing use.
(B) Mandatory compliance from the two (2) years after the date on which the LMP indicated in the previous column are due.
(C) See Second Complementary and Transitory Disposition.
(D) The Monitoring Protocol will be updated.
Source: Environmental Management Law and the Regulation to the Environmental Management Law for the Prevention and Control of Environmental Pollution

The maximum permissible limits established in this regulation are mandatory for new industrial fishing establishments or processing plants and for those who relocate. In this way, no industrial fishing establishment or processing plant may operate if it does not comply with the maximum permissible limits set forth in Table 1.

In order to comply with established maximum permissible limits, owners of industrial fishing establishments must implement chemical, biochemical or other treatment systems complementary to physical treatment.

Voluntary measures, application of clean technologies

The industrial fishing sector in Ecuador has gradually implemented the strategy of maximum permissible limits established through the use of clean technology. Thus, the main fishing companies producing fishmeal and oil have since 2000 with a primary system of recovery of solids composed in most cases by: a solids separator, a grease trap and a flotation cell by air dissolved. There were also drastic changes in raw material discharge systems with the introduction of vacuum transfer equipment using pumps and plastic piping systems. This investment in new clean technologies such as the change of drying equipment as well as modifications to existing equipment have contributed significantly to the efficiency of the process and the reduction of discharges, mainly of liquid and gaseous emissions to the environment.

The implementation of a new stage for recovery of pumping water solids improves standards of quality and efficiency in the production of products through fishing and capture of marine species. The legislation concerned focuses on the recovery of solids and fats, so it is expected that investment in environmental technology will lead to better productivity.

Although the majority of plants already have the required treatment systems, the efficiency of the treatment processes of the pumping water is still very low. After treatment and before being discharged to the sea, the effluents still have very high levels of oil and grease, suspended solids and exert high levels of biological demand or (biochemical) oxygen. In addition, many of the plants, especially in the artisanal fishing zone of the equator do not have emitters and pour their effluents directly in front of the sea. Being the direct impact of these spills, the massive mortality of the marine biotsphere.

Given this situation, the National Directorate for Aquatic Affairs (DIRNEA) has been carrying out important activities to eliminate and mitigate the effluents of fishing activity through the demand for environmental adaptation and management programs (PAMA) and Environmental Impact Studies) And lastly with the requirement of updating them, environmental management plans (PMA), to adapt the activities to the maximum permissible limits (LMP) of the fishing activity, within the framework of the national environmental policy of the Ministry of the Environment .

The history of the peruvian fishery has been a continuous battle to achieve sustainable production, capable of generating continuous benefits for the current population without limiting the productive capacities of future generations, nor compromising the integrity of the Ecuadorian sea.

Environmental pollution is something that we all fear to be involved because it affects directly, with repercussions on our health and environmental health. In industrial fishing processes, effluent from landing and dumping from fish processing plants present high organic waste resulting in massive mortalities of artisanal fishery resources and aquaculture, resulting in massive losses of thousands of dollars and serious social impacts.

METHODOLOGY

A total of 392 interviews were conducted with the representatives of the various artisanal fishermen's organizations of the 5 main artisanal fishing ports, which is being revitalized by the Government of the Citizen Revolution in Ecuador: Port La Poza in the Province of Esmeraldas, Puertos de Jaramijo and San Mateo In the Province of Manabí and Puerto’s de Aconcito and Santa Rosa in the Province of Santa Elena, aiming at learning about events and activities that cannot be directly observed. We used an interview guide to ensure that the issues are considered by the research group as keys to be addressed by all respondents. In order to identify the needs of the fishermen and the actors involved in this activity, artisanal fishermen from the Artisanal Ports of La Poza in the Province of Esmeraldas were surveyed; San Mateo and Jaramijo in the Province of Manabí and Anconcito and Santa Rosa in the Province of Santa Elena, the indicators were: level of technology, credit, identification of support institutions, and the marketing strategies used so far.

The number of artisanal fishermen registered in Ecuador is approximately 14,200 according to the Ministry of Agriculture, Livestock, Aquaculture and Fisheries, through the Ecuadorian Sub-secretariat of Fisheries. In order to determine the size of the sample, the probabilistic sampling method was used; the sample was taken proportionally to the percentage of the number of artisanal fishermen in each of the mentioned ports, with the value of the applied sample being 392.

Table 2. Number of Artisanal Fishermen Registered in the Main Artisanal Fishing Ports of Ecuador

Province	Port	No. of Boats	No. of Artisanal Fishermen
Santa Elena	Anconcito	500	1.900
Santa Elena	Santa Rosa	1.000	3.900
Manabí	Jaramijo	700	2.500
Manabí	San Mateo	700	2.900
Esmeraldas	La Poza	900	3.000
Total	**5**	**3.800**	**14.200**

Source: Ministry of Agriculture, Livestock, Aquaculture and Fisheries. Sub Secretariat of Fisheries of Ecuador

Subsequently, responses were coded according to the following themes: number of fishermen, fishermen, fishing gear, degree of informality, relationship with Municipal Governments, infrastructure, commercialization, trade union organization, conflict between actors, conflict with other actors by Use of the beach, perception of the role of the State, relation with the fishing resource, requested aid for development. The swot descriptive analysis was used to detect the Strengths, Opportunities, Weaknesses and Threats of the sector, to begin working with a development proposal for the artisanal fishing sector.

As for the information collection instrument used, it was a questionnaire administered composed of 10 questions organized in: general sociodemographic information, employment status, information on the fishing sector, commercialization, work organization, associativity, income and general opinion.

The questionnaire, prior to its application, was subjected to a validation of content using the technique of expert judgment that included the participation of a technical team of 7 people. Subsequently, a pilot survey was applied to a representative sample of the population of interest, in order to refine the questionnaire before its final application.

Finally, the data were analyzed through descriptive statistics, and test hypotheses tests that allowed to give an account of the current situation of the artisanal fishing sector in Ecuador before the use of techniques and procedures of cleaner production and management of effluents made in The main artisanal fishing ports of Ecuador according to the change of the productive matrix of the country and the improvement of the artisanal fishing ports.

RESULTS

The artisanal fishing ports of Ecuador that have been remodeled and fishing companies have begun to opt for cleaner production technology to reduce the polluting impact to the environment while recovering valuable material that is incorporated in the main productive process.

All the fish processing companies are implementing projects for the implementation of a system of recovery of solids and oils present in the pumping water that of being discharged to the sea without previous treatment, would generate problems of marine pollution, against the activities of artisanal fishermen , against populations of marine fauna and ecological balance in general, as well as other effluents from the process, which were formerly discharged into the sea, are now returned to the production process.

This investment in water treatment technologies brings, in addition to the environmental benefits, a greater economic profitability thanks to the recovery of these elements and their reincorporation to the process of elaboration of fish products.

The basic treatment system initially consists of separating the solids from the liquid component of the process, using a rotary filter screen or trommel. The solid mass is returned to the process line while the water and oil are sent to a grease trap to recover the floating oil, which is then led to the production process of the plants which represents a considerable income for the company.

The water with solids in suspension is directed to a second treatment phase, this consists of a flotation cell that produces a foam that is recovered with a rotary skimmer, that the remaining water is led to a third phase of coagulation, flocculation and flotation by dissolved air or chemical DAF, where a volume of wet sludge is generated which is finally compacted with a cold separation, reducing the humidity of the sludge by up to 70%. The DAF liquid effluent at this point has already been clarified and complies with the international quality standards for liquid discharges from fishing factories. The entire system is designed with return lines to finally have a single effluent line to the sea.

The sludge that is obtained from the environmental separator can be dehydrated and then converted into fishmeal of standard quality, which in turn can be homogenized with flours of different quality, or used as an input in the elaboration of feed and balanced feed for livestock and fish farms.

The result of the implementation of this series of equipment and treatment technologies represents a

recovery of 95% of the solids and fats present in the process water, which until a few years ago were discharged directly into the sea, are now being recovered through Physicochemical processes of coagulation, flocculation and dehydration.

Similar processes are being replicated in the main companies in the Ecuadorian industrial fishing sector, each with its own recovery systems but all based on the principles of prevention and conservation of the marine environment.

Cases of eco-efficiency in the fishing industry are led by companies that have been implementing eco-efficient measures to encourage the efficient use of natural resources and to promote the protection of environmental quality, thus contributing to the country's competitiveness and facilitating their transition towards sustainable development.

In this sense, the fishing processing companies that are attached to the main artisanal fishing ports have demonstrated that the implementation of eco-efficiency in an integral way in all their business activity have included systems of: Eco-design, good environmental practices, cleaner production, sustainable management renewable natural resources and external waste management.

Ecuador recognizes international biodiversity and other conventions related to environmental protection and recently developed guidelines and concepts, such as the Code of Conduct for Responsible Fisheries (FAO, 2014), as an obligatory reference for the management and management of fisheries.

CONCLUSIONS

The main conclusions of the investigation are as follows:

Cleaner production introduces a basic conception for the improvement of the performance of companies, whereas traditional instruments and mechanisms of command and control oblige them to comply with administrative parameters that in turn can, but not necessarily, influence adjustments In productive processes. While the application of a cleaner production system by companies ensures structural changes.

As effluents are the main pollutant of the marine environment, it is necessary for fish processing companies to initiate a migration to cleaner production processes by applying clean technologies to meet legal standards, improve environmental performance, improve efficiency of its processes by incorporating recovered solids into the main productive process as well as improving its image before the community and facilitating access to international markets.

Although the eco-efficiency and cleaner production are oriented to the prevention of pollution, the difference is that the first focuses on the production of goods and services with lower consumption of raw materials and inputs and less environmental pollution, while the second Implies a change in cultural practices or productive processes through the inclusion of new technologies known as "clean technologies" to reduce pollution or improve environmental performance.

The application of clean technologies in the industrial sector among them in the handling and elaboration of products the fishing and capture of marine species has been taking gradually with the adaptation of equipment and installation of new stages of the main productive process in order to reduce the polluting effect of gaseous emissions and particulate matter, solid wastes and effluents in the environment.

The diverse experiences of companies in the industrial fishing sector show that the decision making process to adopt preventive alternatives is the result of a managerial decision which is closely related to the conception of the managers of the company on the added value of environmental management for your business.

The perception of this value depends on factors of the company environment such as market pressures, pressures from authorities, offer of services or financing facilities, recognition, among others.

REFERENCES

Arroyave J, Garcés L (2007). *Tecnologías ambientalmente sostenibles.* http://repository.lasallista.edu.co/dspace/ bitstream/10567/513/1/pl_v1n2_78-86_ tecnolog%C3%ADas.pdf)

Badillo T (2009). *Pesca y producción limpia. factibilidad de una microempresa de extracción de camarón con tecnología de bajo impacto ambiental.* Revista Desarrollo Gerencial. No. 84-97.http://publicaciones.unisimonbolivar.edu.co/rdigital/desarrollogerencial/index.php/desarrollogerencial/article/viewFile/12/10.

Centro de Promoción de Tecnologías Sostenibles (CPTS), USAID/Bolivia & Embajada Real De Dinamarca (2005). Guía Técnica General de Producción Más Limpia http://libroweb.alfaomega.com.mx/catalogopml/produccionmaslimpia/libreacceso/reflector/ ovas_statics/unid5/PDF_Espanol/Guia_ Tecnica_PML.pdf)

Centro de Producción más Limpia - Consejo Nacional de Producción Limpia. (s. f.). Chile. Recuperado 17 de marzo de 2014, a partir de http://www.cpl.cl/Acuerdos(APL)/sector. php?id=25

Centro para la Sostenibilidad Ambiental CSA (2007). Universidad Peruana Cayetano Heredia. http://www.anchoveta.info/index. php?option=com_content&task=view&id=32&It emid=91.)

Dalila G (2012). *Sistema de producción más limpia para el manejo de Efluentes en el laboratorio de pruebas físicas de cuero de la asociación nacional de curtidores del Ecuador– Ance Producción Más Limpia.* Proyecto de Trabajo de Graduación. Universidad Técnica de Ambato Facultad de Ingeniería en Sistemas Electrónica e Industrial http://repo.uta.edu. ec/bitstream/handle/123456789/2329/Tesis_ t686id.pdf?sequence=1.

Ecuador (2007). *Norma para la Prevención y control de la Contaminación Ambiental del Recurso Agua en Recintos Portuarios, Puertos y Terminales portuarios.* R.O. 41-S, 14-III-2007. Anexo 1C.-III.

Estrucplan (2006). *Guia de Producción Más Limpia.* Peru. Parte 1. https://www.estrucplan.com.ar/produccion.

FAO 2014-2016. Perfiles de Pesca y Acuicultura por Países. Ecuador (2016). Hojas de datos de perfiles de los países. In: Departamento de Pesca y Acuicultura de la FAO. Roma.

Produce (2008). *Límites Máximos Permisibles (LMP) para la Industria de Harina y Aceite de Pescado y Normas Complementarias.* Decreto Supremo 010-2008-PRODUCE.

Programa de Naciones Unidas para el Medio Ambiente (PNUMA), 1992.

Pazmino G (2016). *Relación del Comportamiento Organizacional para mejorar la Eficiencia de la Cadena Productiva del Sector de Pesca Blanca Artesanal en la República del Ecuador*. Lima / Peru: Universidad Nacional Mayor San Marcos.

Pazmino, G. (2016). *La Pesca Artesanal en el Ecuador y la Pobreza en comunidades aledañas a los Principales Puertos Pesqueros Artesanales del Ecuador*. VI Congreso Internacional del Ciencias Administrativas. CET Bolivia.

Retamoso C (2007). *Producción Limpia, Contaminación y gestión ambiental*. http:// books.google.es/books?hl=es&lr=&id=ea0kufq

Rodríguez J, Hleap J, Estrada F, Clavijo J, Perea N (2011). *Gestión de residuos pecuarios de sistemas de producción más limpia.* http://www.bdigital.unal.edu. co/11644/1/9789587610123.pdf.

Subsecretaria de Pesca del Ecuador (2014). *Subsecretaria de Pesca del Ecuador perteneciente al Ministerio de Agricultura, Ganadería, Acuacultura y Pesca*. Quito: Ministerio de Agricultura, Ganadería, Acuacultura y Pesca.

VanHoof B, Herrera C (2007). *Producción más limpia en Colombia*. http://libroweb.alfaomega. com.mx/catalogo/pmlproduccionmaslimpia/libreacceso/libreacceso/reflector/ovas_statics/unid1/PDF_Espanol/PML_Colombia.pdf.

World Bank (1991). *Environmental Assessment Source Book,* Volume III. Guidelines for Environmental Assessment of Energy and Industry Projects, Environment Department, Washington, D.C., USA