Article **Journal Education Sciences**
June, 2023 Vol.7 No.17 1-14

Environmental performance as a factor of social responsibility in higher education

El desempeño ambiental como factor de la responsabilidad social en la educación superior

MARTÍNEZ-CASTELLANOS, María Elena†*, ORTEGA-CHÁVEZ, Laura Antonia, HERNÁNDEZ-RODRÍGUEZ, María Guadalupe and RICO-RAMOS, Nidia Yasmina

Tecnológico Nacional de México/Instituto Tecnológico de Chihuahua II

ID 1st Author: *María Elena, Martínez-Castellanos* / **ORC ID**: 0000-0002-5777-0482, **CVU CONAHCYT ID**: 301645

ID 1st Co-author: *Laura Antonia Ortega-Chávez* / **ORC ID**: 0000-0001-7860-1277, **CVU CONAHCYT ID**: 45500

ID 2nd Co-author: *María Guadalupe, Hernández-Rodríguez*/ **ORC ID**: 0000-0001-7278-7699, **CVU CONAHCYT ID**: 1159049

ID 3rd Co-auhtor: *Nidia Yasmina, Rico-Ramos* / **ORC ID**: 0000-0003-2588-3658, **CVU CONAHCYT ID**: 603293

DOI: 10.35429/JESC.2022.17.7.1.14 Received: January 04, 2023; Accepted June 22, 2023

Abstract

The objective of this work is to perform a trend analysis of the indicators and evaluate the actions taken during the period from 2012 to 2022, to make decisions based on facts and establish improvement actions that increase the environmental performance of the Instituto Tecnológico de Chihuahua II; Considering that the environment is an axis of sustainability and social responsibility that every organization or institution must have, with the purpose of increasing the management of natural resources, implementing innovative solutions and contributing to sustainable development. This project is based on the analysis of historical data collected during the period to be considered, observing general trends that show positive environmental performance, with significant decreases in electricity consumption and drinking water, regardless of the atypical behavior observed during the COVID-19 pandemic. It is sought that the results obtained from the analysis carried out, allow to establish new strategies that lead to increase the environmental performance of the Institute, as well as to show the relationship between environmental performance and social responsibility of the institute, taking into account the axes established in the Network of the Global Compact of the United Nations 2013.

Environmental Performance, social responsibility, Global Compact 2013

Resumen

El objetivo del presente trabajo es realizar un análisis de tendencias de los indicadores y evaluar las acciones tomadas durante el periodo del año 2012 al 2022, para tomar decisiones basadas en hechos y establecer acciones de mejora que incrementen el desempeño ambiental del Instituto Tecnológico de Chihuahua II; considerando que el medio ambiente es un eje de la sustentabilidad y la responsabilidad social que toda organización o institución debe tener, con el propósito de aumentar la administración de los recursos naturales, implementar soluciones innovadoras y contribuir al desarrollo sostenible. Este proyecto se basa en el análisis de los datos históricos recopilados durante el período a considerar, observando tendencias generales que muestran un desempeño ambiental positivo, con decrementos importantes en el consumo de energía eléctrica y agua potable, independientemente del comportamiento atípico observado durante la pandemia por COVID-19. Se busca que los resultados obtenidos del análisis realizado, permitan establecer estrategias nuevas que conduzcan a incrementar el desempeño ambiental del Instituto, así como mostrar la relación entre el desempeño ambiental y la responsabilidad social del instituto, tomando en cuenta los ejes establecidos en la Red del Pacto Mundial de la Naciones Unidas 2013.

Desempeño Ambiental, responsabilidad social, Pacto Mundial 2013

Citation: MARTÍNEZ-CASTELLANOS, María Elena, ORTEGA-CHÁVEZ, Laura Antonia, HERNÁNDEZ-RODRÍGUEZ, María Guadalupe and RICO-RAMOS, Nidia Yasmina. Environmental performance as a factor of social responsibility in higher education. Journal Education Sciences. 2023. 7-17: 1-14

* Author Correspondence (e-mail: maria.mc@chihuahua2.tecnm.mx)
† Researcher contributing as first author.

1. Introduction

The Tecnológico Nacional de México campus Chihuahua II with the aim of strengthening the care of the environment in the technological community, acquires the commitment to establish, implement and maintain the Environmental Management System (EMS) according to the ISO 14001 standard; to achieve this certification, it joins the Multisite Group of the Tecnológico Nacional de México, obtaining this certification in 2012. The operational control of the Environmental Management System (EMS) is established by four environmental programs: 1) rational and effective use of electricity, 2) rational and effective use of water, 3) integral management of municipal solid waste, and 4) integral management of hazardous waste, which have annual indicators established in the Master Plan of the EMS, To comply with these indicators, institutional actions are established.

Another of the commitments established by the institute was to develop a program of social responsibility actions, which are aligned with the axes of the Mexico Network of the United Nations (UN) Global Compact, of which the campus is a participant.

The present work is a first phase of a global project, which aims to carry out an analysis of the historical data of the environmental programs of the EMS, as well as the trends of the indicators and evaluate the strategies implemented during the period between the years 2012 to 2022, to make decisions based on facts, and establish improvement actions that increase the environmental performance of the Institute; Considering that the environment is an axis of sustainability and social responsibility that every organization or institution must have, with the purpose of increasing the management of natural resources, implementing innovative solutions and contributing to sustainable development.

In this first phase, environmental programs for the rational and efficient use of electrical energy and the rational and efficient use of water are addressed. The second phase will include the remaining environmental programs of integrated management of municipal solid waste and integral management of hazardous waste.

The assumption of the research is that the environmental performance of the Institute is a factor that significantly impacts its social responsibility, this responsibility seeks the balance between the environment, society and the economy, considering it essential to meet the needs of the present without jeopardizing the capacity of future generations.

In addition, the project is proposed as a strategy to comply with the provisions of the PDI TecNM Institutional Development Program 2019-2024.

The Institute with an optimal operation of the Environmental Management System (EMS) and its active participation in the UN Compact Network, ratifies the commitment to offer an education under the principles of globalization and sustainability, achieving a culture of environmental care as a factor of social responsibility in the technological community, making this a lifestyle for future generations.

2. Theoretical Framework

When we talk about the environment as a way of life, we assume cultural forms that identify us and allow us to maintain, reproduce or transform the systems in which we develop. Achieving an environmental vision of the world from which the important and fundamental thing is the use of nature for the good of man, to live in harmony, without compromising future generations (Molano and Herrera, 2014).

The environmental management system is a holistic system, which brings together strategy and management with a global and participatory sense, adjusting perfectly to new concepts in environmental matters and interaction with human beings.

An Environmental Management System based on ISO 14001:2015 aims to provide organizations and institutions with a reference framework to protect the environment and respond to changing environmental conditions, in balance with socio-economic needs. This standard specifies requirements that allow an organization and institution to achieve the intended results it has established for its environmental management system (ISO 14001: 2015).

ISSN: 2523-2436

A systemic approach to environmental management can provide information to senior management to generate long-term success and create options to contribute to sustainable development by:

- Protection of the environment by preventing or mitigating adverse environmental impacts;

- Mitigation of potentially adverse effects of environmental conditions on the organization;

- Supporting the organization in complying with legal and other requirements;

- Improving environmental performance;

- Control or influence over the way in which the organization designs, manufactures, distributes, consumes and carries out the final disposal of products or services, using a life-cycle perspective that can prevent environmental impacts from being unintentionally transferred to another point in the life cycle;

- The achievement of financial and operational benefits that may result from implementing environmentally friendly alternatives that strengthen the organization's position in the market;

- Communication of environmental information to relevant stakeholders.

The basis underlying the improvement of an environmental management system is based on the concept of Plan, Do, Verify and Act (PHVA). The PHVA model provides an iterative process used by organizations to achieve continuous improvement. It can be applied to an environmental management system and each of its individual elements, and can be briefly described as follows:

- Plan: establish the environmental objectives and processes necessary to generate and deliver results in accordance with the organization's environmental policy.

- Do: implement processes as planned.

- Verify: monitor and measure processes with respect to environmental policy, including its commitments, environmental objectives and operational criteria, and report on their results.

- Act: take action to continuously improve.

Societal expectations for sustainable development, transparency, responsibility and accountability have evolved in the context of increasingly stringent legislation, increasing pressures regarding environmental pollution, inefficient use of resources, inappropriate waste management, climate change, ecosystem degradation and biodiversity loss. This has led organizations and institutions to adopt a systemic approach to environmental management through the implementation of environmental management systems, which aim to contribute to the "environmental pillar" of sustainability (ISO 14001:2015).

When we talk about the environment as a way of life, we assume cultural forms that identify us and allow us to maintain, reproduce or transform the systems in which we develop. Achieving an environmental vision of the world from which the important and fundamental thing is the use of nature for the good of man, to return to live in harmony within their networks.

This is an urgently equitable position with the land, its species and its conditions. Therefore, the environmental as a way of life necessarily implies a posture of equality, trust, respect and two directions with all the elements of the environment.

It is of utmost interest to improve environmental performance, as well as the environmental, cultural and economic impacts of learning. The importance of analyzing the variables that impact the educational service by having a potential risk to health and environmental performance can influence it. The findings revealed that the push factor (environmental threat) is significantly related to perceived benefits. Pull factors (e-learning motivation, perceived information sharing, and social distancing) significantly impact student benefits. (Ali *et al*., 2021).

ISSN: 2523-2436

Environmental training is the result of those cultural agreements that are established, first in a society, and then in a particular institution of society such as, in this case, the university and as an important factor of social responsibility (Peñafiel and Vallejo, 2018).

This means that environmental training is committed to understanding the present and continuous world.

Higher education has been a central institution in the processes of globalization and internationalization given its direct connection with the production and dissemination of knowledge, as well as in the development of science and technology, which is increasingly recognized for its contribution to the economy by applying the principles of sustainable development (Stromquist, 2008).

The Global Compact Network in its four axes integrates ten principles, aims at sustainability (UN, 2013).

The ten principles are mentioned below:

Human Rights

1. Support and respect the protection of human rights
2. Not being complicit in human rights abuses

Labor Standards

1. Freedom of association and the right to collective bargaining
2. Eliminate forced labor
3. Abolish child labour
4. Eliminate discrimination in work and occupation.

Environment

1. Supporting the preventive approach to environmental challenges
2. Promote greater environmental responsibility
3. Encourage the development and diffusion of environmentally friendly technologies.
4. Anti-corruption.

3. Methodology

The project is carried out using the scientific method, the research is descriptive, is carried out at the Technological Institute of Chihuahua II, covers the period 2012 to 2022; through the use of historical data and an analysis of trends of the indicators established in the Master Plan of the GHS that cover the same period, the actions established to achieve these indicators are evaluated, finally strategic actions based on facts are established, which are aligned with the axis of "Environment" of the UN Global Compact, which will later be registered in the "Logra" platform (second phase), a tool that allows the implementation of innovative solutions to sustainable development as part of social responsibility.

4. Results

4.1 Rational and efficient use of electrical energy

Since of 2012, a monitoring program and visual aids have been implemented for the operational control of electricity consumption, as well as energy performance. The Technological Institute of Chihuahua II has three meters, from which monthly data is collected and analyzed to determine energy performance. These meters are presented in the following table with the areas it manages.

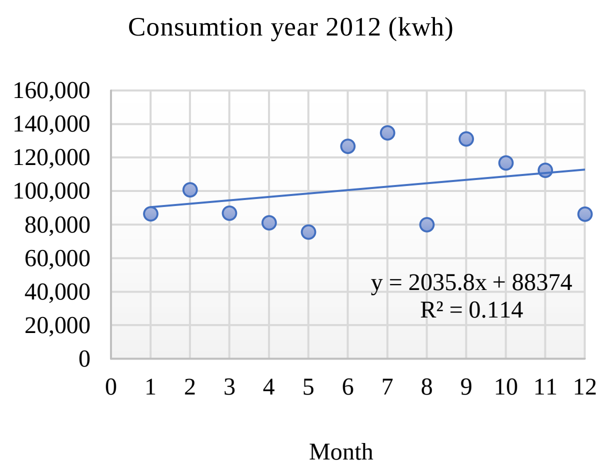
Meter key	Buildings and managed areas
Y574M8	Administrative, Basic Sciences Linkage, Languages, Academic Development, Systems, Industrial, Library, Computer Science Industrial workshop and buildings. B, D, E, F, G
579AJ8	M, O, R
9E2H94	Gymnasium

Table 1 Meter and Area it manages
Source: Authors

The following tables show the global consumption of electricity from the years 2012 to 2014, the years from 2015 to 2022 are presented in the annex. The graphs corresponding to the electricity consumption are also included, performing a Linear Regression analysis to visualize the trends.

Electricity consumption in 2012			
No.	Month	Consumption (kWh).	Cost of electric energy
1	January	86,546	203,811
2	February	100,816	197,227
3	March	86,800	189,797
4	April	81,192	177,856
5	May	75,688	166,642
6	June	126,848	245,752
7	July	134,744	252,675
8	August	79,936	178,069
9	September	131,200	258,254
10	October	116,824	227,110
11	November	112,408	206,516
12	December	86,280	181,092
		1,219,282	2,484,801

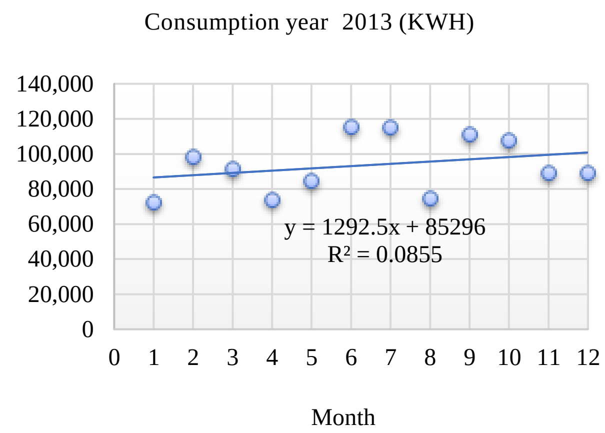
Table 2 Electricity consumption 2012
Source: Authors



Graphic 1 Electricity consumption 2012
Source: Authors

Electricity consumption in 2013			
No.	Month	Consumtion (KWh).	Cost of electric energy
1	January	72,568	153,677
2	February	98,552	208,968
3	March	91,608	187,427
4	April	73,936	158,360
5	May	84,680	166,197
6	June	115,472	246,658
7	July	115,232	236,053
8	August	74,704	158,233
9	September	111,296	227,733
10	October	107,856	217,002
11	November	89,280	188,477
12	December	89,181	222,202
		1,124,365	2,370,987

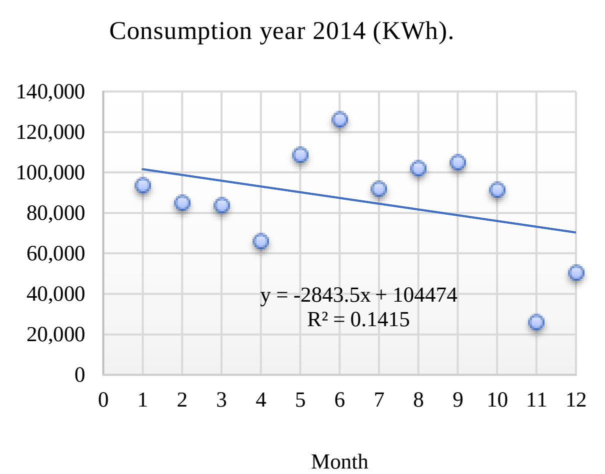
Table 3 Electricity consumption 2013
Source: Authors



Graphic 2 Electricity consumption 2013
Source: Authors

Electricity consumption in 2014			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	93,743	165,614
2	February	85,230	163,894
3	March	83,964	141,889
4	April	66,008	121,290
5	May	108,918	193,025
6	June	126,465	190,052
7	July	92,030	150,867
8	August	102,237	160,524
9	September	105,054	166,014
10	Octobe	91,627	138,458
11	November	26,077	109,037
12	December	50,538	190,678
		1,031,891	1,891,342

Table 4 Electricity consumption 2014
Source: Authors

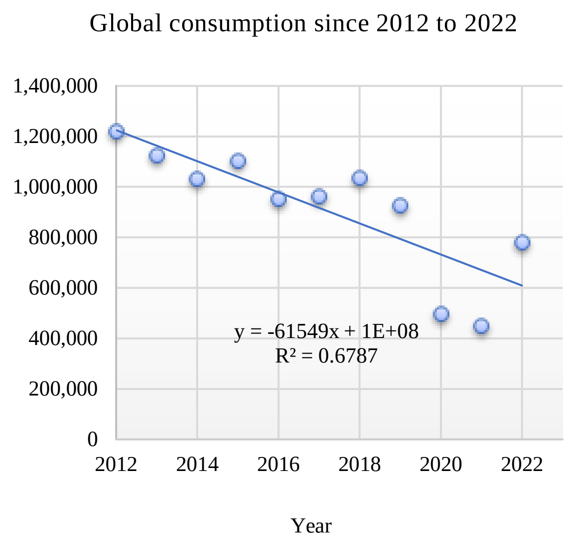


Graphic 3 Electricity consumption 2014
Source: Authors

Below is the global consumption of electrical energy from 2011 to 2022, the year 2011 is included as a reference to be able to calculate efficiency in the analyzed period.

Global consumption	
Year	Consumption
2011	1,218,296
2012	1,219,282
2013	1,124,365
2014	1,031,891
2015	1,104,676
2016	952,238
2017	964,187
2018	1,036,582
2019	927,425
2020	497,631
2021	449,523
2022	779,667

Table 5 Global electricity consumption
Source: Authors



Graphic 4 Global electricity consumption
Source: Authors

It can be seen that the consumption of electrical energy has decreased during the years analyzed, thanks to the measures implemented. As reported by Kholaif and Ming (2022), the lockdown experienced during the COVID 19 contingency provided opportunities to bring back green practices in general in the supply chain and a moderating effect of the Social Responsibility of organizations (including educational institutions) on the fear-uncertainty that was experienced.

These atypical years were taken into account due to the contingency due to COVID 19 (2020, 2021 and the first quarter of 2022), which, due to the absence of activity, generated low energy consumption, but even so, the trend in previous and subsequent years is downward.

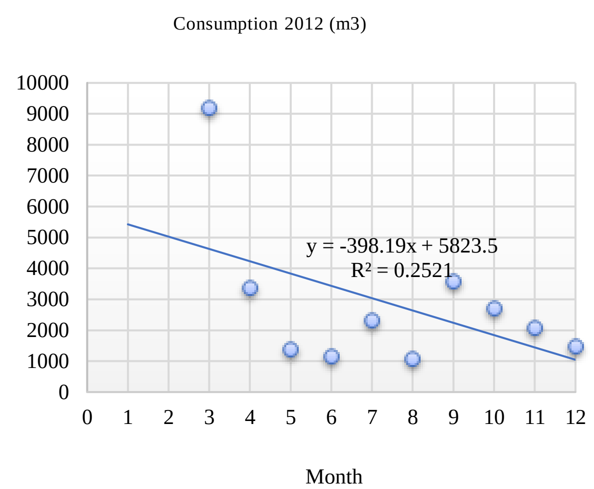
4.2 Rational and efficient use of water

There is information on historical consumption of drinking water since 2010, but data were taken from 2012. It is from this date, that a program of preventive maintenance and monitoring of leaks is implemented for the operational control of water consumption.

Below are the drinking water consumption from 2012 to 2014 presented in tables and graphs in which the trend of this variable can be visualized through each year considered. The data and graphs for the years 2015 to 2022 are presented in the annex.

Drinking water consumption in 2012			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	-	$17.92
2	February	-	$17.92
3	March	Accum 9188	$17.92
4	April	3377	$17.92
5	May	1380	$17.92
6	June	1160	$17.92
7	July	2319	$17.92
8	August	1084	$17.92
9	September	3587	$17.92
10	October	2705	$17.92
11	November	2090	$17.92
12	December	1481	$17.92
		28371	

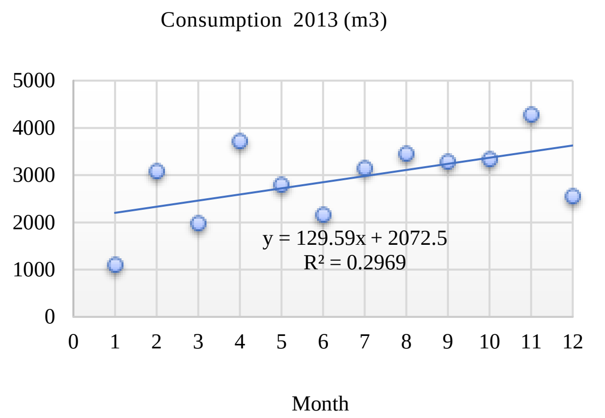
Table 6 Drinking water consumption 2012
Source: Authors



Graphic 5 Drinking water consumption 2012
Source: Authors

Drinking water consumption in 2013			
No.	**Month**	**Consumption (m³)**	**Cost per m³ of water consumed**
1	January	1108	$17.92
2	February	3090	$17.92
3	March	1983	$17.92
4	April	3728	$17.92
5	May	2804	$17.92
6	June	2167	$17.92
7	July	3154	$17.92
8	August	3464	$17.92
9	September	3289	$17.92
10	October	3338	$17.92
11	November	4290	$17.92
12	December	2563	$17.92
		34978	

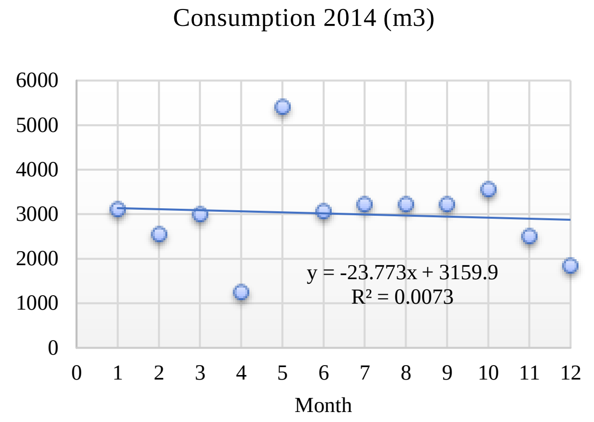
Table 7 Drinking water consumption 2013
Source: Authors



Graphic 6 Drinking water consumption 2013
Source: Authors

Drinking water consumption in 2013			
No.	**Month**	**Consumption (m³)**	**Cost per m³ of water consumed**
1	January	3117	$17.92
2	February	2559	$17.92
3	March	3005	$17.92
4	April	1259	$17.92
5	May	5414	$17.92
6	June	3069	$17.92
7	July	3232	$17.92
8	August	3232	$17.92
9	September	3234	$17.92
10	October	3572	$17.92
11	November	2517	$17.92
12	December	1855	$17.92
		36065	

Table 8 Drinking water consumption 2014
Source: Authors

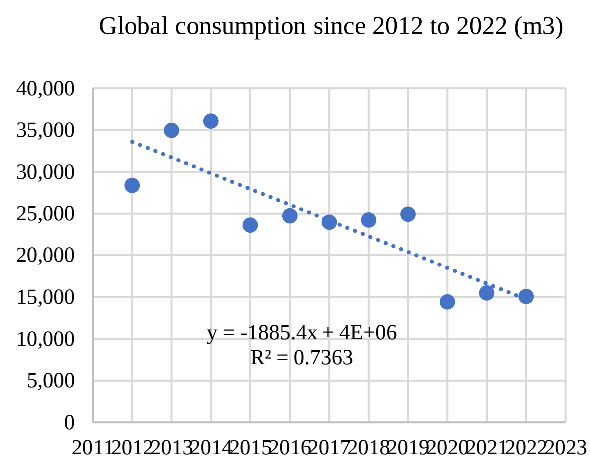


Graphic 7 Drinking water consumption 2014.
Source: Authors

The global consumption of drinking water from 2012 to 2022 is showing in Table 8, also including the graph corresponding to the period considered.

Global Consumption	
Year	Consumption
2012	28,371
2013	34,978
2014	36,065
2015	23,603
2016	24,745
2017	23,966
2018	24,243
2019	24,924
2020	14,412
2021	15,480
2022	15,054

Table 9 Global drinking water consumption
Source: Authors



Graphic 8 Global drinking water consumption
Source: Authors

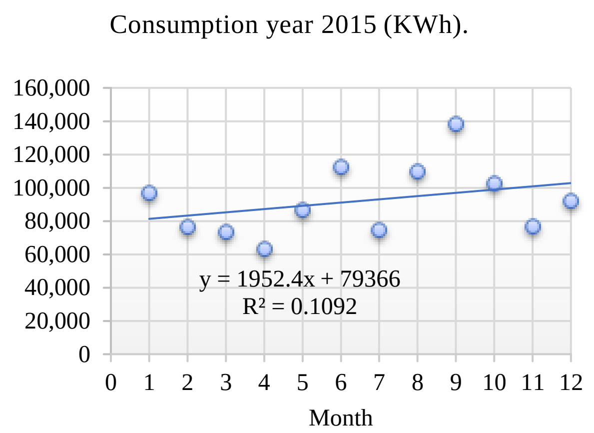
As in the case of electricity consumption, water consumption also shows a decreasing trend through the period analyzed, regardless of the atypical years that occurred due to the contingency of COVID-19.

ISSN: 2523-2436

5. Annexes

Electricity consumption in 2015			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	97,066	201,631
2	February	76,597	164,896
3	March	73,612	137,304
4	April	63,301	112,963
5	May	86,871	150,661
6	June	112,644	178,936
7	July	74,638	127,257
8	August	109,928	184,954
9	September	138,324	233,465
10	October	102,661	173,445
11	November	76,756	139,941
12	December	92,278	158,261
		1,104,676	1,963,714

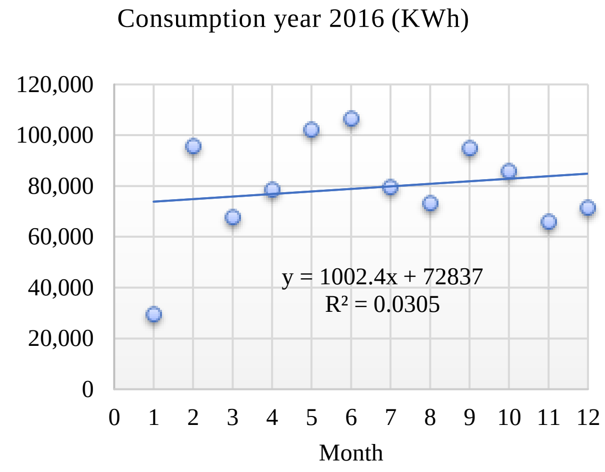
Table A1 Electricity consumption 2015
Source: Authors



Graphic A1 Electricity consumption 2015.
Source: Authors

Electricity consumption in 2016			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	29,592	175,364
2	February	95,805	183,840
3	March	67,773	124,111
4	April	78,770	134,105
5	May	102,343	160,696
6	June	106,536	162,890
7	July	79,713	138,115
8	August	73,315	135,663
9	September	94,952	189,285
10	October	86,021	167,118
11	November	65,944	127,503
12	December	71,474	169,904
		952,238	1,868,594

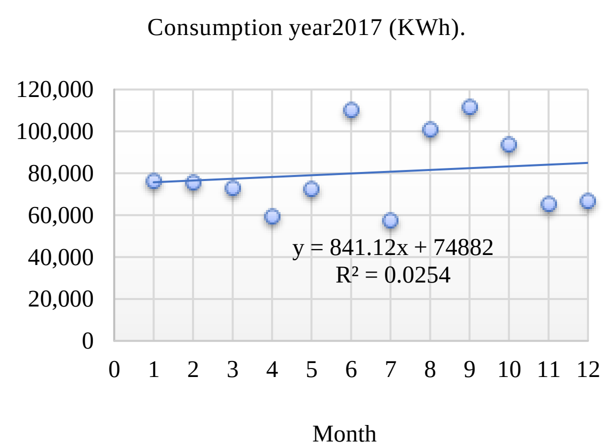
Table A2 Electricity consumption 2016
Source: Authors



Graphic A2 Electricity consumption 2016
Source: Authors

Electricity consumption in 2017			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	76,335	190,380
2	February	75,760	186,458
3	March	73,115	198,097
4	April	59,570	169,864
5	May	72,708	218,888
6	June	110,214	238,289
7	July	57,622	140,686
8	August	101,090	215,225
9	September	111,669	226,840
10	October	93,906	194,626
11	November	65,340	151,781
12	December	66,858	199,395
		964,187	2,330,529

Table A3 Electricity consumption 2017
Source: Authors

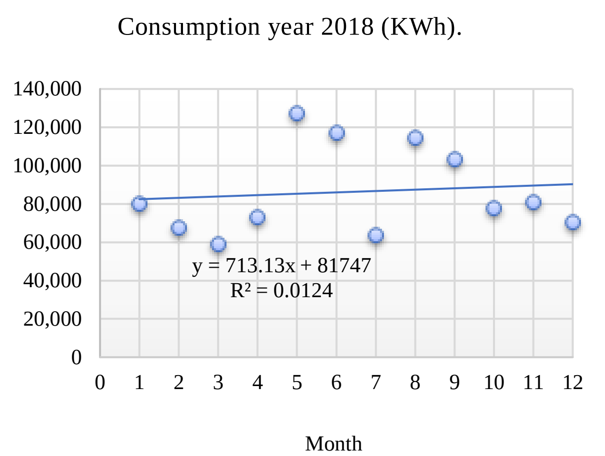


Graphic A3 Electricity consumption 2017
Source: Authors

ISSN: 2523-2436

Electricity consumption in 2018			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	80,235	74,122
2	February	67,850	120,056
3	March	59,132	110,837
4	April	73,367	152,265
5	May	127,301	283,568
6	June	117,202	279,951
7	July	63,832	171,370
8	August	114,661	347,714
9	September	103,392	349,517
10	October	77,777	259,812
11	November	81,162	270,749
12	December	70,671	191,418
		1,036,582	2,611,379

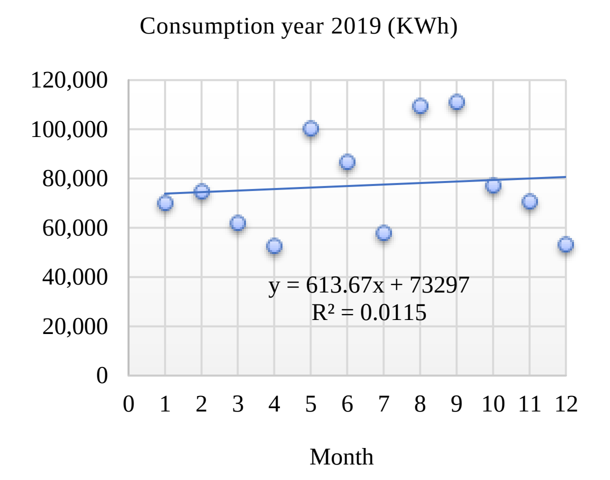
Table A4 Electricity consumption 2018. Source: Authors.



Graphic A4 Electricity consumption 2018
Source: Authors

Electricity consumption in 2019			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	70,307	192,256
2	February	74,912	212,102
3	March	62,043	170,050
4	April	52,706	146,353
5	May	100,389	280,870
6	June	86,808	238,148
7	July	57,946	164,399
8	August	109,527	300,897
9	September	111,219	296,329
10	October	77,356	205,278
11	November	70,772	192,815
12	December	53,440	143,978
		927,425	2,543,475

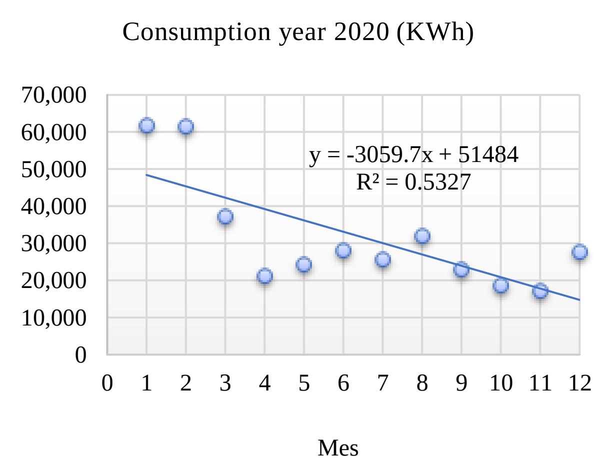
Table A5 Electricity consumption 2019
Source: Authors



Graphic A5 Electricity consumption 2019
Source: Authors.

Electricity consumption in 2020			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	61,872	209,839
2	February	61,584	219,202
3	March	37,344	136,846
4	April	21,264	81,096
5	May	24,360	84,480
6	June	28,152	97,378
7	July	25,752	86,171
8	August	32,040	106,528
9	September	23,040	81,411
10	October	18,768	78,367
11	November	17,232	70,081
12	December	27,744	96,195
		379,152	1,347,594

Table A6 Electricity consumption 2020
Source: Authors

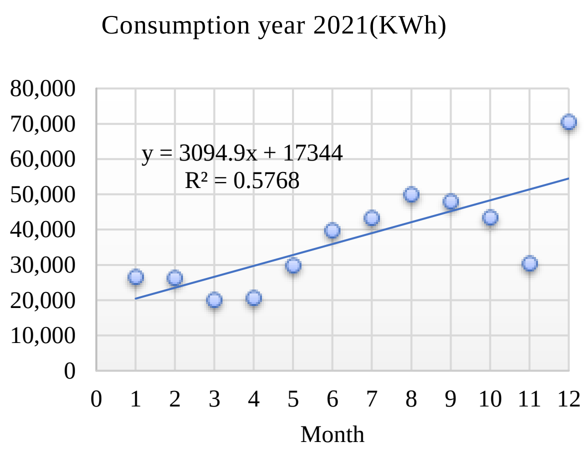


Graphic A6 Electric power consumption 2020
Source: Authors

ISSN: 2523-2436

Electricity consumption in 2021			
No.	Month	Consumption (KWh).	Cost of electric energy
1	January	26,629	69,348
2	February	26,304	71,167
3	March	20,163	54,134
4	April	20,661	57,654
5	May	29,987	81,613
6	June	39,745	111,625
7	July	43,426	121,420
8	August	50,045	138,331
9	September	47,995	129,439
10	October	43,484	115,551
11	November	30,454	86,450
12	December	70,630	111,127
		449,523	1,147,859

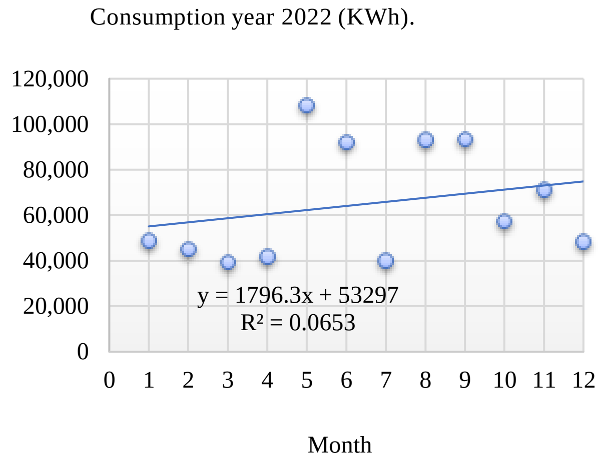
Table A7 Electricity consumption 2021
Source: Authors



Graphic A7 Electricity consumption consumption 2021
Source: Authors

Electricity consumption in 2022			
No.	Month	Consumption (KWh).	Cost of electric energy
1	Januay	49,014	133,734
2	February	45,208	126,656
3	March	39,362	109,026
4	April	41,755	120,738
5	May	108,413	300,675
6	June	92,244	250,126
7	July	40,096	111,987
8	August	93,227	271,731
9	September	93,315	260,907
10	October	57,414	149,662
11	November	71,254	209,381
12	December	48,365	139,101
		779,667	2,183,724

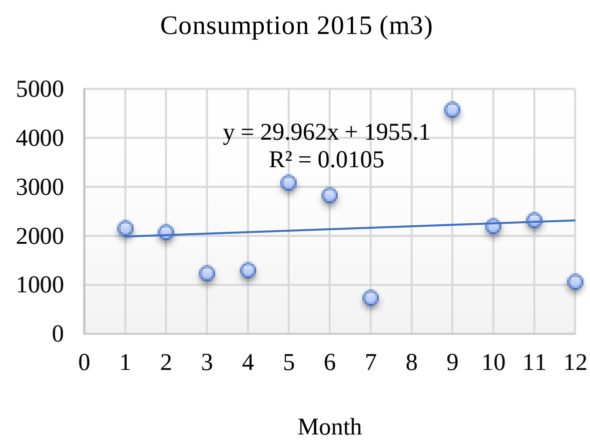
Table A8 Electricity consumption 2022
Source: Authors



Graphic A8 Electric power consumption 2022
Source: Authors

Drinking water consumption in 2015			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2155	$17.92
2	February	2077	$17.92
3	March	1238	$17.92
4	April	1302	$17.92
5	May	3090	$17.92
6	June	2830	$17.92
7	July	744	$17.92
8	August		$17.92
9	September	4582	$17.92
10	October	2199	$17.92
11	November	2317	$17.92
12	December	1069	$17.92
		23603	

Table A9 Drinking water consumption 2015
Source: Authors

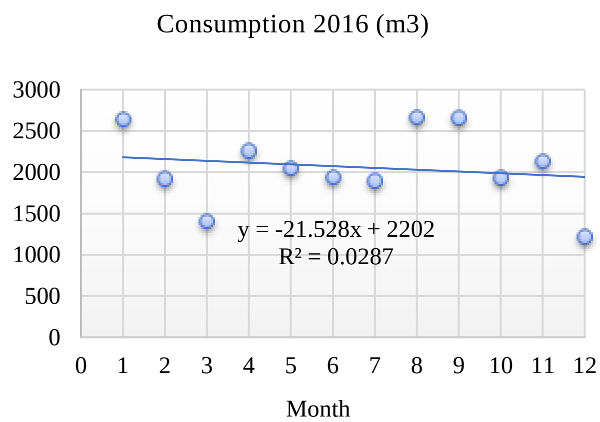


Graphic A9 Drinking water consumption 2015
Source: Authors

ISSN: 2523-2436

Drinking water consumption in 2016			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2640	$17.92
2	February	1919	$17.92
3	March	1410	$17.92
4	April	2261	$17.92
5	May	2054	$17.92
6	June	1942	$17.92
7	Juliy	1897	$17.92
8	August	2667	$17.92
9	September	2659	$17.92
10	October	1935	$17.92
11	November	2138	$17.92
12	December	1223	$17.92
		24745	

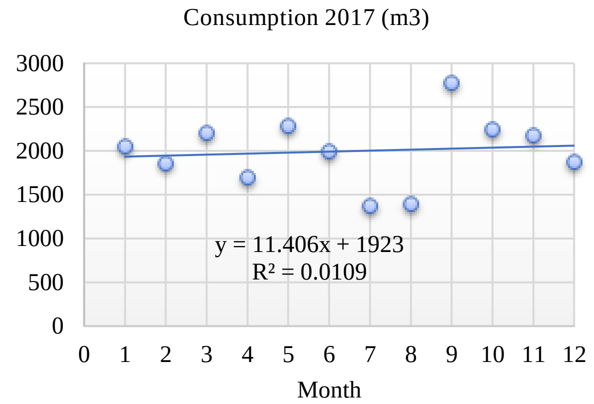
Table A10 Drinking water consumption 2016
Source: Authors



Graphic A10 Drinking water consumption 2016
Source: Authors

Drinking water consumption in 2017			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2054	$17.92
2	February	1862	$17.92
3	March	2209	$17.92
4	April	1699	$17.92
5	May	2290	$17.92
6	June	1998	$17.92
7	July	1377	$17.92
8	August	1396	$17.92
9	September	2779	$17.92
10	October	2246	$17.92
11	November	2179	$17.92
12	Deember	1877	$17.92
		23966	

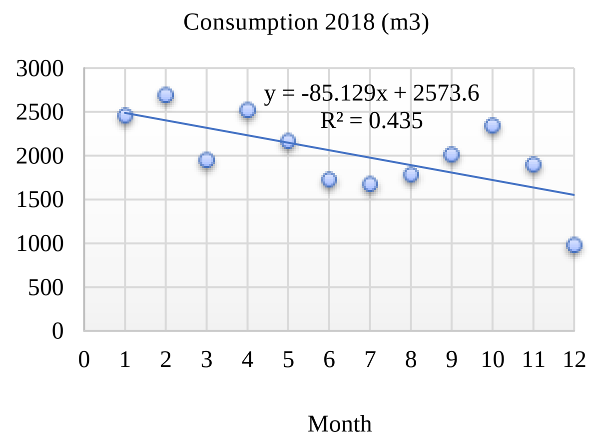
Table A11 Drinking water consumption 2017
Source: Authors



Graphic A11 Drinking water consumption 2017. Source: Authors.

Drinking water consumption in 2018			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2459	$17.92
2	February	2698	$17.92
3	March	1952	$17.92
4	April	2522	$17.92
5	May	2167	$17.92
6	June	1729	$17.92
7	July	1680	$17.92
8	August	1788	$17.92
9	September	2014	$17.92
10	October	2349	$17.92
11	November	1902	$17.92
12	December	983	$17.92
		24243	

Table A12 Drinking water consumption 2018
Source: Authors

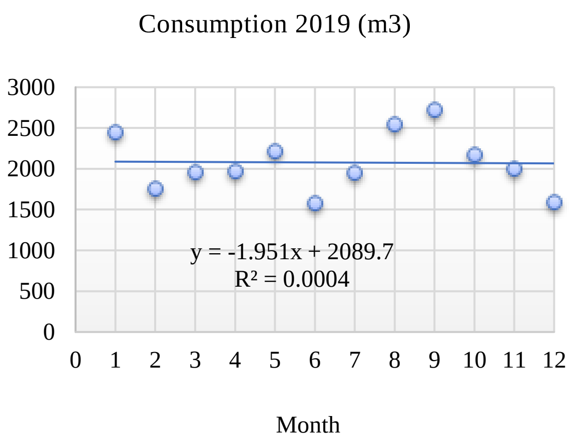


Graphic A12 Drinking water consumption 2018
Source: Authors.

ISSN: 2523-2436

Drinking water consumption in 2019			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2448	$17.92
2	Februar	1756	$17.92
3	March	1959	$17.92
4	April	1970	$17.92
5	May	2219	$17.92
6	June	1579	$17.92
7	July	1952	$17.92
8	August	2546	$17.92
9	September	2725	$17.92
10	October	2177	$17.92
11	November	2002	$17.92
12	December	1591	$17.92
		24924	

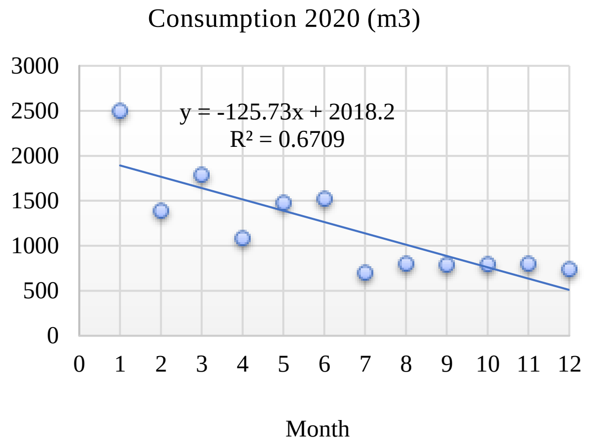
Table A13 Drinking water consumption 2019. Source: Authors.



Graphic A13 Drinking water consumption 2019
Source: Authors

Drinking water consumption in 2020			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	2498	$17.92
2	February	1395	$17.92
3	March	1790	$17.92
4	April	1089	$17.92
5	May	1478	$17.92
6	June	1525	$17.92
7	July	705	$17.92
8	August	802	$17.92
9	September	789	$17.92
10	October	798	$17.92
11	November	803	$17.92
12	December	740	$17.92
		14412	

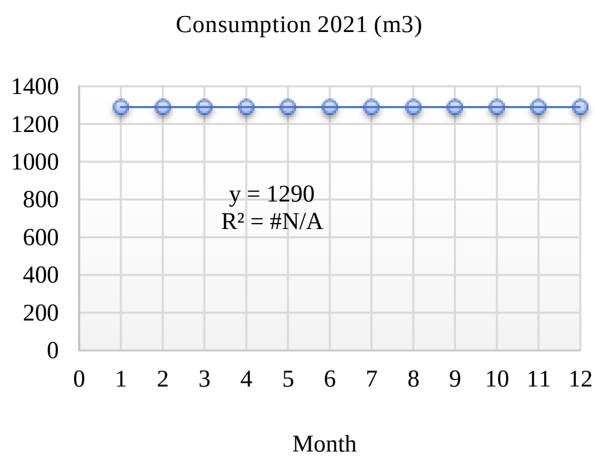
Table A14 Drinking water consumption 2020
Source: Authors



Graphic A14 Drinking water consumption 2020
Source: Authors

Drinking water consumption in 2021			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	1290	$18.16
2	February	1290	$18.16
3	March	1290	$18.16
4	April	1290	$18.16
5	May	1290	$18.16
6	June	1290	$18.16
7	July	1290	$18.16
8	August	1290	$18.16
9	September	1290	$18.16
10	October	1290	$18.16
11	November	1290	$18.16
12	December	1290	$18.16
		15480	

Table A15 Drinking water consumption 2021
Source: Authors

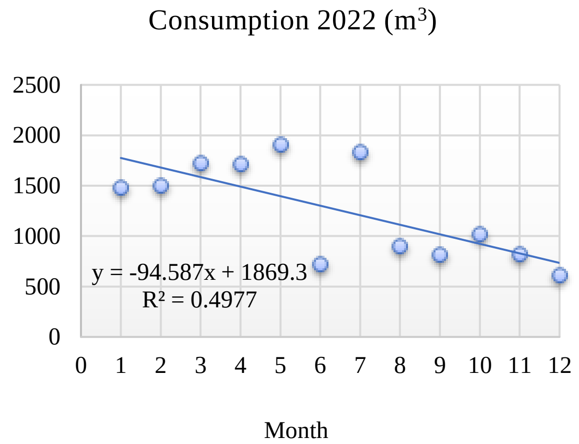


Graphic A15 Drinking water consumption 2021
Source: Authors

ISSN: 2523-2436

Drinking water consumption in 2022			
No.	Month	Consumption (m^3)	Cost per m^3 of water consumed
1	January	1481	$19.38
2	February	1499	$19.38
3	March	1725	$19.38
4	April	1717	$19.38
5	May	1910	$19.38
6	June	724	$19.38
7	July	1834	$19.38
8	August	898	$19.38
9	September	816	$19.38
10	October	1019	$19.38
11	November	819	$19.38
12	December	612	$19.38
		15054	

Table A16 Drinking water consumption 2022
Source: Authors



Graphic A16 Drinking water consumption 2022
Source: Authors

6. Acknowledgements

We want to thank the Tecnológico Nacional de México for its constant concern in the care of the environment that is reflected in the effort made through the support to the Certifications and Recertifications that have been achieved throughout these 10 years of working together in the multisite system. Also to all the staff and students of our Technological Institute of Chihuahua II without whom this goal could not have been achieved.

7. Conclusions

In the development of this work, fact-based actions were established with the objective of increasing environmental performance through the Environmental Management System, incorporating environmental ethics into all activities.

The implementation and operation of the EMS assumes the responsibility of sustaining training and professional activity, the development of science and technology with principles of solidarity with all the peoples of the contemporary world and with criteria of globalization and sustainability to transcend towards future generations as mentioned in the SGA TecNM Manual.

As mentioned in a study developed in the hotel industry by Guan *et al*. (2023), the role played by personal values and pro-environmental behavior of employees of these corporations has a very important impact on corporate Social Responsibility. That is why, with the inclusion of the benefits of Environmental Education in professional training and in the services that the TecNM offers, it is desired to achieve and demonstrate a solid environmental performance, by controlling the impacts on the environment of the activities of the processes in the provision of the Educational Service.

The Tecnológico Nacional de México campus Chihuahua II is permanently working to obtain the certifications of the Management Systems in International Standards; in order to continuously improve its educational service with principles of sustainability, responsibility and equality. Another of the actions to strengthen its social responsibility was its adhesion to the Mexico Network of the Global Compact of the United Nations (UN), where actions are taken to comply with the established axes.

8. References

Ali-Abumalloh R., Asadi S., Nilashi M., Minaei-Bidgoli B., Khan-Nayer F., Samad S., Mohd S., Ibrahim O. (2021). The impact of coronavirus pandemic (COVID-19) on education: The role of virtual and remote laboratories in education. Technology in Society, Volume 67, 101728. https://www.sciencedirect.com/science/article/pii/S0160791X21002037

Guan, X., Ahmad, N., Sial, MS., Cherian, J. and Han, H. (2023). CSR and organizational performance: The role of pro-environmental behavior and personal values. *Corporate Social Responsibility and Environmental Management*, 30 (2), 677-694. https://doi.org/10.1002/csr.2381

ISO 9000: 2015/NMX-CC-9000-IMNC-2015. *Sistemas de Gestión de Calidad: fundamentos y vocabulario (2015)* p. 1-35. México: IMNC.

ISO 14001:2015/NMX-CC-14001-IMNC-2015. *Sistemas de Gestión Ambiental: requisitos (2015)* p. 1-34. México: IMNC.

ISO 9004:2015/NMX-CC-9004-IMNC-2015. *Sistemas de Gestión de la Calidad: Directrices para la Mejora del Desempeño (2015)* p 1-89. México: IMNC.

Kholaif, MMNHK and Ming, X. (2023). COVID- 19's fear- uncertainty effect on green supply chain management and sustainability performances: the moderate effect of corporate social responsibility. *Environmental Science and Pollution Research*, 30:42541–42562. https://doi.org/10.1007/s11356-022-21304-9

Molano-Niño A.C, and Herrera-Romero J.F. (2014)*, La formación ambiental en la educación superior: una revisión necesaria:* Luna Azul, No. 39, julio - diciembre 2014. http://www.scielo.org.co/pdf/luaz/n39/n39a12.pdf

ONU (2013) Política del Pacto Mundial sobre La Comunicación de Involucramiento para Organizaciones No Corporativas. https://www.pactomundial.org.mx/?s=poltica+

Peñafiel-Pazmiño, M.E. and Vallejo-López, A.B. *(2018): "Educación ambiental en las universidades, retos y desafíos ambientales", Revista DELOS Desarrollo Local Sostenible (octubre 2018).* https://www.eumed.net/rev/delos/32/magaly.html//hdl.handle.net/20.500.11763/delos32magaly

Stromquist N.P. (2008). *La Internacionalización: Entre la Promesa de la Calidad y el Riesgo de la Homogenización.* Revista De la Educación Superior. Vol. XXXVII (1) No. 145, pp 88-99. https://www.scielo.org.mx/pdf/resu/v37n145/v37n145a8.pdf

Tecnológico Nacional de México. 2019. *Programa de Desarrollo Institucional TecNM 2019 – 2024*. México, D.F.: E. Fernández, E. Chuayffet.

Tecnológico Nacional de México. 2019. *Manual del Sistema de Gestión Ambiental TecNM*. México, D.F.; M. Lopeandia.

ISSN: 2523-2436