

Study of the factors that include the implementation of the EMS in a higher education institution in the State of Tabasco

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ABSTRACT

Population increasing is happening day by day in addition spaces are being decreasing little by little for these reasons natural resources are being consumed through time to the present. “If you cannot measure it, you cannot improve it.” “When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.” William Thompson. Due to its dynamic population and not having implemented an EMS based on the ISO 14001:2015 Standard, a higher-level educational establishment would not be in a position to take advantage of natural resources, further compromising these for future generations. An Environmental Management System works under 3 ways, social, environmental, economic, therefore its incidence in higher education establishments determines its application under the premise of being sustainable buildings.

Keywords: *environmental management system; risk analysis; environmental factors; environmental impact.*

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Estudio de los factores que inciden para la implemetación del SGA en una institución de educación superior del estado de Tabasco

RESUMEN

A través del tiempo hasta la actualidad, la población va en aumento cada día, y los espacios se van reduciendo poco a poco, lo que implica que haya un consumo de recursos sin medidas, “lo que no se puede medir no se puede controlar, y lo que no se puede controlar no se puede gestionar”, William Thomson Kelvin. Un plantel educativo de nivel superior, por ser una población dinámica, el no contar y no tener implementado un SGA con base a la Norma ISO 14001:2015, no estaría en las condiciones de aprovechar los recursos naturales a su vez comprometiendo estos para las generaciones futuras. Un Sistema de Gestión Ambiental trabaja bajo 3 ejes, social, ambiental económico, por lo que su incidencia en los planteles de educación de nivel superior determina su aplicación bajo la premisa de ser edificios sustentables.

Palabras clave: *sistema de gestión ambiental; análisis de riesgo; factores ambientales; impacto ambiental.*

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INTRODUCCTION

In 1987, The World Commission of Environment and Development (known as 'the Brundtland Commission') launched the 'Our Common Future' report with a call for a 'new charter' to establish 'new norms' to guide the transition to sustainable development.

The Earth Charter is an ethical framework for actions aimed at creating more just, sustainable and peaceful global society in the 21st century. It articulates a mindset of global interdependence and shared responsibility. It provides a vision of hope and a call to action.

Giving continuity to the Earth Charter, The Earth Summit held in 1992, organized by the United Nations (UN), inspired the creation of ISO 14001, being published for the first time in 1996, in 2004 the 2nd edition was published and the most recent edition in the year 2015; led by ISO 207, which addresses environmental impact and climate change, including social and economic aspects related to sustainable development.

In Mexico there are 1,452 organizations that have the ISO 14001 certificate, so all of them must make the transition to the new ISO 14001:2015. Mexico is growing very quickly, so the number of organizations that will have the ISO 14001:2015 standard will increase in a few years. (EUROPEAN SCHOOL OF EXCELLENCE, 2015).

The Quality Management System has made it possible to give order to the administrative, management and academic processes and procedures, which has resulted in the recognition of the quality of two of the Educational Programs offered at the institution, in addition to having a permanent culture of effectiveness, efficiency and continuous improvement. (MOLLINEDO, 2017).

Due to the concern and awareness of the care of the environment, the Higher Education schools of the country have offered to introduce the Environmental Engineering career, including Tabasco, because, based on the concern for the actions of the humankind on the environment causing side effects on it; and having as degree's objective: 'To promote ethical, analytical, critical and creative professionals in environmental engineering with the competence to identify, propose and solve environmental problems in a multidisciplinary way, ensuring the protection, conservation and improvement of the environment, under a legal framework , seeking sustainable development for the benefit of life on the planet.'

However, an educational establishment that shows a scenario with little or zero promotion of care for the environment, biodiversity and the sustainable environment, and outside the philosophy of the objective of the degree with an environmental focus, would lose credibility as a training institution.

Implementing an Environmental Management System, EMS, based on the ISO 14001 2015 Standard would give the image of a higher level educational establishment that is a leader in quality and with a sustainable perspective; it would commit to legal requirements and be in order with it and identify the environmental impacts associated with the activities and/or services it offers.

ISO 14001 has a high-level organization, with identical and common terms that facilitate its application and integration with other Standards, such as 9001, 45001, 27001, etc. As it provides benefits innovation, effectiveness and continuous improvement of performance, prestige, leadership and high credibility of a higher level educational establishment.

METHODOLOGY

This article shows which are the factors that affect decision-making for the implementation of an EMS in a higher education institution in Tabasco, Mex.

Beginning an exploratory and descriptive research on what the campus scenario is like, in various ways; The research outline has a qualitative approach to obtain data.

The main aspects necessary for the implementation of an EMS in the school, under 3 premises, the first being the context variables that affect the school (economics, politics, environmental, social, technological, environmental) and the incidence of factors that result as a second, and those factors involved within the campus linked to risk analysis, and third, having the ISO 14001:2015 Standard as a guide to implement in a Higher level campus.

The first stage is a description made with an environmental approach of the physical space of the campus, localization, and a detailed description of the place is carried out.

Important data that the campus must know to implement the EMS based on the ISO 14001:2015 standard are the identification of risks and opportunities related to environmental aspects; **as stated in the Standard in its numeral 6 Planning 6.1, 6.1 Actions to address risks and opportunities. 6.1.1 General.**

A risk analysis, from the perspective of experts in this stage are the factors that result in the brainstorming and then are classified by variable; from there, a binary evaluation of 0 and 1 is carried out, where 0 is null importance and 1 of great interrelated importance between factors.

In this brainstorming, 4 significant factors involved in the campus came out, which are shown below:

Chart 1. Chart of significant factors involved in the higher education campus.

No:	ENVIRONMENTAL FACTORS:	ACTIVITY:
1	Water consume	Cafeteria service, sanitary service, maintenance of green areas.
2	Electricity consume	Use of computer and printing equipment, stationery and photocopying service, teaching work, use of air conditioners, development of practices and research in laboratories and school workshops, lighting, audiovisual activities.
3	Urban solid waste generation	Teaching work, development of practices and research in laboratories and school workshops, extracurricular activities, cafeteria service, and maintenance.
4	Dangerous residues:	
	▪ Electrical equipment and materials waste	Lighting: equipment and/or work tools
	▪ Use of agrochemicals and pesticides	Development of practices and research in laboratories and school workshops
	▪ Infectious biological waste	Development of practices and research in laboratories and school workshops

Note: adapted from Matriz de aspectos ambientales desglosados, TecNM-GA-PR-01-01,

(https://www.tecnm.mx/?vista=Sistema_Gestion_Ambiental)

Once the significant factors, considered as risk, have been identified, an evaluation is carried out, where the level of risk is measured, as shown in the following chart:

Chart 2. Values for the measurement of environmental risk chart.

VALOR	MAGNITUD	PROBABILIDAD	VALORES	RIESGO
0	No SIGNIFICANT	The damage may not occur		
1	LOW	Damage will rarely occur	1-6	
2	MEDIUM	occasional damage	8-9	
3	HIGH	Damage will always happen	12-16	

Note: adapted from Matriz de aspectos ambientales desglosados, TecNM-GA-PR-01-01,

(https://www.tecnm.mx/?vista=Sistema_Gestion_Ambiental).

The identification of environmental aspects and their significant value is carried out using a double entry matrix. The columns are the environmental aspects according to the environmental factor involved within the campus, as shown below:

The evaluation method is as follows:

Magnitude, MG, Duration, DN, y Frequency, FR, will be evaluated with the options low, medium, high, having the equivalence of 1,2,3.

In each Aspect-criterion interrelation cell, the value that best qualifies for each criterion must be noted. When assigning the values, placing the pointer over the small triangle will help to identify the environmental impact derived from the environmental aspect.

In each activity there is a line in which the significance of each environmental aspect will be found according to the following formula: $(Mg+Dn)(Fr)$, the significance value will appear as values are assigned to the criteria. For example, an evaluated criterion, evaluating each of the 3 with the value of 1, the minimum value, applying the formula: $2; (1+1)(1)$ and in the case of assigning the maximum value, 3; would be $18 (3+3)(3)$.

At the time of giving a result, according to the condition assigned in the result cell, it would automatically show if it is a significant environmental aspect, "S" or if it is a non-significant environmental aspect "NS". (National Technology of Mexico, 2017).

Matrix for the identification of environmental aspects reference to the ISO Standard 14001:2015 6.1.2.

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Finally, taking Chart 2 as a guide, to determine the level of risk that each factor or environmental aspect of a campus has, will allow it to give priority to mitigating or controlling environmental impact.

Chart 3 *Result Matrix*

NO SIGNIFICANT	LOW	MEDIUM	HIGH
Dangerous residues:	•Electrical equipment and materials	Water waste with cleaning material	Electricity Consumption
	PAPER Consumption		Water Consumption
			Cleaning material Consumption
			Solvent and paint consumption
			Wastewater generation
			Urban waste

Source: self-made

Having in knowledge what are those factors that have an environmental impact and are of great incidence to be able to apply an EMS in a higher education institution in the state of Tabasco, Mexico. Only the following recommendations derive:

- If an Annual Work Plan requires to include the implementation of an EMS according to the requirements and demands of the ISO 14001:2015 Standard, an Environmental Management department or area should be considered.
- Scheduled evaluations, in order to update the environmental aspects that have been detected as high risk, with respect to the action plan to mitigate or control the environmental impact.
- Once established, the department or area of Environmental Management, with those in charge or those responsible for the area, carry out internal audits to have control and order of the Environmental Management System implemented, in order to anticipate a sanction or fine within the environmental legal framework.
- Training for all responsible personnel for the Environmental Management area, to reach those needs and goals proposed at the time of EMS implementation in an institution.
- Commitment and participation of senior management in the implementation of the institution's Environmental Management System.

CONCLUSION

An EMS promotes the responsibilities of the management and of each element of the campus, in the protection of the environment, carrying out life cycles of services that do not have a negative influence, generating systems that allow the achievement of the proposed environmental objectives and constant evaluation of the results obtained by this implementation of the ISO 14001 2015 Standard.

ISO 14001 has a high-level organization, with identical and common terms that facilitate its application and integration with other Standards, such as 9001, 45001, 27001, etc. Same that provides benefits innovation, efficiency and continuous improvement of performance, prestige, leadership and high credibility to the organization that implements it according to the requirements and demands that it establishes.

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