



Elaboration and proposal of a methodological guide for an occupational health and safety system based on the international standard OHSAS 18001 in H.G.C.A. Laboratories.

Elaboración y propuesta de una guía metodológica de un sistema de seguridad y salud ocupacional basado en el standard internacional OHSAS 18001 en Laboratorios H.G.C.A.

Ing. Jaime Patricio Fierro Aguilar M.Sc.¹ & Adrián Esteban Rincón Luzuriaga²

Received: 25/07/2019 – Revised: 26/09/2019 -- Accepted: 19/02/2020

Abstract

The implementation of an occupational health and safety management system is an important point, it is here where the appropriate conditions for the worker to perform their assigned tasks are taught. For this reason, this project is about a methodological guide of a management system in occupational health and safety, guidelines are presented to know the OHSAS 18001:2007 standard, its approach and how to implement it in the company, showing the benefits of keeping an Occupational Health and Safety Management System; and thus, assist and optimize the safety and health of workers in the company. The purpose of this research was to provide a solid structure for the implementation of a system according to the requirements of the standard and to achieve its integration with the other two management systems of Laboratorios HG.

key words

OHSAS 18001, occupational health and safety, continuous improvement.

Resumen

La aplicación de un sistema de gestión de seguridad y salud en el trabajo es un punto importante, es aquí donde se enseñan las condiciones adecuadas para que el trabajador realice sus labores asignadas. Razón por la cual este proyecto trata sobre una guía metodológica de un sistema de gestión en seguridad y salud ocupacional, se presentan directrices para conocer la norma OHSAS 18001:2007, su enfoque y manera de implementarlo en la empresa, mostrando los beneficios de conservar un Sistema de Gestión de Seguridad y Salud Ocupacional; y así auxiliar y optimizar la seguridad y salud de los trabajadores de la empresa. El propósito de esta investigación fue brindar una estructura sólida para la implementación de un sistema acorde a los requisitos de la norma y lograr una integración del mismo con los otros dos sistemas de gestión que posee Laboratorios HG.

Palabras clave

OHSAS 18001, seguridad y salud ocupacional, mejora continua.

1. Introduction

According to the International Labour Organization, over 2.3 million workers die due to occupational accidents or work-related diseases, 270 million suffer non-fatal accidents, and 160 million experience short- and long-term work-related illnesses. [1]

In our country, for manufacturing industries, Occupational Health and Safety (OHS) is a legal obligation, according to Article 326 – numeral 5 of the Constitution of the Republic of Ecuador, which states: "Everyone has the right to perform their work activities in an appropriate and conducive environment that ensures the health, integrity, safety, hygiene, and well-being of the worker" [2].

According to Data Quest Farma, there are 69 pharmaceutical laboratories in Ecuador, which, according to the occupational risk categorization by productive activity conducted by the Ministry of Labor, are classified

at risk level 8 [3]. Laboratory H.G.C.A, a pharmaceutical laboratory with 126 years in the market, specializes in the manufacturing and commercialization of pharmaceutical products, cosmetics, and repellents; it is located in the cities of Guayaquil, El Oro, Quito, and Cuenca. [4]

Today, this company faces various issues in terms of OHS and legal technical compliance. Previous audits have highlighted its severe shortcomings regarding the lack of an occupational health and safety management system that improves processes and ensures the safety of its employees. [5]

Knowing that the fundamental goal of Management Systems is to improve the efficiency of all organizational processes, Laboratories H.G.C.A faces a critical issue in identifying and controlling operational risks that directly impact the activities performed by employees and their integrity. [6]

¹ Universidad de Guayaquil, Facultad de Ingeniería Química, Orcid: 0000-0003-2725-8290, jaimе.fierroа@ug.edu.ec

² Universidad de Guayaquil, Facultad de Ingeniería Química, [adrian.rinconl@ug.edu.ec](mailto:аdrian.rinconl@ug.edu.ec)



Despite having two ISO certifications (9001 and 14001), Laboratories H.G.C.A. faces issues due to the lack of an optimal occupational health and safety management system. This has led to problems with operational control compliance in processes, emergency plans, incident and/or accident management, and maintaining a safe working environment, among others [7].

There are compliance regulations to improve the management of OHS systems; however, the outdated nature of these systems, lack of staff training, and budget constraints have led the company to apply inadequate methods regarding occupational health and safety. Consequently, this has resulted in working with a deficient methodology and an inability to pursue OHSAS certification within the company [8].

Given its quality management system (ISO 9001) and environmental management system (ISO 14001), the implementation of an OHS based on OHSAS 18001 standards would be the best option for achieving optimal process management. This approach provides a foundation for minimizing health-related risks and incidents. [9]

1.2 Management systems

The management process can be understood as the effective administration of all humans, material, and technical resources through performance evaluations to achieve the company's objectives. Management is defined as the set of decisions and actions that lead to the achievement of previously established goals.

A management system is a framework of policies, procedures, and processes within a company, tested for continuous management and improvement. [10]

The best companies operate as cohesive units with a shared vision. This includes benchmarking, cooperative information sharing, teamwork, and functioning according to quality and environmental principles. A management system allows a company to achieve its objectives through a set of strategies that involve a focus on management and process optimization. [11]

Today, manufacturing companies face many demanding challenges such as competitiveness, profitability, speed of change, globalization, adaptability, growth, and technology. Stabilizing these and other business requirements can be a difficult and demotivating process. [12]

For these reasons, implementing an effective management system can help to:

- Manage social, environmental, and financial risks
- Improve operational effectiveness

- Reduce costs
- Increase customer and stakeholder satisfaction
- Protect the brand and reputation
- Achieve continuous improvements
- Enhance innovation
- Eliminate trade barriers
- Provide market clarity

The use of a proven management system allows for constant renewal of objectives, strategies, operations, and service levels. [13]

1.3 OSHAS

OHSAS 18000 is an international specification for occupational health and safety management systems. It consists of two parts, 18001 and 18002, and covers a range of additional publications.

OHSAS 18001 is a series for the assessment of occupational health and safety management systems. Its goal is to help companies control and manage health and safety risks at work. It was developed in response to the widespread demand for a recognized standard against which organizations can be certified and assessed. [14]

1.4 OHS management system

A Management System is a series of integrated stages within a continuous process. It creates the optimal and necessary conditions to systematically develop an idea, aiming for its proper execution to achieve improvements that ensure its continuity and success. [15]

A Management System, in its basic form, comprises four stages. These stages create a perfect cycle, known as the "continuous improvement cycle." As this cycle repeats, significant improvements will be achieved, making the Management System more efficient over time. Initially, the system is designed as a proven structure to achieve the management and continuous improvement of the processes and procedures adopted by the organization, as well as the policies implemented by the company [16].

Thus, it can be stated that a management system contributes to achieving a company's objectives through a series of strategies designed for this purpose. These strategies include process optimization, a process-focused management approach, and the disciplined thinking of all its employees [17].

2. Material and methods

To carry out this project of developing and proposing a methodological guide for implementing an occupational health and safety management system based on the international standard OHSAS 18001 at Laboratories H.G.C.A., a review of various types and designs was conducted, along with research.



2.1 Population

Laboratories H.G.C.A is a pharmaceutical company with 268 employees. For this project, the individuals providing the relevant information are:

- **General Manager:** The legal representative who makes decisions regarding the implementation and launch of the OHS management system.
- **Safety Officer:** Responsible for the implementation, execution, launch, and monitoring of the OHS management system.

2.2 Checklist for Compliance with OHSAS standar requirements

Checklists, or verification sheets, are formats created to perform repetitive tasks, inspect compliance with a list of requirements, or collect data systematically. They are used to conduct systematic checks of activities or products, ensuring that the worker, inspector, or researcher does not overlook any important aspects.

2.3 SWOT Matrix

The variables found and analyzed, as well as their representation within the matrix, are specific to that moment. After the analysis, strategic decisions should be made to improve the current situation for the future. The acronym SWOT stands for:

- **Strengths:** Positive internal factors that are advantageous.
- **Opportunities:** Positive external aspects that can be leveraged using our strengths. These depend on the environment.
- **Weaknesses:** Negative internal factors that need to be eliminated or reduced.
- **Threats:** Negative external aspects that could hinder or prevent achieving our objectives. These also depend on the environment.

3. Results

3.1 Company Diagnosis

The diagnosis revealed that the company operates with an integrated management system consisting of:

- Quality Management System based on the ISO 9001 standard
- Implemented in 2007 and certified in 2008.
- Environmental Management System based on the ISO 14001 standard
- Implemented in 2011 and certified in 2012.

3.2 SWOT Diagnosis

As part of the diagnosis, a SWOT analysis was conducted using information gathered from interviews with the General Manager of Laboratories H.G., Ing. Myra Holst,

and the Occupational Health and Safety Officer, Q.F. Xavier Alvarado.

Table 1. SWOT of H.G.C.A. Laboratory

Strengths	Integrated management system (ISO 9001 - ISO 14001)
	126 years in the pharmaceutical market
	Good manufacturing practices (WHO GMP 32)
Opportunities	Stability of the pharmaceutical market
	Acquisition of state-of-the-art equipment and machinery
	Hiring of trained personnel in safety and health management
Weaknesses	Limited access to new products
	Limited updating of knowledge among production staff
	Low process reach in branches
Threats	Public pharmaceutical company
	Increased risks due to growth of operational staff
	Reforms in Ecuadorian occupational health and safety legislation

3.3 Checklist diagnosis of compliance with OHSAS 18001 requirements

Based on the data collected through the checklist during interviews with stakeholders and the review of documentation as evidence, a results table was structured showing the compliance percentages.

Table 2. Checklist – General requirements

Checklist			
Compliance with the requirements of the standard			
Numeral of the standard	Statement	Complies	
		Si	No
4	System Requirements		
4.1	General Requirements		
	Has the organization established, implemented, and maintained an occupational health and safety management system meeting all the requirements of this checklist?		X
4.2	Occupational Health and Safety Management Policy		
	Has top management defined an occupational health and safety management policy that establishes global objectives and commitment to improving performance?	X	
a)	Is the occupational health and safety management policy appropriate and does it consider: the nature, scale, and impacts of occupational health and safety from the organization's activities, products, and services?	X	
b)	Does it include a commitment to prevention for occupational health and safety and continuous improvement?		X



c)	Does it include a commitment to comply with applicable occupational health and safety legislation and regulations and other requirements subscribed to by the organization?	X	
d)	Does it provide a framework for establishing and reviewing occupational health and safety objectives?		X
e)	Is the occupational health and safety management policy documented and implemented?	X	
f)	Is it maintained and communicated to all employees of the organization?	X	
g)	Is it available to interested parties and the public?	X	
h)	Is it reviewed periodically to ensure it remains relevant and appropriate for the organization?	X	
4.3	Planning		
4.3.1	Planning for Hazard Identification and Risk Assessment and Control		
	Has the organization established procedures to identify hazards, assess risks, and implement necessary control measures?		X
a), b), c), d), e)	Do these procedures cover: (a) all activities, (b) all personnel, (c) all facilities, (d) internal threats, (e) external threats?		X
a), b)	Is the hazard identification and risk assessment methodology: defined as preventive in scope, classifying risks to identify those that need to be eliminated or controlled, consistent with operational experience, providing requirements for facilities, training, and operational controls, and allowing for monitoring of required actions?		X
a), b), c), d), e)	Is the hazard and risk identification within the organization, the OHS system, its activities, controls, and risk reduction in accordance with: (a) elimination, (b) substitution, (c) engineering controls, (d) signage, (e) personal protective equipment?		X
	Is this information documented, maintained, and updated?		X

Table 3. Checklist - Legal Requirements

4.3.2	Legal and Other Requirements		
	Does the organization maintain a procedure to identify and access legal and other requirements subscribed to?	X	
	Is this procedure maintained and updated?	X	
	Are these requirements communicated to employees and other interested parties?		X
4.3.3	Objectives and Programs		
Objectives	For setting objectives, has the organization considered: (a) each function and level in the organization, (b) legal requirements and other important standards, (c) hazards and risks, (d) technological options, (e) financial, operational, and business requirements, (f) views of interested parties?		X
OHS Program	Does the organization have an occupational health and safety management program to achieve its objectives?		X
	Does it include allocation of responsibilities by function and importance, means, and timelines		X

	to achieve objectives?		
	Is the program periodically reviewed critically?		X
	Is the program applied to new developments, activities, modifications, products, services, or operational conditions of the organization?		X
4.4	Implementation and Operation		
4.4.1	Resources, Roles, Responsibilities, and Authority		
	Has the organization defined, documented, and communicated roles, responsibilities, and authorities?	X	
	Have necessary resources been provided?		X
	Does the staff have the skills, technology, and financial resources?		X
4.4.1	Has top management appointed one or more management representatives with roles, responsibilities, and authority to establish, implement, and maintain the OHS management system?	X	
	Do these representatives report to top management on the performance of the OHS system for review and continuous improvement?	X	
4.4.2	Competence, Training, and Awareness		
	Have training needs been identified?	X	
	Has designated personnel received that training?	X	
	Does the staff whose tasks may impact occupational health and safety have the necessary competence or training?		X
4.4.2	Are procedures defined, established, and maintained to ensure that workers are aware of: (a) the importance of the OHS management system, (b) significant occupational health and safety impacts related to their work activities, including emergency response, (c) compliance with OHS policies and procedures?		X
4.4.3	Communication, Participation, and Consultation		
4.4.3.1	Communication		
	Are there procedures to ensure that relevant information reaches the appropriate employees in the organization?		X
	Are communications with involved personnel documented?		X
4.4.3.2	Participation and Consultation		
	Are workers involved in the analysis of policies and procedures for risk management? Are they consulted about any changes related to health and safety? Are they represented in health and safety matters?		X
4.4.4	Documentation		
	Does the organization establish and maintain information in appropriate media to describe the elements of the management system and their relationships? Is information and guidance on related documentation provided?	X	
4.4.5	Document Control		



Does the organization establish and maintain procedures for controlling all documents and data required by this checklist?	X	
The organization ensures that documents and data: (a) Can be located? (b) Are analyzed periodically and reviewed whenever necessary? (c) Are available at all premises with operations essential to the operation of the safety and health management system? (d) Removed in a timely manner in the case of obsolete documents and information? (e) Properly archived for legal purposes or to preserve their identification and knowledge?	X	

	If the organization uses equipment for monitoring and measurement, does it establish and maintain calibration and maintenance procedures? (b) Are calibration and maintenance activities, and results, recorded?		X
4.5.2	Legal Compliance Evaluation		
4.5.2.1	Does the organization (a) establish and maintain procedures for periodically evaluating compliance with applicable legal requirements? (b) Maintain records of compliance evaluations?		X
4.5.2.2	Does the organization (a) evaluate compliance with other subscribed requirements? (b) Maintain records?		X
4.5.3	Incident Investigation, Non-Conformity, Corrective and Preventive Actions		
	Incident Investigation		
4.5.3.1	Does the organization have procedures to define authority and responsibility for handling and investigating incidents? (a) Does it take measures to mitigate the consequences of incidents? (b) Does it initiate and complete corrective, preventive, and improvement actions?	X	X
	Non-Conformity, Corrective and Preventive Actions		
4.5.3.2	Does the organization establish and maintain procedures to address actual and potential non-conformities and to take corrective and preventive actions? Does the organization verify and confirm the effectiveness of corrective and preventive actions? Are records and communications of corrective, preventive actions and their effectiveness reviewed and communicated? Have changes in procedures as a result of corrective and preventive actions been documented? corrective and preventive?	X	X
	Record Control		
4.5.4	Does the organization establish and maintain procedures to identify, maintain, and dispose of occupational health and safety records, as well as audit and critical analysis results? (a) Are records legible and identifiable? (b) Do they allow tracking of involved activities? (c) Are they archived and maintained for easy retrieval and adequate protection?	X	X

Table 4. Checklist - Operational Control

	Operational Control		
	Has the organization distinguished operations and activities related to identified risks?	X	
	Has it established and maintained documented procedures?		X
4.4.6	Has it stipulated operational criteria in the procedures?		X
	Has it established and maintained procedures related to risks in goods, equipment, and services, communicating them to suppliers and contractors?		X
	Has it established and maintained procedures for the design of work areas, processes, facilities, equipment, including adaptations to human capacities?		X
	Emergency Preparedness and Response		
4.4.7	Does the organization establish and maintain plans and procedures to address incidents and emergencies?	X	
	Does the organization (a) analyze emergency preparedness and response plans, especially after incidents and emergencies? (b) Conduct periodic drills of such procedures?		X
4.5	Verification		
	Monitoring and Measurement		
	Does the organization establish and maintain procedures for periodically monitoring and measuring occupational health and safety performance?	X	
	Do these procedures ensure appropriate quantitative and qualitative measurements?		X
4.5.1	Is the monitoring of the achievement of occupational health and safety objectives conducted?	X	
	Is the conformity with occupational health and safety management programs monitored?		X
	Are measures in place to monitor accidents, illnesses, incidents, and other deficiencies in occupational health and safety performance?		X
	Are records of data and results from monitoring and measurement maintained?		X

Table 5. Checklist - Internal Audit

	Internal Audit		
	Does the organization establish and maintain a program and procedure for periodic audits of the occupational health and safety management system?	x	
C	Do the program and procedures allow for determining whether the management system: (a) Is in compliance with planned arrangements? (b) Has been properly implemented and maintained? (c) Is effective in relation to the policy and objectives?		x
	Does the program and procedures allow for: (a) Analyzing results of previous audits? (b) Providing audit results to top management?		x
	Is the program developed based on risk assessments and previous audits?		x



4.6	Do the procedures define the scope, frequency, and methodologies of audits, as well as responsibilities and reporting requirements?	x	
	Are audits conducted by personnel who are independent of the activities being evaluated?	x	
	Management Review		
	Does top management review and analyze the occupational health and safety management system periodically to ensure its appropriateness and effectiveness?		x
	Does top management have properly collected information to carry out the evaluation and analysis?		x
	Does top management evaluate the need for changes in the occupational health and safety management policy based on audit results of the management system?		x

The percentage of compliance with the requirements of the OHSAS 18001 standard at HG Laboratories is detailed below.

Clause	Item	Com	% Com	Analysis
4.1	Unique	No	0%	Does not have a system that meets all the requirements of this standard.
4.2	A	Yes	75%	Has a policy, but it does not provide a framework for setting objectives.
	B	No		
	C	Yes		
	D	No		
	E	Yes		
	F	Yes		
	G	Yes		
	H	Yes		
4.3				
4.3.1	1	No	0%	No procedures have been established for identifying hazards, assessing risks, and determining controls according to the requirements.
	2	No		
	3	No		
	4	No		
	5	No		
4.3.2	1	Yes	66,6%	Has a procedure for identifying requirements but does not communicate these requirements to workers and other stakeholders.
	2	Yes		
	3	No		
4.3.3	1	No	0%	No occupational health and safety programs have been implemented to achieve objectives considering each function and level of the organization, legal requirements, and other
	2	No		
	3	No		
	4	No		

	5	No		important standards.
4.4				
4.4.1	1	Yes	60%	Necessary resources have not been provided; staff lack sufficient skills.
	2	No		
	3	No		
	4	Yes		
	5	Yes		
4.4.2	1	Yes	50%	Personnel performing tasks with significant impacts have not received the necessary training; not all personnel are aware of the safety and health procedures.
	2	Yes		
	3	No		
	4	No		
4.4.3				
4.4.3.1	1	No	0%	No procedure exists to ensure that relevant information on OHS reaches workers.
	2	No		
4.4.3.2	1	No	0%	Employees are not involved in risk management analysis and any changes related to occupational health and safety.
	2	No		
4.4.4	1	Yes	50%	Not all elements of the OHS system and their relationships are described.
	2	No		
4.4.5	1	Yes	100%	Has a procedure for controlling all documents.
	2	Yes		
4.4.6	1	Yes	20%	No documented procedure specifies operational criteria and procedures for designing work areas, processes, facilities, and equipment, including adaptations to human capabilities.
	2	No		
	3	No		
	4	No		
4.4.7	1	Yes	50%	Plans and procedures for emergency preparedness and response are not analyzed, especially after incidents and emergencies.
	2	No		
4.5				
4.5.1	1	Yes	28,57 %	No appropriate quantitative and qualitative measurements are made, and compliance with OHS management programs is not monitored.
	2	No		
	3	Yes		
	4	No		
	5	No		
	6	No		
	7	No		



4.5.2	1	No	0%	No documented procedures are available for evaluating legal compliance.
	2	No		
4.5.3				
4.5.3.1	1	No	50%	No procedures are in place to define authority and responsibility for handling and investigating incidents.
	2	Yes		
4.5.3.2	1	Yes	100%	Has procedures for addressing non-conformities and taking preventive or corrective actions.
	2	Yes		
	3	Yes		
	4	Yes		
4.5.4	1	No	50%	Has procedures for identifying, maintaining, and disposing of records, but OHS records are not included.
	2	Yes		
4.5.5	1	Yes	100%	Has procedures for conducting audits, and audits are performed on safety issues.
	2	Yes		
	3	Yes		
	4	Yes		
	5	Yes		
	6	Yes		
4.6	1	No	0%	Top management does not review and analyze the OHS management system periodically, nor assess the need for changes in policy.
	2	No		
	3	No		
4.5.5	1	Yes	100%	Has procedures for conducting audits, and audits are performed on safety issues.
	2	Yes		
	3	Yes		
	4	Yes		
	5	Yes		
	6	Yes		
4.6	1	No	0%	Top management does not review and analyze the OHS management system periodically, nor assess the need for changes in policy.
	2	No		
	3	No		

Overall Compliance Level: 40.01%

4. Conclusions

Laboratories H.G., C.A. has an overall compliance level of 40.01% with the OHSAS 18001 standard requirements. With this result, the company is not eligible for certification audit.

The company needs to seek a methodological guide for implementing an occupational health and safety management system based on the OHSAS 18001 international standard.

By applying the proposed METHODOLOGICAL GUIDE FOR IMPLEMENTATION, the company will be able to achieve certification of the OHSAS 18001 standard and thus improve its processes regarding the health and safety of its workers.

References.

- [1] J. A. FRAGUELA FORMOSO, L. CARRAL COUCE, G. IGLESIAS RODRÍGUEZ, A. CASTRO PONTE and M. J. RODRÍGUEZ GUERREIRO, "LA INTEGRACIÓN DE LOS SISTEMAS DE GESTIÓN. NECESIDAD DE UNA NUEVA CULTURA EMPRESARIAL," vol. 78, no. 167, 2011.
- [2] F. L. Muñoz Salas, E. G. Pincay Parrales and F. J. Duque-Aldaz, "Propuesta para la implementación de la metodología 5 S en el área de talleres de la empresa Diseños Santana," Universidad de Guayaquil, Guayaquil, 2019.
- [3] J. M. Oyasa Nasimba, 2015. [Online]. Available: <https://repositorio.uta.edu.ec/jspui/bitstream/123456789/33967/1/T5188ig.pdf>.
- [4] S. Vásquez Artunduaga, J. C. Correa Ruiz and L. E. Hincapié Palmezano, "Medición del impacto en la rentabilidad dada la implementación de un sistema de gestión en seguridad y salud en el trabajo en la empresa americana de curtidos LTDA. & CIA. S.C.A.," vol. 20, no. 1, 2015.
- [5] E. Raffo Lecca, L. Ráez Guevara and O. Cachay Boza, "Riesgos psicosociales," vol. 16, no. 1, 2013.
- [6] S. Vinícius Bonato and C. Schwengber Ten Caten, "Diagnóstico da integração dos sistemas de gestão ISO 9001, ISO 14001 e OHSAS 18001," vol. 25, no. 3, 2015.
- [7] S. S. Alvarado Merchán, M. J. Chávez Tomalá and F. J. Duque-Aldaz, "Propuesta de optimización del proceso flexográfico de la empresa Flexoviteq mediante la metodología kaizen," Universidad de Guayaquil, Guayaquil, 2019.
- [8] F. J. Duque-Aldaz, M. A. Suriaga Sanchez, M. A. Rodríguez Gómez, G. E. Medina Pinoargote and R. J. Calderón Angulo, La Eficiencia y la Eficacia en Procesos Administrativos, Guayaquil: CIDEPRO, 2019.
- [9] I. A. López Puerto, "Efecto del programa de medicina preventiva bajo el sistema OHSAS 18001, sobre el riesgo cardiovascular en la Empresa Colombiana de Operaciones Petroleras," vol. 6, no. 1, 2014.
- [1] "eqssa.com," 2016. [Online]. Available: <http://eqssa.com/sistema-gestion-la-calidad/>.
- [1] O. L. Ocampo López, L. H. Vargas Barrera and K. L. Suárez
- [1] Giraldo, "Determinación de brechas estructurales en la integración de la responsabilidad social en empresas del sector textil-



confección de la región Centro-Sur de Caldas," vol. 24, no. 35, 2016.

- [1] "Cepal.org," diciembre 2015. [Online]. Available:
2] https://www.cepal.org/sites/default/files/publication/files/45005/RVE129_Medeiros.pdf.
- [1] J. H. Molano Velandia and N. Arévalo Pinilla, "De la salud ocupacional a la gestión de la seguridad y salud en el trabajo: más que semántica, una transformación del sistema general de riesgos laborales," vol. 23, no. 48, 2013.
- [1] OHSAS, "Traducción de la Norma OHSAS 18001:2007," 2007.
4] [Online]. Available:
<https://www.cip.org.ec/attachments/article/111/OHSAS-18001.pdf>.
- [1] T. P. Libonatti Madrid, "Gestión de la seguridad y la salud en el trabajo durante la construcción de obras de infraestructura vial en los departamentos de Atlántico, Magdalena y Bolívar," vol. 6, no. 1, 2014.
- [1] V. J. Lancheros Suarez, H. E. Hernández Riaño and J. R. Robles González, "Uso y difusión de Normas Técnicas relacionadas con Sistemas de Gestión en el sector de elaboración de productos alimenticios y de bebidas," vol. 13, no. 2, 2008.
- [1] H. Giacomello, M. A. Gonzalez Stumpf and A. Parisi Kern,
7] "Implementation of an integrated management system into a small building company," vol. 13, no. 3, 2014.