ECORFAN®

Chief Editor
RAMOS-ESCAMILLA, María. PhD

Senior Editor
SERRUDO-GONZALES, Javier. BsC

Senior Editorial Assistant
ROSALES-BORBOR, Eleana. BsC
SORIANO-VELASCO, Jesús. BsC

Editorial Director
PERALTA-CASTRO, Enrique. MsC

Production Editors
ESCAMILLA-BOUCHAN, Imelda. PhD
LUNA-SOTO, Vladimir. PhD

Administration Manager
REYES-VILLAO, Angélica. BsC

Production Controllers
RAMOS-ARANCIBIA Alejandra. BsC
DÍAZ-OCAMPO Javier. BsC

ECORFAN Journal-Mexico

Definition of the Journal

Scientific Objectives

Support the international scientific community in its written production Science, Technology and Innovation in the Field of Social Sciences, in Subdisciplines Economics, Computer Science, Optimization, Risk, Finance, Business and Management.

ECORFAN-Mexico SC is a Scientific and Technological Company in contribution to the Human Resource training focused on the continuity in the critical analysis of International Research and is attached to CONACYT-RENIECYT number 1702902, its commitment is to disseminate research and contributions of the International Scientific Community, academic institutions, agencies and entities of the public and private sectors and contribute to the linking of researchers who carry out scientific activities, technological developments and training of specialized human resources with governments, companies and social organizations.

Encourage the interlocution of the International Scientific Community with other Study Centers in Mexico and abroad and promote a wide incorporation of academics, specialists and researchers to the publication in Science Structures of Autonomous Universities - State Public Universities - Federal IES - Polytechnic Universities - Technological Universities - Federal Technological Institutes - Normal Schools - Decentralized Technological Institutes - Intercultural Universities - S & T Councils - CONACYT Research Centers.

Scope, Coverage and Audience

ECORFAN Journal-Mexico is a Journal edited by ECORFAN-Mexico S.C in its Holding with repository in Mexico, is a scientific publication arbitrated and indexed with semester periods. It supports a wide range of contents that are evaluated by academic peers by the Double-Blind method, around subjects related to the theory and practice of Economics, Computing, Optimization, Risks, Finance, Administration and Business with diverse approaches and perspectives , That contribute to the diffusion of the development of Science Technology and Innovation that allow the arguments related to the decision making and influence in the formulation of international policies in the Field of Social Sciences. The editorial horizon of ECORFAN-Mexico® extends beyond the academy and integrates other segments of research and analysis outside the scope, as long as they meet the requirements of rigorous argumentative and scientific, as well as addressing issues of general and current interest of the International Scientific Society.

RAMÍREZ - MARTÍNEZ, Ivonne Fabiana. PhD
Universidad Andina Simón Bolívar

ALIAGA - LORDEMANN, Francisco Javier. PhD
Universidad de Zaragoza

YAN-TSAI, Jeng. PhD
Tamkang University

GUZMÁN - HURTADO, Juan Luis. PhD
Universidad de Santiago de Compostela

SANCHEZ - CANO, Julieta Evangelina. PhD
Universidad Complutense de Madrid

BELTRÁN - MORALES, Luis Felipe. PhD
Universidad de Concepción

GARCIA - ESPINOZA, Lupe Cecilia. PhD
Universidad de Santiago de Compostela

MIRANDA - GARCÍA, Marta. PhD
Universidad Complutense de Madrid

TORRES - HERRERA, Moisés. PhD
Universidad Autónoma de Barcelona

VARGAS - DELGADO, Oscar René. PhD
Universidad de Santiago de Compostela

GÓMEZ - MONGE, Rodrigo. PhD
Universidad de Santiago de Compostela

POSADA - GÓMEZ, Ruben. PhD
Institut National Polytechnique de la Lorraine

VILLASANTE, Sebastian. PhD
Universidad de Santiago de Compostela

ORDÓÑEZ - GUTIÉRREZ, Sergio Adrián. PhD
Universidad Paris VIII

BLANCO - GARCÍA, Susana. PhD
Universidad Complutense de Madrid

VALDIVIA - ALTAMIRANO, William Fernando. PhD
Universidad Nacional Agraria La Molina

DE AZEVEDO - JUNIOR, Wladimir Colman. PhD
Universidade Federal do Amazonas

LUO, Yongli. PhD
Universidad de Chongqing

CUBÍAS-MEDINA, Ana Elizabeth. PhD
Universidad Carlos III de Madrid

SEGURA-DE DUEÑAS, Cecilia Elizabeth. PhD
Universidad Autónoma de Barcelona

ROSILLO-MARTÍNEZ, Alejandro. PhD
Universidad Carlos III de Madrid

MIRANDA-TORRADO, Fernando. PhD
Universidad de Santiago de Compostela

PALACIO, Juan. PhD
University of St. Gallen

CAMPOS-QUIROGA, Peter. PhD
Universidad Real y Pontifica de San Francisco Xavier de Chuquisica

BARRERO-ROSALES, José Luis. PhD
Universidad Rey Juan Carlos III

GUZMAN - SALA, Andrés. PhD
University of California

DIMAS - RANGEL, María Isabel. PhD
Universidad José Martí de Latinoamerica

DANTE - SUAREZ, Eugenio. PhD
Arizona State University

D. EVANS, Richard. PhD
University of Greenwich

ALVARADO - BORREGO, Aida. PhD
Universidad Autónoma de Sinaloa

CERVANTES - ROSAS, María de los Ángeles. PhD
Universidad de Occidente

DOMÍNGUEZ - GUTIÉRREZ, Silvia. PhD
Universidad de Guadalajara

ARRIETA-DÍAZ, Delia. PhD
Escuela Libre de Ciencias Políticas y Administración Pública de Oriente

LUIS - PINEDA, Octavio. PhD
Instituto Politécnico Nacional

REYES - MONJARAS, María Elena. PhD
Universidad Veracruzana

RUIZ - MARTINEZ, Julio César. PhD
Instituto Politécnico Nacional

VELÁSQUEZ - SÁNCHEZ, Rosa María. PhD
Instituto Tecnológico de Oaxaca

PÉREZ-SOTO, Francisco. PhD
Colegio de Postgraduados

TAVERA - CORTÉS, María Elena. PhD
Colegio de Postgraduados

SANROMÁN-ARANDA, Roberto. PhD
Universidad Panamericana

IBARRA-RIVAS, Luis Rodolfo. PhD
Universidad Autónoma del estado de Morelos

SALDAÑA - CARRO, Cesar. PhD
Colegio de Tlaxcala

CONTRERAS–ÁLVAREZ, Isaí. PhD
Universidad Autónoma Metropolitana

MÁRQUEZ - IBARRA, Lorena. PhD
Instituto Tecnológico de Sonora

ESPINOZA - VALENCIA, Francisco Javier. PhD
Instituto Pedagógico de Posgrado en Sonora

VÁZQUEZ - OLARRA, Glafira. PhD
Universidad Michoacana de San Nicolás de Hidalgo

PELAYO - MACIEL, Jorge. PhD
Universidad de Guadalajara

GARCÍA- ROJAS, Jesús Alberto. PhD
Universidad de Puebla

CAMELO– AVEDOY, José Octavio. PhD
Universidad de Guadalajara

GAZCA - HERRERA, Luis Alejandro. PhD
Instituto de Administración Pública del Edo. de Veracruz

LANDAZURI - AGUILERA, Yara. PhD
Universidad Autónoma de Nuevo Leon

TAPIA - MEJIA, Erik. PhD
El Colegio de Tlaxcala

RIOS - VAZQUEZ, Nidia Josefina. PhD
Instituto Tecnológico de Sonora

SALAZAR - VÁZQUEZ - Fernando Adolfo. PhD
Instituto Universitario Internacional de Toluca

SÁNCHEZ - VÁZQUEZ, Elizabeth. PhD
Universidad ETAC

GALICIA - PALACIOS, Alexander. PhD
Instituto Politécnico Nacional

BUJARI - ALLI, Ali. PhD
Instituto Politécnico Nacional

GIRÓN, Alicia. PhD
Universidad Nacional Autónoma de México

COBOS - CAMPOS, Amalia Patricia. PhD
Universidad Autónoma de Chihuahua

CÓRDOVA - RANGEL, Arturo. PhD
Universidad Nacional Autónoma de México

PERALES - SALVADOR, Arturo. PhD
Universidad Autónoma de Chapingo

AZIZ - POSWAL, Bilal. PhD
Instituto Politécnico Nacional

CAMPOS - RANGEL, Cuauhtémoc Crisanto. PhD
Universidad Autónoma de Tlaxcala

MORÁN - CHIQUITO, Diana María. PhD
Universidad Autónoma Metropolitana

NOVELO - URDANIVIA, Federico Jesús. PhD
Universidad Autónoma Metropolitana

CRUZ - ARANDA, Fernando. PhD
Instituto Tecnológico y de Estudios Superiores de Monterrey

ÁLVAREZ - ECHEVERRIA, Francisco Antonio. PhD
Universidad Nacional Autónoma de México

GÓMEZ - CHIÑAS, Carlos. PhD
Instituto Politécnico Nacional

ORTIZ - ARANGO, Francisco. PhD
Instituto Tecnológico y de Estudios Superiores de Monterrey

LINAREZ - PLACENCIA, Gildardo. PhD
Centro Universitario de Tijuana

HERNÁNDEZ, Carmen Guadalupe. PhD
Instituto Politécnico Nacional

VARGAS - SANCHEZ, Gustavo. PhD
Universidad Autónoma Metropolitana

GUILLEN - MONDRAGÓN, Irene Juana. PhD
Universidad Autónoma Metropolitana

CASTILLO - DIEGO, Teresa Ivonne. PhD
Universidad Autónoma de Tlaxcala

TREJO - GARCÍA, José Carlos. PhD
Instituto Politécnico Nacional

MANJARREZ - LÓPEZ, Juan Carlos. PhD
El Colegio de Tlaxcala

SANTILLÁN - NÚÑEZ, María Aída. PhD
Escuela Normal de Sinaloa

MARTÍNEZ - SÁNCHEZ, José Francisco. PhD
Instituto Politécnico Nacional

COTA - YAÑEZ, María del Rosario. PhD
Universidad de Guadalajara

GARCÍA - ELIZALDE, Maribel. PhD
Universidad Nacional Autónoma de México

MARTÍNEZ - GARCÍA, Miguel Ángel. PhD
Instituto Politécnico Nacional

GONZÁLEZ - IBARRA, Miguel Rodrigo. PhD
Universidad Nacional Autónoma de México

ESCALETA - CHÁVEZ, Milka Elena. PhD
Universidad Autónoma de San Luis Potosí

MARTÍNEZ - HERNÁNDEZ, Mizraim. PhD
Colegio Universitario de Distrito Federal

GAVIRA - DURÓN, Nora. PhD
Instituto Politécnico Nacional

BECERRIL - TORRES, Osvaldo U. PhD
Universidad Autónoma del Estado de México

CAMPOS - ALVAREZ, Rosa Elvira. PhD
Universidad Autónoma de Durango

CAPRARO - RODRÍGUEZ, Santiago Gabriel Manuel. PhD
Universidad Nacional Autónoma de México

ISLAS - RIVERA, Víctor Manuel. PhD
Instituto Politécnico Nacional

PÉREZ - RAMÍREZ, Rigoberto. PhD
Universidad Nacional Autónoma de México

RIVAS - CASTILLO, Jaime Roberto. PhD
Centro de Investigaciones y Estudios Superiores en Antropología Social

PELÁEZ - PADILLA, Jorge. PhD
Universidad Nacional Autónoma de México

NIEVA - ROJAS Jefferson. PhD
Universidad Autónoma de Occidente

BURGOS - MATAMOROS, Mylai. PhD
Universidad Nacional Autónoma de México

OLIVO - ESTRADA, José Ramón. PhD
Instituto Pedagógico de Estudios de Posgrado

HUERTA - QUINTANILLA, Rogelio. PhD
Universidad Nacional Autónoma de México

PEREZ - BRAVO, Julia. PhD
Escuela Libre de Ciencias Políticas y Administración Pública

GONZÁLEZ - HERRERA, Karina Concepción. PhD
El Colegio de Tlaxcala

REYNOSO - IBARRA, Omayra Yolanda. PhD
Instituto Tecnológico Superior de San Luis Potosí

PEREZ - VEYNA, Oscar. PhD
Universidad Juárez del Estado de Durango

QUIJANO - GARCIA, Román Alberto. PhD
Universidad Anáhuac Mayab

GARCÍA - VILLALOBOS, Alejandro Rodolfo. PhD
Universidad Cuauhtémoc

AHUMADA - TELLO, Eduardo. PhD
Universidad Iberoamericana del Noroeste

Assignment of Rights

The sending of an Article to ECORFAN Journal Mexico emanates the commitment of the author not to submit it simultaneously to the consideration of other series publications for it must complement the Originality Format for its Article.

The authors sign the Authorization Format for their Article to be disseminated by means that ECORFAN-Mexico, S.C. In its Holding Mexico considers pertinent for disclosure and diffusion of its Article its Rights of Work.

Declaration of Authorship

Indicate the Name of Author and Coauthors at most in the participation of the Article and indicate in extensive the Institutional Affiliation indicating the Department.

Identify the Name of Author and Coauthors at most with the CVU Scholarship Number-PNPC or SNI-CONACYT- Indicating the Researcher Level and their Google Scholar Profile to verify their Citation Level and H index.

Identify the Name of Author and Coauthors at most in the Science and Technology Profiles widely accepted by the International Scientific Community ORC ID - Researcher ID Thomson - arXiv Author ID - PubMed Author ID - Open ID respectively.

Indicate the contact for correspondence to the Author (Mail and Telephone) and indicate the Researcher who contributes as the first Author of the Article.

Plagiarism Detection

All Articles will be tested by plagiarism software PLAGSCAN if a plagiarism level is detected Positive will not be sent to arbitration and will be rescinded of the reception of the Article notifying the Authors responsible, claiming that academic plagiarism is criminalized in the Penal Code.

Arbitration Process

All Articles will be evaluated by academic peers by the Double Blind method, the Arbitration Approval is a requirement for the Editorial Board to make a final decision that will be final in all cases. MARVID® is a derivative brand of ECORFAN® specialized in providing the expert evaluators all of them with Doctorate degree and distinction of International Researchers in the respective Councils of Science and Technology the counterpart of CONACYT for the chapters of America-Europe-Asia- Africa and Oceania. The identification of the authorship should only appear on a first removable page, in order to ensure that the Arbitration process is anonymous and covers the following stages: Identification of the Journal with its author occupation rate - Identification of Authors and Coauthors - Detection of plagiarism PLAGSCAN - Review of Formats of Authorization and Originality-Allocation to the Editorial Board-Allocation of the pair of Expert Arbitrators-Notification of Arbitration -Declaration of observations to the Author-Verification of Article Modified for Editing-Publication.

Instructions for Scientific, Technological and Innovation Publication

Knowledge Area

The works must be unpublished and refer to topics of Economics, Computer Science, Optimization, Risks, Finance, Administration and Business and other topics related to Social Sciences.

Presentation of Content

In the first chapter we present *Indicators that enhance the quality of service in tourist accommodation centers*, by MORALES-MORALES, Jaime, VALDEZ-ACOSTA, Nadia, OVALLES-TOLEDO, Luiz and VÁZQUEZ-RUEDA, Leonardor, with adscription in the Universidad Autonoma Sinaloa, As a next article we present, *Investment in environmental protection in the textile sector: Influence of legal, environmental and economic-financial factors*, by, CARREGAL-CASTRO, Laura, ALLÓ-PAZOS, María and LONGARELA-ARES, Ángeles, with adscription in the Universidad de Coruña, as the following articulompresentamos, *MILENALES ... A new form of truly significant learning?,* by ESCAMILLA-REGIS, Daisy, MARTÍNEZ-BAHENA, Elizabeth and LUNA-MÁRQUEZ, Marco Antonio, with announcements in the Tecnológico de Estudios Superiores de Cuautitlán Izcalli, as the next article we present, *Green economy and investment in environmental protection in the technological sector: the case of product manufacturing electronic*, by DARR IBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles, with advertisements at the Universidad de Coruña, as the next article we present, *The process of management of integral change in educational organizations,* by SOTO-MUCIÑO, Luis Enrique, INFANTE-MENDOZA Benjamin and ALPUCHE-DE LA CRUZ Ezequiel, , with adscription in the*,* Instituto Politécnico Nacional*,* Dirección General de Educación Normal y Actuación del Magisterio*,* Tecnológico de Estudios Superiores de Chimalhuacan, as the next article we present, *Different types of homogeneity,* by PACHECO-JUÁREZ, Yaziel, as the next article we present, *The competitiveness of the NAFTA countries members in the imports demand of Japanese meat market,* by PASTOR, Guillermo, GÓMEZ, Alma Alicia and GARCÍA- FIGUEROA, Francisco, whit adscription in the Instituto Tecnológico Autónomo de México and the Universidad Autónoma Chapingo, as the next article we present, *Investigation of the effect of cognitive dissonance and customer brand engagement an customer's Luxury brand aspiration*, by AHMADVAND, Shiva & SHIRAZIAN, Zahra, whit adscription in the Islamic Azad University.

Content

<p align="center">**Artícle**</p> <p align="right">**Page**</p>

Indicators that potentiate the quality of service in tourist accommodation centers

Indicadores que potencializan la calidad en el servicio en los centros de hospedaje turístico

MORALES-MORALES, Jaime†, VALDEZ-ACOSTA, Nadia, OVALLES-TOLEDO, Luiz and VÁZQUEZ-RUEDA, Leonardo

Universidad Autónoma de Sinaloa, Facultad de Contaduría y Administración

ID 1° Author: *Jaime, Morales-Morales / * **ORC ID:** 0000-0001-7723-4137, **Researcher ID Thomson:** Q-6384-2018, **CVU CONACYT-ID:** 666334

ID 1° Coauthor: *Nadia, Valdez-Acosta / * **ORC ID**: 0000-0003-2008-5331, **Researcher ID Thomson**: Q-6779-2118, **CVU CONACYT-ID:** 332732

ID 2° Coauthor: *Luiz, Ovalles-Toledo / * **ORC ID:** 0000-0003-0289-3394: **Researcher ID Thomson**: 6822-2018- **CVU CONACYT-ID:** 435465

ID 3° Coauthor: *Leonardo, Vázquez-Rueda / * **ORC ID:** 0000-0002-4666-5839, **Researcher ID Thomson:** Q-9764-2018, **CVU CONACYT-ID:** 287699

Abstract

The present research work sought to recognize some quality indicators in the service in tourist accommodation centers, the objective of the research was to establish if the indicators of the research variable addressed potentiate quality in the service, through a methodological approach used In a mixed manner with a descriptive approach that provided both qualitative and quantitative data that allowed interpreting through basic statistics and simple tabulation to the object of study, a sample of 100 frequencies or users of the hosting service was determined on a finite population of 1,000 using a system statistical computer whose sampling error was 1.89%. Among the most relevant findings of the research, it was determined that the knowledge and skills, speed and attitudes of human capital are indicators of the quality of service that users recognize, therefore, they come to satisfy their needs, for On the other hand, this research will allow us to carry out other underlying investigations, which will allow us to determine the user's loyalty to tourist accommodation centers

Quality in the Service, Lodging Centers, Quality Indicators

Resumen

El presente trabajo de investigación realizado buscó reconocer algunos indicadores de calidad en el servicio en centros de hospedaje turísticos, el objetivo de la investigación fue establecer si los indicadores de la variable de investigación abordados potencializan la calidad en el servicio, mediante un enfoque metodológico utilizado de manera mixta con un enfoque descriptivo que aportó tanto datos cualitativos como cuantitativos que permitieron interpretar mediante estadística básica y tabulación simple al objeto de estudio, se determinó una muestra de 100 frecuencias o usuarios del servicio de hospedaje sobre una población finita de 1,000 utilizando un sistema informático estadístico cuyo error de muestreo fue de 1.89%. Entre los hallazgos más relevantes de la investigación, se pudo determinar que los conocimientos y habilidades, la rapidez y las actitudes del capital humano son indicadores sobre la calidad en el servicio que reconocen los usuarios, por lo tanto, llegan a satisfacer sus necesidades, por otro lado, la presente investigación permitirá realizar otras investigaciones subyacentes, que permitan determinar la fidelización del usuario a los centros de hospedaje turísticos.

Calidad en el Servicio, Centros de Hospedaje, Indicadores de Calidad

---

---

† Researcher contributing first author.

Introduction

Currently, the need to generate value for a brand or an attribute of a product or service lies in the strategies and innovative ideas of profit-oriented organizations, in this sense the business spheres dominant in a market propose ideas or doctrines to generate a life experience for a consumer or group of consumers.

Innovation as a strategy allows the entrepreneur or leader of an organization to determine to what extent it is possible to contribute with these experiences that are foreseen in the consumer, however, an idea is not an organization, in the organization the human capital is in charge of applying said idea innovative, that is, the intellectual and technical capacity of human capital is needed to achieve concrete ideas. One of the factors that is needed for an experience to be unforgettable for a consumer is the behavioral aspect of who would be responsible for carrying it out, not least are the technical aspects such as the management and interpretation of work systems and management of certain inputs, to name a few.

However, an innovative idea must contain certain so-called quality standards that are aligned with the business philosophy of the organization or that help a branch or business line be recognized, but not without having a certain degree of social responsibility in the decisions made take to improve. In this sense, the quality of the service, at times, is not determinant as a variable of loyalty and loyalty of the client, since marketing authors focus more on the strategic sense of aspiration of top management in tangible aspects, although others point out the intangibility of the service as a way to generate expectations and positive experiences in the consumers.

Now, in the present investigation, a type of quality analysis is done in the service of a hotel company, in order to know what their best business practices are to offer a positive experience to the consumer or client towards a certain company. In this sense, four quality indicators were determined in the service that should contain the human capital of said company, of which stand out, attitudes and knowledge and skills; also allows to determine if it is a fundamental part in the experience obtained by a client and therefore justify their loyalty to the organization.

Central question and objective of the investigation

Once the idea of research on the variable of quality in the service was conceived, as well as the bibliographic reference and established its scientific methodology in order to gather information for its study, the research question was raised.

What are the indicators that consumers recognize as potentializers of quality in the service in a tourist accommodation center? In this sense, the central objective of this research indicates the following: Recognize the indicators that enhance the quality of service in a tourist accommodation center.

Conceptualization of quality in the service

In order to offer a broader reference on the research variable called quality in the service, those who subscribe to it consider it opportune to deliver the conceptualizations corresponding to both the quality, the service and an approach to the indicators or dimensions of the research variable; in this sense you have the following below:

Quality

Quality has been defined in several ways as value (Abbott, 1955; Feigenbaum, 1951), compliance with specifications (Gilmore, 1974; Levitt, 1972), compliance with the required requirements (Crosby, 1979), fitness for the use of the product (Juran, 1974, 1988), the search of not lost by the client (Taguchi, cited in Ross 1989), and the knowledge and / or overcoming of clients' expectations (Grõnroos, 1983; Parasuraman, Zeithaml and Berry, 1985).

Service

In terms of service, this is the production of a satisfactory shopping experience (Ginebra and Arana, 1999, page 19). Therefore, the buyer becomes a customer of the service and quality with experience.

Quality in the service

The quality of service has previously been established as a group of factors that tend to have an important effect on the satisfaction and retention of clients and users (Taylor and Baker, 1994, Spreng and Mackoy, 1996 and Zeithaml et al., 1996).

Theoretical framework

To start this theoretical section, it is considered important that an applied research is carried out in an entity with its own characteristics, based, founded and conceived by an original business philosophy, once the scientific intervention is necessary the theoretical foundation and border knowledge emanating from research in organizations or organizations, then the importance of a theory and an organization *per se* is stressed.

Theory comes from the Greek theōría and is the speculative knowledge considered independently of any application; and a series of laws that serve to relate certain order of phenomena. In particular Hodge, Anthony and Wales, (2001, page 17) subscribe that the theory is the explanation of a phenomenon, being constituted by principles that affirm the observed relationships in relation to the phenomenon. It is a set of interrelated prepositions capable of explaining why and how a phenomenon occurs (Hernández, et al, 2014, page 69).

The Theory of the Organization is a set of concepts, principles and hypotheses that try to explain the existing interaction between the different organizational components, from this the descriptive theory is developed which aims to specify the nature of the relations between the subsystems of the organization and the Prescriptive or normative theory suggests to managers about what they should do in the company in terms of efficiency, benefits, job satisfaction, among others, Hodge, Anthony and Wales (2001, page 17).

The Theory of the Organization and the Theory of Administration are closely related concepts since the manager of a company so that it can be effective must understand the organization, consequently the theory of the organization serves as a basis for the proper administration of it. For differential effects between one and another, see table 1.

Theory of the organization	Management theory
- It is made up of men (human capital and its intellectual capital). - In this theory man formulates processes and procedures to achieve certain goals. - The theorists point out that the identity of the organization is formed - It is formed of concepts and principles that try to decribe an organization (not a group of people).	- It is specified as an area of human knowledge and challenges. - It emanates from theories about different approaches, such as the classic approach and its classical theory and scientific administration, humanistic approach and its theory of human relations, structuralist approach and its theory of bureaucracy and systems and neoclassical approaches. - It is the basis for administrative development in organizations.

Table 1 Differences between theory of organization and theory of administration
Source: Own Elaboration (2018) with information of Da Silva 2002

In this sense, to carry out a good administration it is pertinent to have previously permeated with theories in which an organization or economic entity can be identified, namely that each organizational unit is different, its complexity is relative to the theory where it could fit, it is then that, even though the organization is closely related to the administration, both are essential to each other (Díaz, 2013). It is said then that the quality of the service is a crucial direction to improve business performance, which underlies the adoption of initiatives to improve quality in the service industry, the benefit of expectations and customer satisfaction become a great challenge for the service industries (Punnakitikashem, Buavaraporn, Maluesri and Leelartapin, 2012).

Wang (2009) points out that most researchers define service quality as a comparative judgment of expectations versus perceived performance, thus, the perception of a high level of quality received from the service may increase the probability of recommending that service provider and consequently generate consumer loyalty.

In a study by Mondo (2014) the technical aspects such as access, human element, experience and technical quality are dimensions and / or advantages of quality in the tourist service whose indicators are consistent with those of the present investigation, being among others, the service, knowledge and attention, which consumers or users detect as intangible benefits.

In this sense, the value obtained from customer satisfaction when acquiring a service is proportional to the processes that the organization uses to achieve this objective, the plans drawn tend to obtain results that are not very encouraging with respect to the quality of the service provided, However, methodologies such as teamwork, *kaizen* or quality circles, can place organizations in places above their competence, that is, be perpetual in the thinking of the consumer and / or user of services.

In this sense, we can point out the link that quality in the service has with customer satisfaction as indicated by Agha, Guan, Sambasivan & Sidir (2017), however, for the present investigation satisfaction is considered an indicator that will allow determine the central objective of it. On the other hand, it must be considered that the SERVQUAL model has been taken as reference for the intervention, but with adjustments in the dimensions of this so-called gap model, it is the most widely used and its purpose has always been to improve the quality of the service that is offered by an organization through its measurement.

However, to refer to the indicators of the variable to be investigated, it is necessary to relate them to the human factor, which according to Todd & Hocutt (2001) discovered in a study to clients in restaurants, that the perception of customer-oriented behaviors by the employee was positively related to two results, such as satisfaction, therefore.

Parasuraman et al. (1988) when developing SERVQUAL they concentrated mainly on the human aspects of service provision, considering that trust, responsibility and empathy are mostly human dimensions. Bitner (1990) observed that employee behaviors had an impact on clients' perceptions of service quality. Companies have to train their employees in interpersonal skills in order to truly focus on the client. Mills & Morris (1986), Schneider & Bowen (1992) and Stebbing (1993) emphasized the role of human aspects in the provision of services. (Savi & Goncalvez, 2016). Therefore, the adjustment to this model can be seen in figure 1 of the construction of research indicators section that is offered later.

Reiterating the need to identify the technical aspects that validate the variable of quality in the service, Grönroos (1990) argues that the service quality model describes how customers or consumers perceive quality as technical aspects and as an image (Agha, Guan, Sambasivan & Sidir, 2017), However, the present investigation does not take into account the image, but a technical aspect, which is what is delivered at the moment when human capital literally serves clients.

On the other hand, the generation of value of an organization comes from the intellectual capital that is acquired by the human resource through its education, as well as empirical experiences in them; "Thus, human capital is a creator of economic value through its intellectual process and the knowledge acquired and capitalized in some productive activity" (Loubet & Morales, 2015).

Then it can be stressed that the knowledge and skills can ensure a quality service, without a doubt the education and continuous training would be necessary for the generation of value of an organization and therefore it would be an indicator that the user of the service would observe as a factor Loyalty.

Authors such as Galbraith (1973), Edvinsson and Sullivan (1996) and Drucker (2001) argue that an important element for companies is knowledge. In this sense (Gutierrez, Sapién, & Piñón, 2015) point out that knowledge is a new resource to achieve the competitiveness of the company.

In terms of skills, there are several categories in which it precedes the skill as an intangible asset that allows its development within an organization, (Gazzera & Vargas, 2018) in its research on the intangibles of the companies providing tourism services cite Brooking (1997) which points to skill as an asset centered on the individual.

In this sense, knowledge and skills denote the value of hosting organizations, as a fundamental part of competitive advantage as they are both generic and professional skills that human capital sets in motion once it offers customer service.

Brief introduction of the scenario studied

The scenario where this research was carried out is a company of the so-called hotel business, it is a company founded in 2009 and belongs to the Association of Hotels and Motels 3 Islands, of the State of Sinaloa, Mexico.

It has eleven departments or headquarters of which stand out, the department of human resources, department of maintenance, purchases, security and sales, among others. This hotel organization has 92 rooms and its name is four stars. The name of the organization is omitted at the request of the authorities and therefore in the present investigation is not mentioned in any of its sections.

Methodology

For the research, a methodology was established whose characteristics sustain the pertinence with the investigated variable, which is reminded that it is the quality in the service, as well as the characteristics of the unit of analysis where it was intervened, for which a mixed study was used with a descriptive approach.

In this sense, mixed methods represent a set of systematic, empirical and critical research processes and involve the collection and analysis of quantitative and qualitative data Hernández and Mendoza 2008 (as cited in Hernández et al, 2014, page 534).

On the other hand, the descriptive approach has the purpose of showing the way in which a problem that is studied occurs, one of the characteristics of descriptive studies is that it has enough theoretical conceptual elaboration to plan hypotheses or research assumptions (Castañeda, 2011, pág. 74).

Its validity is justified once the convergence or correspondence is confirmed when comparing quantitative and qualitative data, second, there is an integral and complete vision of the studied phenomenon, third, this method implies the reduction of uncertainty before unexpected results, that is, a method mixed can help explain the findings found in the research.

Fourth, the credibility since using both methods (qualitative and quantitative) the procedures and results are reinforced, and fifth, it offers a clarity in the investigation, since it visualizes covert relations which would not have been detected by a single method (either this qualitative or quantitative).

Construction of research indicators

The construction of the indicators of the quality variable in the service was based on non-participant observation and access to specialized literature, based on the above, it is argued in this research that the indicators to reject or accept their hypothesis are the following:
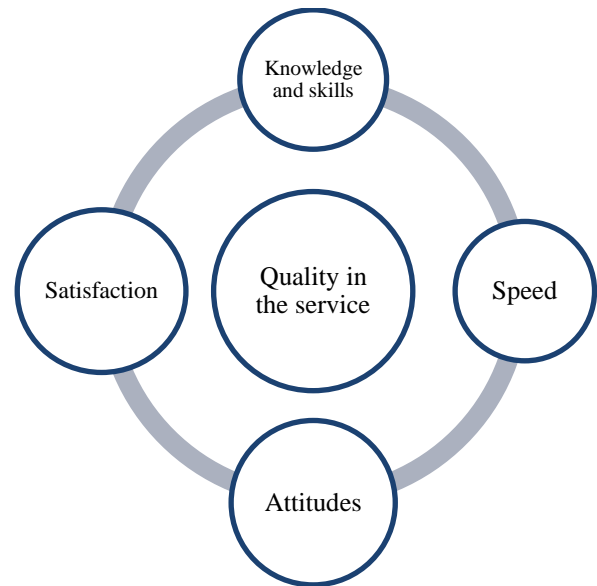
Figure 1 Indicators of the quality variable in the servic
Source: Own Elaboration (2018))

Instrument applied to research

In scientific research there is a baggage of methodological techniques and tools to obtain data and information. In the present investigation, the survey type questionnaire was used with a Likert technique and / or summary evaluation method. In this sense, this collection technique was used to qualify the attitude object that was measured (Hernández, Fernández, & Baptista, 2014, page 238), in this case quality in the service through affirmations that had to do with the indicators released for research.

Therefore, with the assistance of the Dyane 4.0 software it was possible to catalog the statements that qualify the object of attitude in categorical variables, which helped to identify the affirmations measured with non-metric scales (nominal and ordinal) (Santesmases, 2009); therefore, an invalid data was considered if two or more options were marked and consequently rejected by the system.

This technique of data collection (Likert) estimates that all items have equal weight (Hernández, Fernández, & Baptista, 2014, page 244), based on the judgment on the study variable. Therefore, a questionnaire was created in which an attitude or opinion was measured in which a continuum of values was formed in relation to a positive or negative opinion, as well as an intermediate point.

This questionnaire was created based on the SERVQUAL model, whose objective is to understand how clients or users of a service perceive the quality of a service (Punnakitikashem, Buavaraporn, Maluesri and Leelartapin, 2012). For this reason, this survey was formed with 13 items, plus three general information, in which information about the indicators on the research variable was offered, see table 2.

Knowledge and skills	Speed	Attitudes	Satisfaction
Item 1-4	Item 5-7	Item 8-10	Item 11-13

Table 2 Items developed in the survey
Source: Self Made (2018)

Based on these items developed for the research, the Cronbach alpha coefficient = 0.9185 was obtained using the Dyane 4.0 software.

In this sense, it is necessary to point out that for the collection of information the following requirements of the users of the hosting service were necessary. Be a user of the hosting service and have had the minimum interaction with the human capital of the lodging center.

Population and sample

For the purposes of research statistics it is important to emphasize the concepts of population and sample, so we have that population is a set of individuals or objects of interest or measures that is obtained from all individuals or objects of interest Lind, Marchal and Wathen (2012, page 7).

For Anderson, Sweeney and Williams (2004, page 14) a population is the set of all the elements of interest of a given study. Consequently, a sample is a portion or part of the population of interest (Lind, Marchal and Wathen, 2012, page 7); subgroup of the universe or population from which the data are collected and which should be representative of this Hernández et al (2014, page 173).

In this sense, the survey that was applied to the users of the hosting service was a probabilistic sample since Flores and Lozano (1998, page 220) detail that non-probabilistic sampling and / or sampling on trial is based in broad assumptions about the variables that will be studied in the population; that is, the population visiting the lodging center had the same possibility of being chosen for the data collection.

Once the sample information of a population was obtained, the data collected within the *Dyane* version 4.0 system was integrated, which is a software for applied research on the measuring instrument. Then, a measurement instrument is a resource that the researcher uses to record information about the research variables, Hernández et al. (2014, pág. 199). For this research the instrument, as stated above, was a survey, in this sense, Castañeda (2011, page 145) following Ghiglione and Matalon (1989) indicates that said measuring instrument is the systematic interrogation of individuals in order to generalize and is used to know the opinions of a group of people regarding a research topic. The *Dyane 4.0* program is designed to facilitate research techniques through its practical application, this software performs this process by grouping a set of tasks shown below: Design of the research with the definition of the variables of the study, capture, recording, edition and treatment of the data and analysis of the data by means of statistical techniques uni or multivariables. (Santesmases, 2009, pág. 29).

Proportions	
They have the attribute	p: 0.99%
They do not possess the attribute	q: 0.01%
Finite population	
Size of the population	1,000
Sampling error (%)	1.89
Sample size	100
Confidence interval (%)	95.5

Table 3 Sampling error and sample size
Source: Self made (2018)

Results

The data collection was based on a questionnaire survey with a Likert technique in which it showed possible answers of a totally according to a total disagreement, broken down as follows in the following codes: code 1: "totally agree", code 2: "agree", code 3: "neither agree nor disagree", code 4: "disagree" and code 5: totally disagree "; which allowed access to a quantification of the data and qualitative description.

Consequently, the most relevant graphs for research are shown below:

The hotel staff has sufficient knowledge and skills to carry out their work

Graphic 1 Knowledge and skills
Source: self made (2018) with data from Dyane 4.0

Graph 1 shows that in the indicator called "knowledge and skills" the users of the hosting service stated that the staff has sufficient knowledge and skills to perform their work, so that in the conglomerate of code 1 and 2 a 95 % and chose to indicate the positive aspect, while 1% expressed disagreement and only 4% remained undecided, said results show a standard deviation of 0.6164 with respect to the arithmetic mean of 1.6000.

I got quick answers to my questions about the service I received
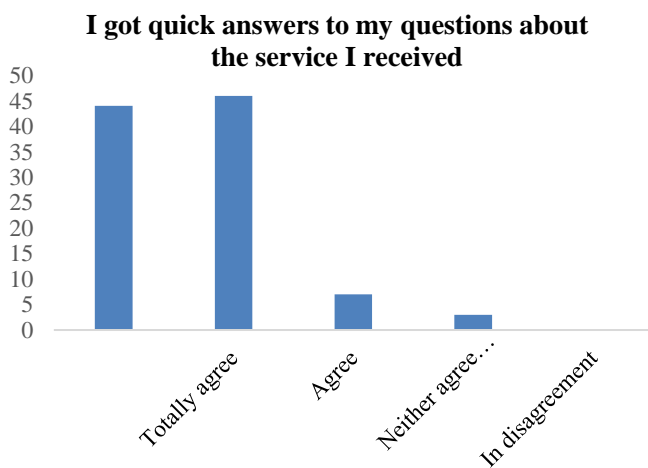
Graphic 2 Speed of service
Source: Self made (2018) with data from Dyane 4.0

Figure 2 shows that in the indicator called "rapidity", the users of the hosting service stated that they obtained quick answers to questions or circumstances about the service they received, so in its conglomerate of codes 1 and 2 throws a 90%, so only 3% responded that he did not receive the service quickly, in turn only 7% was neither in agreement nor in disagreement. These results show an arithmetic mean of 1.6900 and a standard deviation of 0.7307.

The human capital of the hotel cares about offering a positive experience to customers
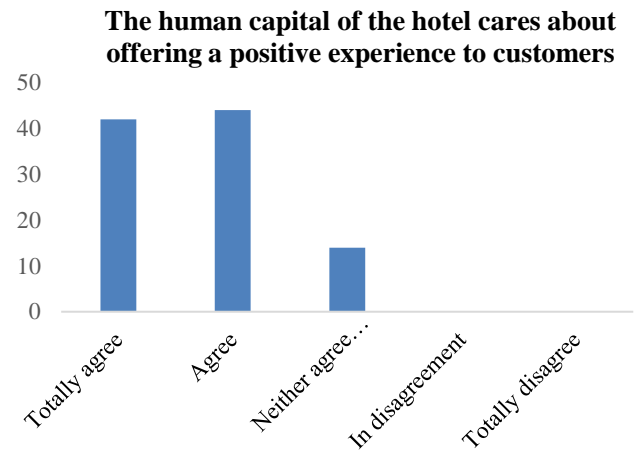
Graphic 3 Attitudes about the service
Source: self made (2018) con datos de Dyane 4.0

Graph 3 shows that in the indicator called "attitudes", users of the hosting service expressed in a conglomerate of 86% of code 1 and 2 that the human capital of the lodging center cares about offering a positive experience to customers or users, while 14% remained undecided, these results show a standard deviation of 0.6940 with respect to 1.7200 of the arithmetic mean.

I am satisfied with the service provided by the hotel's human capital
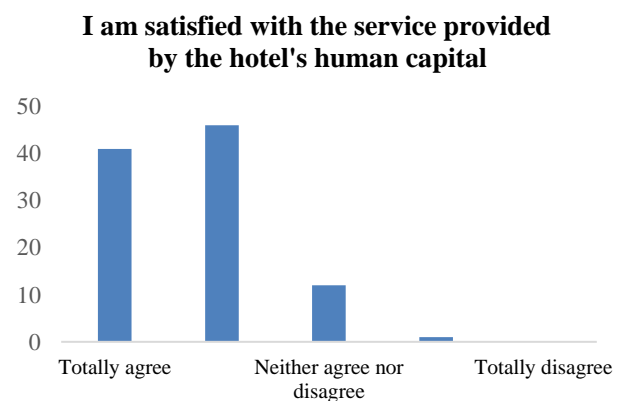
Graphic 4 Satisfaction about the service received
Source: self made (2018) with data from Dyane 4.0

Graphic 4 shows that in the indicator called "satisfaction", the users of the hosting service stated in a conglomerate of code 1 and 2 that 86% are satisfied with the service provided by the staff of the lodging center, while the 12 % remained undecided and 1% said they did not agree with the item, the results show a standard deviation of 0.7051 with respect to the arithmetic mean of 1.7300.

Conclusions and suggestions

It is important to note that there was an agglutination of the responses of the instrument in question, both positive, neutral and negative, that is, codes 1 and 2 which means "totally agree" and agreed "meant a yes, code 3 represents the neutral response of the survey and codes 4 and 5 "disagree" and "totally disagree" meant no.

In this sense, 62% of the respondents were female, while 38% male, 96% were domestic tourists while 4% were identified as foreign tourists. Consequently, 93.5% of the total number of people surveyed then identified the indicator of knowledge and skills as a fundamental part of quality in the service, on the other hand, 88.67% agreed that speed is also important.

Finally, regarding the attitude indicator, 87.67% of the people surveyed consider it as a dimension of the research variable and 87.66% consider that they are satisfied with the service received. Then, once the interpretation is made, an answer is offered to the central question that says, what are the indicators that consumers recognize as potentializers of quality in the service in a tourist accommodation center? resulting in knowledge and skills, speed, attitudes and satisfaction as technical indicators that recognize the users of the hosting service.

Regarding the general objective that the letter says, to recognize the indicators that potentiate the quality in the service in a tourist lodging center, this objective is fulfilled since the users recognize the indicators indicated above as potentializers of the quality in the service. It is suggested in the future to carry out studies to determine if these indicators that are recognized as potentializers of quality in the service can be identified as intangible in customer loyalty, as well as to determine the correlation between loyalty and quality in the service.

References

Agha, K. L., Guan, C. K., Sambasivan, M., & Sidir, S. (2017). Integration of standardization and customization: Impact on service quality, customer satisfaction, and loyalty. *Journal of Retailing and Consumer Services, XXXV*, 91-97. Obtenido de https://www.sciencedirect.com/science/article/pii/S0969698916302417

Anderson, D. R., Sweeney, D. J., & Williams, T. A. (2004). *Estadística para la administración y economía* (Octava ed.). Thomson.

Arias, G. F. (2001). *Introducción a la metodología de la investigación en ciencias de la administración y del comportamiento* (Sexta ed.). Trillas.

Báez, C. S. (2009). *Hotelería* (Cuarta ed.). Patria.

Castañeda, J. J. (2011). *Metodología de la investigación* (Segunda ed.). MacGraw-Hill.

Díaz, G. S. (2013). Lo humano en la teoría de las organizaciones. *Visión gerencial*(1), 45-57. Obtenido de http://www.redalyc.org/pdf/4655/465545895008.pdf

Evans, J. R., & Lindsay, W. M. (2015). *Administración y control de la calidad* (Septima ed.). Cengage Learning.

Gazzera, M. A., & Vargas, M. E. (2018). El valor de los intangibles en las empresas prestadoras de servicio turísticos- caso hotelería en Toluca, México. *Gestión Turística*, 9-26.

Gutierrez, D. M., Sapién, A. A., & Piñón, H. L. (2015). Gestión de conocimiento en PyME del sector servicios en la ciudad de Chihuahua. *Nova Scientia, VII*(15), 499-513.

Hernández, S. R., Fernández, C. C., & Baptista, L. P. (2014). *Metodología de la investigación* (Sexta ed.). McGraw-Hill.

Hueso, A., & Cascant, M. J. (2012). *Metodología y técnicas cuantitativas de investigación* (Primera ed.). Editorial Universitat Politécnica de Valencia.

Kotler, P., & Armstrong, G. (2012). *Marketing* (Decimocuarta ed.).

Kotler, P., & Armstrong, G. (2017). *Fundamentos de marketing* (Desimotercera ed.). Pearson educación.

Lattin, G. W. (2008). *Administración moderna de hoteles y moteles* (Segunda ed.). Trillas.

Lochan, D. R. (2015). Service quality and the training of employees: The mediating role of organizational commitment. *Tourism Management, XLVI*, 419-430.

Loubet, O. R., & Morales, P. A. (2015). Formación del capital humano para el crecimiento económico de Sinaloa. *Ra Ximhai, XI*(3), 41-55.

Lovelock, C. H. (1997). *Mercadotecnia de servicios* (Tercera ed.). Prentice-Hall.

Santesmases, M. M. (2009). *DYANE versión 4. Diseño y análisis de encuestas en investigación social y de mercados.* Madrid, España: Pirámide

Savi, M. T., & Goncalvez, S. F. (2016). Atributos de la calidad de servicios en atractivos turísticos. Un estudio netnográfico en el uso del protocolo TOURQUAL. *Estudios y Perspectivas en Turismo, XXVI*(2), 124-144. Obtenido de http://www.redalyc.org/pdf/1807/180744490002.pdf

Stanton, W. J., Etzel, M. J., & Walker, B. J. (2007). *Fundamentos de marketing* (Decimocuarta ed.). McGraw-Hill.

Tschohl, J. (2006). *Servicio al cliente.* México: Pax México.

Investment in environmental protection in the textile sector: Influence of legal, environmental and economic-financial factors

Inversión en protección medioambiental en el sector textil: Influencia de factores legales, medioambientales y económico-financieros

CARREGAL-CASTRO, Laura†[1], ALLÓ-PAZOS, María[2] and LONGARELA-ARES, Ángeles[2]*

[1]*Universidade da Coruña, University of A Coruna, Faculty of Economics and Business, Elviña, 15071 A Coruña, Spain.*
[2]*Universidade da Coruña, University of A Coruna, Jean Monnet Research Group on Competition and Development_C+D Group, Department of Economy, Faculty of Economics and Business, Elviña, 15071, A Coruña, Spain.*
[3]*Universidade da Coruña, University of A Coruna, Research Group on Regulation, Economy and Finance (GREFIN), Departament of Business, Faculty of Economics and Business, Elviña, 15071 A Coruña, Spain.*

ID 1° Co-author: María, ALLÓ-PAZOS / **ORC ID**: 0000-0003-1389-7235, **Researcher ID Thomson**: E-9244-2015

ID 2° Co-author: Ángeles, LONGARELA-ARES / **ORC ID**: 0000-0003-0488-4950, **Researcher ID Thomson**: R-1495-2018

Abstract

The textile sector has gone through numerous crises, nevertheless, is currently one of the strongest sectors in Spain. In spite of, it is the second most polluting industry not only in the country but also in the world due to the production of lots of waste products. In particular, according to data from the National Institute of Statistics (2018), this sector emits a total of 850 million tons of CO_2 per year worldwide. Due to the magnitude of the problem, this project analyses what factors may be affecting to the investment in environmental protection of this sector in Spain, in order to establish guidelines to follow in the future to alleviate this situation. For this, a bivariate correlation analysis and a regression analysis have been carried out, in order to verify if the factors that have been discovered throughout the study are influencing the investment in environmental protection of the sector. The results show that a higher revenue collection from environmental service seem to be affecting in a negative way to the textile sector and the level of CO_2 emissions of this sector promotes the investment to combat the problem.

Investment, Environmental Protection, Textile Sector, Sustainability

Resumen

El sector textil, ha sufrido numerosas crisis, sin embargo, es uno de los más fuertes en España. A pesar de ello, se posiciona como la segunda industria más contaminante no solo a nivel nacional sino también mundial, debido al alto grado de residuos que produce. Según datos del Instituto Nacional de Estadística (2018) este sector emite un total de 850 millones de toneladas de CO_2 anualmente en todo el mundo. Debido a la magnitud del problema, este trabajo analiza qué factores pueden estar afectando a la inversión en protección ambiental del sector en España, para poder establecer una serie de recomendaciones para el futuro para aliviar esta situación. Para ello, se ha llevado a cabo un análisis de correlación bivariante y un análisis de regresión, con el fin de comprobar si los distintos factores que se han ido descubriendo a lo largo del estudio, están influyendo en la inversión en protección ambiental del sector. Los resultados muestran que una mayor recaudación de impuestos ambientales parece afectar negativamente a la inversión y que el nivel de emisiones de CO_2 del sector textil, fomenta la inversión para combatir el problema.

Inversión, Protección Ambiental, Sector Textil, Sostenibilidad

* Correspondence to Author (email: angeles.maria.longarela.ares@udc.es)
† Researcher contributing first author.

1. Introduction

Currently, the protection and care of the environment is an issue that is gaining prominence. Society is increasingly aware of the environmental damage that is being caused, the negative impact that business activities have on the planet and the need to carry out collective actions in order to achieve a more sustainable planet (Gallizo Larraz, 2006; Broega, Jordão, & Martins, 2017).

Environmental pollution is the result of poor management of natural resources, and translates into such harmful effects as the emission of greenhouse gases (GHG) or deforestation. Even if renewable resources are used, but with uncontrolled consumption and at a great pace it will not have positive effects (Jacobs, 1996). In 2015, the Spanish economy emitted 338.6 million tons of GHG, of which 24.34% of tons are the result of manufacturing industries (Instituto Nacional de Estadistica, 2018).

The textile sector, formed by the textile industry, clothing, leather and footwear, is the second most polluting on the planet (after the oil industry) as it emits a total of 850 million tons of CO_2 annually. These data are worrisome if we take into account the study by Carrera-Gallisà (2017) that shows how the growth of the population leads to an increase in textile consumption per capita and with it a greater consumption of natural resources and a greater generation of waste.

All polluting human and productive activities seriously affect the ecosystem, generating negative changes both globally and locally, such as temperature rises (causing health effects as indicated by Ballester et al. (2014)), increases in the level of the sea, wear of the ozone layer, natural disasters, loss of ecosystem services, etc. (Del Brío González, Jesús Ángel & Cimadevilla, 2001). However, at the business level there are certain positive developments. In this sense, there is an improvement in the internal and external transparency of companies committed to sustainable development. Specifically, they make available to the interested parties reports on their operation in this aspect, through Eco-Management and Audit Scheme or Community Regulation of Eco-management and Eco-audit (EMAS) (Ministry of Agriculture and Fisheries, Food and Environment. Government of Spain, 2018).

In this line and focusing on the textile sector, Valverde (2018) points out how this sector is increasingly adding to sustainable fashion. One example is the international group Slow Fashion Next created in 2011, whose objective is to promote sustainability through a balance between society, fashion and nature. In this sense, it is emphasized how textile waste goes to third countries that can not take measures to treat them and, therefore, there are eliminated and generate harmful gases that contribute to aggravate environmental problems.

It should be noted that producing in a "green" way may involve producing at a much slower and more expensive pace, but with the right technology, the production process could be much cheaper and, in addition, the cleanest production in the textile sector saves energy and water and reduce waste (Casallas, Cortes and Martinez, 2018).

Technology is essential for a good control of time, costs and quality and, therefore, the textile sector needs to improve in this area constantly. Although at the beginning it will mean an additional investment, in the long run, technological innovations will lead to an increase in profit, since it will be cheaper to produce and, therefore, supply will increase and more will be produced for each price level (Couñago Garrido, 2009). Also, it should be mentioned that a reduction in costs does not imply that prices fall, companies can decide to keep it to obtain a profit margin that allows a reinvestment (López & Martín, 2012).

From the Public Administrations the formento of the environmental protection also seems to be an objective thus, in Spain, the State every year establishes a budget in Investigation and Development to incentivar to the companies to improve this aspect, through subsidies and helps Spain it was placed in 2015 as the eleventh country that made the most investments in innovation, representing 3.2%, behind the pharmaceutical industry (20%) (Ministry of Economy, Industry and Competitiveness, 2018).

When we talk about economic sectors such as textiles it is important to take into account consumers. In this sense, the population is increasingly aware and this has led to an increase in awareness and interest regarding environmental issues, especially since 2015, creating a greater social preference in favor of protection.

Environmental (González Alvarado and Martín Granados, 2018) which may cause the demand for sustainable products to increase. Knowing the acceptance of consumers or their willingness to pay is fundamental, as indicated by Ramos (2002). However, since 2009 and until 2013 there seems to be less interest in finding information on environmental issues (Graphic 1). This may be due to the strong economic crisis undergone at that time, where environmental protection could have gone into the background.

The data of Graphic 1 was obtained from the means of the results, from 2007 to 2015, of searches on environmental issues: sustainable development, wastewater, pollution, sustainable fashion, sustainability and circular economy. The numbers reflect the search interest in relation to the maximum value of a graphic in a given region and period. A value of 100 indicates the maximum popularity of a term, 50 that a term is half popular in relation to the maximum value and 0 that there was not enough data of the term.
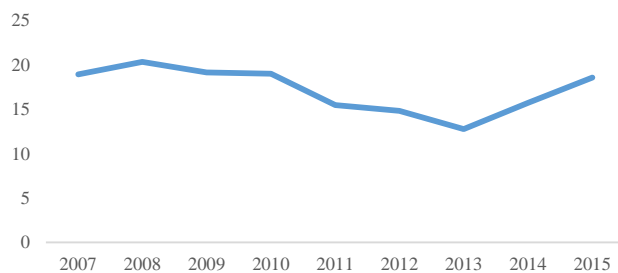
Graphic 1 Evolution of interest in environmental issues in Spain
Source: self made through data collected in Google trends (2018)

In the case of fashion consumers, they do not always know how harmful this activity is, although, without realizing it, their decisions play an essential role when it comes to improving the sustainability of companies (Manzano Zambruno, 2014) because they can make they are more transparent and responsible. The purchase decision does not only depend on consumer awareness, since consuming green labeled garments is much more expensive (Parro, 2017). This means that customers opt for the cheapest option to be able to afford to buy clothes more times a year, which causes the demand for sustainable products to be reduced. In fact, family spending in the textile sector in 2015 has dropped considerably by 33.35%, despite the fact that fashion is still the fourth best consumed in Spain, after transport, housing and food.

This decrease in textile consumption may be due, among other things, to the price, which has been increasing considerably since the beginning of the crisis, especially leather and footwear (Graphic 2) and the evolution of income per household (Graphic 3), which has been reduced by 9.36% from 2008 to 2015.
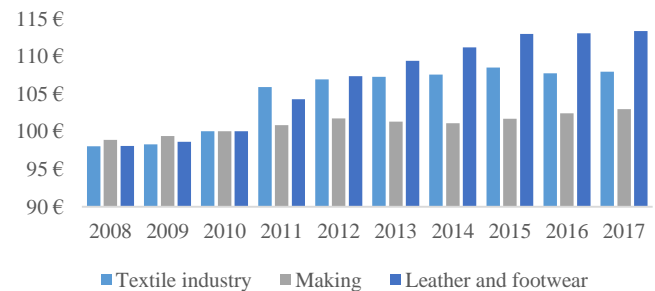
Graphic 2 Evolution of the Price Index by sector
Source: self made through data collected in the INE (2018)
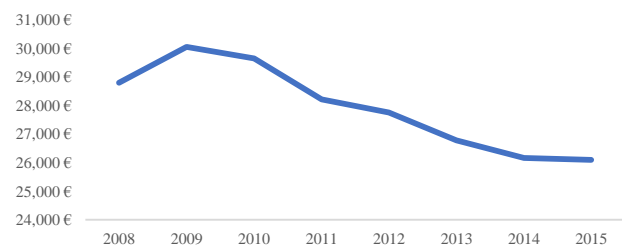
Graphic 3 Evolution of national income by household
Source: Business association of textile, accessories and leather trade (2015)

Therefore, if the prices of the goods increase and the incomes of the households decrease, the expense of the families has to be reduced in some way in the consumption and in a decrease of the quantity demanded for each price, when the products are considered of the textile sector as "normal goods" (Couñago Garrido, 2009).

Waste & Resources Action Program (2018), says that you need to improve shopping habits, learn to care for and keep clothes for longer periods of time, in addition to recycling when they no longer serve or donate is important if you want to make the most of the garments and thus increase the environmental benefits.

It is evident that the protection and care of the environment is a global challenge, which will affect future generations more than it does in the present and that, therefore, all agents must be involved and be Participants in the design and implementation of practices that lead to an improvement in the care of natural and environmental resources.

Based on the comments, the objective of this paper is to study the possible factors that may influence the investment in environmental protection of the textile sector, in addition to publicizing its impact on the environment. This is a matter of great importance since it is necessary to bear in mind that the companies study carefully in what to invest their capital to grow and improve, but sometimes they leave aside such important environmental issues.

Based on this objective, our study analyzes whether environmental regulation, the level of polluting emissions and the turnover of the textile sector have significant effects on the level of environmental protection of companies (measured through the investment perform). That is, the following hypothesis is developed: the investment in environmental protection is explained by the variables "Environmental taxes", "CO2 emissions" and "Turnover" of the sector and all of them are related to each other. To validate this hypothesis, a quantitative analysis based on the results obtained through a multiple linear regression model, developed after the corresponding analysis of correlations between the variables, will be carried out.

The added value of our study is to focus the analysis from a different perspective to that of the literature consulted, in which some authors analyze what factors affect CO2 emissions and their behavior, based on economic growth and environmental regulation (Torras & Boyce, 1998; Balsalobre-Lorente, 2018) but do not focus on the level of environmental protection or investment in such protection.

The work consists of six blocks, including the introduction: in section 2, the textile sector is made known through a general study of the historical and current perspective in Spain, together with the explanation of the characteristics of each one of the subsectors that form it; the impact of the sector on the environment is discussed and what are the reasons why it is one of the most polluting sectors and the relevant factors are presented to advance towards the sustainability of the textile sector (factors that will be taken as variables when perform the analysis). Subsequently, section 3 explains the main objective of the work, the hypothesis and the methodology that will be carried out to analyze the variables.

In section 4 the results obtained are presented and, finally, in section 5 reference is made to the conclusions of the work, gathering the bibliographic references used in section 6.

2. Evolution of the textile sector, environmental consequences and relevant factors for sustainability

2.1. Historical and current perspective

At the beginning of the 70s, the textile sector received numerous aids (Costa & Duch, 2005). It tried to favor national production against foreign competition and have a good productive capacity. In general, this decade is characterized by great productive growth, by the signing of the important Multifibre Agreement that provides countries with direct control of textile imports and by the good economic situation in Spain. At the end of the 70s and the beginning of the 80s a strong crisis was unleashed, especially due to the fall in investment and international competitiveness (Costa & Duch, 2005, CITYC, CCOO, & UGT, 2009).

In the 80s seeing the situation, the government decided to address an industrial reconversion, as the only alternative to get out of the crisis and the textile sector took its measures of industrial and financial sanitation since "this sector was the one that most needed adapt to new technologies " (Garaben, 1984). To all this, it must be added that the great international competition provoked a strong pressure towards the local industry, focusing on the internal markets. In the mid-1980s, Spain became part of the European Economic Community and, little by little, imports increased due to the increase in the offer of cheaper and higher quality products from developing countries (CITYC et al., 2009; Costa & Duch, 2005).

In the nineties, this sector was again affected by an economic crisis, which caused a fall in the demand for consumer goods, in addition to the disappearance of numerous producers and manufacturers, despite the fact that there was a certain recovery was not strong enough (Costa & Duch, 2005; CITYC et al., 2009).

In 2005, the Multifibre Agreement ceased to be carried out and Spanish textile companies were allowed to adapt better to foreign trade. Therefore, the crises that this industry has gone through have led to a profound restructuring (Costa & Duch, 2005).

The textile sector has been immersed in several crises that have affected its volume of total companies (Molina, 2017). As shown in Table 1, there is a decrease in the total number of companies dedicated to this activity in recent years that is largely due to the strong general economic crisis suffered by Spain from 2008 to 2015.

Year	Total (in units)
2007	26.792
2008	25.133
2009	22.881
2010	21.545
2011	20.854
2012	19.763
2013	19.302
2014	19.494
2015	19.441
2016	19.726

Table 1 Evolution of the total number of companies in the textile, clothing, leather and footwear industries
Source: Economic Development Institute of the Principality of Asturias (2018)

Since the beginning of the crisis, the number of companies has gradually fallen, reaching a minimum of a total of 19,302 companies in 2013, when in 2007 it reached a total of 26,792, that is, it was reduced in seven years. 26.94%. From 2007 to 2016 a total of 26.37% was reduced, however, in 2016 you can see how this sector takes a bit more strength reaching almost reaching again a total of 20,000 companies.

The textile sector is developed throughout the Spanish territory, but there are different areas where there is more or less influence. In 2016, the Valencian Community has the largest number of companies in this industry, followed by Catalonia, Andalusia and Madrid; on the other hand, Ceuta and Melilla, Cantabria and Extremadura have the lowest number of companies (Instituto de Desarrollo Económico del Principado de Asturias, 2018).

In terms of turnover, (Graphic 4) we can see how sales have been hit by the strong crisis because, just at the beginning of this, in 2007, the textile sector collected a total of 23,246,868 €, amount that goes down by 36.03% until the year 2015.

Graphic 4 Evolution of the turnover by sector of the textile industry, of leather and shoemaking in Spain
Source: Economic Development Institute of the Principality of Asturias (2018)

It should also be noted that the five main countries to which exports of the textile sector have been destined have been France, Italy, Portugal, Germany and the United Kingdom. On the other hand, the five main countries to which Spain has allocated its imports in the textile sector have been China, Bangladesh, Turkey, Italy and Morocco.

Both exports and imports have increased considerably in the last decade. However, the balance has suffered highs and lows throughout this stage, although always maintaining negative values, that is, imports have always exceeded exports. The best balance value was achieved in 2013, reaching a total of - € 2,747,330.4, a figure that was not reached since 2003, however, the worst data was reached in 2008, with the beginning of the economic crisis reaching a total balance of - € 6,541,703.59 (Instituto de Desarrollo Económico del Principado de Asturias, 2018).

2.2. The environmental impact of the textile sector and the path towards its reduction

Converting raw materials into garments has very negative environmental consequences and reducing these consequences means making production longer and more complex along with increasing costs and delivery times. Producing sustainably becomes, therefore, a challenge for textile companies (Shen, Li, Dong & Perry, 2017).

In the textile sector (CNAE-13) it is necessary to differentiate a series of activities, first, those that are related to raw materials and second, those that are related to the type of transformation that will be carried out. In addition, in these stages we must highlight the garment sector (CNAE-14) as this is part of the textile sector's production process.

These activities are developed through various stages such as the preparation of raw materials, spinning and weaving, making and distribution (Consulting and Training Projects, 2007), stages in which the fashion industry deals with materials and ready-made articles that make use of a set of harmful materials for the environment (Oliva, 2003). With regard to the leather and footwear sector (CNAE-15), the fabric comes from the skins of animals, which are transformed thanks to a series of processes such as obtaining the raw material, preparing the skin and tanning and using the leather (McCann, 2012). In addition, the footwear industry works with a wide variety of materials ranging from leather, plastic or wood, among others. Each of the processes of leather and shoes, carries with it negative consequences not only environmental but also for health due to flammable products such as toxic solvents, used in adhesives and cleaners, or the high concentrations of dust that are created in the atmosphere (McCann, 2012) causing environmental damage that is often irreversible over water, soil and air (Martinez Diaz, Borda & Smith, 2018).

Based on the above, compared to other commercial sectors, the environmental impact of this sector is particularly high, being the second most polluting in the world after the oil industry. The main problem is related to the discharge of wastewater, as they carry with them a high level of contamination due to the fiber finish, and all kinds of chemical products that are used for their transformation. The United Nations Organization (2018) explains how the textile sector is the second largest wastewater produced in the world. In particular, to produce a garment it is necessary to make use of approximately 200 tons of water and 20% of the industrial pollution of water worldwide is due to the dyeing and treatment of textiles (Ellen Macarthur Foundation, 2017).

The Ellen MacArthur Foundation offers us a study in which it states that the textile industry generates waste that equals 50,000 million plastic bottles per year, and 97% of the raw materials used come from non-recycled elements (the plastic represents 63%, cotton 26% and other materials 11%) and less than 2% comes from materials that are recycled. In addition, it should be noted that approximately 53 million tons of fiber are produced, of which 12% are discarded throughout the process and only 13% of the material is recycled after use.

These processes have a negative impact, both on people and on the environment, negative effects on farmers, workers in factories and the environment. Large amounts of water resources are used, high volumes of waste are produced and polluted in an obvious way deriving devastating consequences for the environment and for people (Luque González, 2018). The textile industry depends for the most part on non-renewable resources. Specifically, in this industry 70% of the fibers used are synthetic and artificial and are made with materials such as acrylic, cellulose, polyamide or polyester among others.

But, sustainability is increasingly present in large companies at the time of manufacturing their products, as well as in the economic or government, which means that when it comes to produce, and other alternatives are sought. An example of this is organic cotton, which has already been used by numerous companies, such as Inditex and H & M, but "making use of organic raw materials is not enough, as there is still an excessive use of water and energy" (Riaño, Riera, P. Gestal, De Angelis y Marin-Camp, 2016). Polyester is the most used fiber in this industry and this has great consequences. When they wash, they release microfibers that, as they are not biodegradable, end up in rivers and marine organisms such as plankton. This means that it affects the aquatic environment since plankton, among others, is the food of numerous marine species. And, finally they end up in people when they eat fish or seafood. But not only polyester generates negative effects, also, fibers such as cotton have serious environmental consequences (due to the use of fertilizers) although, to a lesser extent (Perry, 2018).
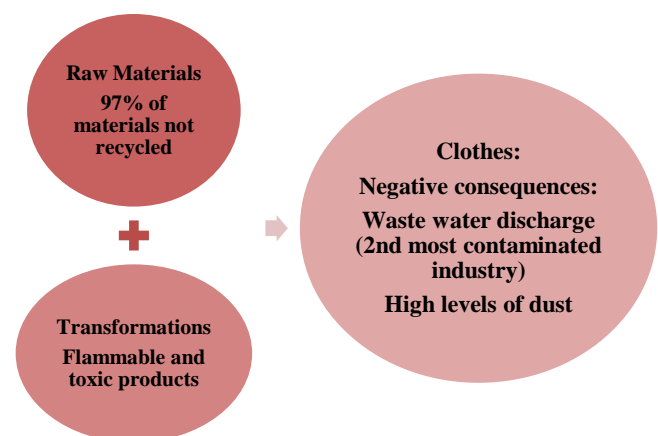
Graphic 5 Production process of the textile sector and the consequences for the environment
Source: self made based on Riaño, Riera, P. Gestal, De Angelis and Marin-Camp (2016), Ellen Macarthur Foundation (2017) and Perry (2018))

The fact that the production process of the textile sector has negative consequences for the environment (Graphic 5) is due, among other things, to the phenomenon "Fast fashion". This phenomenon refers to the rapid rotation of the supply with respect to garments, new collections in very short periods of time, at low prices and of low quality that make the clients feel attracted to replace the clothes constantly what entails an increase in textile waste (Barrios, 2012). "The big" Fast fashion "chains will never be sustainable" (Gómez, 2015).

Gómez (2015) says that making this industry 100% sustainable is not a simple process since it makes great use of water, energy and chemical elements that affect the ecosystem in the short and long term and mitigate those consequences entails a long process.

2.3. Factors that contribute to facilitate the process towards sustainability in the textile sector

Next, some of the factors that can favor the sustainability of the textile industry are identified. First, the level of investment in environmental protection will be a key aspect that can be influenced by other aspects such as the turnover of companies, CO2 emissions, and environmental taxes. This section discusses what your contribution may be when it comes to making the activities developed and the products made in the textile sector more sustainable.

2.3.1. Investment in environmental protection

To reduce the level of pollution in the textile sector, many companies invest in environmental protection, as this investment allows them to make their activities more sustainable. As shown in Graphic 6, the total investment in environmental protection reached its highest figure (with respect to the analyzed data) in the year 2000, reaching a total of €25,307,553.

In the following year this figure fell considerably, specifically by 31.32%. From there, the investment remains more or less constant until 2007, when the crisis period begins, and the figure drops to € 9,544,479. The decline continues until 2014 when it starts to resurface, reaching € 4,689,348. The data between the year 2000 and 2008 have been collected in the Galician Institute of Statistics (2018) and from 2008 to 2015 by the Instituto Nacional de Estadística (2018).
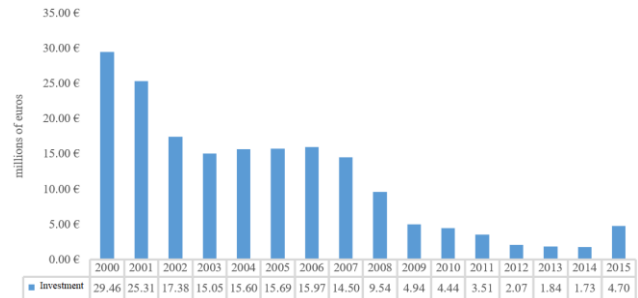
Graphic 6 Evolution of the total investment in environmental protection in the Spanish textile sector
Source: self made through data collected in the INE and IGE (2018; 2018)

Organizations that apply environmental measures improve their image and can respond to the new needs of their clients, thus obtaining a competitive advantage (Salas Canales, 2018), an additional reason for investment in this area, in addition to the contribution with the environment.

2.3.2. Environmental taxes

Environmental taxes have been one of the control instruments most traditionally applied as a tool to achieve certain environmental objectives (Magadán and Rivas, 2003). Specifically, taxes have been introduced in order to mitigate pollution and encourage the proper use of natural resources. That is, the polluter has to pay these taxes.

This can be a factor that influences companies when investing more or less in the environment, since paying more taxes will mean that they have less capital to invest. On the other hand, they can also influence the sustainability of companies because the higher these taxes are, the companies will be able to become aware and will be encouraged to carry out an activity that is more respectful with the environment.

As seen in the following Graphic 7, environmental taxes have suffered increases and decreases in the period to be analyzed (2000-2015), with 2015 being the year in which the highest amount was collected with a total of € 20,857,000,000 representing 8.6% of the total taxes of the Spanish economy. On the other hand, the lowest value was reached in the period prior to the crisis, in the year 2000 with a total of € 13,870,000,000.
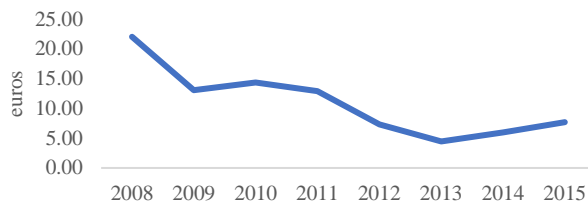
Graphic 7 Evolution Environmental taxes in Spain
Source: European Statistical Office (2018)

These data show the total collection of environmental taxes for the total of industries in Spain in the aforementioned time period, therefore, when the collection of environmental taxes decreases, it may mean that companies are improving their management in terms of environmental protection therefore, they are supported by those companies that do not carry out sustainable activities. On the other hand, when the collection of environmental taxes increases, it could mean that companies are doing activities that are harmful to health and the environment.

2.3.3. CO2 emissions

The textile industry generates a high level of CO2 emissions. These emissions, as reported by Balsalobre-Lorente, Shahbaz, Roubaud, & Farhani (2018), are related to economic growth, in such a way that as the economy grows, more investment will be made in innovation. This will allow an improvement in the factors and productive processes of the activity and, in turn, improve in this aspect will mean a reduction in the levels of CO_2 emissions.

However, "there is evidence to suggest that the increase in economic activity does not always guarantee environmental quality" (Balsalobre-Lorente, Shahbaz, Roubaud, & Farhani, 2018). In addition, "adequate environmental regulation could accelerate effectively the technological changes capable of reducing pollution" (Torras & Boyce, 1998).

According to the latest data compiled in the INE of 2014, (Graphic 8) the evolution of CO2 emissions in the textile sector in Spain have decreased in the period of time 2000-2014, with 2007 being the year in which more emissions of gases have occurred and the year 2014 the least. These data have been obtained through the National Institute of Statistics (2018) where first the emissions of the sector have been extracted between the years 2008 and 2014.

Once this step was taken, the percentage they represent with respect to the total CO_2 emissions emitted by all Spanish industries in the 2008-2014 period was calculated, finally, multiplying said percentage to the total and obtaining an estimate of how much was issued between the years 2000 - 2014.
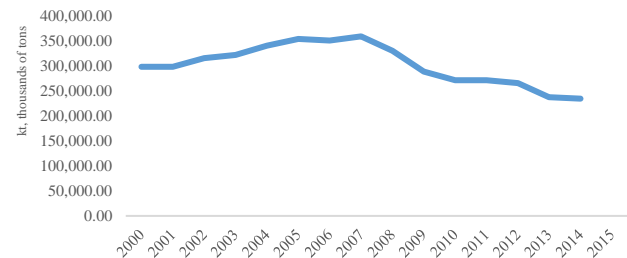
Graphic 8 Evolution of CO2 emissions in the textile, clothing, leather and footwear industries
Source: self made through data collected in the INE (2018)

This drop in emissions may be due to the increase in environmental awareness, as well as to standards such as the Kyoto Protocol, which, as the Organization for Ecology and Development (2018) has, promotes the reduction of Greenhouse Gases (GHG) to through the so-called emission rights. This works in such a way that each member country has a limit of emission rights, that is, it can issue up to a certain percentage. If it goes beyond that limit, it must buy emission rights in order to emit more gases than initially considered. On the other hand, if all the rights are not used, they can be sold to other countries, creating the "Emissions Trading".

According to the data shown in Graphic 9, which have been collected by the European System of CO2 Trading (2018), the prices of emission rights decrease considerably from 2008 to 2015 and this is due to the excess of supply and falling demand for rights (Planelles, 2017).
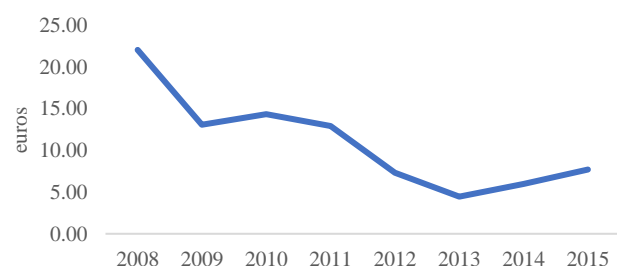
Graphic 9 Evolution of prices of GHG emission rights
Source: European CO2 Negotiation System (2018)

2.3.4. Business figure

Heras and Arana (2011) find that companies with better financial returns are more likely to have certifications such as ISO 14001. In order to analyze this effect in the available data sample, the turnover is used as a proxy. This variable has already been discussed when talking about the current perspective of the sector, showing in Graphic 4, how sales have been hit by the strong crisis since 2007. Since that year, when the textile sector collected a total of € 23,246.868, turnover decreased by 36.03% until 2015.
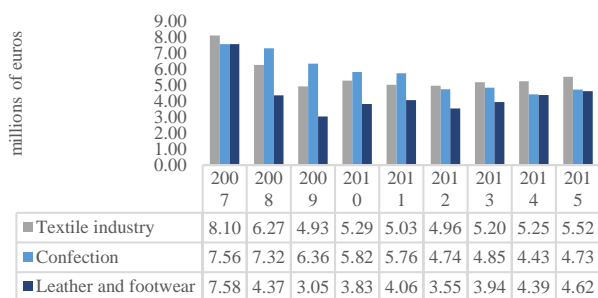
millions of euros	200 7	200 8	200 9	201 0	201 1	201 2	201 3	201 4	201 5
Textile industry	8.10	6.27	4.93	5.29	5.03	4.96	5.20	5.25	5.52
Confection	7.56	7.32	6.36	5.82	5.76	4.74	4.85	4.43	4.73
Leather and footwear	7.58	4.37	3.05	3.83	4.06	3.55	3.94	4.39	4.62

Graphic 4 Evolution of the turnover by sector of the textile industry, of leather and shoemaking in Spain
Source: Economic Development Institute of the Principality of Asturias (2018)

3. Methodology

Taking into account all that has been mentioned up to now and, above all, the importance of the environment, the main objective of this work is to analyze how the factors mentioned in section 2.3 above can affect the investment made by companies of the textile sector in environmental protection in the period of time 2000-2015.

Specifically, the works of Balsalobre-Lorente (2018) and Torras and Boyce (1998) are taken as a basis, where the authors analyze what factors affect CO2 emissions and analyze the behavior of these emissions, based on economic growth and environmental regulation, among others. Their conclusions indicate that it is evident that the indicators are related.

At this point, it should be noted that the novelty of our study is to focus the analysis from another perspective. Given the importance of investing in environmental protection for the sustainability of business activities, the object of the study is to observe which economic, legal and environmental variables can influence their variation in an efficient manner.

Based on this objective, the following hypothesis is developed.

Hypothesis: The investment in environmental protection is explained by the variables CO2 emissions, environmental taxes and turnover of the sector and all of them are related to each other.

To study the hypothesis, an econometric analysis will be carried out with the IBM SPSS Statistics 24 program, starting with a bivariate correlation analysis between the variables and culminating with the elaboration of a multiple linear regression model and the analysis of the results obtained through of said model.

In particular, it is analyzed if the level of polluting emissions, environmental regulation and the turnover of the textile sector have significant effects on the level of environmental protection of companies, measured through the investment they make. This process will be carried out taking into account the following variables related to the textile sector:

− Total investment in environmental protection (euros).
− Environmental taxes (euros)
− CO2 emissions (kt)
− Business figure (euros)

As economic variables, turnover has been selected because the better the development and evolution of the company, the willingness to invest in environmental protection will be greater. Regarding legal factors, environmental taxes have been selected since the level of taxes assumed by a company may be a reflection of its position on the opportunities to invest in environmental protection. Regarding the environmental variables, CO_2 emissions have been selected, because authors such as Balsalobre-Lorente, Shahbaz, Roubaud, & Farhani (2018) already highlight its importance when explaining economic growth, which shows a incentive to reduce these polluting emissions thus investing in environmental protection. In addition, it should be added that the availability of sectoral data has been an aspect that has also been taken into account when selecting model variables.

The data has been obtained from various sources, as discussed in section 2.3. In the case of the total investment in environmental protection in the Spanish textile sector, the data were obtained in the INE and IGE; the data on CO2 emissions were obtained from the INE for the period 2008-2014, the percentage they represent was calculated with respect to the total CO2 emissions emitted by all Spanish industries in the period 2008-2014 and this percentage was multiplied by total to obtain an estimate of how much was issued in the total period considered since 2000; Regarding environmental taxes in Spain, these data were extracted from the European Statistical Office and data on the turnover were taken from the Economic Development Institute of the Principality of Asturias (2018).

Regarding the treatment of these data, the econometric analysis carried out is discussed below.

3.1. Bivariate correlation

First, a bivariate correlation was carried out. The aim is to observe whether or not there is a relationship between the variables "x" and "y", as well as the direction of the relationship (positive or negative) and the intensity of this (the degree). If there is a relationship between the variables, knowing the value of one can anticipate the other. If the relation between the variables is positive, it indicates that both vary in the same sense, so that if one increases the other will also. On the contrary, if it is a negative relationship, both variables will vary in the opposite direction. To observe the degree of the relationship there are several coefficients such as Pearson, Tau-b Kendall and Spearman. In this case, the Pearson correlation coefficient will be used. This coefficient allows us to measure the intensity of the relationship between the variables in a range of -1 to 1 (Merino & Díaz, C Miguel Ángel Ruíz, 2006):

$$r_{xy} = \frac{\sum xy}{n s_x s_y} \tag{1}$$

Equation 1 shows the Pearson correlation coefficient (r_{xy}). Within the equation, in the numerator the "x" shows the referential scores of the variable investment in environmental protection, which come from subtracting the direct scores minus the arithmetic mean. ($xi - \bar{x}$).

As for "and", on the one hand, it will refer to the differential scores of the turnover, on the other, to the referential scores of the environmental taxes and finally to the referential scores of the variable CO2 emissions. In the denominator, sx and s refer to the standard deviations of the variables respectively and n to the number of samples.

Regarding the possible results of this coefficient, we indicate the following:

–   If $r_{xy} = 1$, there will be a positive perfect linear relationship. The closer to 1 the relationship will have a positive trend.
–   If $r_{xy} = 0$, there will be no relationship between the variables.
–   If $r_{xy} = -1$, there will be a perfect negative linear relationship. When closer to -1, the relationship will have a negative tendency.

The correlation coefficient has a property: r_{xy}^2, which is called the coefficient of determination. This coefficient indicates what both variables have in common, or otherwise, the variance proportion of "y" explained by "x".

3.2. Multiple linear regression

The linear regression model is a method used to analyze the dependency ratio between different quantitative variables or, in other words, the way in which they relate to each other. There are different types depending on how many variables are going to be analyzed, if there are two variables, the simple linear regression model will be used and if, on the contrary, more than two variables will be analyzed, it will be the multiple linear regression model. In this case, it will be a multiple linear regression model of ordinary least squares where the relationship will be quantified by the Pearson correlation coefficient (Cea, 2002; Merino, Díaz & Ruíz, 2006).

We will predict the values of the independent variables to obtain the value of the dependent variable through the formulation of the equation that will represent the linear association that exists between the variables that are going to be included. The goodness of the fit of the model and its significance will be analyzed to determine the relationship that exists between the variables. It is necessary to point out that in the regression we can distinguish the dependent variable, which represents the one whose variability we want to analyze, and the independent variables that explain the variability of the dependent.

Based on the aforementioned theory, the analysis focuses on four variables: total investment in environmental protection (dependent), environmental taxes (independent), CO_2 emissions from the textile sector (independent) and turnover (independent). This model, therefore, is used in order to quantitatively show the degree of relationship between the dependent variable and the independent variables, that is, to know the value of the dependent variable from certain values that form the series of independent variables (Cea, 2002; Merino et al., 2006)

$$Y_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i} + e_i \qquad (2)$$

Where, Y_i, equation (2) represents the dependent variable (total investment in environmental protection) and this is formed with the linear combination of the independent variables that are the X_i such that, X_1 is the variable environmental taxes, X2 is the variable CO_2 emissions and X_3 the variable turnover. Add that the a represents a constant and that the b_1, b_2 and b_3 are the coefficients that accompany the independent variables and represent the weight they have in the equation. To finish, e_i "is the random component that collects everything that the other independent variables do not explain" (Merino et al., 2006).

Y_i	Total, investment in environmental protection of the sector
X_1	Environmental taxes
X_2	CO_2 emissions from the sector
X_3	Number of businesses in the sector
b_1	Coefficient of environmental taxes
b_2	Coefficient of CO_2 emissions
b_3	Coefficient of the turnover
e_i	Random component

Table 2 Composition of the regression equation
Source: self made

Therefore, the strategy that has been followed to carry out the exploratory approach can be summarized in the process collected in the following graphic (Graphic 10):
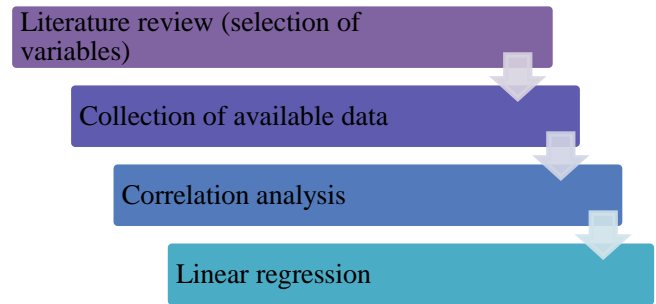
Graphic 10 Process of the exploratory approach
Source: Self Made

4. Results

4.1. Exploratory analysis: the matrix of correlations

To begin the explanation of the results, an analysis of bivariate correlations will be carried out, where, as Cea (2002) points out, so that the effects of the independent variables in the dependent variable can be measured more precisely they will select those variables that do not have an excessively high correlation because "it causes the estimation of the coefficients to be less precise".

		Investment	Environmental taxes	CO2 emissions	Business figure
Investment	Pearson Correlation	1	-,659[**]	,586[*]	,922[**]
	Next (bilateral)		,006	,022	,000
	N	16	16	15	16
Environmental taxes	Pearson Correlation	-,659[**]	1	-,073	-,497
	Next (bilateral)	,006		,797	,050
	N	16	16	15	16
CO2 emissions	Pearson Correlation	,586[*]	-,073	1	,762[**]
	Next (bilateral)	,022	,797		,001
	N	15	15	15	15
Business figure	Pearson Correlation	,922[**]	-,497	,762[**]	1
	Next (bilateral)	,000	,050	,001	
	N	16	16	15	16
	Next (bilateral)	,000	,015	,034	,000
	N	16	16	15	16
** Correlation is significant for the bilateral 0.01 level).					
*. Correlation is significant for the 0.05 level (bilateral).					

Table 3 Correlation matrix
Source: Own elaboration based on the bivariate correlation model obtained with IBM SPSS Statistics

As can be seen in Table 3, CO2 emissions and investment show a significant correlation since p = 0.022 <0.05 and also the relationship of these two variables is a positive linear relationship because r_{xy}= 0.586," that is, the variable CO2 emissions explains 34% of the investment, since r_{xy}^2 = 0.343 and, they vary in the same direction, so that as CO2 emissions increase (or decrease) it also increases (or decrease) the investment.

Environmental taxes and investment, in turn, present a very significant correlation since p = 0.006 <0.01 and, unlike CO2 emissions and turnover, it has a negative linear relationship r_{xy} = -0.659. This means that when the investment variable increases (decreases) the environmental taxes decrease (increase) explaining 43% of the investment variable since r_{xy}^2 = 0.434.

The turnover and the investment show a very significant correlation as well, p <0.01, in addition to having an almost perfect positive linear relationship, since the value of the coefficient is very close to 1 r_{xy} = 0.922. To understand this relationship, this can be explained in such a way that if the turnover of the sector increases (or decreases), as a result the investment will also increase (or decrease). Turnover, therefore, explains 85% of the investment variable since r_{xy}^2 = 0.85.

As has been mentioned, an excessively high correlation, such as that between turnover and investment, "causes the estimation of the coefficients to be less precise" (Cea, 2002), so to measure the effects more precisely of the independent variables in the dependent variable only those variables that do not have an excessively high correlation will be selected. In this case, environmental taxes and CO2 emissions, but not the turnover.

	Factors	Expected effects
Investment in **environmental protection**	Environmental taxes	Negative
	CO2 emissions	Positive
	Business figure	Positive

Table 4 Impacts of the factors that can influence the investment in environmental protection of the textile sector
Source: Own elaboration through the multiple linear regression model obtained with IBM SPSS Statistics 24

4.2. The regression equation

Taking into account the correlation that exists between the variables, the multiple linear regression analysis will be performed to know the shape of the relationship, that is, which is the dependent variable and which independent ones.

Based on the theory analyzed, it is considered that the dependent variable Yi is the investment in environmental protection and the independent variables (X1) and (X2) environmental taxes and CO2 emissions respectively. As explained in section 4.1. the turnover will no longer be included as a dependent variable in the model because it presented an excessively high correlation with the investment in environmental protection. We start by calculating the regression equation, whose coefficients are observed in Table 4.

Model		Non-standardized coefficients		
		B	**Typical error**	
1	**(Constant)**	28.373.570,960	16.914.742,770	
	Environmental taxes	-,003	,001	
	CO2 emissions	4,286	1,219	
Model		**Standardized coefficients**	**T**	**Next .**
		Beta		
1	**(Constant)**		1,677	,119
	Environmental taxes	-,613	-3,983	,002
	CO2 emissions	,541	3,516	,004

Table 5 Coefficients of the regression equation
Source: Own elaboration through the multiple linear regression model obtained with IBM SPSS Statistics 24

Therefore, the resulting regression equation would be the following:

$$\text{Investment} = 28{,}373{,}570{,}960 - 0.003 * \text{Environmental Taxes} + 4{,}286 * \text{CO2 emissions} \qquad (3)$$

The non-standardized coefficients, the "B" represent the value of the coefficients that form the previous equation. These provide more accurate information than the Pearson correlation coefficient, since they indicate how much the dependent variable varies when one of the independent variables varies one unit, keeping the others constant.

The order in the origin (28,373,570.96): represents the constant and determines what is the estimated value of the investment if you could cancel the variables environmental taxes and CO2 emissions.

Taxes (-0.003): it is a negative coefficient which means that the estimated relation between the dependent variable (investment) and the independent variable (taxes) is inverse. That is, the variable Taxes indicates that if everything else is kept constant an increase (decrease) of € 1,000,000 in said variable, will correspond to a decrease (increase) of € 3,000 in investment. CO_2 emissions (4,286): it is a positive coefficient, therefore, the estimated relationship between the dependent variable (investment) and the independent variable (CO2 emissions) is direct. That is, the CO2 emissions variable indicates that if everything else remains constant an increase (decrease) of a KT in said variable, corresponds to an increase (decrease) of € 4,286,000 in Investment.

4.3. Evaluation of the model

Finally, "once the regression equation is estimated, it is interesting to know how well the model obtained predicts the variability of the dependent variable" (Cea, 2002). For this, the goodness of fit and the significance of the model will be observed.

4.3.1. Goodness of fit

Model	R	R square	R squared adjusted	Typical error of the estimate
1	,847[a]	,717	,670	5.000.240,539
a. Predictors: (Constant), CO2 emissions, environmental taxes.				

Table 6 Summary of the multiple linear regression model
Source: Own elaboration through the multiple linear regression model obtained with IBM SPSS Statistics 24

As can be seen, in Table 5, $R^2 = 0.717$ this means that 71% of the variation in the variable "Investment" can be explained by the variation suffered by the variables "Environmental taxes" and "CO2 emissions". 28.3% of the variability remains unexplained due to variables that have not been considered.

This value of R^2 has a series of limitations, so it is considered that in order to measure the goodness of the adjustment it will be more accurate to analyze the adjusted R^2, since this corrects the overestimation that may exist in R^2. Therefore, in this case, $R^2\alpha = 0.670$ which means that the variables "Environmental taxes" and "CO2 emissions" explain 67% of the variance of the variable Investment.

As this value is close to the unit, it can be said that there is a good fit.

4.3.2. Significance of the analysis

This section tries to show, through the results obtained in Table 6, the effect that the variables "Environmental taxes" and "CO2 emissions" have in the prediction of the variable "Investment". Therefore, the following hypotheses are proposed to know whether the model is explanatory or not:

$H_0: \beta_1 = \beta_2 = 0$
$H_1: \beta_1 \neq \beta_2 \neq 0$

Where H_0 is the null hypothesis and its rejection means that the model is explanatory and statistically significant; and where H_1 is the alternative hypothesis. To know how significant the model is, you have to know the value of the F.

Model		Sum of squares	gl	Half quadratic	F	Next
1	Regression	760.486.158.800.000	2	380.243.079.400.000	15,208	,001[b]
	Residual	300.028.865.400.000	12	25.002.405.450.000		
	Total	1.060.515.024.000.000	14			
a. Dependent variable: Investment.						
b. Predictors: (Constant), CO2 emissions, environmental taxes.						

Table 7 ANOVA
Source: Own elaboration through the multiple linear regression model obtained with IBM SPSS Statistics 24

As noted, the level of significance is p = 0.001, which indicates a high level of significance. The probability of success if you reject H_0 is 99.99%. This means that the model is explanatory and that there is a significant linear relationship between the variables.

All this can lead us to reason that companies in the textile sector make the decision to invest in environmental protection based on variables such as "Environmental taxes" and "CO2 emissions", because these show a high degree of significance with respect to to "Investment".

CARREGAL-CASTRO, Laura, ALLÓ-PAZOS, María and LONGARELA-ARES, Ángeles. Investment in environmental protection in the textile sector: Influence of legal, environmental and economic-financial factors. ECORFAN Journal-Mexico 2018.

5. Conclusions

Companies carefully study what to invest their capital to grow and improve as much as possible throughout their lives, but sometimes they leave out issues as important as the environment. Therefore, the main objective of this work has been to show what factors can influence companies in the textile sector, when investing in environmental protection. In particular, legal factors such as environmental taxes, economic factors such as the turnover of the sector and environmental factors such as CO_2 emissions have been taken into account.

As mentioned in section 2, the historical evolution of the textile sector in Spain has been characterized by the large number of crises that it has had to go through, being these reasons for the great restructuring that subsequently suffered. At the same time, it was considered important to show what is the impact that this industry has on the environment; highlighting that it is the second most polluting planet, due to the large amount of waste generated. In order to study this problem, factors that may be influencing investment in environmental protection by companies have been identified.

Taking into account the analyzed factors, in section 3 the hypothesis has been put forward that the investment in environmental protection can be explained by the variables "Environmental taxes", "CO2 emissions", and "Turnover" of the sector and, that they are all related to each other. This hypothesis has been explained through a bivariate correlation analysis and the elaboration of a multiple linear regression model.

In this regard, through the results obtained in section 4, it is concluded that legal factors may be playing a very important role. The variable environmental taxes is a proxy variable that indicates, as already mentioned, the total collection of environmental taxes for the total of industries in Spain and not only in the sector. This variable, therefore, explains part of the variation in investment in environmental protection since, on the one hand, paying more taxes will mean that companies have less capital to invest and, on the other hand, that they pay environmental taxes will mean that they are not carrying out a sustainable activity. Specifically, it is observed that, when more has been collected, there is less investment in environmental protection.

Therefore, taxes can be an incentive for companies to be more sustainable, because they will not be interested in paying taxes that can be saved. It should be noted that taxes are the ones that explain the investment, that is to say, as tax collection decreases means that companies in the textile sector invest more in sustainability, since these taxes have been introduced in order to reduce the level of pollution.

On the other hand, environmental factors also explain much of the investment. Appropriate environmental regulation could accelerate effectively the technological changes capable of reducing pollution. As has been observed, as CO_2 emissions increase, investment in protection also increases, so it is concluded that this may be due to limitations such as the Kyoto protocol where each member country has a limit on emission rights. How many more gases are emitted by these countries, these will have to buy more emission rights, that is, it is invested to be able to emit more harmful gases.

Therefore, to try to design more effective future policies in terms of promoting investment in environmental protection, the following should be recommended.

– The economic incentives are not clear enough, so it would be advisable to take into account more economic variables so that the results are more accurate.

– Environmental variables have more weight than the legislative ones, because the results obtained indicate that taxing is not the most effective. On the contrary, the regulations relating to CO2 emissions, how the Kyoto Protocol can work. That is, the regulations that are most effective could be those that raise awareness and not those that have a sole purpose of collection. Therefore, it would be advisable to analyze other legislative variables that could be more specific.

The model of this work has been carried out with respect to the temporal period 2000 - 2015, that is to say with a total of 16 observations. This sample size is considered sufficient because, as explained by Cea (2002), the criterion of having 5 to 10 times more cases than independent variables is met. In this case, the analysis is formed by two independent variables, therefore, it could be said that the minimum number of observations is reached.

However, the results would be more solid with a larger sample, although in this case, it has not been possible since the INE only offers data at the sector level for that temporary period.

For future analyzes carried out with respect to this topic, it would be interesting to cover a greater number of significant variables that may affect investment in environmental protection of the textile sector, to take into account other aspects that may influence, as much or more, than those already analyzed in this work. Another interesting topic would be to see the relationship between different economic sectors in Spain with respect to environmental protection and what could be the degree of complementarity between them in this aspect.

6. References

Asociación empresarial del comercio textil, complementos y piel. (2015). El comercio textil en cifras. Recuperado de: https://bit.ly/2L3Tsjz.

Balsalobre-Lorente, D., Shahbaz, M., Roubaud, D., & Farhani, S. (2018). How economic growth, renewable electricity and natural resources contribute to CO2 emissions? Energy Policy, 113, 356-367. https://doi.org/10.1016/j.enpol.2017.10.050

Ballester, F., Llop, S., Querol, X., & Esplugues, A. (2014). Evolución de los riesgos ambientales en el contexto de la crisis económica. Informe SESPAS 2014. Gaceta Sanitaria, 28(1), 51-57. https://doi.org/10.1016/j.gaceta.2014.03.004

Barrios, M. C. L. (2012). El impacto ambiental del fast fashion pronta moda. Arquetipo, (4), 71-80. Recuperado de: https://dialnet.unirioja.es/servlet/articulo?codigo=5654048

Broega, A. C., Jordão, C., & Martins, S. B. (2017). Textile sustainability: Reuse of clean waste from the textile and apparel industry. Paper presented at the IOP conference series: Materials science and engineering, 254 (19) Recuperado de: https://bit.ly/2NKTsDx.

Carrera-Gallisà, E. (2017) Los retos sostenibilistas del sector textil. Revista de Química e Industria Textil, 220, 20-32. Recuperado de: https://upcommons.upc.edu/handle/2117/103614

Casallas, K. D. A., Cortes, Y. M. A. & Martinez, L. E. R. (2018). La producción más limpia como una estrategia innovadora aplicada en una empresa del sector textil. Revista de Investigación Agraria y Ambiental, 9(2). https://doi.org/10.22490/21456453.2271

Cea, M. A. (2002). Análisis multivariable. Teoría y práctica en la investigación social. Madrid: Editorial Síntesis.

CITYC, CCOO & UGT. (2009). El nuevo sector textil/confección. Recuperado de: https://bit.ly/2g643eY.

Costa, M. T., & Duch, N. (2005). La renovación del sector textil-confección en España. Instituto de Economía de Barcelona, (355/356), 263-272. Recuperado de: http://www.mincotur.gob.es/Publicaciones/Publicacionesperiodicas/EconomiaIndustrial/RevistaEconomiaIndustrial/355/1PAG%20263-272.pdf

Couñago Garrido, C. (2009). Principios de microeconomía. Departamento de Análisis económico y administración de empresas. Universidad de A Coruña.

Del Brío González, Jesús Ángel, & Cimadevilla, B. J. (2001). Medio ambiente y empresa: De la confrontación a la oportunidad. Civitas.

Ellen Macarthur Foundation. (2017). Recuperado de: https://bit.ly/2Ld1UK9.

Gallizo Larraz, J. L. (2006). Responsabilidad social e información medioambiental de la empresa. Asociación Española de Contabilidad y Administración de Empresas, AECA.

Garaben, A. (1984). El plan de reconversión textil, sacrificio rentable. El País. Recuperado de: https://bit.ly/2JhdSQU.

Gómez, G. (2015). El fast fashion jamás podrá ser sostenible. Recuperado de: https://bit.ly/2uvGwJ4.

González Alvarado, T. E., &, Martín Granados, V. M. A. (2018). Redes de cooperación empresarial internacionales en el sector ambiental y cooperación triangular. Universidad & Empresa, 20(35), 51-77. http://dx.doi.org/10.12804/revistas.urosario.edu.co/empresa/a.5307

Google trends. (10 de abril 2018). Recuperado de: https://trends.google.es/trends/?geo=ES.

Heras, I., Arana, G. (2011). Impacto de la certificación ISO 14001 en el rendimiento financiero empresarial: conclusiones de un estudio empírico. Cuadernos de Economía y Dirección de la Empresa, 14(2), 112-122. https://doi.org/10.1016/j.cede.2011.02.002

Instituto de desarrollo económico del principado de Asturias. (15 de marzo 2018). Recuperado de: https://www.idepa.es/.

Instituto Gallego Estadística (2018). IGE. Recuperado de: https://bit.ly/2yFxVDJ.

Instituto Nacional de Estadística (10 de abril 2018). INE. Recuperado de: http://www.ine.es/.

Jacobs, M. (1996). La economía verde: Medio ambiente, desarrollo sostenible y la política del futuro. Icaria Editorial.

Shen, B., Li, Q., Dong, C., & Perry, P. (2017). Sustainability issues in textile and apparel supply chains. Sustainability, 9(12), 1592. https://doi.org/10.3390/su9091592

López, J. E. N., & Martín, L. Á G. (2012). Fundamentos de dirección estratégica de la empresa. Aranzadi.

Luque González, A. (2018). Exploración de la corrupción textil transnacional: ¿excepcionalidad o norma sistémica? Revista Empresa y Humanismo, 21(2), 123-184. https://doi.org/10.15581/015.xxi2.123-184

Magadán, M., Rivas, J. (2003). Fiscalidad y Medioambiente en España. Septem Ediciones, SL. Recuperado de: www.septem.es/files/libroresumen.pdf

Manzano Zambruno, L. (2014). Moda sostenible y hábitos de consumo. Trabajo Fin De Grado en periodismo de la Universidad de Sevilla. Recuperado de: https://idus.us.es/xmlui/handle/11441/29430

Martínez Díaz, S. M., Borda, C., & Smith, B. (2018). Gestión ambiental empresarial en el sector de cuero en Bogotá como estrategia competitiva para ingresar al mercado europeo. Recuperado de: http://repositorio.uniagustiniana.edu.co/handle/123456789/285

McCann, M. (2012). Capítulo 88 cuero, pieles y calzado Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT).

Merino, A. P., Díaz, C. y Ruíz, M.A. (2006). Análisis de datos con SPSS 13 base McGraw-Hill Interamericana.

Ministerio de Agricultura y Pesca, Alimentación y Medio ambiente. Gobierno de España. (10 de abril de 2018). Recuperado de: http://www.mapama.gob.es/es/.

Ministerio de Economía, Industria y Competitividad. Gobierno de España. (10 de abril de 2018). Recuperado de: http://www.mineco.gob.es/portal/site/mineco/.

Molina, L. (2017). La industria española gana 285 empresas en 2016 y se acerca a las 20 000 compañías. Recuperado de: https://bit.ly/2peCORs.

Oficina europea de estadística. (05 de marzo de 2018). Eurostat. Recuperado de: http://ec.europa.eu/eurostat.

Oliva, J. C. (2003). El sector textil-confección español: Situación actual y perspectivas. Boletín Económico De ICE, Información Comercial Española, (2768), 5-8. Recuperado de: https://dialnet.unirioja.es/servlet/articulo?codigo=625184

Organización de Ecología y Desarrollo. (30 de abril de 2018). ECODES. Recuperado de: https://bit.ly/2uL0G1E.

Organización de Naciones Unidas. (30 de abril de 2018). ONU.

Parro, S. (2017). Porqué la moda sostenible es la tendencia definitiva. Recuperado de: https://bit.ly/2ur87uI.

Perry, P. (2018). The environmental costs of fast fashion. Recuperado de: https://phys.org/news/2018-01-environmental-fast-fashion.html.

Planelles, M. (2017). Europa intenta que contaminar sea más caro. Recuperado de https://elpais.com/economia/2017/03/03/actualid ad/1488563461_784629.html

Proyectos consultoría y Formación. (2007). Guías de actividad empresarial, sector textil.

Ramos, A. (2002). Disponibilidad de los consumidores a la compra de productos ecológicos y sensibilidad de precios en Colombia. "Casos de madera y café," 89. Recuperado de: http://repository.humboldt.org.co/bitstream/hand le/20.500.11761/31388/33.pdf?sequence=1

Riaño, P., Riera, S., P. Gestal, I., De Angelis, C. y Marin-Camp, F. (2016). Moda sostenible: La nueva hoja de ruta del sector. moda.es. Recuperado de: https://bit.ly/2kgOMb4.

Salas Canales, H. J. (2018). Marketing ecológico: La creciente preocupación empresarial por la protección del medio ambiente. Fides et Ratio-Revista de Difusión cultural y científica de la Universidad La Salle en Bolivia, 15(15), 151-170. Recuperado de: http://www.revistasbolivianas.org.bo/scielo.php? script=sci_arttext&pid=S2071-081X2018000100010&lng=es&nrm=iso

Sistema europeo de negociación de CO2. (2018). Recuperado de: http://www.sendeco2.com/es/.

Torras, M., & Boyce, J. K. (1998). Income, inequality, and pollution: A reassessment of the environmental kuznets curve. Ecological Economics, 25(2), 147-160. https://doi.org/10.1016/S0921-8009(97)00177-8

Valverde, N. (2018) La industria textil se suma al carro de la moda sostenible. Recuperado de: https://bit.ly/2odk8kc.

Waste & Resources Action Programme (14 de abril el 2018). Recuperado de: http://www.wrap.org.uk/.

ISSN-Print: 2007-1582- ISSN-On line: 2007-3682
ECORFAN® All rights reserved.

CARREGAL-CASTRO, Laura, ALLÓ-PAZOS, María and LONGARELA-ARES, Ángeles. Investment in environmental protection in the textile sector: Influence of legal, environmental and economic-financial factors. ECORFAN Journal-Mexico 2018.

MILLENNIALS ... A new way of truly meaningful learning?

MILLENNIALS…. ¿Una nueva forma de aprendizaje realmente significativo?

ESCAMILLA-REGIS, Daisy*†, MARTÍNEZ-BAHENA, Elizabeth and LUNA-MÁRQUEZ, Marco Antonio

Tecnológico de Estudios Superiores de Cuautitlán Izcalli

ID 1st Author: *Daisy Escamilla Regis* / **CVU CONACYT ID**: 650408

ID 1st Coauthor: *Elizabeth Martinez Bahena* / **CVU CONACYT ID**: 811086

ID 2nd Coauthor: *Marco Antonio Luna Márquez* / **CVU CONACYT ID**: 908280

Abstract

Objectives, methodology

This research seeks to demonstrate that new generations promote new ways of carrying out the teaching-learning process, and this is not intended to devalue previous methods, but to visualize the application of various technological tools that guide the education not only become more agile, but also, no longer fall into the fact that to learn, you have to be in a classroom, currently, learning must be available to everyone, at any time and place. We will use the quantitative method, where we will show how important and significant it is for young people to apply technological tools to learn.

Contribution

This article aims to demonstrate the importance that technological tools currently have in all areas of the lives of learners, so much so that, as knowledge impartors, we must understand that instead of trying to prohibit them in the classroom , we have to generate processes of inclusion, so that students feel more attracted to the methods of study and it is not a pretext to be able to carry out activities or examinations not to be in person in the classrooms, currently, it should also be understood that Distance education is another way to learn

Millennials, Education, Technological Tools, Teaching-Learning, Critical Thinking

Resumen

Objetivos, metodología

Esta investigación busca, el demostrar que las nuevas generaciones promueven nuevas formas de llevar a cabo el proceso enseñanza- aprendizaje, y no con esto se pretende desvalorizar los métodos anteriores, sino el visualizar la aplicación de diversas herramientas tecnológicas que dan pauta a que la educación no solo se vuelva más ágil, sino además, ya no se caiga en el hecho de que para aprender, hay que estar dentro de un salón de clases, actualmente, el aprendizaje debe estar al alcance de todos, en cualquier momento y lugar. Utilizaremos el método cuantitativo, donde mostraremos qué tan importante y significativo es para los jóvenes la aplicación de herramientas tecnológicas para aprender.

Contribución

Este artículo, tiene como objetivo el demostrar la importancia que tienen en la actualidad las herramientas tecnológicas en todos los ámbitos de la vida de los educandos, tanto, que, como impartidores de saberes, debemos entender que en lugar de tratar de prohibirlos en el aula, tenemos que generar procesos de inclusión, para que los alumnos se sientan más atraídos a los métodos de estudio y no sea un pretexto el poder realizar actividades o exámenes el no estar de forma presencial en los salones, actualmente, se debe entender además, que la educación a distancia es otra forma de aprender.

Millennials, Educación, Herramientas Tecnológicas, Enseñanza-Aprendizaje, Pensamiento Crítico

---

Citación: ESCAMILLA-REGIS, Daisy, MARTÍNEZ-BAHENA, Elizabeth and LUNA-MÁRQUEZ, Marco Antonio. MILLENNIALS ... A new way of truly meaningful learning? ECORFAN Journal-Mexico 2018, 9-21: 27-32.

---

* Correspondence to Author (email: daxy03@hotmail.com,)
† Researcher contributing first author.

Introduction

Millennials: are a generation of children born after Generation X (from 1965 to 1976), they are located between 1977 and 1995. Perhaps the most common date of birth is from 1980 to 1995, they are also called Generation Y, the Peter Pan or Generation Boomerang. (Millennial Generation, 2018)

It has always been said that one of the paradigms of education is that the more you learn, the more you have doubts, that is how, as nowadays, students are involved in an accumulation of technological tools, which are increasingly more competitive, which is that the educational process is wearing more and more, however, we must note that current generations require activities that allow them to make their learning process more meaningful, and that includes the power to generate technological resources that invite you to search, development and implementation that in turn provide new methods that keep the members of a group captive, either face-to-face or virtual, so that, in this way, not only their talents become evident, but also , their new contributions to the society that surrounds them and also influences their professional development.

However, all this prevails over the fact that, although education must be modified and updated to new ways of imparting it, we must also be assertive about the fact that not all of us learn in the same way, however, technological resources they are surpassing traditional methods and millennials, they are the first to acquire and share new knowledge through these resources that are increasingly needed as social networks, tutorials, videogames, virtual chat tables, online appointments, etc.

We will also show the main apps that the young people belonging to the study team use and the time they occupy of a normal day in the use of the various online devices for this purpose.

Our central hypothesis is based on the fact that this article will show that, while the Millennials have come to revolutionize the way of life of today's society, they also try to streamline all processes to get closer to acquiring or sharing knowledge, and its critical thinking becomes more agile as they allow approaching new teaching methods, such as the use of online tutorials and videos**.**

The teacher therefore becomes an expert guide and monitor in the activities of the students, that is why, we have the obligation to, also get soaked not only in the use, but also in the development of new technologies and technological prototypes that help to spread knowledge among young people, and do it in such a way, that it is attractive, agile and easy to understand for them.

1. Millennials, what are they and how are they changing the world?

They are young people born in the early nineties, whose main characteristic is to live permanently connected to the internet through a screen or mobile device, where reality and virtuality are part-for them-of the same world; have the advantage of being considered MULTITASKING, that is, they are able to carry out different tasks using the same means or different media, accessing different types of information in real time, what is known as Omni-channel, their way of socializing is precisely through a screen, they are addicted to the app's that are offered on the internet and social networks, consult, share and comment on them, it has become the main activity they perform on their smartphones.

On the other hand, they are very critical and demanding people, where for them the online shopping experience is an aspect that has gone viral, so if any site does not meet their expectations, they easily forget about it and even do negative recommendations; their influence sometimes goes beyond their community or the society of which they are a part, many of them are called Influencers, with all the connotations that this implies.

2. How do Millennials learn?

Currently, for young people, it is very explanatory to be able to access video tutorials, e-books, chat rooms between friends or study groups and internet searches.

Figure 1 Main information access apps (Google images, 2018)

That is why, Millennials sometimes consider that going to a classroom will only cause them to waste their time, since they believe that teachers limit their creativity and cognitive development in a significant way, having all the possibilities of learning within the reach of their electronic device, pretend that, only when accessing a web page, they will understand the entire context of what is shown there.

The use of these technological tools, by themselves, does not guarantee the absorption of knowledge, especially when accompanied by the use of social networks, online games, digital conversations, etc., all pretending to do at the same time. Young people today, are considered capable of performing several tasks at the same time, and if that can be done from a single instrument, (call computer, lap, cell phone or tablet), it is even better.

3. Traditional education vs Millennial education

The Transmission Model or traditional perspective conceives teaching as a true art and the teacher as an artisan, where its function is to clearly explain and gradually expose their knowledge, focusing centrally on student learning; the student is seen as a blank page, a marble to be modeled, an empty glass or a piggy bank that must be filled. The student is the center of attention in traditional education. (Education in Values, 2018).

Currently, we can see that educational models have undergone drastic changes in the fact that their functionality, no longer applies in these times, previously, the teacher was the center of learning, from it, tasks were generated and processes were given by the activities that emanated from him, the role of the student was passive, that is, was only responsible for receiving knowledge through the board and the notes that, year after year, taught by the teacher, this generated the same responses by young people who observed that their level of understanding was given by the qualification of a test (oral or written) and did not take into account other types of skills inherent in the student body; there was a limitation in the didactic and pedagogical methodology in which there was a palpable lack of innovation, which could be translated into a unilateral process, where there was no room for empathy or the tutorial processes for the different individuals that required it, the process was the same for all, generating confusion, since not all of us learn under the same methods.
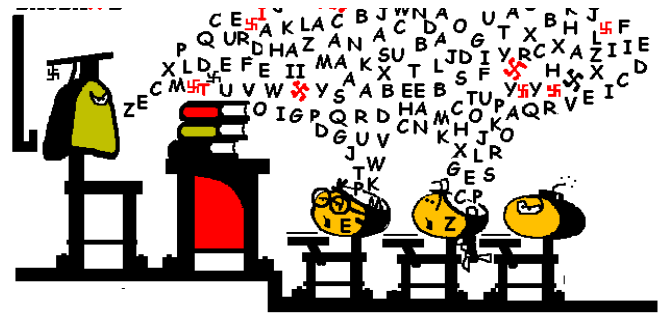
Figure 2 The traditional school (Google imagenes, 2018)

The new educational trends, on the other hand, have as the central author the student, who has a totally active and adaptable role to the use of different technological and computer tools, for him; On the other hand, time is no longer a limitation, since you can learn anywhere, at any time that is appropriate, you no longer need to be physically in a certain space to have access to information and this results in an increase More and more tangible of the virtual classes, that is to say, each time the students get closer to this way of learning, of approaching the notions of learning.

Teachers become facilitators in this way, and peers allow spaces for consultation and collaboration when allowed, that is, students become adaptable and open to sharing new ways of capturing information, and most importantly, this it allows them to compete and exchange knowledge not only at an environmental level, they become part of the information society at a nation, continent, and even transcending borders.

This also implies that schools must change educational paradigms, based on the demands made by millennials, that is, to generate greater research, communication and collaboration capacities among their peers and the environment, this form of learning, It allows us to have many visions of the things that they live and of which they are a part, and their methods to solve situations, adapt to the resources that surround them at that moment, therefore, solving a problem can be carried out nowadays thousand ways, so they use different technological tools such as smartphones, laptops, tablets, and everything that brings them closer to the network of networks.

Figure 3 Millennial Education (Google imágenes, 2018)

4. Where does this new educational trend lead us?

It is a fact that we are facing an abysmal change in education, we are already in a stage where we are surrounded by technology and in this way, we understand the new information and discoveries that occur every day, however, we are also in the stage of understanding how young people think, how they feel and how they make decisions, for that, they take into account the educational needs they have as individuals and the response they generate.

The new trend that is shown as an integral part of education is the aforementioned NEUROEDUCATION, this one "takes advantage of the knowledge about how the brain works integrated with psychology, sociology and medicine, in an attempt to improve and enhance both the processes of learning and memory of students, as those of teaching by teachers." (Arroyo, 2018). In other words, learning takes place, first from an emotion, then as part of the inherent curiosity of all human beings and as a consequence, attention is generated towards a specific or necessary issue or process at a specific time of the student's life, to, as a consequence, provide new knowledge, new uses and technological tools, etc.

Today we know that the educational process can be generated in different ways, and there is also a great relationship between how to learn, how to memorize and how to teach (where the teacher or facilitator intervenes))
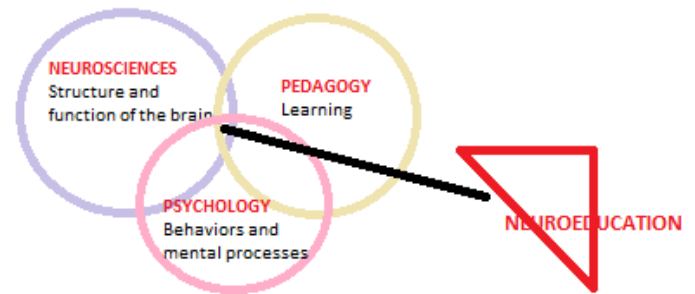
Figure 4 The Neuroeducational process (Corporacionaem, 2018)

5. Technological tools with greater use by Millennials.

Currently, many IES higher education institutions and their teachers have to adopt new disruptive strategies that are associated with the 4.0 revolution, as this allows us to begin meeting the new needs, styles and learning styles of the Millennials students; it is for this reason that, next, it will be shown how important and significant it is for the students the application of technological tools for the construction of their popio learning, being this core part of this article.

To carry out this objective, we began with a study which allows quantitative research to be carried out in the IES, said higher institution has approximately 4,800 students; therefore, it is considered to apply the following formula to obtain a sample size, having a margin of 5% and a confidence level of 95%.

$$n = \frac{z^2(p*q)}{e^2 + \frac{(z^2(p*q))}{N}} \tag{1}$$

Statistical equation for population proportions

n = Sample size
z = Desired confidence level
p = proportion of the population with the desired characteristics (success)
q = Proportion of the population without the desired characteristic (failure)
e = Level of error willing to commit
N = Size of the population

Figure 5 Formula simple calculation (Corporacionaem, 2018)

ESCAMILLA-REGIS, Daisy, MARTÍNEZ-BAHENA, Elizabeth and LUNA-MÁRQUEZ, Marco Antonio. MILLENNIALS ... A new way of truly meaningful learning? ECORFAN Journal-Mexico 2018.

Taking into consideration the sampling by applying the formula shown in Figure 5, it results in a total of 356 students, which were considered to apply a test, which aims to identify which tool they use frequently and in which they pass more time, as well as the importance of a teacher presence sharing materials with technological tools to support students, and finally identify what is the tool that students use most to support their subjects, all mentioned is to be able to check and demonstrate the importance that currently have the technological tools for Millennial students as a new form of meaningful learning.
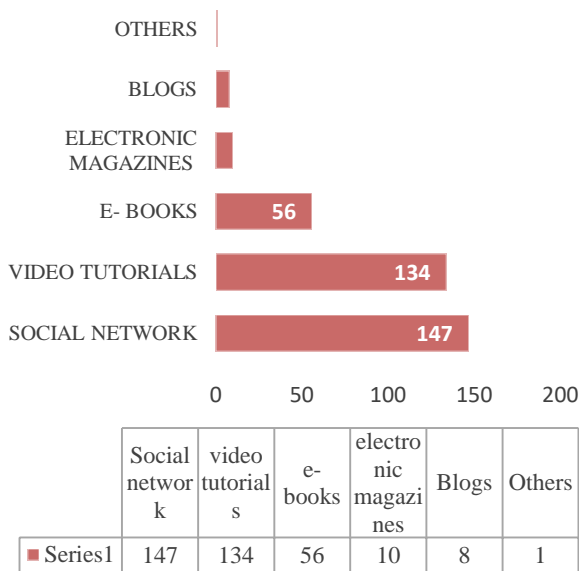
Therefore it shows the importance of social networks, for Millennial students, since for this generation they are one of the tools where they spend more time as shown in Figure 1.

Tool where Millenials spend more time

	Social network	video tutorials	e-books	electronic magazines	Blogs	Others
■ Series1	147	134	56	10	8	1

Graphic 1 Millennials use and spend more time

Likewise, it is also investigated, about the importance of the teacher including technology in their subjects even being presential, since for the students it means to relate them more in their world, and in this case the teacher has to step aside to the technological tools update educative, that allow to strengthen the teaching-learning techniques that it offers to its students, with the objective that their students feel in their same technological world mixing the knowledge and knowledge of the subjects that they are studying in their moment, thus also helping that the student can build their own knowledge and this is significant.

In Graph 2, it is shown that more than 60% of students give a positive response, since they feel even more identified by the use of tools.

It is important that the teacher shares materials and learning tools that reinforce what is seen in class, through a technological tool.
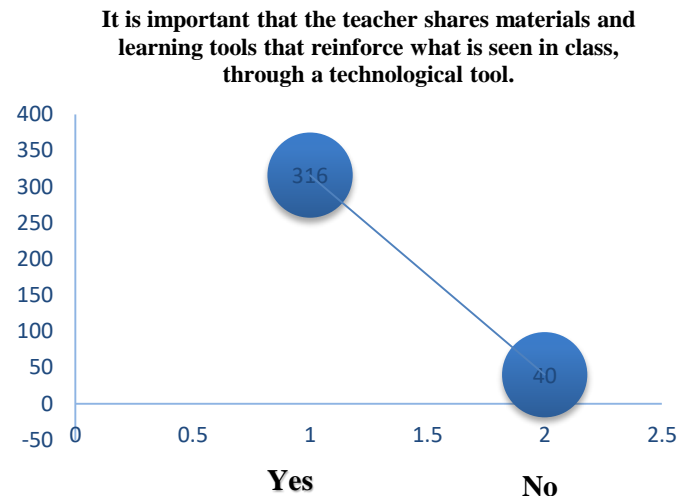
Graphic 2 Importance for Millennials, that the teacher includes technological tools in class

Millenial generation, are very accustomed to have a device that allows you to have Internet connection, and just have access to the search engine, type the subject and have too much information, which can sometimes confuse the knowledge they have acquired in person.

Based on the previous paragraph, it was necessary to identify what is the technological tool that Millennial students use frequently, when they need any help on any topic or research they need to perform, for that, in Graph 3, it shows that the videotutoriales are your great support to reinforce your knowledge and keep building it, since it is your main source of information.

	Wikis	Blog	Videotutoriales	Mooc	Cursos en linea
■ Series1	23	12	156	86	79
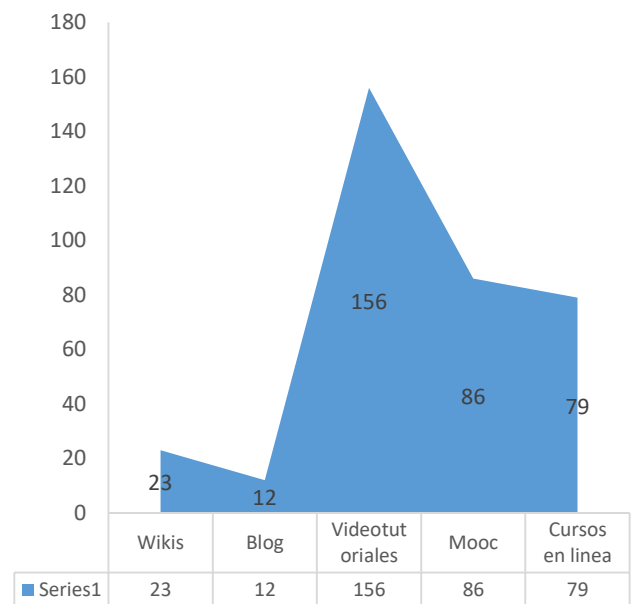
Graphic 3 Technological tools that Millennials use frequently to support their subjects

Results

According to the research carried out, it can be observed that millennial students are very accustomed to the use of technology and for that reason they would not know the world without the help of the internet, this is how, as in the current 21st century, this generation has been able to cover certain deficiencies in various areas, which can be social, economic, and learning, since it is enough, with a device that is connected to the internet to be able to consult any type of information that requires at any time, contact friends, family and even work online, which for them technology is the most important.

Currently, the teacher has to be a facilitator for the Millennial student, which is why it must be updated in technological tools and new teaching-learning strategies, which motivate the student inside and outside the classroom, so that together they can build knowledge signficative. Millennial students, technology is deeply rooted, and that is why everything that surrounds it must be on the same line.

Conclusions

Millennial generation works in a variety of technological tools to be able to socialize, distract or learn, but in this case, what is the role of the teacher? Well, according to the researched, the teacher is only the person who guides and reinforces that knowledge, by means of technological tools, such as video tutorials, since this is one of the tools most often used by students, and it also facilitates their learning, since they must identify how to learn to build their own learning, that with the demacía of information that exists, it can be confused.

So the teacher has to be updated in the millennial environment, to find alternatives that allow them to digest the information, which will be of great help to clarify doubts that may have in the future.

References

Arroyo, C. (15 de julio de 2018). Blogelpaís.com. Obtenido de http://blogs.elpais.com/ayuda-al-estudiante/2013/12/la-neuroeducacion-demuestra-que-emocion-y-conocimiento-van-juntos.htm

Corporacionaem. (30 de julio de 2018). Corporacionaem. Obtenido de http://www.corporacionaem.com/tools/calc_muestras.php

Educación en Valores. (18 de julio de 2018). Obtenido de https://diananahir.wordpress.com/educacion-tradicional-ventajas-y-desventajas/

Generación Millennial. (08 de julio de 2018). Obtenido de https://generacionmillennials.science/ Google images. (10 de julio de 2018). Obtenido de https://www.google.com.mx/search?q=images+de+aplicaciones+web&tbm=isch&source

Google images. (18 de julio de 2018). Obtenido de https://www.google.com.mx/search?q=educaci%C3%B3n+tradicional&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiB36bQlqrcAhUDXq0KHZMtBzcQ_AUICigB&biw=1366&bih=662#imgrc=3tei8JSTiuBjVM:

Google imágenes. (19 de julio de 2018). Obtenido de https://www.google.com.mx/search?q=educacion+en+los+millennials&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjbmvG936vcAhWI6IMKHWjdBEUQ_AUICigB&biw=1366&bih=662#imgrc=OAx4_HaOwAb3eM:

PNUD. (2007). External Debt and the Millenium Development Goals: A New Sustainable Framework. Nueva York: Naciones Unidas.

Green economy and investment in environmental protection in the technological sector: The electronics manufacturing case

Economía verde e inversión en protección medioambiental en el sector tecnológico: El caso de la fabricación de componentes electrónicos

DARRIBA-LINDÍN, Helena[1]†, GAGO-CORTÉS, Carmen[2]* and LONGARELA-ARES, Ángeles[3]

[1] *Universidade da Coruña, University of A Coruna, Faculty of Economics and Business, Elviña, 15071 A Coruña, Spain.*

[2] *Universidade da Coruña, University of A Coruna, Economic Development and Social Sustainability Research Group (EDaSS), Department of Business, Faculty of Economics and Business, Elviña, 15071, A Coruña, Spain.*

[3] *Universidade da Coruña, University of A Coruna, Research Group on Regulation, Economy and Finance (GREFIN), Departament of Business, Faculty of Economics and Business, Elviña, 15071 A Coruña, Spain.*

ID 1° Coauthor: *Carmen, Gago-Cortés* / **ORC ID**: 0000-0002-5670-968X, **Researcher ID Thomson**: G-2514-2016

ID 2° Coauthor: *Ángeles, Longarela-Ares* / **ORC ID**: 0000-0003-0488-4950, **Researcher ID Thomson**: R-1495-2018

Abstract

Climate change is a reality that is becoming more and more evident. The willingness to facing this challenge, together with growing environmental awareness, favours the emergence of currents in favour of a sustainable economic model that respects the environment. Due to the main environmental impacts are generated by industries, this paper focuses on explaining the investment in environmental protection of the technological sector in its branch of electronics manufacturing. In order to achieve this objective, it is carried out a study of the different variables that may affect this type of investment and what type of influence may wield. An attempt is made to understand the relationship between organisations and the environment to reach conclusions that favour the development of policies and the reduction of environmental impacts. The methodology consisted of two types of statistical analysis: correlation analysis and regression analysis. The results obtained seem to reveal that the economic, ecological and legal variables show a high interaction with the evolution of investment in environmental protection. However, the economic and ecological factors are those that seem to explain the evolution of this type of investment.

Green economy, Investment, Environmental protection, Technological sector, Electronics manufacturing

Resumen

El cambio climático es una realidad cada vez más evidente. La disposición a afrontar este reto, unida a la creciente concienciación medioambiental, favorece la aparición de corrientes a favor de un modelo económico sostenible y respetuoso con el entorno. Debido a que los principales impactos ambientales son generados por las industrias, este trabajo se centra en explicar la inversión en protección medioambiental del sector tecnológico español, en su rama de fabricación de componentes electrónicos. Para la consecución de dicho objetivo, se lleva a cabo un estudio de los factores que pueden afectar a este tipo de inversión y qué influencia pueden ejercer. Se intenta comprender la relación existente entre las organizaciones y el medioambiente con la intención de alcanzar conclusiones que favorezcan el desarrollo de políticas y la reducción de los impactos ambientales. La metodología aplicada ha consistido en dos tipos de análisis estadísticos: correlación y regresión. Los resultados obtenidos parecen desvelar que las variables económicas, ecológicas y legales muestran una alta interacción con la evolución de la inversión en protección medioambiental. Sin embargo, los factores económicos y ecológicos son los que parecen explicar la evolución de esta inversión.

Economía verde, Inversión, Protección medioambiental, Sector tecnológico, Fabricación de componentes

* Correspondence to Author (email: m.gago@udc.es)

† Researcher contributing first author.

Article

1. Introduction

During the last decade, society has faced many environmental challenges such as global warming, uncontrolled emissions of gases, intensive exploitation of resources, desertification, pollution of the oceans or the extinction of animal species, among others. Consequently, the fact of knowing how to face these situations from awareness and logic has been gaining increasing relevance.

Currently, one of the answers to the environmental concern is the emergence of the green economy. This tendency has been favored by the disenchantment with the prevailing economic panorama, the financial and economic crises and the failure of the market during the first decade of the 21st century (Vargas, Trujillo and Torres, 2017).

The broad concept of green economy can be defined as the improvement of human wellbeing and social equity, while significantly reducing environmental risks. In other words, it is an economy with low emissions, which uses resources in the most efficient way and which has the support and support of society (United Nations Environment Program, 2011).

The green economy must be supported by three fundamental strategies: the reduction of carbon emissions, greater energy efficiency and the use of natural resources (Carfi & Schilirò, 2012; Vargas et al., 2017). In order to implement and develop these strategies, political support at the regulatory level is necessary, as well as support through public or private investments (Vargas et al., 2017).

In this way, we can invest in measures that help reduce the tons of carbon emissions or greenhouse gases (GHG) harmful to the environment (Galvin, 2015), measures that contribute to increasing energy efficiency, so that to carry out the same activities energy consumption is lower or more activities are carried out with the same consumption (Croucher, 2011) and measures that facilitate the development of respectful manufacturing processes with the environment making responsible use of natural resources and reducing their consumption (Rivet, 2017).

The economy and the environment achieve a high degree of interaction, due to the environmental awareness of society, since most of the productive activities are the cause of the damage to the natural environment. Therefore, they directly affect social dynamics (Vargas et al., 2017).

The beginning of environmental awareness on the part of companies is evident in the United Nations Conference on the Human Environment in 1972, also known as the Stockholm Declaration. This fact represented a turning point for companies and for the protection of the environment. Subsequently, in 1983, the World Commission on Environment and Development was created with the objective of questioning the contemporary model of production and consumption. All this would be materialized in 1992 as the Rio Declaration on Environment and Development.

Therefore, from the business point of view, the concept of environmental responsibility must be taken into account, which consists of the integration of environmental concerns into the decision-making process and into the daily operations of the companies. Given that there are multiple factors that can influence the decisions of companies when investing in environmental protection, In the present work, the influence of some of them will be observed, focusing on the situation of the technological sector or ICT sector (Information and Communication Technologies) and, more specifically, in the branch of manufacture of electronic components.

This sector has been chosen because of the crucial role it plays as a basis for the digitization of traditional sectors (Eyraud and Clements, 2012). It must be borne in mind that the international framework of current business development is marked by two fundamental issues: the globalization of the economy and the technological revolution. These aspects will suppose high rates of innovation, technological progress and productivity, intrinsic characteristics of the ICT sector.

These aspects will suppose high rates of In recent years, there has been a growing incorporation of new technologies to the production model of companiesinnovation, technological progress and productivity, intrinsic characteristics of the ICT sector.

This commitment to ICT goes hand in hand with greater environmental awareness because, taking into account data from the Spanish Instituto Nacional de Estadística (INE), the ICT products manufacturing branch spent € 48,732,278 on environmental protection during the year. 2015, which represents 6.7% of the total expenditure on environmental protection of the last fifteen years. In addition, it invested € 5,616,643 in equipment and facilities that prevent and control pollution, representing 1.62% of all the investment made by the manufacturing industry in Spain.

The remarkable incorporation of the new technologies to the companies, the digitalization of the economy and the continuous advances in the matter, leave record of the technological revolution that we live. That is why it is necessary to highlight the relevance of the ICT sector and its impact at the economic, social and environmental levels, resulting in a subject of great interest.

The main objective of this work is, therefore, to explain the investment in environmental protection of the companies dedicated to the manufacture of electronic components in Spain and look for those factors that can influence such investment. The period chosen for the analysis covers from 2000 to 2015, and data has been collected on the main economic, ecological, social and legislative variables that affect companies in the manufacturing sector of the ICT sector, considering them as factors that can affect the investment.

It should be specified that the manufacturing branch is included in the National Classification of Economic Activities (CNAE) 2009 in: development of electronic components, printed circuits, computers and peripheral equipment, magnetic and optical media, consumer electronics and telecommunications equipment. And, at the service level, it includes all those activities related to information technology and telecommunications, that is, it groups together all the companies dedicated to the sale of computer equipment, resource management, data processing, hosting and maintenance, among others (Ministry of Energy, Tourism and Digital Agenda, 2017).

Taking into account this objective, the scope of study, the variables and their relevance at the environmental level, two hypotheses were formulated. The first assumes that "the analyzed variables show a high relation with the investment in environmental protection". To validate it, a bivariate correlation analysis is carried out. And the second is that "the investment in environmental protection is explained by the factors studied, in the electronic components manufacturing industry". To validate this hypothesis, a multiple linear regression analysis is carried out.

The work will be structured in six sections, including the introduction in the first place. Section 2 gives a brief overview of the situation of the ICT sector and the branch of electronic components manufacturing and explains the factors that can influence investment in environmental protection. In section 3 the methodology followed to carry out the study is exposed, while in section 4 the results obtained are presented. Finally, section 5 reviews the main conclusions reached in this study and, in section 6, the bibliographic references used are collected.

2. ICT sector, manufacture of electronic components, environmental impacts and relevant factors for sustainability

The technology sector or Information and Communication Technology (ICT) groups those companies whose activity is the manufacture of goods, provision of technological services and telecommunications. It also encompasses all those technologies that allow remote communication electronically and store and display acoustic, optical or electromagnetic information. As already mentioned, this sector is classified into several activity areas, including the telecommunications sector, due to the convergence of both at present.

At a historical level, this sector in Spain has been based on electronic communications infrastructures. Its differentiating characteristics are the rapid technological evolution and the intense competition, together with a sustained reduction in the prices of telecommunication services (Pérez and Frías, 2017). It is also worth noting its constant growth. According to the latest data from the National Commission of Markets and Competition (2017), its figures were positive until 2008, at which time the sector began to stagnate and entered a negative trend, coinciding with the beginning of the economic crisis global.

However, the development of new communication services through the internet facilitated the consolidation of the ICT sector. This fact, together with the high degree of innovation and the offer of better functionalities, have favored the process of replacement and growth, in a difficult economic situation for many consumers (Pérez y Frías, 2017).

Proof of this is the growth of ICT companies in Spain compared to previous years, which represents 4% (Ministry of Energy, Tourism and Digital Agenda, 2017). However, not all of its subsectors have grown at the same pace. There are branches such as computer activities or sound recording and music editing activities that grow more than usual. In contrast, the branches of telecommunications, manufacturing and publication of books and newspapers have been affected by a slight decline. The number of people employed in the ICT sector has increased, with 367,906 people in 2016 (Graph 1), together with turnover (Graph 2), which has also had a positive trend in recent years, reaching 80,000 million euros in 2016 (Ministry of Energy, Tourism and Digital Agenda, 2017).
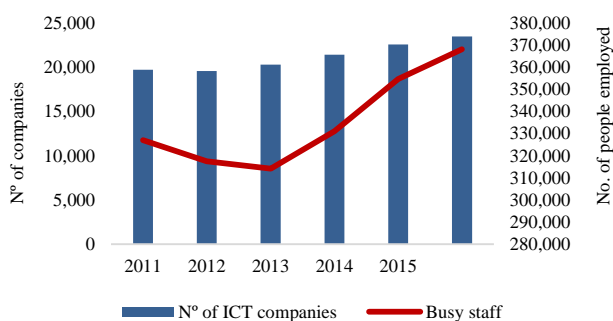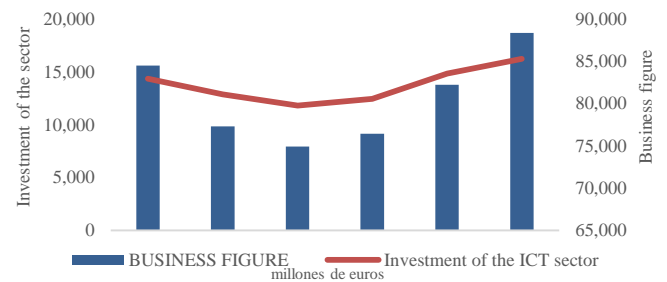

Graphic 1 Relationship of employment and companies in the sector
Source: Own elaboration based on data from the Ministry of Energy, Tourism and Digital Agenda (2017))

Relationship of employment and companies in the sector But, above all, special attention should be paid to investment, since it has been the indicator that has been most negatively affected by the economic crisis of 2008.

Source: Own elaboration based on data from the Ministry of Energy, Tourism and Digital Agenda (2017). Although in the last three years has experienced a positive trend, during 2016 investment in the ICT sector has been 16.222 million euros (Graphic 2).

The forecasts for the next few years are associated with a generalized positive trend, there is even talk of exponential growth due to the increasing linkage of the ICT sector to trade and manufacturing activities.

Graphic 2 Main indicators of the ICT market
Source: Own elaboration based on data from the Ministry of Energy, Tourism and Digital Agenda (2017)

Regarding the manufacturing branch, the core of this work, it constitutes 4% of the ICT sector according to the data published by the Ministry of Energy, Tourism and Digital Agenda, in the year 2017. Despite the positive trend of the ICT sector in a global term, the manufacturing sector has a negative trend in recent years, which may be due to the concentration in other branches, such as services or telecommunications.

The employment generated by these companies has suffered a stagnation in recent years (Graphic 3). As a result, the number of companies has also decreased and with it the relevance of the sector. This may be due to the growth of emerging markets such as Egypt and India, since they are the countries that have the highest growth forecasts in the sector in 2017, estimating that both countries will grow in the period between 2016 and 2020 by 7.2% and 6.7%, respectively (Ministry of Energy, Tourism and Digital Agenda, 2017) or the need to outsource production to lower costs (Myro Sánchez and Fernández-Otheo Ruiz, 2004).

In 2016, most of the employment generated by this sector comes from companies dedicated to the manufacture of electronic components (64.9%) followed by the manufacture of telecommunications equipment (21.5%). The remaining percentage is made up of subsectors dedicated to the manufacture of computers and peripheral equipment, manufacture of assembled printed circuits and manufacture of magnetic and optical media (Ministry of Energy, Tourism and Digital Agenda, 2017).

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.
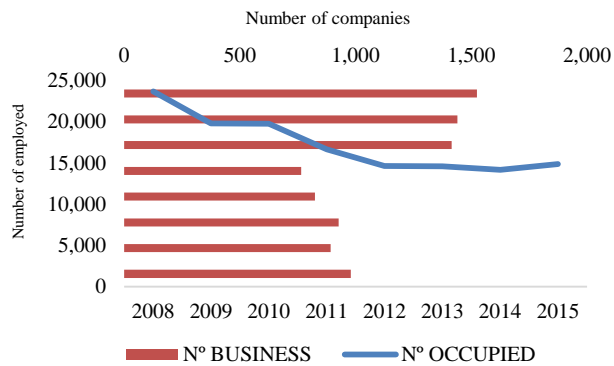
Graphic 3 Relationship number of companies and number of employees in the sector
Source: Own elaboration based on data from the INE and the Ministry of Energy, Tourism and Digital Agenda, for the period 2008-2015

The traditional objective of companies has always been the creation of value and benefits for their owners and shareholders. However, the transition towards a more social and green model reveals a series of goals, where the main objective is to create value for society and its environment (Ochoa, 2018). In addition to social pressure and economic aspects, companies are obliged by current legislation to comply with certain requirements and to take precautions when dealing with issues related to the environment. Environmental protection by the industry is defined by standards that define the levels of protection required according to the activity carried out and / or the polluting substances that are used or generated in the production cycle (Agudo, 2003).

In the specific case of the manufacture of products of the ICT sector, according to INE data, in 2014 a total of 1,207,756 tons of waste were generated, which represents 3.12% of the total generated by the manufacturing industry. And in 2015 it has made an energy consumption of € 186,034, representing 1.74% of total energy consumption by the industry. Therefore, the environmental management of organizations is aligned with the social responsibility of these, with the impacts on the environment and society, with the reaction of interest groups and with compliance with current legislation.
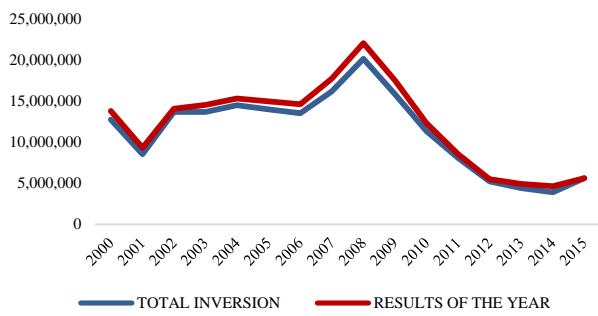
Next, we proceed to explain those factors that can influence the level of investment in environmental protection in the electronic components manufacturing industry. All of them are closely linked to the issues discussed and, therefore, will be the basis of the variables to be used in the empirical analysis of this work.

2.1. Economic factors

The care of the environment can benefit organizations, since they need natural resources for the development of their activity and, at the same time, they develop it in their own environment. Despite the classic conception that spending on measures to protect the environment implies an increase in current expenses and, consequently, a reduction in profits, this idea leads to a misconception of the social objectives of companies (Rivema, 2017).

A sustainable economic model favors the possibility of offering a quality product or service, at a lower production cost and with a lower consumption of natural resources, which leads to a greater profit margin (Rivet, 2017). In addition, the incorporation of environmental measures in organizations has repercussions in other aspects such as anticipation, adaptation to the environment and risk prevention. Companies should be prepared for legislative changes in environmental matters, increases in environmental standards or, even, adaptations in the production process. For these reasons, environmental aspects play a key role at the economic level, because they represent new opportunities and challenges (Rivet, 2017).

Environmental management is closely linked to Corporate Social Responsibility (CSR) or Corporate Social Responsibility (CSR), since economic success does not follow the unique and exclusive path of maximizing benefits, but rather the protection of the environment and the care of the social environment they are also variables to consider (Lacruz, 2005). The model developed as the basis of this work will include, as one of the explanatory factors of the investment in environmental protection, the "Economic Result" of the companies. One of the main functions of this factor is to generate benefits and create value for its owners, therefore, it will be taken into account to try to explain how the economic result affects the environmental management (Graphic 4).

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.

Graphic 4 Evolution of economic results together with investment in environmental protection in the electronic components manufacturing industry
Source: Own elaboration based on INE data, for the period 2000-2014

2.2. Ecological factors

The main impacts generated by the manufacturing industry of electronic components to the environment are determined by the flow of materials and waste during the production cycle. The phases related to transformation and production are those that most affect energy consumption and those that generate the most emissions harmful to the environment (Galvin, 2015). These emissions are classified into two groups: the first refers to greenhouse gas emissions (GHG), generated during the electrical or thermal production of manufacturing and, the second group, refers to the volatile organic compounds and atmospheric pollutants dangerous (European Commission, 2016).

Based on this, "CO2 Emissions" have been considered as a factor to be taken into account in the model developed as the basis of this study. Graphic 5 shows a comparison of the emissions of the manufacturing branch of electronic components with the total GHG. This comparison allows to verify the weight of the emissions of this branch in a global context.
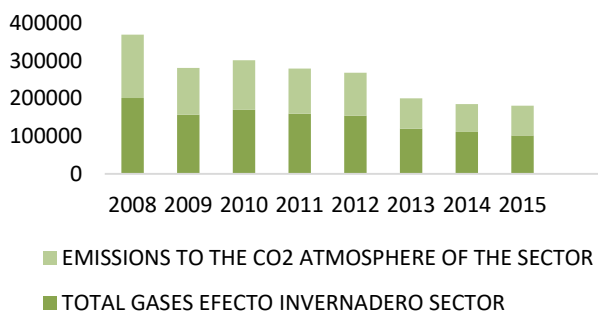

Graphic 5 GHG ratio and CO2 emissions
Source: Own elaboration based on INE data, for the years 2008-2015

In 2015, emissions from the manufacture of electronic components account for 0.10% of the total emissions of the manufacturing industry in Spain (Graphic 6). It is a small percentage, which coincides with the observations of authors such as Fuchs (2008).

Fuchs (2008) states that the industry based on information and knowledge is less aggressive with natural resources compared to traditional industry, because it favors the reduction of environmental impact through more efficient production and distribution systems. However, as we will see later, the proliferation of new technologies and the transition towards a knowledge society can have a negative environmental impact and their study is equally interesting.
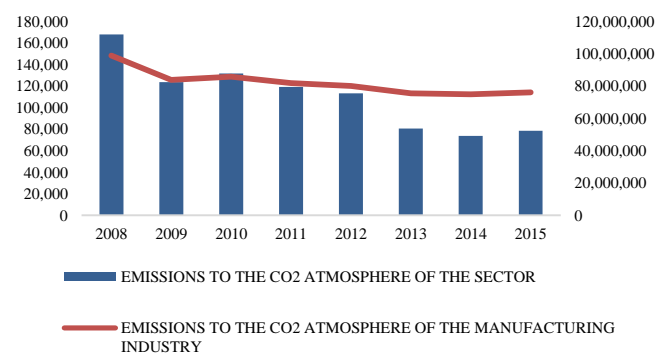
Graphic 6 Emissions from the ICT manufacturing sector in relation to the manufacturing industry
Source: Own elaboration based on INE data, for the years 2008-2015

As can be seen, the evolution of emissions follows a negative trend in the last eight years. Programs are being developed by the European Union (EU) to reduce them, such as the EU's emissions trading system (EU ETS). This organism establishes a limit for the amount of GHG that the industries emit, the objective being the reduction of emissions.

At the end of each year, companies must have enough allocations to cover all their emissions. In the event that organizations have predictions that they will exceed the limit, they can acquire emission rights between them and the rest sell them (Graphic 7). If, on the other hand, this limit is not covered, companies can reserve the surplus for future needs or sell the emission rights to organizations that need it (European Union, 2018).

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.
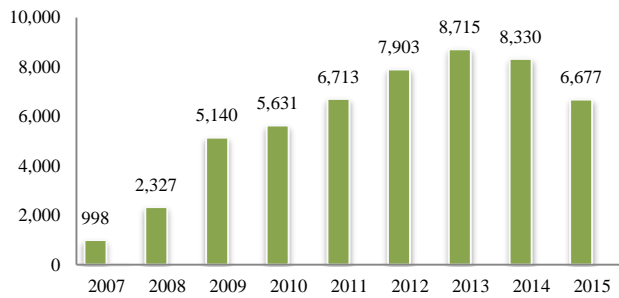
Graphic 7 Number of emission rights marketed in the EU
Source: European Union, for the period 2007-2015

On the other hand, although in recent years technology has marked a path in the change of the traditional economic model, this transition towards a knowledge society does not mean the elimination of industrial structures, but rather the opposite. This industry requires large infrastructures for the extraction of minerals and metals and for the subsequent manufacture of components (Herrmann, Saraev and Scheidt, 2012).

The manufacturing industry generates great environmental impacts, especially in terms of resource efficiency. Precious metals and large surfaces are needed for manufacturing. For example, 60% of the environmental damage caused by laptops is attributed to their manufacture and distribution (Braga, Nedelcu and Udroiu, 2017).

Fuchs (2008) affirms that the reuse of technological products would generate improvements in the environment, but this goes in the opposite direction to the business logic. At this point, the social responsibility of companies comes into play, that is, they act in favor of ecological sustainability and, according to this logic, the tendency would be to accept less benefits in order to preserve the environment.
To reflect the effect that ecological factors may have on investment in environmental protection, the "CO2 Emissions" to the atmosphere has been chosen as an indicator.

2.3. Legislative factors

The ordinances responsible for regulating the environment with the status of law are those that ensure respect and care for the environment, whether terrestrial, aquatic or atmospheric, and the beings that live in them, flora and fauna. (Ecoembes, 2017)

Legislation marks the way for companies to act, in this case, in terms of the effects that poor environmental management or lack of awareness can have. At the Spanish level, the environmental aspects are regulated by a score of laws, however, the most relevant ones will be shown and those that really mark a trend in the investment of companies in environmental protection (De Gispert, 2000), as well as those European laws of a community nature:

− Law 26/2007 on Environmental Responsibility: follows the "polluter pays" principle with the aim of preventing, avoiding and repairing any environmental damage (Official State Gazette, 2007).

− Law 42/2007 on Natural Heritage and Biodiversity: establishes the bases for the conservation, sustainable use, improvement and restoration of the natural heritage and biodiversity. Directly related to article 45 of the Spanish Constitution (Official State Gazette, 2007).

− Law 2/2011 of Sustainable Economy: whose objective is the promotion of the development of a sustainable economic system, based on principles such as the improvement of the competitiveness, the financial stability, the promotion of the innovative capacity of the companies, the saving and the efficiency energy or the promotion of clean energies (Official State Gazette, 2011).

− Law 22/2011, of July 28, on waste and contaminated soils: its objective is to regulate the management of waste by promoting measures that prevent its generation and that mitigate the adverse impacts on human health and the environment, associated with its generation and management and improving efficiency in the use of resources (Official Gazette of the State, 2011).

− Law 21/2013 on Environmental Evaluation: its objective is to regulate the evaluation of projects or plans that may have effects on the environment, to guarantee its protection and sustainable development (Official State Gazette, 2013).

This set of regulations emphasizes the importance of social and corporate responsibility in order to maintain sustainable development over the years, and be able to enjoy the natural environment.

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.

At the level of the European Community, the following regulations are found:

− Directive 2004/35 / EC of the European Parliament and of the Council, on environmental responsibility, in relation to the prevention and repair of environmental damage. It establishes the provisions to regulate situations that have caused damage to the environment and its payment through the cost of preventive or remedial measures or other administrative, legal or executive expenses incurred (European Union, 2004).

− Directive 2008/99 / EC on the protection of the environment through criminal law, in force since 2008. Its main objective is to protect the environment more effectively. For this purpose, offenses and penalties that entail "effective, proportionate and dissuasive criminal sanctions" are defined (European Union, 2008).

Table 2 shows the current legislation, both national and community level, which implies more responsibilities for the industry and sector studied. Therefore, Law 22/2011, on waste and contaminated soils, has been chosen as an indicator for empirical analysis, because it has been considered as the main regulation affecting those industries dedicated to the manufacture of electronic components..

	Validity	objective
Law 26/2007 on Environmental Responsibility	October 25, 2007	Prevent, avoid and repair possible environmental damage.
Law 22/2011, on waste and contaminated soil	July 28, 2011	Regulate the management of waste, to improve the efficiency of resources.
Directive 2004/35 / EC	April 21, 2004	Regulate situations that have caused damage to the environment and its payment through the cost of preventive or remedial measures.
Directive 2008/99 / EC	November 19, 2008	Protection of the environment through criminal law.

Table 2 Main environmental regulations
Source: Own elaboration based on OSG data

2.4. Social factors

There are multiple instruments developed by the EU for organizations to evaluate, inform and improve their performance in environmental matters. One of them is the so-called Eco-Management and Audit System of the EU (EMAS). This tool covers all sectors and is open to any type of organization that is committed to its goals (European Union, 2018). According to EU data, there are now 4,500 organizations subject to this project of which the electronic components manufacturing industry accounts for 0.47% of total EMAS in the EU.

Within this line of tools that favor the development of Environmental Management Systems, are the standards that regulate environmental management, specifically the series of ISO 14000 standards promoted by the International Organization for Standardization and developed by the Technical Committee ISO / TC 207 This tool sets the guidelines for organizations that try to be responsible with the environment. Specifically, within this series, ISO 14001, ISO 14004, ISO 14006 and ISO 14011 focus on the optimal standards for Environmental Management Systems (EMS) and the reduction of environmental impact.

The main contents of these regulations are: general requirements, environmental policy, implementation and operation planning, verification and corrective measures and management review (International Organization for Standardization, 2018).

The sector under study, as can be seen in table 1, is within the top five industries with ISO 14001 certificates worldwide, with a total of 22,183 certificates, representing 8.30% of total certificates of the industry dedicated to the manufacture of electronic and optical equipment worldwide.

Order	Sector	No. certificates
1	Building	43.759
2	Metal and fabricated metal products	24.171
3	Electrical and optical equipment	22.183
4	Wholesale and retail trade, repairs of motor vehicles	17.967
5	Machinery and equipment	14.024

Table 1 The five main industrial sectors for ISO 14001 certificates
Source: International Organization for Standardization (2015)

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.

At a national level, the evolution of certificates follows an increasing trend during the first ten years (Graphic 8). Both trends can be marked by the benefits that accrue from the acquisition of these certificates, such as: the improvement of the company's reputation and confidence in public tenders (International Organization for Standardization, 2018).
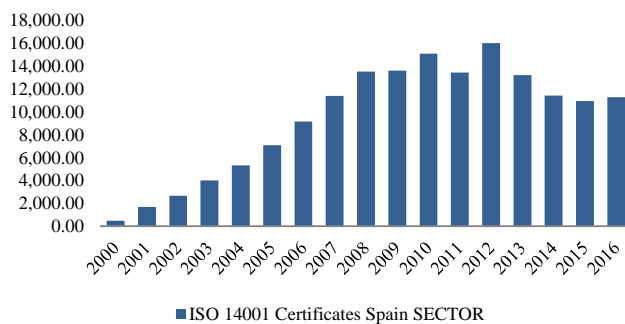
Graphic 8 ISO 14001 Certificates in Spain
Source: International Organization for Standardization in the years 2000-2016

Both tools are closely linked to the environmental management of organizations and to CSR. CSR must be considered as a competitive advantage, since potential consumers have priority for those products or services that respect the environment and society (Puentes, Antequera and Gámez, 2008). It involves three responsibilities: economic responsibility, aimed at maximizing the benefit of its owners; social responsibility, focused on meeting legal requirements, adapting and respecting the culture with which it interacts and environmental responsibility, which focuses on avoiding any negative impact on the environment and contributing to sustainable development (Puentes et al, 2008).

However, investment in environmental matters by organizations is also affected by external factors such as interest groups or stakeholders, a fundamental element in organizations when making decisions in this area. There are studies that confirm the positive correlation between interest groups and the existence of environmental management systems (Díez, Medrano and Díez, 2008).

According to Díez et al. (2008), interest groups can be divided into three categories: organizational, normative and social, and each of them has different effects on companies.

The organizational groups are those that are more linked to the company, and their actions directly or indirectly influence the success of this. Rosewicz (1990) in the USA, concluded in a study conducted in the USA, that the purchasing decisions of customers were oriented towards organic products and had preference for those companies that respect the environment. Within the organizational group, the shareholder is also included. The shareholders do not show a special interest in environmental aspects, however, it contrasts with their long-term responsibility in the company and their future decisions (Díez et al., 2008).

Regulatory groups encompass state and government organizations. This category is directly linked to compliance with the legislation (Díez et al., 2008). And social groups, formed by media and environmental entities, are becoming increasingly important and therefore their pressure is directly linked to the adoption of environmental policies (Delgado and Vidal, 2013).

As can be seen, the environmental concern is influencing the decisions of the different interest groups. And the organizations satisfy the needs of these interest groups, obtaining mainly benefits from this relationship (Díez et al., 2008). Through the information provided by the groups of interest to the company, or through patterns and behavior models, relevant aspects can be known for future decision-making.

The pressure exerted by stakeholders on ecological aspects causes an increase in the involvement of the management on these matters and, therefore, the company will have a greater willingness to invest in environmental protection. Therefore, a good knowledge of the stakeholders allows strategic planning and action in environmental matters, since, to greater knowledge, less risk and greater capacity for anticipation (Delgado and Vidal, 2013).

It should be noted that the regulatory groups are not the ones that have the most influence, although there is a view that these groups impose regulations and rules that may lead to changes in the company. But social groups exert a greater degree of influence, since they directly affect the level of priority (Díez et al., 2008).

It is also important to note that companies that promote the development of their activities within the framework of CSR are committed not only to generate benefits for their internal interest groups, but also are called to promote better living conditions in the areas of intervention of their projects and to respect the rights and to fulfill their duties, always in the constitutional foundation of the Social State of Law (Córdoba Penagos, González Santiago, & Gamboa, 2018).

Taking into account the different factors that are discussed throughout the section, the number of "ISO 14001 Certificates" has been considered as the main indicator for the analysis, because, as it is a voluntary choice of companies, it may be giving response to the needs of different interest groups. And it is noteworthy that the sector under study is within the main industries with this certificate.

3. Methodology

Taking into account what has been mentioned up to now and, above all, the remarkable incorporation of new technologies to companies, the continuous advances in this matter and the importance that the environment is increasingly charging, the main objective of this work is to look for the factors that influence that the companies dedicated to the manufacture of electronic components invest more or less in the protection of the environment.

The period chosen for the study covers from the year 2000 to the year 2015. The analysis has been structured in the behavior of an explained or dependent variable (Y) "Investment in environmental protection", based on other variables called explanatory or independent (X_i)) (Table 3).

These explanatory variables have been chosen according to their nature, distinguishing economic, ecological, social and legal factors, as already mentioned in the previous section, and as summarized below:

− The "Results of the Exercise" of companies in the sector in euros (X1): it is used as an economic variable to try to explain the investment, since investments in environmental or other matters are determined by the level of income and profits generated by the company.

− The "Emissions of CO2" to the atmosphere in tons (X2): it is used as an ecological variable, in order to show some of the impacts, in environmental terms, generated by these companies. In addition to being an indicator, whose decrease may mean an increase in environmental protection.

− The "Law 22/2011", of waste and contaminated soil (variable dummy) (X3): is used as a legislative variable since, as mentioned previously, for companies dedicated to manufacturing has been considered as the most relevant in environmental terms. Entered into force in 2011, date in which investment in environmental protection began to decrease.

− The "ISO 14001 Certificates" in number of certificates (X4): is used as a social variable, because these certificates help companies to manage and identify environmental risks; in short, they can show the environmental commitment of organizations.

Y_i	Investment environmental protection
X_1	Results of the Exercise
X_2	CO2 emissions
X_3	Law 22/2011
X_4	ISO 14001 Certificates
β_1	Coefficient of Results of the Exercise
β_2	Coefficient of CO2 Emissions
β_3	Law Coefficient 22/2011
β_4	Coefficient of ISO 14001 Certificates
e_i	Random component

Table 3 Composition of the regression equation
Source: Self Made

Taking into account these variables and their relevance at an environmental level, the objectives of the study are then formulated:

Objective 1: *Analyze the relationship of the variables studied with the investment in environmental protection in the electronic components manufacturing industry.*

As a result of this objective, the following hypothesis is posed:

Hypothesis 1: *The analyzed variables show a high relation with the investment in environmental protection.*

To validate this hypothesis, a simple correlation analysis will be carried out. This analysis allows the obtaining of significant relationships between the variables and the investment in environmental protection, through the interpretation of the Pearson coefficient.

Objective 2: *Analyze how variables relate to investment in environmental protection through regression analysis*.

As a result of this objective, the following hypothesis is posed:

Hypothesis 2: *The investment in environmental protection in the electronic components manufacturing industry is explained by the factors studied*.

To validate this hypothesis, a multiple linear regression analysis will be carried out.

The commented analyzes are developed with the IBM SPSS Statistics program and, once the results are obtained, it will be evaluated.

The data has been obtained from various sources. In the case of the "Investment in Environmental Protection" and the "Results of the Exercise" in the branch of manufacturing of electronic components of the Spanish technological sector, the data were obtained from the INE. The data on "CO_2 emissions" were also obtained from the INE for the period 2008-2015, calculating the percentage they represent with respect to the total CO_2 emissions of all Spanish industries in the period 2008-2015.

We then obtained an average of the percentages found and multiplied this by the total emissions of the years 2000-2007 to obtain an estimate of how much was issued in this period (*proxy variable*). Regarding the data of "Law 22/2011", it was considered that in the period 2000-2015 until 2011 this Law was not applied because it did not exist, putting a "0" as the value of the variable and, starting of 2011 included, a "1", because it had already entered into force (dummy variable). And the data on the "ISO 14001 Certificates" were extracted from the International Organization for Standardization between the years 2000 and 2015.

Regarding the treatment of these data, the econometric analysis carried out is discussed below.

3.1. Correlation analysis

The starting point of this analysis will be to analyze the existence of relationship or dependence between the variables that are the object of study (And with respect to X). In addition, the type of relationship and the intensity of this relationship are determined. The simple correlation analysis has been chosen because it determines how the behavior structure of one variable (Y) is explained by the behavior of another (X) (Visauta, 2002).

First of all, the aim is to analyze the correlation ratio between the values of the variable X that are given together with those of Y. The correlation will be greater the greater the power of the variable X when explaining the value that the variable Y takes, that is, a high correlation indicates that the variability of Y can be attributed to the variability of X. Otherwise, when the level of correlation is small, it indicates that the variations of Y are not attributed to the variable X, but to other causes not included in the analysis or are, but to a small extent (Montero, 2007).

To measure the degree of dependence between the variable Y and X, the coefficient of linear determination is determined, which is represented as r2. This coefficient shows the percentage of the variability of the data that is explained when associating the two variables X and Y. It takes values between zero and unity, so that:

- $r^2 = 0$ means that the ability to explain the relationship between X and Y is small.
- r2 = 1 means that the ability to explain is greater.

The square root of the coefficient of determination is known as the Pearson linear correlation coefficient, and is represented as r. This coefficient only implies the existence or not of statistical dependence among the linear variables, that is, the variables of the model can depend on another type of function (Montero, 2007). Its sign indicates the sense of the relationship between the variables, that is, if it is positive, the greater the value in one variable, the greater in the other, and if it is negative, the higher the value in one variable, the lower is in the other variable (Camacho, 2004). Take values between -1 and 1, therefore:

- r = 1 the relationship between the variables is positive, total dependence.
- r = -1 the relationship between the variables is negative.

- r = 0 there is no linear correlation between the variables.

To check the significance of the coefficient, a contrast is made that follows the Student's t distribution with n-2 degrees of freedom. What this contract proves is whether the population from which the sample originates has a r equal to 0 (not significant) or if r is different from 0 (it is significant) (Camacho, 2004).

3.2. Multiple linear regression

The question that arises in this analysis is what value of the variable explained corresponds to each of the values of the explanatory variables (Ramil, Rey, Lodeiro, Arranz, 2014). The expression of the model is as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \varepsilon_i \qquad (1)$$

The formulation of the model is subject to the following hypotheses (Ramil et al., 2014):

- The explanatory variables are deterministic, that is, they are not random variables.
- The disturbance is a variable with zero hope and constant and diagonal covariance matrix.
- The dependent or explained variable is random, since it depends on the random variable.
- There is absence of specification errors, that is, the X variables are relevant for the explanation of the variable Y.
- The explanatory variables are linearly independent, that is, there is no exact linear relationship between them, independence hypothesis.

The main objective is to obtain the estimates, that is, the numerical values of the coefficients β_0, β_1, β_2.

For this, the quality of the adjustment or goodness of the adjustment is taken into account, which depends on the size of the errors, that is, on how close the observed and estimated values of the return are. The quality of the adjustment can be assessed by decomposing the total variation of the return in two parts: that explained by the model and the residual. But to avoid compensation the sum of its squares is used (Ramil et al., 2014).

To analyze the quality of the adjustment these sums of squares are taken and different measures are defined that are explained below. First, the degree of dependence of Y with respect to X_1, X_2, X_3 and X4 is measured by means of the coefficient of linear determination, denoted R^2, which takes values between zero and unity. When it is close to the unit, the regression explains a high percentage of the variations of the explained variable. In general, a value close to unity should be obtained, since it is an indication of a good fit. However, a small coefficient of determination indicates that an error was probably made (Ramil et al., 2014).

Therefore, a model will be better the higher R^2 is, however, this coefficient depends on the introduction of new variables to the model. For this reason, for large samples it is replaced in R^2 for $\bar{R}^2$, which is the coefficient of determination corrected by the degrees of freedom. So $\bar{R}^2$ can be considered a good measure of the quality of the regression (Ramil et al., 2014).

To perform contrasts on the correlation coefficient R, the F statistic that follows a F (k, T-k-1) distribution of Fisher de Snedecor is used. This statistic will allow to find regions of confidence at a level of significance α for the set of bi parameters of the model (Ramil et al., 2014).

4. Results

4.1. Correlation analysis

In this part of the analysis, we have chosen the quantitative variables whose degree of relationship we want to analyze. First, the relationship between the variable Y (Investment in environmental protection) and the variable X1 (Result of the Exercise) and secondly the relationship between the variable Y (Investment in environmental protection of the sector) and the variable X2 (Emissions from CO2). Third, the relationship between variable Y and variable X3 (Law 22/2011). Finally, the relation of the variable Y with respect to the variable X4 (Certificates ISO 14001).

The matrix shown below is symmetric, where the values of the diagonal are equal to 1 because they correspond to the correlation of a variable with itself. It shows values such as the Pearson correlation coefficient, the significance of each coefficient and the number of variables involved in the calculation of the relationship (Table 4).

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.

		Investment in Environmental Protection	Results of the exercise	CO2 emissions	Law 22/2011	ISO 14001 Certificates
Investment in Environmental Protection	Correlation. Pearson	1	,773**	,885**	-,852**	-,212
	Next (bilateral)		,001	,000	,000	,431
	N	16	15	16	16	16
Results of the exercise	Correlation. Pearson	,773**	1	,538*	-,587*	,133
	Next (bilateral)	,001		,039	.021	,637
	N	15	15	15	15	15
CO2 emissions	Correlation. Pearson	,885**	,538*	1	-,835**	-,277
	Next (bilateral)	,000	,039		,000	,299
	N	16	15	16	16	16
Law 22/2011	Correlation. Pearson	-,852**	-,587*	-,835**	1	,506*
	Next (bilateral)	,000	.021	,000		,038
	N	16	15	16	16	16
ISO 14001 Certificates	Correlation. Pearson	-,212	,133	-,277	,506*	1
	Next (bilateral)	,431	,637	,299	,038	
	N	16	15	16	16	16
** The correlation is significant at the 0.01 level (2 tails)).						
* The correlation is significant at the 0.05 level (2 tails)).						

Table 4 Correlation matrix
Source: self made from IBM SPSS Statistics

The Pearson correlation coefficient between the variables Y and X_1 is r = 0,773 **, that is, they show a positive relationship with a medium-high intensity. The better the result of the exercise obtained by the companies in the sector, the greater the investment they make in environmental protection. Its level of significance (p <0.01) indicates that the relationship between both variables is significant.

Between the variables Y and X_2 the correlation coefficient is r = 0.891 **, that is, positive relationship with a fairly high intensity. The greater the emissions to the atmosphere, the greater the investment made in environmental protection. Its level of significance (p <0.01) shows that the relationship is significant.

For the variables Y and X_3 the correlation coefficient is r = -0.852 **, that is, the variables show a negative relationship with a fairly high intensity. The existence of environmental laws has an impact on the reduction of investment in environmental protection. Its level of significance is relevant (p <0.01).

Finally, for variables Y and X_4 the Pearson coefficient is r = -0.212, that is, it shows a negative relationship with the number of ISO 14001 certificates, however, this relationship is not significant, therefore, the variable "ISO 14001" (X_4) will not be taken into account in the regression.

This result may be due to the fact that, as has been indicated, the sector analyzed is within the five main sectors with ISO 14001 certificates worldwide, so that, once this objective is reached, it meets the needs of the different interest groups , investment in environmental protection seems not to be significantly affected by this variable. After analyzing the results of the correlation matrix, the bivariate correlation model will be based on the variables that are shown to be significant:

− Results of the Exercise (X_1)
− CO2 emissions (X_2)
− Law 22/2011 (X_3)

When calculating the coefficient of linear determination, which is represented as r^2, we find that for Y and X_1 the $r^2 = 0.5975$, that is, the results of the exercise of these companies explain 59.75% of the investment in environmental protection. On the other hand, for the variables Y and X_2 the $r^2 = 0.7938$, that is, the emissions of CO2 emissions from the manufacturing companies account for 79.38% of the investment in environmental protection. For variables Y and X_3, $r^2 = 0.7259$, that is, Law 22/2011 explains 72.59% of the investment in environmental protection.

4.2. Multiple linear regression analysis

The multiple regression equation for investment in environmental protection is shown below, based on the result of the year, CO2 emissions and Law 22/2011, on waste and contaminated soils (Table 5). As you can see, the variable X4 has been eliminated, leaving the new expression of the model as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \varepsilon_i \quad (1)$$

		Non-standardized coefficients		Standardized coefficients	t	Next
		B	Standard error	Beta		
1	(Constant)	-3356480,178	3963465,824		-,847	,415
	Results of the Exercise	3,869	1,148	,381	3,369	,006
	CO2 emissions	91,020	27,130	,515	3,355	,006
	Law 22/2011	-2033087,556	1654352,627	-,196	-1,229	,245
a. Dependent variable: Investment in Environmental Protection						

Table 5 Multiple regression equation
Source: self made from IBM SPSS Statistics

DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles. Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case. ECORFAN Journal-Mexico 2018.

Therefore, the equation that relates the variables is:

$$\hat{Y}= -3356480{,}178+3{,}869X_1+ 91{,}020X_2 - 2033087{,}556X_3 \qquad (2)$$

The ordinate at the origin (-3356480,178): represents the constant and determines what is the estimated value of the investment if the variables "Results of the Exercise", "Emissions of CO2" and "Law 22/2011" could be annulled. As can be seen, the economic variable "Results of the Exercise" and the ecological variable "CO2 emissions" are those that are significant ($p < 0.05$) both with a positive relationship with the variable explained "Investment in environmental protection" being those that have a greater effect on this one. Regarding "Law 22/2011", it is not shown as a significant variable.

The non-standardized coefficients of "Exercise Results" and "CO2 Emissions" are treated as positive coefficients, which indicates that the estimated relationship between the dependent variable ("Investment in environmental protection") and the independent variables is directly proportional. That is, if everything else remains constant an increase (decrease) of € 100 in "Results for the Fiscal Year" will correspond to an increase (decrease) of € 386.9 in the investment and an increase (decrease) of 100 tons in " CO2 emissions " will mean an increase (decrease) of € 9,120 in investment.

The variable "Law 22/2011", in this case, does not show significant.

Table 6 shows the multiple correlation coefficients, the adjusted and unadjusted determination coefficient and the standard error for the model, which are used to determine the quality of the adjustment made.

The correlation coefficient has a value of R = 0.954, which indicates that the relationship between the explained and explanatory variables is positive. The coefficient of determination takes the value $R^2 = 0.910$, that is, 91% of the variations in investment in environmental protection are explained by the regression. The coefficient of determination adjusted to the number of independent variables of the model is $R^2 = 0.874$. In addition, since it is a high value, since $R^2 > 0.9$ it can be said that, according to these results, the model specification is correct.

Model	R	R square	R adjusted squared	Standard error of the estimate
1	,954[a]	,910	,885	1605389,362

a. Predictors: (Constant), Law 22/2011, Results of the Year, CO2 Emissions

Table 6 Summary of model coefficients
Source: self made from IBM SPSS Statistics

Regarding the analysis of the variance with the F statistic for the test of hypotheses about whether or not there is a linear relationship between the dependent variable of the model and the set of independent variables, $F = 25.233$ and the significance <0.00 for which it is accepted that the hypothesis is fulfilled and there is a significant linear relationship between the investment in environmental protection and the study variables (Table 7). As it is observed, it presents a high level of significance, which indicates that the model is explanatory and that there is a significant linear relationship between the variables.

ANOVA[a] Model		Sum of squares	gl	Average quadratic	F	Next.
1	Regression	285717401000000	3	95239133660000	36,953	,000[b]
	Residue	28350025030000	11	2577275002000		
	Total	314067426000000	14			

a. Dependent variable: Investment in Environmental Protection
b. Predictors: (Constant), Law 22/2011, Results of the Year, CO2 Emissions

Table 7 Analysis of the variance
Source: self made a partir de IBM SPSS Statistics

5. Conclusions

The main objective of this work is to show what are the factors or variables that affect the investment of companies in environmental protection and, thus, to better understand the decisions taken in this matter to design policies that are more effective.

As mentioned in section 2, companies in the ICT sector, in their area of electronic component manufacturing, have always bet on the creation of value and benefits for their owners and shareholders. However, the transition towards a more social and green model reveals a series of goals, where the main objective is to create value for society and its environment, in addition to complying with current legislation on issues related to the environment.

At the same time, it was considered important to see how environmental protection by the industry is defined by standards that define the levels of protection required according to the activity performed and / or the polluting substances that are used or generated in the production cycle (Agudo, 2003). In order to study this problem, factors that may be influencing investment in environmental protection by companies in the sector have been identified. These factors are economic variables such as "Results of the Fiscal Year", ecological variables such as "CO2 emissions", legal variables such as "Law 22/2011" and social variables such as "ISO 14001 Certificates", all of which are related to each other.

Taking into account what has been said, in section 3 two hypotheses have been put forward and an analysis of the economic, ecological, social and legislative variables has been carried out in order to understand and verify the relationship that exists with the investment in environmental protection. These hypotheses are:

Hypothesis 1: The analyzed variables show a high relation with the investment in environmental protection**.**

Hypothesis 2: The investment in environmental protection in the electronic components manufacturing industry is explained by the factors studied**.**

Section 4 shows the results of the analyzes performed. A bivariate correlation analysis has been carried out, which allows to validate, in part, the first hypothesis. This hypothesis has been validated in part because not all the variables studied have shown a relationship with the dependent variable. This is the case of the ISO 14001 certificates, which do not have a significant relationship with the investment in environmental protection.

Regarding the economic variables "Results of the Exercise" and ecological "CO2 emissions" the linear relationship is quite high and positive, that is to say, before an increase of one or the other there is an increase in the investment in environmental protection. On the other hand, the legislative factor is significant in the correlation analysis and shows a fairly high and negative relationship with the dependent variable, that is, if there is a hardening of the laws, the investment in environmental protection will be smaller.

To fulfill the second objective of the work, a multiple linear regression analysis has been carried out. This allows to verify how the variables relate to the investment in environmental protection and obtain the regression equation to predict the value of the dependent variable. The adjustment of the estimate can be considered acceptable. The analysis allows to validate, in part, the second hypothesis.

The behavior of the investment in environmental protection depends on the values taken by the economic and ecological variables, which are the most significant. Specifically, 91% of the variations in investment in environmental protection are explained by the variables.

The results obtained in this study allow us to offer a series of recommendations:

– CO2 emissions are the main causes of climate change and, in the specific case of this work, it is observed that investment in environmental protection and this factor are closely related. Therefore, it is necessary to ask for more commitment from companies and industries in this aspect, so that they are more responsible for the damage they cause. The Paris Conference already establishes an objective to reduce GHG emissions, especially from 2020, but instead of reducing, one should try to avoid these emissions to mitigate the impacts generated. Betting on new technologies and clean ways to generate energy is the way to achieve a change in the business mentality.

– The business benefits are those that mark the way when acting in the care of the environment. In the analysis, this conception is verified, since it is observed how the economic results and the investment in environmental protection are related, that is, the organizations invest in this area in fusion of the benefits. Therefore, for the future the promotion and increase of subsidies for those companies that bet on the use of sustainable materials and tools should be a priority.

Based on the above, the main points on which future policies or regulations should affect, to promote sustainable development in the manufacturing sector of the ICT sector, would be to promote the use of sustainable materials and tools with the environment and the reduction of waste and emissions to the atmosphere (Agarwal and Nath, 2011).

The fact of encouraging the use of new materials would not only favor the environment, but also the companies themselves promoting the development of R + D + i.

Another point to take into account within this sector would be the promotion of the use and manufacture of reusable or renewable electronic products, which can be repaired without having to re-manufacture a new product, that is, encourage initiatives based on circular economy, in order to reduce the generation of waste of these companies. An example of this would be the manufacture of mobile phones easy to repair, with parts that can be reused or from which valuable materials can be extracted once discarded for later reuse. This is important since the generation of waste is not based solely on manufacturing, but covers the entire value chain of companies, from extraction to sale. Therefore, the promotion of the aforementioned measures could favor the reduction of large impacts in the environment, as stated by McDonough and Braungart (2002).).

At the same time, at a more general level, it would also be important to encourage the use of eco-technologies, which use new technological innovations to promote the sustainable use of natural resources, both in companies and in urban spaces (García and Balderrama, 2018). In the same line, it would also be necessary to continue promoting new initiatives for the creation of green jobs, in which the introduction of new technologies also contributes to reducing the environmental impact of companies (Network of Vocational Training Institutes, 2018). An example that unites the two lines indicated would be the installation of solar panels that can serve to provide power to charging stations of electric vehicles.

This type of projects can generate important virtuous circles, since they not only favor the reduction of the ecological footprint, but the energy savings they provide also has important economic benefits that, in certain business sectors, can favor an increase in investment in environmental protection as the results of this study show. Finally, add that the results obtained show certain limitations, such as the scarcity of data in relation to the variables used, since it was not possible to obtain data for a longer period of time. The availability of more data would allow to establish some kind of trend in the investment in environmental protection.

The confidentiality of certain data has also been a limitation, since companies are not obliged to publish certain information. Technological advances, the increasing incorporation of new technologies and the continuous development of this sector could favor future lines of research in this field.

6. References

Agarwal, S., & Nath, A. (2011). Green computing-a new horizon of energy efficiency and electronic waste minimization: A global perspective. In 2011 International Conference on Communication Systems and Network Technologies, 688-693. IEEE. doi: 10.1109/CSNT.2011.148

Agudo, J. (2003). Técnicas de control de la contaminación los estándares de protección medioambiental (Tesis Doctoral). Universidad Autónoma de Madrid, Madrid. Recuperado de: https://repositorio.uam.es/handle/10486/4975

Braga, I.C., Nedelcu, A., & Udroiu, R. (2017). Risk reduction in dimension inspection of the plastic injection-molded parts from mechatronic devices by using optical 3D measuring techniques. MATEC Web of Conferences, 94. doi: 10.1051/matecconf/20179404001

Boletín Oficial del Estado. (2013). Ley 21/2013, de 9 de diciembre, de evaluación ambiental. Madrid, 11 de diciembre de 2013, nº 296. Recuperado de: https://www.boe.es/buscar/doc.php?id=OSG-A-2013-12913

Boletín Oficial del Estado. (2011). Ley 22/2011, de 28 de julio, de residuos y suelos contaminados. Madrid, 29 de julio de 2011, nº 181. Recuperado de: https://www.boe.es/buscar/doc.php?id=OSG-A-2011-13046

Boletín Oficial del Estado. (2007). Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Madrid, 14 de diciembre de 2007, nº 299. Recuperado de: https://www.boe.es/buscar/act.php?id=OSG-A-2007-21490

Boletín Oficial del Estado. (2007). Ley 26/2007, de 23 de octubre, de Responsabilidad Medioambiental. Madrid, 24 de octubre de 2007, nº 255. Recuperado de: https://www.boe.es/buscar/doc.php?id=OSG-A-2007-18475

Boletín Oficial del Estado. (2011). Ley 2/2011, de 4 de marzo, de Economía Sostenible. Madrid, 5 de marzo de 2011, nº 55. Recuperado de: https://www.boe.es/buscar/act.php?id=OSG-A-2011-4117

Camacho, J. (2004). Estadística con SPSS versión 12 para Windows. Madrid, España: Ra-ma, SA.

Comisión Nacional de los Mercados y la Competencia. (2017). Informe anual 2017. Recuperado de: http://data.cnmc.es/datagraph/jsp/inf_anual.jsp

Córdoba Penagos, A., González Santiago, E. A., & Gamboa, G. (2018). Percepción de las comunidades del área de influencia del campo abanico en el municipio de Espinal-Tolima de los beneficios de los programas de gestión social en el marco de la Responsabilidad Social Corporativa de Pacific Rubiales Energy [recurso electrónico] (Doctoral dissertation). Recuperado de: http://bibliotecadigital.univalle.edu.co/bitstream/10893/11361/1/CB-0574791.pdf

Croucher, M. (2011). Potential problems and limitations of energy conservation and energy efficiency. Energy Policy, 39, 5795-5799. doi: 10.1016/j.enpol.2011.07.011

De Gispert, C. (2000). Tributos ambientales sobre el agua y comportamiento del sector industrial. (Tesis doctoral). Universitat de Barcelona, Barcelona. Recuperado de: http://hdl.handle.net/2445/35365

Delgado, J., y Vidal, M. D. (2013). La influencia de los grupos de interés en el comportamiento medioambiental de los directivos: el uso de estrategias indirectas. Cuadernos económicos de ICE, 86, 153. Recuperado de: https://bit.ly/1rOvMjb

Díez, F. D. A., Medrano, M. L., y Díez, E. P. (2008). Los grupos de interés y la presión medioambiental. Cuadernos de gestión, 8(2), 81-96. Recuperado de: https://idus.us.es/xmlui/handle/11441/40035

Ecoembes (2017). 20 Leyes de medio ambiente que debes conocer. Recuperado en: https://www.ecoembes.com/es/planeta-recicla/blog/20-leyes-de-medio-ambiente-que-debes-conocer

European Commission. (2016). Best Environmental Management Practice for the Electrical and Electronic Equipment Manufacturing Sector. Recuperado de: http://susproc.jrc.ec.europa.eu/activities/emas/eeem.html

Eyraud, L., y Clements, B. (2012). Hacia una energía verde: crece en el mundo la inversión en tecnologías amigables con el medio ambiente. Finanzas y desarrollo: publicación trimestral del Fondo Monetario Internacional y del Banco Mundial, 49(2), 9-4. Recuperado de: https://bit.ly/2mNZ0RA

Fuchs, C. (2008). The implications of new information and communication technologies for sustainability. Environment, Development and Sustainability, 10(3), 291-309. doi: 10.1007/s10668-006-9065-0

Galvin, R. (2015). The ICT/electronics question: Structural change and the rebound effect. Ecological Economics, 120, 23-31. doi: 10.1016/j.ecolecon.2015.08.020

García, J. y Balderrama, A. S. (2018). Modelo AMUVAM para la valuación de espacios eco-tecnológicos. Caso de estudio: vialidad solar proyectada en la ciudad de Tijuana. Revista de Direito da Cidade, 10 (3), 1813-1841. doi: 10.12957/rdc.2018.33861.

Herrmann, C., Saraev, A., & Scheidt, L. G. (2012). Green IT: A holistic approach for identifying sustainable performance. In Electronics Goes Green 2012+(EGG), 1-6. IEEE. Recuperado de: https://bit.ly/2JIpaOx

IBM. IBM SPSS statistics.

Instituto Nacional de Estadística (2018). Principales variables por sectores de actividad: número de ocupados y resultados del ejercicio. Serie 2008-2015. Recuperado de: http://www.ine.es/jaxiT3/Table.htm?t=24917

Instituto Nacional de Estadística (2018). Cuenta de emisiones a la atmósfera. Serie 2008-2015. Recuperado de: http://www.ine.es/jaxi/Table.htm?path=/t26/p084/base_2010/serie/l0/&file=01001.px&L=0

Instituto Nacional de Estadística (2018). Encuesta sobre generación de residuos en el sector industrial. Serie 2012-2014. Recuperado de: http://www.ine.es/jaxi/Table.htm?path=/t26/e068/p02/serie/l0/&file=01001.px&L=0

Instituto Nacional de Estadística (2018). Encuesta del gasto de la industria en protección ambiental. Serie 2008-2016. Recuperado de: http://www.ine.es/jaxi/Table.htm?path=/t26/p070/p01/serie/l0/&file=01001.px&L=0

Instituto Nacional de Estadística (2018). Cuentas de emisiones a la atmósfera. Base 2010. Serie 2008-2015. Recuperado de: http://www.ine.es/jaxi/Table.htm?path=/t26/p084/base_2010/serie/l0/&file=01001.px&L=0

Instituto Nacional de Estadística (2018). Encuesta de consumos energéticos. Serie 2009-2015. Recuperado de: http://www.ine.es/jaxi/Table.htm?path=/t04/p02/cnae09/2015/l0/&file=04001.px&L=0

Lacruz, F. (2005). La empresa ambientalmente responsable. Una visión de futuro. Economía, (21). Recuperado de: http://iies.faces.ula.ve/revista/Articulos/Revista_21/Pdf/Rev21Lacruz.pdf

McDonough, W., & Braungart, M. (2002). Cradle to cradle: Remaking the way we make things. New York, EEUU: Farrar, Straus and Giroux.

Ministerio de Energía, Turismo y Agenda Digital. Gobierno de España. (2017). Informe Anual del Sector ICT y de los Contenidos en España 2017. Recuperado de: https://bit.ly/2xBbtjH

Montero, J. (2007). Estadística descriptiva. Madrid, España: Paraninfo, SA.

Myro Sánchez, R. y Fernández-Otheo Ruiz, C.M. (2004). La deslocalización de Empresas en España. La atracción de la Europa Central y Oriental. Información Comercial Española, ICE: Revista de economía, ISSN 0019-977X, 818, pp. 185-204. Recuperado de: https://dialnet.unirioja.es/servlet/articulo?codigo=1121852

Ochoa, J.N. (2018). Oportunidades de negocio y tendencias medioambientales. Universidad & Empresa, 20 (35), 13-50. http://dx.doi.org/10.12804/revistas.urosario.edu.co/empresa/a.5740

Organización Internacional de Normalización (2018). ISO 14000 family - Environmental management. Recuperado de: https://www.iso.org/iso-14001-environmental-management.html

Organización Internacional de Normalización. (2018). ISO 14001 - data per country and sector - 1999 to 2016. Recuperado de: https://bit.ly/2Gzune7

Pérez, J., y Frías, Z. (2017). Las infraestructuras ICT y la consolidación de la economía digital. Información Comercial Española, ICE: Revista de economía, (897), 23-38. Recuperado de: https://bit.ly/2Luhpki

Programa de las Naciones Unidas para el Medio Ambiente. (2011). Hacia una economía verde: Guía para el desarrollo sostenible y la erradicación de la pobreza. Recuperado de: http://sostenibilidadyprogreso.org/files/entradas/hacia-una-economia-verde.pdf

Puentes, R., Antequera, J. M., y Velasco, M. D. M. (2008). La responsabilidad social corporativa y su importancia en el espacio europeo de educación superior. In Estableciendo puentes en una economía global (p. 48). Escuela Superior de Gestión Comercial y Marketing, ESIC. Recuperado de: https://bit.ly/2LuAClM

Ramil, M., Rey, C., Lodeiro M., y Arranz, M. (2014). Introducción a la econometría: Teoría y práctica. A Coruña, España: Reprografía Noroeste SL.

Red de Institutos de Formación Profesional. (2018). Prospección de necesidades formativas para la generación de empleos verdes en Centroamérica y República Dominicana. Recuperado de: https://bit.ly/2x6M4L3.

Remacha, M. (2017). Medioambiente: Desafíos y oportunidades para las empresas. Navarra, España: Cátedra CaixaBank de Responsabilidad Social Corporativa. Recuperado de: https://www.iese.edu/Aplicaciones/upload/ST0431.pdf

Unión Europea. (2018). EU Emissions Trading System (EU ETS). Recuperado de: https://ec.europa.eu/clima/policies/ets_en

Unión Europea. (2008). Directiva 2008/98. CE del Parlamento Europeo y del Consejo, del 19 de noviembre de 2008. Recuperado de: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2008:328:TOC

Unión Europea. (2004). Directiva 2004/35. CE del Parlamento Europeo y del Consejo, del 30 de abril de 2004. Recuperado de: https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=celex:32004L0035

Vargas, O. I., Trujillo, J. M., y Torres, M. A. (2017). La economía verde: un cambio ambiental y social necesario en el mundo actual. RIAA, 8(2), 175-186. Recuperado de: https://bit.ly/2NxRW6J

Visauta, B. (2002). Análisis estadístico con SPSS para Windows. Madrid, España: MCGRAW-HILL, SA.

The process of management of integral change in educational organizations

El proceso de gestión de cambio integral en las organizaciones educativas

SOTO-MUCIÑO, Luis Enrique*†[1], INFANTE-MENDOZA Benjamin[2] and ALPUCHE-DE LA CRUZ Ezequiel[3]

[1]*Instituto Politécnico Nacional*
[2]*Dirección General de Educación Normal y Actuación del Magisterio*
[3]*Tecnológico de Estudios Superiores de Chimalhuacan*

ID 1°Author: *Luis Enrique, Soto-Muciño* / **ORC ID:** 0000-0002-8305-7736

ID 1° Co-author: *Benjamín, Infante-Mendoza* / **CVU CONACYT ID:** 0000-0001-926991

ID 2° Co-author: *Ezequiel, Alpuche-De la Cruz* / **CVU CONACYT-ID**: 225891

Abstract

Currently, there is a need to manage the different processes that educational organizations must go through, due to a dynamic environment that requires solid structures that allow them to generate strategies and management mechanisms for the achievement of organizational objectives. The concept of renewal is usually associated with certain characteristics of change, desirable and superior to the reality of the work know-how it has, which have not yet been incorporated into the various economic and organizational processes, as a whole and specifically in what refers to the relationships of educational organizations. Fundamentally, change management is a discipline that requires the interactions and considerations of the groups that comprise it, educational organizations, face in their own context and complexity, seeking to develop skills and where efforts should be made to stay, like any other organization. In this work, through the documentary exploration, the description with an integral vision of the characteristics of adaptation to the transformations suffered by an educational organization, by the internal and external environment was made.

Change Management, Integral, Educational Organizations

Resumen

Actualmente se tiene la necesidad de gestionar los distintos procesos por los que deben de transitar las organizaciones educativas, debido a un entorno dinámico que requiere de estructuras sólidas que les permitan generar estrategias y mecanismos de gestión para el logro de los objetivos organizacionales. El concepto de renovación suele asociarse a determinadas características de cambio, deseables y superiores a la realidad del know-how de trabajo esta desempeña, las cuales aún no han sido incorporadas a los diversos procesos de carácter económico y organizacional, como un todo y específicamente en lo que se refiere a las relaciones de las organizaciones educativas. Fundamentalmente, la gestión de cambio es una disciplina que requiere de las interacciones y las consideraciones de los grupos que lo conforman, las organizaciones educativas, se enfrentan en su propio contexto y complejidad, buscando desarrollar capacidades y donde se deben realizar esfuerzos para la permanencia, como cualquier otra organización. En este trabajo se realizó a través de la exploración documental, la descripción con una visión integral, de las características de adaptación a las transformaciones que sufre una organización educativa, por el medio ambiente interno y externo.

Gestión de Cambio, Integral, Organizaciones Educativas

* Correspondence to Author (email: lsotom607@gmail.com)
† Researcher contributing first author.

Introduction

The importance of managing the different processes that make up educational organizations, and with the perspective of achieving organizational development, in order to contribute to the positions from the environment, this article aims to perform a conceptual exploration of the main elements associated with organizational development. Consideration will be given to the management of the processes of change that must be carried out by the administration of the organization of education, that from the management through a leadership of conversion, that should be developed in the intelligent organizations, with a renewed culture, located at gestar the necessary changes to achieve the integral vision of the educational organization (Garbanzo-Vargas, 2016).

The management of information in organizations is a transcendent issue at present, since the changes in the working groups at the global level demand the improvement of their operation structures, currently this improvement propitiates the management for a transition of the private sector and public, as a fusion or transformation towards digital work schemes. Although, there are difficult scenarios to understand and talk about a process of change in the behavior of corporations, and much more to manage a change, starting from the roots in the behaviors, ways of thinking and tacit patterns of working groups in the groups.

According to Nonaka and Takeuchi (1995) cited by Soto (2016), the conversion between explicit and tacit knowledge gives rise to four conversion flows or conversion cycles, which are shown in figure 1, and are described below.:

From tacit to tacit, the step of knowledge from tacit to tacit occurs through processes of socialization, that is, through the acquisition of knowledge and information through direct interaction with the outside world, with other people, with other cultures.

From tacit to explicit, it occurs through outsourcing, which could be defined as the process of expressing something, dialogue, externalizing is to convert images and / or words through dialogue.

From explicit to explicit, this step is called combination, as its own name suggests, different forms of explicit knowledge are combined through documents or databases.

Tacit to tacit, is the internalization of knowledge, and consists of the incorporation of tacit knowledge by the individuals of any organization.
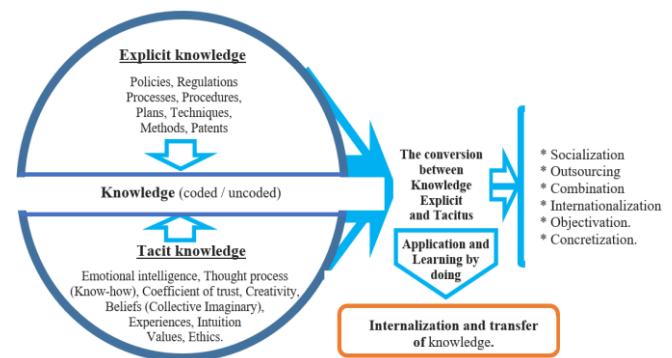

Figure 1 A comprehensive vision of explicit and tacit knowledge and its conversion (Soto, 2016)

Explicit and tacit knowledge is part of a stage of knowledge, in which the individual, through experience, obtains the discernment of the area of specificity through applied praxis and the representations of processes. It is important to consider that for the members of the organizations, it is necessary to understand the importance of the processes of knowledge formation and the role that the technology of use emphasizes. For an organization, it should be an art to create value from intangible assets, in the knowledge of people (tacit), and explicit knowledge is shared, dynamic, and systematized (Soto, 2016).

The organizations are not exempt from the consequences, in addition, as Salgado, Leria, Arcos, Pineda & González (2018) own to the repercussions that globalization processes entail, there is the generation of competitive and highly demanding work environments, in which the workers are subject to permanent demands, changes and uncertainties.

The globalization of markets, the diffusion of information technology and social networks; and changes in the nature of the labor force, impact on the processes of harmonious transformation of organizations and their members (López, Restrepo & López, 2013).

SOTO-MUCIÑO, Luis Enrique, INFANTE-MENDOZA Benjamin and ALPUCHE-DE LA CRUZ Ezequiel. The process of management of integral change in educational organizations. ECORFAN Journal-Mexico. 2018.

The specialists have emphasized that these pressures and contingencies of the socioeconomic context have generated the need to respond with elements not only technological and innovation, but also attitudinal, particularly flexibility and openness to change, as a sine qua non condition to the operation and performance of the worker in the contemporary organization (Rodríguez, 2011). However, the evidence suggests that adaptability, flexibility and confrontation to change within organizations are one of the variables most resisted by workers (DiFabio & Gori, 2016).

In this work the information will be addressed according to the following structure:

1. The origin of the change
2. Organizational change
3. Organizational development
4. Causes of change in Organizations
5. External and internal forces of change
6. SAW. Change in the system
7. Change in the structure of the working groups
8. Organizational culture
9. The organizational policy
10. System integration and open data interoperability
11. Access security, information security.
12. Organizational innovation
13. Change Process
14. Managing change and overcoming resistance to change

In particular, the resistance or difficulty in implementing changes in any organization is linked to the restrictive forces (Pizarro, 2005). These forces and the driving forces are what maintain a system in status quo (Guízar, 2013). In particular, Lewin's model considers these two forces in his proposal, stating that: "When both forces are balanced, the current levels of behavior are maintained and, according to Lewin, a quasi-stationary equilibrium is achieved" (Guízar, 2013, p.28).

1. The origin of the change

One of the first authors to allude to the concept of Change was the Greek philosopher Heraclitus of Ephesus (544 to 484 a.C.) belonging to the Ionian school, as part of his doctrine mentions that the universe is the result of two major currents (Forces).

The first as a descending process (top down), understanding this as the origin of all things; the second is an ascending process (bottom up) conceiving this as the movement of transformation of everything (change), both processes have a certain cycle which lies in the perpetual flow and ebb, work translated from Greek by Zeferino González (1831- 1894), Philosophy Project (2002).

These postulates are the principle of the movement, which is taken up by Aristotle, who mentions that "The essence of things consists in continuous change". Later in the sixteenth century Nicolás Machiavelli wrote: "It must be borne in mind that there is nothing more difficult to carry out, or more doubtful success, or more dangerous to handle, than to initiate a new order of things". All those who subsequently joined that discussion, allow us to assert that the discussion on the topic (phenomenon) of change is not a novelty, however if it is valid since no change is equal to another.

2. Organizational change

The change for Williams (1991) cited by Carrión and Manchado (2006) "occurs in physical and relatively fast environments". The author's vision of the change indicates that these are presented in the matter, that is, the tangible things of the organization, in addition to presenting themselves in an accelerated way which implies that the only way to execute the change is fast. However, according to Beckhard (1992) cited by Domínguez (2009) the organizational change "the capacity of organizations to adapt to the different transformations suffered by the internal or external environment", since the adaptation processes are presented gradually, as small improvements so the process is slow.

The implication that the change occurs in an accelerated or slow way has to do with the origin of the change, as Beckhard mentions the transformation suffered by the environment; if this is external, the change will be presented in an accelerated way as a means of survival, so the speed of response of the organization is vital; while the transition is an internal process, as mentioned by Williams Bridges (1991) cited by Carrión and Manchado (2006), this process is of "psychological character that occurs in people as a consequence of the situation generated by the change, and with Regarding this, it can be said that the transition occurs more slowly ".

The studies carried out by Nadler (1982), Gordon (1997) mentioned by Acosta (2002) expose four types of change: the first as a tuning or anticipation of changes in the environment, focusing on increasing efficiency and effectiveness through policies , the procedures and the introduction of technologies; second as adaptation or progressive responding to the environment, introducing new products or modifying existing ones; a third reorientation or discontinuity anticipating changes in the industry, redefinition, organizational philosophy, redesign or reengineering. Finally, as recreation or discontinuous changes tend to be abrupt and severe as times of crisis.

Organizational change as "a process that is generated within organizations and that can be inductive (from the inside out) or deductive (from the outside in)" (Ribera, 2013). So Beckhard, Mintzberg and Westley visualize that organizational change occurs inductively (from the inside out) in a process of adaptation to the new environment that is brewing.

However, for Pelayo (2001) the change is the fundamental transformation of public or private organizations and systems, so that spectacular improvements in their effectiveness and efficiency can be produced, this can be focused on the ability to adapt, that is, to carry out adjustments, organizational transformations, abandoning their rational description to place themselves more in the terrain of the constant changes and negotiations that take place in organizations and that imply their different levels, as well as their capacity to innovate. Therefore, the change for Robbins & Judge (2013) is to do something differently (differently), however, the change can be presented as incidental to some organizations, while for others, the change is intentional, that is, the change is planned for the fulfillment of goals and objectives.

3. Organizational development

The Organizational Development (DO) according to Beckhard (1973) in Münch (2010) as "a planned effort of the entire organization, administered from the top management, to increase its effectiveness and well-being, through planned interventions in the processes of the entity, applying the knowledge of the behavioral sciences "(p.165).

The DO as a strategy involves the whole of the organization as a system (integrated) that aims to improve efficiency and effectiveness, so it is necessary to change the focus of the organization and improve as mentioned by Gordon (1997) cited by Acosta (2002) "communication, group behavior, intergroup behavior, leadership skills, power relations, as well as changing the organizational culture" (p.22).

It can be considered that communication is the backbone of the organization, since for coordination, if this is inefficient all other efforts also; the communication within the group, and between the groups, will be significantly affected, just as the planning of the top management mentioned by Beckhard does not achieve its purpose. For these reasons, for Arellano (2007), it is necessary to establish the relationships that exist between individuals and the organization, said dichotomy allows the association between the actors and the system, between the established order and the necessary action.

The hierarchical system of the organization that Beckhard refers to, about the planning process, which is managed by senior management, should be reformulated (raised), as well as the power relations and organizational culture of Gordon, as mentioned Arellano (2000), between the established order and the necessary action, if the established order (system) does not allow for better efficiency that order has to change. Therefore, it is necessary to rethink the definition (paradigm) of organization as Zimmermann does (2000) states that the organization is a dynamic system, which seeks to configure (establish) in a rational and functional, individual relationships, equipment, knowledge and technology marked with it borders with the outside, trying to reduce the complexity of reality.

On the other hand, in Gordon's vision of Zimmermann's organization, of moving from groups to work teams, he reflects that the simple association (location) of individuals in an organization is not enough to achieve the goals, that results will not be obtained (Significantly better if not the sum of efforts and talents (knowledge) in the fulfillment of designated tasks.

The definition of the DO is in constant evolution, some authors have tried to simplify as Zimmermann (2000) "the constant search for a balance between planning and monitoring the process of change".

While others have retaken their predecessors as does Pariente (2010) define it as a "complex educational strategy, which is carried out through a series of activities planned in a participatory manner, aimed at the entire organization and managed by senior management, whose fundamental objectives are to increase the effectiveness and well-being of the members of the organization, some others somewhat abstract as Jones and George (2006) is the movement of an organization to move away from its current state and approach a desired future state for increase its efficiency and effectiveness.

Organizations for organizational development are transformed and invest in learning and understand that organizations that are unable to learn from a systemic and permanent approach have little chance of sustaining themselves in the context in which they were created. An intelligent organization understands that investing in learning is not an option, it is a responsibility that must be assumed with the highest moral and ethical principles and values. Thus, a learning organization is capable of creating, acquiring, transmitting and reforming attitudes that promote individual development within an organization that faces constant transformations (Chiavenato, 2009; Garbanzo, 2016). When individual learning increases, the intellectual capital of the organization also increases and it is up to management to transform this knowledge into action.

4. Causes of change in Organizations

Organizational change is considered by Hellriegel, Jackson and Solcum (2005) as any transformation associated with the design or operation of an organization. Efficient and effective management knows the opportune moment when a change is required and also knows the strategies to lead your organization through the process of change.

Changes can be promoted by internal or external forces. Externally, it usually happens as a consequence of the social transformations resulting from the dynamic and complex society, as well as knowing good practices applied in other organizations. Internally, due to the organization's own needs such as the normal processes of structural adjustments and changes in its objectives.

Courtney (1997) cited by Dominguez (2009) identify three positions of change adopted by organizations, these may be to shape the future, adapt to the future and reserve the right to participate. The first position is to lead in innovation, be at the forefront in the sector, is in continuous transformation and becoming the model to follow. The second is based on the ability to react, when the environment is more dynamic and uncertain, the more flexible it must be, to adapt to the evolution of the environment. The last position does not follow the trends and is not as flexible to adapt, makes changes progressively when it is safe and certain to manage the transformation.

More than a position of change, Courtney (1997) determined that the ways in which organizations adapt with the implementation of technological innovation. A committed position must be assumed for the change, based on the configuration of the future that is focused on the organization based on the technological application. While the position of adapting to the future is necessary for relatively young organizations, which are increasing their service capacities. For this reason, the educational organizations that reserve the right to participate are institutions whose size (size) or longevity have developed complex processes (control sections), which due to their dimensions, which are difficult to adapt in an agile way to the changes that occur in the work environment.

For Robbins (1999), the change depends on the magnitude, when it is continuous and does not affect the functioning of the organization, it was a first order change; but if the change is discontinuous, radical, involves new ways of operating it was a second-order change.

Robbins' position on the magnitude of the first order change, where organization is not affected by the change is an idealized form of organization, while the position of second order, sees it as something abrupt and unexpected which breaks with the principle that all organizational change is planned, in addition to those exposed by Courtney before the ways in which organizations adapt technological innovation, however it must not be overlooked that some technological innovations are abrupt.

The focus of the causes of change for Gordon (1999) resides in three aspects: behavioral, structural or technological. In the first case, it focuses on improving communication, group behavior, leadership, power relations and culture; in the second it focuses on the redesign of organizations and on the ways of working. Finally, the third focuses on changing equipment and methods, materials or techniques, improvement and automation of processes (reengineering).

Courtney's identification of the shape of the future is analyzed in more concrete ways by Gordon, since one of the ways in which organizations deal with change is through flexible structures that facilitate the process of adapting change and another behaviorally. Supported by culture, leadership, it also incorporates the technological aspect as the cause of the independent change to the turn of the organization as Courtney mentions.

The structural approach (based on processes) is shared by Coronilla and Del Castillo (2000) cited by Rubio (2009) in the actions that derive from the functions, the procedures; likewise Acosta (2002), mentions the relationship with the activities of the organization, the first ones are presented in the processes that lead to the scope of the organizational mission; the seconds in the support and coordination processes, in charge of synchronizing the operation of the areas that make up the organization, however they are the result of a process of reconfiguration of the organization; which require time and not all organizations can afford; it is for this reason that Gordon adds to the change the technological approach as an accelerator and determining factor of causes of organizational change.

For García, Rojas & Díaz (2011), the causes of organizational change are given in three dimensions, the first is in the context, where the need to change converge or diverge; the second, is the content, this is presented as evolutionary when the change is gradual and is carried out so naturally that it does not generate conflicts or in a revolutionary way when it modifies the structures and rules of the organization, the third dimension of change is in the process, these can be tangible or intangible.

The context of the organizations is diverse, so the form and speed of the changes varies from sector to sector, in some the need for change occurs in years, while in others in months, Courtney already indicated in the ways to configure or adapt to the future, and is taken up by Rubio (2009), as incremental transformations, anticipated or emerging, in order to adjust its operation to new requirements.

Organizational change can originate from various causes (reasons), some of which originates in processes, infrastructure, services or culture; which generates uncertainty about the way to face the changes; there is a diversity of opinions on the aspects to consider in an organizational change.

5. External and internal forces of change

Returning to the foregoing in the origin of the change by Heraclitus of Ephesus (544 to 484 a.C.), on the existence of two major currents (Forces). Beckhard (1973) exposes the planned effort as a principle of Organizational Development (DO) and later incorporates organizational change (Beckhard, 1992), as the internal or external environment, there is a struggle of opposites (constant) in every act associated to man, and the process of organizational change is not the exception.

This struggle of opposites in the process of change, as internal and external forces work together tracing paths for survival, and that for Silva (2002) cited by Dominguez (2009) has influence on the "decisions of those who have the task of directing organizations "(p.14), as a consequence of the transition suffered by organizations for Rivera, (2013) due to the process of adoption and / or adaptation.

External forces

Everything that is outside of organizational control can become a force for change, so it is necessary to know it. Stewart (1992) mentions that the external forces that are involved with the process of change are four, the first is the social environment, which has a great influence on the working environment such as clothing, religion, customs, norms, cultures, age, education and standard of living, among other aspects, these can influence both individuals and groups, as the environment in the organization. The second is the economic, this affects the income level of people; the interest rates, exchange rates, the type of goods that can be acquired, the production of the companies, among others, are modified.

The third is politics, influences organizations through national or international laws, through taxes, regulations, changes in public policies. Finally, innovation, use of new techniques, modification of procedures, knowledge necessary to work in the environment, increasingly demanding, the introduction of new technology, machinery, equipment, work tools are drastic changes for some workers.

A consequence of life in society has an impact on individuals, so individuals are continuously adjusting their behavior, that is, they do not remain static in the face of social changes. Similarly, the economy of people and organizations, undergoes adjustments through periods of abundance interspersed by periods of austerity, so, you must learn to deal with adoption and / or adoption processes, as mentioned by Rivera (2013), you can reduce the periods of austerity of the organization and therefore that of the people. The change in policy, mentioned by Stewart (1992), can affect individuals, as their freedoms (social change) are restricted, as their income is reduced by the payment of taxes (economy), to the over-regulation to effect some procedure (bureaucracy); to the change in the regulations derived from a change in the law.
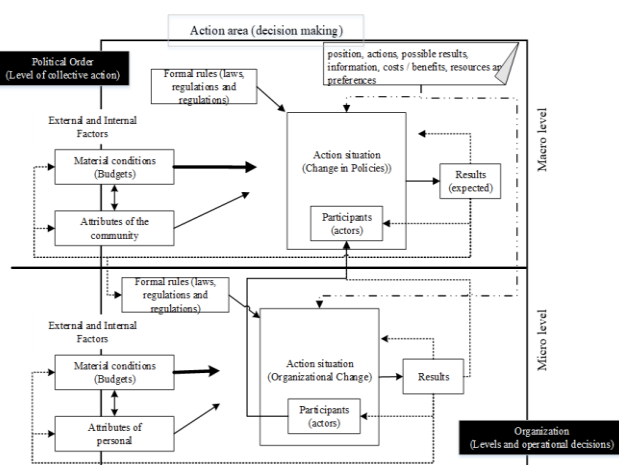
Figure 2 Change in the organization from public policy
Own elaboration based on Kiser and Ostrom (1982), Ostrom (2005), in Real (2007)

Organizations are affected in a similar way, however, this requires an analytical approach (methodical), as is the IAD (Institutional Analysis and Development Framework), as mentioned by Kiser and Ostrom (1982) cited by Real (2007), present the change in policies as the result of micro-processes, based on the relationships of the subsystem (strategic relationships, limited rationality).

With the areas of action, given that these interactions are considered in the context of institutional structures, acting as a guide of individual action; the policy space, as elements of the subsystem's environment, where stability in a public policy is directly related to the autonomy of the subsystem, and its decision-making capacity, therefore, the rules that affect the participants, the positions and the Control decisions are of special importance, this is illustrated below.

The subsystem conformed by the area of action (decision making), the participants (actors) that try to influence decisions in the levels of collective action or in the operational decision; and whose actions within the subsystem vary, depending on the components of the action situation (origin of the change), the formal rules (laws, regulations and regulations) and informal rules that are managed between the components and the factors (external and internal)), which are not necessarily under contro. The decision making for Kiser and Ostrom (1982), are exemplified by the change of policies (laws, normativities), how they affect the organization and the subsystems that make it up; where the magnitude of the change does not stop its daily activity as mentioned by Robbins (1999) derived from its autonomy to adapt to the future.

Internal forces

The internal forces are factors that originate or drive changes, emanate from the organization itself, arise from the analysis of organizational behavior, are displayed as alternative solutions, creating the need for change. In this regard Stewart (1992) mentions that the level of motivation of workers can favor a change. While for Robbins (1999) the motivation is the will to exert high levels of effort for the fulfillment of the institutional goals, without neglecting the satisfaction of the individual need. However, for Hellriegel, Jackson & Solcum (2005) motivation is a source of energy that incites, inspires, impels and influences people to action.

Therefore, it is necessary to acknowledge (know) if the personnel that work in the organization are motivated since they are the ones who will make the effort during a change process, and if they lack this motivation or it decays, the initiative (process) of change, it will be diminished. García, et. al., (2009), mentions that the motivation increases to the extent that satisfaction of the needs of the individual is perceived and the importance that it assigns to different components of their work environment.

Within these components of the environment, Stewart (1992), mentions the relationships between individuals and groups, a good working environment, an adequate management of conflicts between individuals, between individuals and interest groups or with unions, among others. workers and hierarchies (heads, authorities), favors communication in the organization.

Figure 3 Elements of the environment, Da Silva (2002) Theories of Administration, p. 53, cited by Domínguez & Giordano (2009).

For Fernandez (2005) communication allows building an identity of the organization, in a climate of trust and encouragement, deepen knowledge of the company as an entity, make public the achievements (achieved) by the organization, individually inform the members of the organization, promotes communication at all levels. For his, part Nosnik (2000) cited by Santana (2011), characterizes the organizational communication system as an important means that the organization has to adapt to the changes it experiences as a system, therefore it can be studied as a process or as a series of superimposed processes. Communication is a set of effective activities, which allow to create and / or maintain good relations with and among the members of the organization, integrated and encouraged to contribute with their work to the achievement of organizational objectives, to make known the need for change.

Returning to what was stated by Domínguez & Giordano (2009), "the demands that lead organizations to change are the environmental trends constituted by internal factors:

Structural management or by strategy for competitiveness; and external: social, economic, political, legal, cultural and ecological "(p.14).

For McKelvin & Aldrich (1983) the external and internal forces work together to generate a change, while for Stewart (1992) the external forces are involved, that is, they have some relation but do not establish any proportion or level of affectation, while that for Carrión & Machado (2006) and López (2013) only create the need for changes of internal order.

The internal and external forces of change configure different routes, for which the managers of the organization must be careful when selecting what change or changes are needed, to manage the change process, it must take into account the costs and the problems that entails face it, as illustrated in the following image. Zamora (2018) a simple definition of the concept of change could be when you consider that "change" means that the new state of things is different from the past state of things.

However, change is a process that involves modifying power centers, uses and customs, both personal and group, risk, dominate fears and resistances. Changes in an organization go beyond implementing technological advances, redesigning the structure or developing new business strategies.
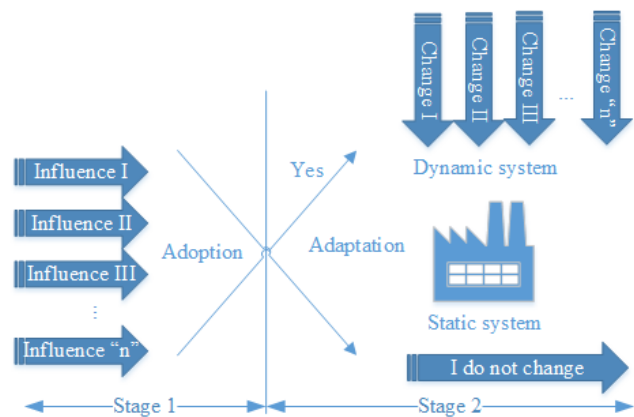

Figure 4. General perspective of organizational Change: adoption and adaptation processes, Rivera (2013, p.97) "Organizational change: a strategic process of adoption and adaptation" Postgraduate Studies and Research Section, UPIICSA, IPN

Any change tends to affect the human "Factor" system, in this regard De Faria (1995), mentions that any change in the technical or administrative system affects some modification of activities, tasks or attributions of people.

Organizational change: What really changed?

In the organization the formal and the informal coexist, Selznick (1957), quoted by Pelayo (2001) refers about the coexistence between the ideal and the real of the organization, in this duality can understand how an organization generates rules and forms of behavior particular of this organization. Therefore, the change that occurs in an organization depends on the talent (capacity) and the aptitude (skills) of the managers to operate them (execute it). Allaire and Firsirotu (1992) cited by Rodriguez (2009), mention that this change can focus on systems, structures, culture and / or strategies, this is not exclusive, the change can be focused on one of these elements, or in combination of some or all of them.

6. Change in the system

When talking about system is not in reference to a computer system or a development of a computer application (program), it is in reference to the system of established order, for Katz and Kahn (1977) in Pelayo (2001) organizations are systems that achieve stability through structures of authority, reward mechanisms based on values; changing when there are significant changes. While Miller (1978) cited by Pelayo (2001) are a "set of interdependent units that establish strong links between them, ie, that the mobilization of a unit means the readjustment or mobilization of the rest of the system", to this type of Systems are known as loosely coupled systems. Weick (1982) cited by (Pelayo 2001), states that systems loosely exist when the relationship between unit A and unit B is:

1. More sporadic than constant.
2. More casual than consistent;
3. More significant than significant
4. More indirect than direct, and
5. More eventual than immediate "(weick, 1982, cited by pelayo, 2001: 46).

The organization for Pelayo (2001); Thompson (1967); Scott (2001); Schein (1985), is a loosely coupled system that has a defined structure, ie part of a hierarchical authority (not necessarily rigid) and limited decision making capacity, (establish strong links) and where one or more are pursued determined ends, from several functionally differentiated and coordinated means (interdependent units) requiring that they be interpreted as a system.

Returning to Selznick's (1957) discussion of the coexistence between the ideal and the real, where the struggle of opposites is necessary to remain in motion; in the definition of a system that are a set of interdependent units, in which it is not ruled out that these units come into conflict, but, rather, that said conflict is part of the interdependence.
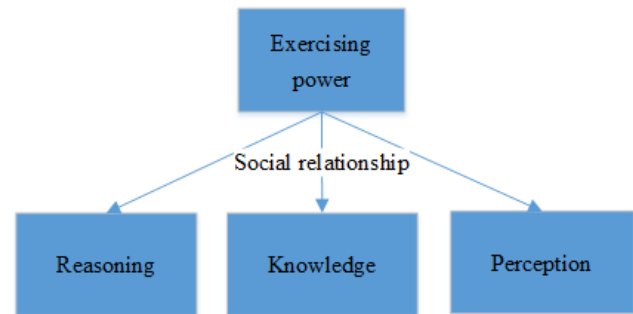

Figure 5 The nature of power and control, own elaboration based on Adams (2007)

The affirmation of Allaire and Firsirotu (1992), on the fact that the changes are focused on the systems and the characterization that they are loosely coupled as is a corporate organization.

7. Change in the structure of the working groups

The changes for Drazin (1990), cited by Pelayo (2001) are actions of individuals or groups to establish, maintain or defend the power reserve; they are the fruit, the result of negotiation or perception in a power structure, they are characterized by modifying the functioning of an organization. Changing the structure has been studied by Pelayo (2001) emphasizes the need to transform structures and the implementation of new forms of organization, reassessing the work.

The relationship between actors and structures for Cabrero (2000), cited by Pelayo (2001) becomes more complex and requires imaginative, creative and permanent approaches that allow to establish the balance between the organizational order and individual action. While for Acosta (2002) it refers to the transformations suffered by the organization itself in its functionality, specialty and control processes, product of its own learning; organizations of pyramidal structures and rigid chains of command, at the time were perceived as highly specialized or bureaucratic.

For Adams (2007), the change in structure has its origin in man (being), modifying its behavior, so that it agrees with that of others, with its own desires, to achieve it manipulates the environment (indirect control) where is exercising power (control system) over the capacity for reasoning, knowledge and perception.
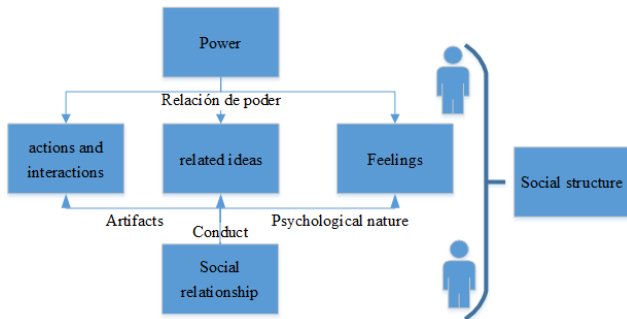

Figure 6 Social Control System, own elaboration based on Adams (2007)

The Power for Adams (2007) is part of the Control System, of the greater effort of human beings to adapt when creating new and more complex structures, where the borders and the disposition (structure or arrangement) of self-organization are delimited, this it also involves a social relationship, what in it "exists" is a set of actions and interactions, and a related set of ideas and feelings, said "relationship" refers to a particular set of psychological (processes) in terms of behavior (evident process), and artifacts, that involve two or more individuals, giving rise to power relations.

Power relations for Adams (2007) are conceived as the interaction between two people, these can take the form of egalitarian or subordinate, in the first the actors assume that their relationship is equity / cooperation, while in the second one of the actors is in a subordinate position and the other as a subordinate, the person who represents authority or who assumes a superior power, is by the fact of having control over the elements of the environment.

The basis of the power structure that the human being (man) has built around them, are actually a series of relationships (power) that allow increasing the chances of survival (social relationship), as mentioned by Adams (2007), this through controlling (energy manipulation) the processes (physical elements) of the environment, that is, based on the control of knowledge (and events), however, to exercise power is not enough to have control.

It is also necessary (it is required) to recognize the nature of the effect of the control, or rather, the effective control in the decision making in order to exert power.

The granting of power from one individual to another represents, both in a hierarchical relationship and a coordination (delegate power), this leads to an affectation to the behavior of the individual which goes beyond their own control, that is, the power that emanates is transformed into a series of corporate structures (system), where the leader reached a source of power, allowing some independence with respect to the power assigned to him by the members of the group according to Adams (2007), however, control and decision-making that entails, depending on the way in which the position or position of structure was obtained, on the possession of skills (reasoning) and / or superior knowledge.

8. Organizational culture

The term culture is studied by Insaurralde (2010) tracing its origins to the Latin culturam, whose translations can be understood as cultivation or being in the care of something, in the sixteenth century the term was resignified to the cultivation of the mind, about Molano (2007) alludes that the term was taken from Cicero who metaphorically had written the animi culture (cultivation of the soul). While the term Kultur implied a personal progression towards spiritual perfection, by later in the eighteenth century transforming into civilization as mentioned Kuper (2001) cited in Molano (2007) is associated with material progress.

The organizational culture for Smircich (1983) is a means to improve the performance and achievement of the objectives; culture is a resource that generates value, and that is not possible to be replicated (copied) by competitors. In the end (later) Schein (1985) cited by Insaurralde (2010), formulates that culture is understood through artifacts, values and assumptions, where the first (is the surface of culture) are the tangible aspects and visible from cultural activity, the latter represent the social, philosophical, goals and standards. Finally, third parties are beliefs regarding reality and human nature. While for Barney (1986) the organizational culture becomes competitive advantage and at the same time as a strategic asset.
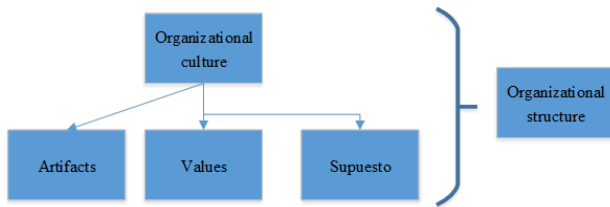
Figure 7 Formulation of culture, own elaboration based on Schein (1985)

The changes in the organization, for Allaire and Firsirotu (1992) cited by Insaurralde (2010), are due to the fact that they are small companies, and therefore producers of their own culture; similarly for Acosta (2002) they are a change in the culture of the same; such changes may cover the entire organization, or only a part of it; a change in culture modifies the values that regulate the behavior of individuals and organization, among individuals themselves, in the same way customs and knowledge (assumptions) are affected, this makes culture a means to achieve the goals of the organization (artifacts).

Allaire and Firsirotu (1992) cited by Insaurralde (2010), mention that organizations are small societies, and therefore producers of their own culture; similarly for Acosta (2002) the changes in the organization are related to a change in the culture of the same; such changes may cover the entire organization, or only a part of it; a change in culture modifies the values that regulate the behavior of individuals and organization, among individuals themselves, in the same way customs and knowledge (assumptions) are affected, this makes culture a means to achieve the goals of the organization (artifacts).

Culture for Rendón and Montaño (2009) represents the symbolic life of a community, while the organizational culture associates a series of resources to delve into the hidden aspects of the organization's functionality (operation); On the other hand, Rodríguez (2009) mentions that cultural references are the sum of experiences in the cultural education of managers and other members of an organization, of organizations originated in other social units and in the geographical environment in which it operates..

The cultural references mentioned by Rodríguez (2009) are:

- National: includes beliefs about employment, labor relations, accepted uses of authority and other forms of shared relationships that are manifested in laws, customs and other social institutions.
- Regional: refers to significant variations of national cultural patterns that exist within a country -such as those of the north in relation to the center or the south-. It also includes regional guidelines covering more than one country.
- Professionals: refers to beliefs and values shared by professional groups such as doctors, nurses, lawyers, computer workers and other similar groups.
- Institutional: values of non-profit organizations such as political, religious, professional associations and unions.
- Sectoral: refers to common assumptions in an industry or sector of activities about the appropriate form of behavior or practices such as agricultural, mining or fishing. (Rodríguez, 2009, p.71).

Through the artifacts, values and assumptions, one can get to understand the social conformations exposed by Allaire and Firsirotu (1992), achieving with them the cultural changes as Acosta (2002) affirms, in the process of self-regulation of the mentioned borders by Adams (2007), the symbolisms and functionalities of Rendón and Montaño (2009) and the cultural referents of Rodríguez (2009), thus conforming the changes in the organizational structure and culture.

9. The organizational policy

The model of economic man is opposed to the idea of administrative man, Simon (1947) cited by Pelayo (2001) argues that in the individual there are certain natural limits to store and process information, and their behavior is not in terms of looking for what better, and only the best possible solution, maximization; but it is satisfied with the solution that satisfies the preferences (minimum that it has), it is a limited rationality, to this possible solution we can understand it as the political (decision making).

Kiser and Ostrom (1982), the changes that are presented in the policies are the product of the relationships of the subsystem as well as the elements of the environment. Where the stability in a policy is related to the autonomy of the subsystem and the capacity of decision thus influencing the organization, through laws, taxes, normativities and specificity of work.

However, for Adams (2007) it is about the influence of one man over another, that sooner or later, will raise the question of politics, which is part of most systems as a constant effort to maintain and reproduce an order previously established. That like Tyrtania Geidt (2007) is an omnipresent element in all human relationships, hence the models must take it into account.

Similarly, the policy for Dominguez (2009), is part of the demands that lead organizations to change. In recent years laws have been approved or reformed with the aim of promoting and promoting the use of ICT. In Mexico, the Inter-Secretarial Commission for the Development of Electronic Government (CIDGE) was created, a collegial body established by Presidential Agreement, on December 9, 2005, whose objective is to "Promote and consolidate the use and exploitation of Information Technologies and Communications (TIC) in the Federal Public Administration "(gob.mx, 2017).

Subsequently, on February 4, 2016, the "AGREEMENT is published which modifies the policies and provisions for the National Digital Strategy, in the area of information and communication technologies, and in information security, as well as the Administrative Manual of General Application in said matters. "(Official Gazette of the Federation, 2017).

In this agreement, the National Development Plan (2013-2018), the Program for a Close and Modern Government (2013-2018), in which the adoption and development of Information and Communication Technologies is fostered, is retaken. (ICT), modernization and improvement of government services, this through the "Administrative Manual of General Application in the areas of information technology and communications, and in the security of information" (MAAGTICSI), published on May 8, 2014 and in accordance with the "Administrative Manual of General Application on Procurement, Leases and Services of the Public Sector" (MAAGMAASSP). (Official Gazette of the Federation, 2017). With them, it is intended to reduce the technological backwardness of the Federal Public Administration, in addition to the administrative simplification of the processes contained in it; It begins with the standardization of terms as established in Chapter I, entitled "Object, Scope of Application and Definitions", Article 2: This section contains definitions regarding technology, such as:

- ICT: Information and communication technologies that include computer equipment, software and printing devices that are used to store, process, convert, protect, transfer and recover information, data, voice, images and video; "(Official Gazette of the Federation, 2017: 12).
- Computational Application: software and / or computer systems, which are made up of a set of components or programs built with tools that enable a functionality or digitize a process, according to previously defined requirements; "(Official Gazette of the Federation, 2017: 9).
- ICT Infrastructure: the hardware, software, networks and facilities required to develop, test, provide, monitor, control and support ICT services; "(Official Gazette of the Federation, 2017: 11).

The definition of computer application is made in references to the development of a program (software) to perform a specific task and that can make use of a hardware device, so it is necessary to manage the technological infrastructure with which the institution has.

Green Technologies: the set of mechanisms and actions on the use and exploitation of information and communication technologies, which reduce their impact on the environment, contributing to environmental sustainability; even considering the recycling of components used in the use of these technologies; "(Official Gazette of the Federation, 2017: 12).

ICTs have the characteristic of interoperability, standardization of their components and the sharing of resources through the configuration of the local area network, because the efficient use of these technologies reduces the environmental impact.

Definitions for improvement

Bases of Collaboration: the consensual instruments celebrated by the institutions to establish actions that modernize and improve the provision of public services, promote productivity in the performance of their functions and reduce operating expenses, in order to increase efficiency and effectiveness and comply with the objectives set forth in the Program and formalize the commitments, as well as their respective performance indicators; "(Official Gazette of the Federation, 2017: 9).

Guidelines: Guidelines for the application and monitoring of measures for efficient, transparent and effective use of public resources, and budgetary discipline actions in the exercise of public spending, as well as for the modernization of the Federal Public Administration, published in the Official Gazette of the Federation on January 30, 2013; "(Official Gazette of the Federation, 2017: 12).

PETIC: the set of projects developed by the Institutions, consisting of a maximum of 7 strategic projects, in the terms established in this Agreement; (Official Gazette of the Federation, 2017: 12).

Promoting modernization, through a collaborative base decreases the redundancy of information, promotes the interoperability of systems, which translates into an improvement in services and a reduction in processing times, this as part of the guidelines for the modernization of public administration, for them, public institutions grouped no more than seven strategic projects as part of the Strategic Program of Information and Communication Technologies (PETIC).

10. System integration and open data interoperability

–   Computation in the Cloud: the model of digital services that allows institutions to access a catalog of standardized digital services, which can be: infrastructure as services, platform as services and software as services (...)
–   Decree of Open Data: the Decree establishing the regulation on Open Data published in the Official Gazette of the Federation on February 20, 2015 (...)
–   Technological Domain: the logical groups of ICT called domains, which make up the technological architecture of the Institution, which may be, among others, security groups, central and distributed computing, end user computing, telecommunications, collaboration and email, internet, intranet and computer applications;
–   EIDA: the Interoperability and Open Data Scheme of the Federal Public Administration, established by means of an Agreement published in the Official Gazette of the Federation on September 6, 2011; (Official Gazette of the Federation, 2017: 10).

Encourage the use of open data in corporations, has the purpose of generating trust through transparency and access to information, for them, the access and interoperability decrees are the basis for the cloud computing scheme, since, for one side is based on providing information at any time, as well as without dependence on a particular system (platform), as in the past, certain applications required a browser, base operating system or a specific program to access the information.

11. Access security, information security.

–   Digital Identity: the unique identification of a physical or moral person through the Single Population Registration Code (CURP) or the Federal Taxpayer Registry (RFC) e.firma, before a computer application or an electronic service; (...)

–   ERISC: ICT security incidents response team at the Institution (...)

–   MAAGTICSI: the Administrative Manual of General Application in the areas of information technology and communications, and in the security of information. Sole Annex to this Agreement; "(...)

–   National Single Window: the one established through the Decree published in the Official Gazette of the Federation on February 3, 2015; "(Official Gazette of the Federation, 2017: 11-13)

Derived from a cloud computing policy where users can request almost any information or perform a procedure through the single window, which is part of the national program for the modernization and administrative simplification gob.mx, this program must be applied by every instance of government, to improve the attention to citizenship, so it is necessary to identify and access these systems through digital identification, which leads to significantly improve access to and security of information (MAAGTICSI), which requires a specialist in the field and a framework of operation.

Project management in the field of information technology and communication:

–   Executive Portfolio of ICT Projects: Total set of ICT projects that the institution will propose to the Unit for follow-up.

– Operational Portfolio of ICT Projects: Total set of projects that support the daily operation of the UTIC and are not considered as strategic.

– ICT Policy Management Tool: web system used to carry out the communication of reporting activities established in the Agreement, considering the PETIC report, obtaining the technical opinion issued by the Unit, authorization by the UPCP, the business architecture, the MAAGTICSI, among others; (...).

– Portfolio of ICT projects: is the total of ICT projects grouped according to their classification in the Executive Portfolio of ICT Projects and Operational Portfolio of ICT Projects that the Institution plans to develop, in the terms established by the MAAGTICSI; (...).

– Proyectos de TIC: el esfuerzo temporal que se lleva a cabo para crear un producto, servicio o resultado de TIC y que cuenta con presupuesto para su ejecución; considerando 2 tipos: proyectos operativos que soportan las actividades diarias de la UTIC y proyectos estratégicos en los términos señalados en el presente Acuerdo; (…).

– UTIC: la Unidad de Tecnologías de Información y Comunicaciones o área responsables de las TIC en la Institución." (Diario Oficial de la Federación, 2017: 11-13).

In Chapter III called "Policies for the National Digital Strategy", Article 5, The Information and Communications Technologies Unit (UTIC), establish the technological record through the ICT Policy Management Tools, in this, it is integrated with an estimated budget and interoperability of the systems, in the month of October of each year. Article 6 establishes the Strategic Portfolio of Strategic ICT Projects (PETIC), with a maximum of 7 projects, to be delivered in the month of December of the same year, contemplating, among other things, its impact on strategic objectives.

ICT, information technologies and communications, are the technologies needed for the management and transformation of information, and very particularly the use of computers and programs that allow creating, modifying, storing, protecting and recovering that information (Sanchez , 2008).
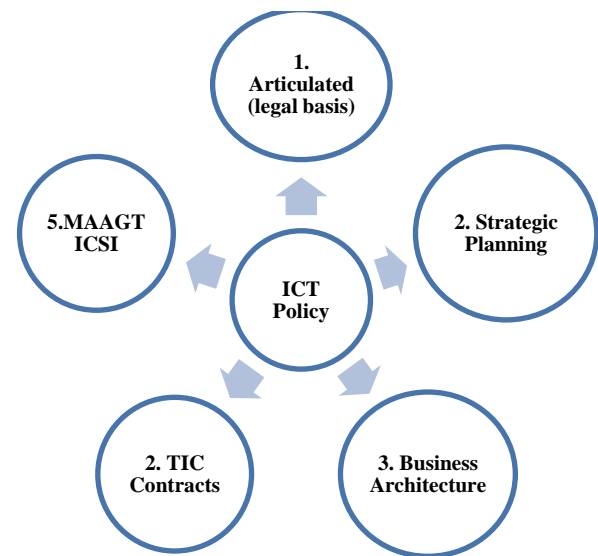

Figure 8. Main elements of the ICT Policy. Own elaboration based on the 8 Policies, in the Matter of Information Technologies and the MAAGTICSI (2018).

In Article 8 and 11 states that public institutions should share resources, such as infrastructure, ie the shared use of telecommunications networks and encryption system for data security. While in Article 9 and 10 the hiring and leasing process is proposed, through public bidding with the invitation of at least three suppliers, a technical opinion, a detailed design of the modular base application, in addition to the provisions of the fraction V of Article 10 of the "totality of its components as they are, the source code, the object code, the physical and logical design, the technical and user manuals; except for all those who already have a registration, patent or license to use; "(Official Gazette of the Federation, 2017: 17)

12. Organizational innovation

One of the factors that increase productivity is technological change, for Schumpeter (1978) cited by Montoya (2004), they are the cause of a constant transformation process, that is, the phenomenon of technological innovation; It is important to clarify that the importance lies in provoking revolutionary changes in the organization or in the management processes.

SOTO-MUCIÑO, Luis Enrique, INFANTE-MENDOZA Benjamin and ALPUCHE-DE LA CRUZ Ezequiel. The process of management of integral change in educational organizations. ECORFAN Journal-Mexico. 2018.

However, for Dávila (1991) quoted by Pelayo (2001), innovation is understood as: accomplishing new things, achieving or seeking new combinations of resources, doing things in a new way. The main characteristic of competitiveness, for Porter (1991) cited by Soto-Muciño (2016) is the innovation in the organization must be permanent, although it requires a continuous effort for its success.

Innovation for Tissen, Andriessen and Deprez, (2000), is assumed as the anticipation and adaptation to change, is related to the capacity of organizations, therefore, organizations must be proactive. While for Cabrero (2000) cited by Pelayo, (2001) is the relationship between actors and structures, they become more complex and require imaginative, creative and permanent approaches that allow to establish the balance between the organizational order and individual action.

One of the factors that shape competitiveness is innovation for Miltenburg (2005) cited by Soto-Muciño (2016), defined as the ability to quickly introduce new products / services or make changes in current ones. While for Robbins & Judge (2013), it is a specialized exchange rate, the application of an idea to start or improve a product, process or service. According to the Oslo manual (2006) in a series of modifications introduced progressively, that is, a generally continuous process of adoption of innovations, characteristics of the sectors of low or medium technological content.

Respond to the need to install (in the servers) capacities aimed at the continuous improvement of public management by recognizing the processes that all entities live in order to generate, systematize and transfer information necessary to respond to the challenges and needs of public entities. It requires a commitment from the organization, which is why, through the Institutional Training Plan, it is sought the integration of programs that allow to receive knowledge and promote multiplying agents in the work team, thus favoring a culture of knowledge that impacts the processes of the corresponding entity, for its better functioning of operation.

Sources of innovation

The sources of innovation are for Zimmermann (2000), within the organization, in the structures, in the administration and in the excess of resources, which is the responsibility of the members of the organization to obtain the best performance. First of all in the organizational structure, since it influences positively; in organic organizations there is less differentiation, that is, there are few hierarchical levels, so they are vertical and centralized in their daily operation, thus promoting flexibility and organizational adaptation, allowing the creation and adoption of innovations.

Second, the administration provides legitimacy and knowledge, how to do the tasks and obtain the desired results, that is, it allows to follow up on the activities that are carried out, as well as improving the quality achieved, reducing the time processing allowing it to be used in developing new ideas.

Third, there must be an excess of resources, since these allow an organization to innovate, assuming the cost of instituting or assimilating failures, only then innovation flourishes. In aspect of the communication between units is extensive, and it is required to be facilitated in the organization between the different departments, through the creation of committees and task forces, which combine the various profiles thus promoting innovation in the organization. However, Zimmermann (2000) mentions that they are several of the best organizational innovation ideas that were never put into practice.

The principles of innovation in culture

Innovation implies a radical uncertainty, Nelson & Winter (2000) mention that due to this uncertainty, people and organizations do not agree on the direction they will take, which implies that the main function of an efficient institutional structure is effective selection of innovations, accepting and spreading the good ones and eliminating the bad.

So, innovation is a discipline, whose principles can be learned, built, practiced, implemented correctly can lead to improve the performance of organizations and sustainable growth, the culture of innovative organizations is based on principles such as:

– Environment: Organizations must cultivate passion, encourage learning, reflect, in the same way they must stimulate and challenge people to take risks, to think independently...

– Values: these are the guide and give direction to the organization, the ethical work that supports our actions inside and outside the organization

– Resource: The resources of an organization are the human capital that is in it, that through creativity and knowledge, achieve great transformations.

– Processes: attention must be paid to opportunities for improvement, no matter how big or small it may seem

– Behavior: Innovation must be timely, flexible, adaptable, collaborate, resistant, capable of making brave decisions under conditions of uncertainty and dealing with ambiguity "(Nelson & Winter, 2000).

A group of workers can become a team of innovators, this is achieved if they share a vision and language of innovation; they have at their reach the tools to build processes for continuous improvement.

Some of the organizational changes can be presented in the structure, Acosta (2002) refers to the transformations that the organization suffers in its functionality, specialty and control processes, product of its own learning; organizations of pyramidal structures and rigid chains of command, at the time were perceived as highly specialized or bureaucratic, however, at present the flat and multifunctional structures have shown to have a better ability to adapt and respond to changes.

Innovation in the organization

Martínez, Carrasco. & Bull (2018) the adoption of technology and new methods of work by collaborators is often difficult to achieve, generating in most cases a resistance to the changes proposed by managers or heads of small and medium-sized areas Business. Given this problem, a series of models have been generated in the academy to address the management of the change. Within these proposals, one of the most outstanding corresponds to the classic change management model called the Three Step Model proposed by Lewin.

This model identifies three stages to manage the change in the companies, which correspond to the phases of: unfreezing of the old practices, displacement and change of the organization towards the new direction and re-freezing of the most effective ways in the organization (Mengíbar, del Rio and Terol, 2007).

Garbanzo (2016) it is necessary to have an organizational capacity of teaching developed at the interios of this, and it is properly an innovation that guides the organizational development, this positively influences the promotion of innovations and competitive organizational management. Learning is considered an eminent condition for change based on the level of knowledge of each organization, which includes both cognitive and behavioral components associated with knowledge. Innovation involves profound changes and transformative responses to contextual demands, which in turn translate into the development of labor competencies of the member staff of the organization, and generate a greater growth of the organization and adaptive capacity exemplary permanently, understanding the organization from a systemic approach.

Innovation is defined as the process of creating and implementing a new idea:

Hellriegel, Jackson, S. & Solcum (2005, p.355) Innovation always involves the breaking or redefinition of some procedure or the emergence of an emerging thought, which put into practice contributes to new organizational schemes in search of institutional objectives; is to do something new, different. The ideas that underpin innovation can arise within the organization as well as externally. Dynamic organizational environments promote change and innovation more easily. Innovations can occur in the technical, processes and procedures of the administration.

The concept of innovation for Damanpour, (1991) cited by Soto-Muciño, Reyes and Infante (2016), is very broad, reflecting the existence of a wide variety of dimensions (phenomenon), it can be a new product or service, a technology , a structure or an administrative system. For them, organizational innovation is defined as the adoption of new systems, policies, programs, processes, products or services, generated internally or acquired (Daft, 1982, Damanpour & Evan, 1984, Zaltman, Duncan & Holbek, 1973). According to Jiménez-Narváez (2005), he argues that there are various theoretical references from the economy that study innovation as a theoretical problem.

SOTO-MUCIÑO, Luis Enrique, INFANTE-MENDOZA Benjamin and ALPUCHE-DE LA CRUZ Ezequiel. The process of management of integral change in educational organizations. ECORFAN Journal-Mexico. 2018.

The integrative proposal for the study of innovation is known as the theory of systemic competitiveness, and, in a large social plane of intervention and general action, the concept of national innovation system, in a particular plane of governmental intervention as a policy of development, are the works of Lundvall (1992) and the Sussex School for the sustainable development of technological capabilities, through a holistic and integrating vision, closely related to the theories of organizational development.

The success of an organization depends to a large extent on the use of knowledge and skills, innovative creativity and motivation, both of its staff and its allies: suppliers, collaborators or the customers themselves-users of the services, as well as the organizational learning, all of them circumscribed in the value chain of the organization. Very large and bureaucratized organizations can be as innovative as small and unbureaucratized ones.

Organizational innovation before change for Lam (2005) cited by Oslo (2006), "is a response to technological change, when in fact innovation in organization could be a necessary and prior condition for technological innovations" (page 18). In addition, that organizational innovation also refers to the implementation of new methods of organization.

This is a fundamental element of organizational learning that is a systemic process, which has a knowledge structure that evolves, are developed on a permanent basis responding to the transformations of the context that occur in different ways depending on each case. Thus, innovation is understood as a process that articulates the accumulation and combination of new knowledge (Acosta, 2011).

According to Garbanzo (2016), he proposes that an organization that learns has the necessary internal resources to promote the transformations it requires, as well as the ability to promote a culture of permanent improvement and optimize the performance of each individual that makes it up. In learning organizations, innovation and change are seen as processes inherent to the internal culture. There are characteristics of organizations that learn, worthy of consideration in the educational field:

- The leadership is shared.
- Innovation is part of the culture.
- The attention to the target population is a priority.
- The members of the organization are part of the identification and solution of problems.
- Work resistance is approached correctly.
- Regarding the media, both the management and the rest of the levels know and share the scope, objectives and goals.

Considering that there are determining elements in public organizations that must learn in themselves according to their particular activity and that require considering, from their management, in the different elements that articulate, that favor efficiency in the organization based on knowledge mutual, and for this it should be considered that this group is participating fully, then it requires a current dynamics of the public organization that must leave behind traditional organizational paradigms to give rise to new conceptions, which should be supported in the development with a philosophy of innovation.

13. Change Process

Organizational change is presented in different ways, as García Rubiano, Rojas and Díaz (2011) suggest, it is possible to classify it in the following way:

a. Changes in the systems is presented in three ways, the first as the change within the system, in this one acts on the effects and not on the causes; the second as a change to the system, modified the processes that are operated, and finally of the systems, that is, by a change in technology that can be accessed, thereby allowing significant advances.

b. Lack of opportunity, is based on the reduction of expenses and the development of strategies to increase profits.

c. Adaptation-transformation, in this type of change seeks the adaptability of people and transformation of the environment.

d. Fluid structures, accelerated changes, although the changes have not been fully understood, the following transformation has been initiated, which is why discontinuous scenarios are more similar to fluids than structures.

e. Continuity-discontinuity, the discontinuity of the changes, changes break with the logical sequences of improvement, disruptive innovations.

f. Linear-systemic thinking, the type of linear thinking perceives changes as simple sequences in a direct cause-effect relationship, while the systemic integrates the variables of their environment (García Rubiano, Rojas and Díaz, 2011, p.128).

The change in the systems is a process of adoption and adaptation of technologies, which is regularly given by obsolescence, which allows to lead to processes of adaptation-transformation, in these the skills and knowledge are put to the test, without embargo, if changes are radical adaptation time is increased, which can lead to continuity-discontinuity changes, if they are prolonged irremediably lead to processes of change due to lack of opportunity, if the technological change had taken correctly this would be seen as a process of linear-systemic thinking change. So the classification of Novoa can also be understood as the transition of a process of change badly carried out (executed).

For Levinthal (1991) quoted by Rivera (2013) the processes of organizational adaptation and selection are not contradictory perspectives to analyze organizational change, nor simply complementary points of view; these two processes have a very strong relationship of interdependence in which the learning of the organizations contributes to the organizational inertia that is the basis of the selection process.

On the other hand, is Greiner (1967) cited by Bartlett and Kayser (1997) Carrión & Machado (2006, p.14) as one of the scholars who has contributed the most to his contributions to Organizational Change and who has made a large amount of studies on the subject, which have led him to differentiate a program of successful change from another failure, and for this he considers three methods when initiating a process of change; first, unilateral action; Secondly, the shared power and finally the delegated authority.

14. Managing change and overcoming resistance to change

To overcome resistance to change Robbins and Judge (2013), in their study of organizational behavior, mentions that there are eight tactics:

The first is education and communication; resistance is reduced by communicating to employees the reasons for change, the effects of misinformation or poor communication causes anxiety, therefore, by reporting on the facts and the needs of change, resistance is mitigated giving rise to the generation of commitment to make the change a reality.

The second is to promote Participation; when an individual is part of the initiative or when they have made a significant contribution, their participation reduces resistance, earns commitment and increases the quality of decision to change.

The third, is to create support and commitment, to manifest a weak commitment to change, resort to the status quo and resist holding on to the current situation.

The fourth is the development of positive relationships individuals are more willing to accept changes, when you have a relationship of trust with superiors, likewise, a work environment should promote personal development, this will lead to more positive relationships with respect to the process of change.

The fifth tactic is based on Implementing changes with justice, a way in which the organization can reduce the impact of change, resides in how the process of change is executed, that is, the fundamental thing is change and the intention to improve and not to keep privileges.

The sixth, is the manipulation and co-optation, initially refers to the attempts to exert a covert influence. Twisting and distorting the facts to make them appear more attractive, hide unwanted information and create rumors for employees to accept the change. While in the second place the manipulation and participation of the organizational leaders is combined, by granting them positions or key roles to obtain the support.

The seventh, is to select the individual, the right selection, adopt a positive attitude towards change, be willing to take risks, a flexible behavior, stability to accept and adapt easily to change are related to personality.

The eighth, the coercion. It consists in the direct application of threats or force to those who resist.

Other important factors intervene to overcome resistance to change, according to Hellriegel and Slocum (2004) cited by Dorta (2011).:

1. **Empathy and support.** Understand how employees experience change Help identify those who are concerned about the change and understand the nature of their concerns.

2. **Communication.** People are more likely to resist change when they feel insecure about the consequences. Effective communication reduces gossip and unfounded fears. Proper information helps employees prepare for change.

3. **Participation and inclusion.** Perhaps the most effective individual strategy to overcome resistance to change is to involve employees directly in the planning and implementation of the change. The participating employees will be more committed to implementing the planned changes, and are more likely to generate certainty that they will work correctly than those employees who have not participated (Dorta, 2011).

Conclusion

This paper describes the aspects related to the change management process in organizations, and how it can be addressed to satisfy the need to respond to the circumstances of the environment, with the requirement to adapt to certain characteristics of change, desirable and superior how to do it in the organization itself.

The management of information in organizations is a transcendent issue at present, since the changes in the working groups at the integral level demand the improvement of their operation structures, currently this improvement propitiates the management for a transition of the private sector and public, with the merger or a transformation towards digital work structures. However, there are difficult scenarios to understand and talk about a process of change in the behavior of the groups and identify the characteristics of the organization at the individual and organizational level, where the application and understanding of the operations actions will have to be carried out of change managers in the cluster.

Likewise, the methodology to be used and its sensitivity analysis, in application of hard and soft technologies by the organization, is of great importance, this will allow to identify the set of minimum factors to be modified in order to unfreeze the existing prejudices in the working groups, for its adaptation and improvement of its own competences in its operation activities, in addition, the planning of a change project must have the participation of all the actors involved in the organization.

References

Acosta R., C. (2002). Cuatro preguntas para iniciarse en Cambio Organizacional. Revista Colombiana de Psicología, 9-24. Recuperado el 22 de enero de 2016, de http://www.bdigital.unal.edu.co/13630/1/1194-6035-1-PB.pdf

Acosta, P. (2011). El aprendizaje organizacional como proceso de innovación en nuevas empresas de base tecnológica, un estudio de casos. Ideas, CONCYTEG 6 (74) 959-976.

Adams, R. N. (2007). La red de la expansión humana (Primera ed.). (C. d. (CIESAS), Ed.) Mexico: Mexico. Recuperado el 26 de febero de 2017, de http://www.ciesas.edu.mx/publicaciones/clasicos/libros/La_red.pdf

Allaire, Yvan y Firsirotu, Mihaela. (1992). "Revoluciones culturales en las grandes organizaciones" En Abravanel y otros "Cultura organizacional" en Legis. Bogotá, pp. 163-186.

Arellano H. A. ¿Es posible una epistemología política que solucione la asimetría entre naturaleza absolutizada y política relativizada? In: Filosofía política contemporánea. México: UNAM-IIF-Fac. Filosofía 2007. En prensa.

Barney, J. (1986). "Organizacional culture can be a source of sustained competitive advantage" En Revista Academy of Management Review, Vol. 11 Nº 3.

Beckhard R. (1973). Desarrollo Organizacional. Estrategias y Modelos. Mc. Graw Hill. Sao Paulo.

Carrión, M., & Machado, F. (2006). Estudio de los procesos de cambios implementados en mi casa entidad de ahorro y prestamo, sede principal(tesis licenciatura). Maturin, Monagas, Venezuela: Universidad de oriente. Recuperado el 20 de marzo de 2016, de http://ri.bib.udo.edu.ve/bitstream/123456789/671/1/TESIS-658.406_C282_01.pdf

Chiavenato, I. (2009). Comportamiento Organizacional (2a edición). México D.F.: Mc Graw Hill.

De Faria Mello, F. A. (1995). Desarrollo organizacional: enfoque integral. México D.F.: Ed. Limusa.

Diario Oficial de la Federación. (22 de mayo de 2017). http://www.dof.gob.mx/. Recuperado el 10 de febrero de 2016, de http://www.dof.gob.mx/nota_detalle.php?codigo=5424367&fecha=04/02/2016

Domínguez De Sanctis, L., & Giordano Groba, J. P. (Abril de 2009). Sistema de Indicadores para el Cambio Organizacional -S.I.C.O.: Una propuesta de medición del cambio organizacional. Recuperado el 22 de febrero de 2016, de Conocimiento libre repositorio institucional: https://www.colibri.udelar.edu.uy/bitstream/123456789/720/1/M-CD3874.pdf

Dorta Quintana, A. (2011). Centro de Desarrollo Gerencial Un espacio para el aprendizaje. Recuperado de: http://centrodedesarrollogerencial.blogspot.mx/2011/01/resistencia-al-cambio.html

Fernández C. C. (2005). "La comunicación en las organizaciones". Editorial Trillas S.A. México, D.F., Segunda Edición.

Fernández Palma, O. (Ed.). (2010). Metodología de la investigación. Colombia: Prentice Hall-Persoan. Proyecto filosofia (2002). Historia de la Filosofía (2ª ed.) 1886, tomo 1, páginas 112-115. Proyecto Filosofía en español, © 2002 filosofia.org

Hellriegel, D., Jackson, S. & Solcum, J. (2005). Administración. Un enfoque basado en competencias (10 Ed.). México: McGraw-Hill de México.

García R. M., Gómez N. P., & Londoño, O. P. (enero-junio de 2009). Relación entre motivación y resistencia al cambio en personas que trabajan en una empresa del sector público, en Bogotá (Colombia). Diversitas: Perspectivas en Psicología, 141-159. Recuperado el 26 de febrero de 2016. http://www.redalyc.org/articulo.oa?id=67916259012

García R. M., Rojas , M. F., & Díaz , S. (7 de enero-junio de 2011). Relacion entre el cambio organizacional y la actitud al cambio en los trabajadores de una empresa de Bogota. (U. d. tomas, Ed.) Diversitas Perspectivas en Psicología, 125-142. Recuperado el 20 de noviembre de 2016, dehttp://www.redalyc.org/pdf/679/67922583009.pdf

García R, M., Rubio, P. & Bravo, L. (2007). Relación entre los factores de riesgo psicosocial y la resistencia al cambio organizacional en personal de seguridad de una empresa del sector economico terciario. Diversitas, 3(2), 301-315. Recuperado de http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1794-99982007000200011&lng=pt&tlng=es.

García-Rubiano, M. & Forero-Aponte, C., (2015). Contrato psicológico y cambio organizacional en una entidad perteneciente al sector terciario de la ciudad de Bogotá, Colombia. Revista de investigación y desarrollo e innovación, 6(1), 15-28. https://doi.org/10.19053/20278306.4047

Garbanzo Vargas1 G. M., (2016). Desarrollo organizacional y los procesos de cambio en las instituciones educativas, un reto de la gestión de la educación. Revista Educación 40(1), 67-87, e-ISSN: 2215-2644, enero-junio. http://dx.doi.org/10.15517/revedu.v40i1.22534

Guízar, R. (2013). Desarrollo Organizacional: Principios y aplicaciones (4ta ed.). Mexico D.F.: McGraw-Hill/Interamericana Editores.

gob.mx. (2017). Comisión Intersecretarial para el Desarrollo del Gobierno Electrónico. (C. I. Electrónico, Editor) Recuperado el 8 de mayo de 2017, de http://www.gob.mx/cidge: http://www.gob.mx/cidge/acciones-y-programas/politica-tic-maagticsi-2017

Insaurralde, M. (2010). "Cultura organizacional en una Multinacional. Estudio de caso en la empresa Danone."Tesis de Maestria. Mexico: Universidad Autónoma Metropilitana. Recuperado el 2 de febrero de 2017, de http://148.206.53.84/tesiuami/UAMI14575.pdf

Jones, G. R., & George, J. M. (2006). Administración contemporánea (Primera ed.). (J. F. Dávila Martínez, & A. Deras Quiñones, Trads.) México, Mexico: McGrawHill.

Kiser, Larry y Elinor Ostrom. 1982. "The three worlds of action: a metatheoretical synthesis of institutional approaches", en Elinor Ostrom (ed.), Strategies of Political Inquiry. California: Sage.

López, M.E., Restrepo, L.E. & López, G.L., (2013). Resistencia al cambio en organizaciones modernas. Scientia et Technica, 18(1), 149-157. Recuperado de http://www.redalyc. org/pdf/849/84927487022.pdf

López G. W. O. (2013). El estudio de casos: una vertiente para la investigación educativa. Educere, 17(56), 139-144. Recuperado el 17 de marzo de 2016, de http://www.redalyc.org/pdf/356/35630150004.pdf

López_D. M. E., Restrepo de O. L. E., & López V. G. L. (1 de abril de 2013). Resistencia al cambio en organizaciones modernas. Scientia Et Technica, 149-157. Recuperado el 16 de febero de 2016, de http://www.redalyc.org/articulo.oa?id=84927487022

Lundvall, B. (ed.) (1992). National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning. London: Pinter Publishers.

MAAGTICSI (2018). ACUERDO por el que se modifican las políticas y disposiciones para la Estrategia Digital Nacional, en materia de Tecnologías de la Información y Comunicaciones, y en la de Seguridad de la Información, así como el Manual Administrativo de Aplicación General en dichas materias. DOF: 23/07/2018.

Manual Oslo (2006). Guia para la recogida e interpretración de datos sobre innovación. (J. Z. Ogállal, Trad.) España: Grupo Tragsa - Empresa de Transformación Agraria, S.A. Recuperado el 6 de diciembre de 2017. http://www.itq.edu.mx/convocatorias/manualdeoslo.pdf

Martínez B. E., Carrasco S. C. & Bull, M. T. (2018). Propuesta metodológica para implementar la primera fase del modelo de gestión del cambio organizacional de Lewin. Estudios Gerenciales, 34(146), 88-98.

McKELVEY, B. & ALDRICH, H. (1983): "Populations, natural selection and applied organizational science". Administrative Science Quarterly, Vol. 28, N. 1, pp. 101-128.

Mengíbar, M., del Río, S. y Terol, J. (2007). La gestión del cambio. En Temes J.L. y Mengíbar M. (Eds.), Gestión Hospitalaria (pp. 501- 518), Madrid: McGraw Hill Interamericana.

MINEDULACIÓN & ICETEX (2018). Plan institucional de capacitación, Plan de capacitación Bogotá D.C.. Molano L., O. L. (2007). Identidad cultural un concepto que evoluciona. (U. E. Colombia, Ed.) Opera(7), 69-84. Recuperado el 12 de febrero de 2017, de http://www.redalyc.org/articulo.oa?id=67500705

Montoya Suárez, O. (agosto de 2004). Schumpeter, innovación y determinismo tecnológico. Scientia et Technica, 2(25), 209-213. Recuperado, 15 de marzo de 2016. http://revistas.utp.edu.co/index.php/revistaciencia/article/view/7255/4285

Münch, L. (2010). Administracion Gestion organizacional, enfoque y proceso administrativo. (P. M. Rosas, Ed.) México: Pearson Educacion. Recuperado el 8 de enero de 2017

Nelson, R., & Winter, S. (2000). En busca de una teoría útil de la innovación. Cuadernos de Economía, 19(32), 179-223. Recuperado el 11 de febrero de 2017, de http://www.revistas.unal.edu.co/index.php/ceconomia/article/view/11094/21130

Pariente F., J. (2010). Procesos de cambio y desarrollo en las organizaciones. http://www.uat.edu.mx/SitePages/principal.aspx: http://academia.uat.edu.mx/pariente/Libros/Pariente_Procesos%20de%20cambio%20y%20DO.pdf

Article

Patiño, M., Rachid, O., & Delgado, W. (2006). Instituto Superior de Psicologia Social. Recuperado el 13 de octubre de 2016.
 http://www.bahiapsicosocial.com.ar/biblioteca-descripcion.php?id=677

Pelayo O. A. (2001). Factores que propician los cambios en la gestión municipal y sus consecuencias en la administración pública (Tesis de Maestría). Los Mochis, Sinaloa, México: Universidad Autónoma Metropolitana Unidad: Iztapalapa.
http://tesiuami.izt.uam.mx/uam/aspuam/presentat esis.php?recno=4345&docs=UAM4345.PDF

Pizarro, G. (2005). Innovación en tiempos de cambio. En Marchant L. (eds.), Actualizaciones para el desarrollo organizacional. (pp. 68-74). Viña del Mar, Chile: Patagonia Impresores Ltda.

Real D. J. (2007). Mecanismos de cambio en las políticas públicas: propuesta de un marco teórico-conceptual sintético. VIII Congreso Español de Ciencia Política y de la Administración Política para un mundo en cambio. Grupo de trabajo 17. Análisis y Evaluación de Políticas Públicas.

Rendón C. M., & Montaño H. L. (2009). Las aproximaciones organizacionales caracterización, objeto y problemática. (U. Facultad de Contaduría y Administración, Ed.) Journal of Accounting and Management, 1-15.
http://www.ejournal.unam.mx/rca/213/RCA2130 4.pdf o http://www.cya.unam.mx/index.php/cya/article/v iew/458

Rivera G. A. E. (2013). El Cambio Organizacional: Un Proceso Estratégico de Adopción y Adaptación. (I. -UPIICSA, Ed.) Gestion y estrategia, 93-105. http://zaloamati.azc.uam.mx/bitstream/handle/11 191/2593/El_cambio_organizacional_un_proces o_estrategico_de_adopcion_y_adaptacion.pdf?se quence=3

Robbins SP. (1999). Comportamiento Organizacional. 2da ed. México, DF: Prentice Hall Hispanoamérica.

Robbins, S. P., & Judge, T. A. (2013). Comportamiento organizacional. México: Perarson Educacion.

Rodríguez G. R. (2009). La cultura organizacional. Un potencial activo estratégico desde la perspectiva de la administración. Invenio, 12(22), 67-92. http://www.redalyc.org/articulo.oa?id=87722106

Rubio C. F. A. (2009). La Estructura Organizacional en Centros de Investigación, Desarrollo e Innovación; una Aproximación a la Experiencia Internacional (tesis de doctorador). Santiago de Querétaro: Universidad Autónoma de Querétaro.
http://fca.uaq.mx/files/investigacion/doctorado/tesi s/FelipeAlejandroRubioCastillo.pdf

Rodríguez, M.D. (2011). Gestión Organizacional (Quinta edición ed.). (V. d. Continua, Ed.). Santiago, Chile: Ediciones Universidad Católica de Chile.

Rodríguez, V. & Mladinic, A. (2016). Ambivalencia actitudinal ante el cambio organizacional: un análisis desde el individuo en contexto laboral. Psykhe (Santiago), 25(1), 1-17. https://dx.doi. org/10.7764/psykhe.25.1.733

Salgado R. J., Leria D. F., Arcos C. L., Pineda A. C., & González C. C. (2018). Actitud y resistencia al cambio organizacional en trabajadores. Mineros. Revista de Psicología, Vol. 36 (1), 2018, pp. 105-134 (ISSN 0254-9247). Universidad de Atacama-Chile

Sánchez D. E. (2008). Las tecnologías de información y comunicación (tic) desde una perspectiva social. Revista Educare Vol. XII, N° Extraordinario, 155-162, ISSN:1409-42-58. http://www.redalyc.org/pdf/1941/194114584020.p df

Sandoval, J.L. (2014). Los Procesos de Cambio Organizacional y la Generación de Valor. (B. C. Universidad ICESI, Ed.) Elsevier Doyma, 30(131), 162-171. https://doi.org/10.1016/j. estger.2014.04.005

Santana H. B. A. (2011). Escuala de Organizacion Industrial.
http://www.eoi.es/blogs/bruniladaaltagraciasantan a/2011/12/05/teoria-de-los-sistemas/
Smircich, L. (1983). Concepts of culture and organizational analysis. Administrative Science Quarterly, 28 (3), 339-358.

Soto-Muciño L. E. (2016). Análisis socioeconómico de la producción de miel en el municipio de Álamo, Veracruz. Una propuesta para el desarrollo competitivo de la actividad apícola. Universidad del Distrito Federal. Santa María. No. 2016-117.

Stewart, J. (1992). Gerencia para el cambio. Planeación, entrenamiento y desarrollo, Fondo Editorial LEGIS, Colombia.

Tissen, R., Andriessen, D. y Deprez, F.L. (2000). El valor del conocimiento, Madrid: Prentice Hall, (2000)

Tyrtania Geidt, Leonardo (2007). "Termodinámica de la supervivencia para la sociedad humana". En: Adams, Richard N. La red de la expansión humana. México: CIESAS, pp. 20-22. Wolf, Eric

Zamora A. M. G. (2018) El desarrollo organizacional como generador de un cambio significativo en las organizaciones de la sociedad civil. María Guadalupe Zamora Aguilar. Revista Extremeña de Ciencias Sociales "ALMENARA" nº 10. Asociación de Ciencias Sociales de Extremadura (ACISE).

Zimmermann, A. (2000). Gestión del cambio organizacional caminos y herramientas. (Segunda, Ed.) Quito, Ecuador: ABYA-YALA.

Different types of homogeneity

Distintos tipos de homogeneidad

PACHECO-JUÁREZ, Yaziel*†

ID 1°Author: Yaziel, Pacheco-Juárez / **ORC ID**: 0000-0002-1611-3937, **Researcher ID Thomson**: V-2765-2018, **arXiv ID**: pachecojuarez_y_1

Abstract

The degree of homogeneity of a space X is the number of orbits under the action of the group of homeomorphisms of X in X. The smaller the degree of homogeneity, the more homogeneous the space, in fact, having a degree of homogeneity 1 is equivalent to being homogeneous. Another way to measure the homogeneity of a space is to use n-homogeneity and n-homogeneity at a point. Our work focuses on spaces called continuous (metric, compact and related spaces), studying the relationship between these three types of homogeneity mentioned, as well as their interaction with the local connection, the indescomponibilidad and cutting points of the continuum. We prove, among other things, that the homogeneous spaces in a point have a degree of homogeneity 1 or 2 and, when the space has a single cut point, we relate the degree of homogeneity of the continuum with the degree of homogeneity of the components of the complement of said cut point. In addition, we generalize some already known results of the subject.

Continuous, Gegree of homogeneity, n-homogeneity, Cut points

Resumen

El grado de homogeneidad de un espacio X es el número de órbitas bajo la acción del grupo de homeomorfismos de X en . Entre más pequeño es el grado de homogeneidad, más homogéneo es el espacio, de hecho, tener grado de homogeneidad 1 es equivalente a ser homogéneo. Otra manera de medir la homogeneidad de un espacio es utilizar la n-homogeneidad y la n-homogeneidad en un punto. Nuestro trabajo se centra en los espacios llamados continuos (espacios métricos, compactos y conexos), estudiando la relación entre estos los tres tipos de homogeneidad mencionados, así como su interacción con la conexidad local, la indescomponibilidad y los puntos de corte del continuo. Probamos, entre otras cosas, que los espacios homogéneos en un punto tienen grado de homogeneidad 1 o 2 y, cuando el espacio tiene un único punto de corte, relacionamos el grado de homogeneidad del continuo con el grado de homogeneidad de las componentes del complemento de dicho punto de corte. Además, generalizamos algunos resultados ya conocidos del tema.

Continuo, Grado de homogeneidad, n-homogeneidad, Puntos de corte

* Correspondence to Author (email: yazi28@hotmail.com)
† Researcher contributing first author.

1. Introduction

This work is framed within the Theory of Continuos and more specifically, in the study of the continuous 1/n-homogeneous. Research in homogeneous spaces is extensive in Topology. However, not all spaces are homogeneous and, even among those that are, it is interesting to have a measure of how homogeneous the space is. We investigate three concepts that help us in this task: the 1/n-homogeneity, the n-homogeneity and the n-homogeneity in a point.

The study of the continuous $1/n$ - homogeneous, for n>1, formally began in 1989 with H. Patkowska. However, it was not until relatively recently that this issue has gained momentum, gaining the interest of researchers in Continuous Theory. Most articles written in recent years focus on the study of 1/2-homogeneity.

In this work we study each of the three notions of homogeneity, both separately, and the relationship between them; as well as the interaction with the local connection, the indescomponibilidad and the points of cut of a continuous.

Section 2 is devoted to the definitions, the notation and the basic and general theorems that we will use. Section 3 is dedicated to 1/n-homogeneous spaces. We define, among other notions, the degree of homogeneity of a space, 1/n-homogeneous space and orbits of a space. We also test general results of this topic.

In section 4 we adapt, for n-homogeneous spaces in a point, valid theorems for n-homogeneous spaces, and generalize other known results. In Theorems 4.4 and 4.7 we prove that the n-homogeneous or n-homogeneous spaces in a point have a degree of homogeneity 1 or 2 and are decomposable. Theorems 4.8 to 4.10 relate the homogeneity of space with n-homogeneity and n-homogeneity at a point. In section 5 we study the interaction of these two concepts with the local connection.

In section 6 we present two simple results that show the relationship between the different types of homogeneity we have considered, when one of its' orbit is degenerate.

Finally, in section 7 we study the 1/n-homogeneous continuums with exactly one cut-off point. Theorem 7.1 shows a relation between the orbits of the continuum and the orbits of the components of the complement of the cut-off point. Corollary 7.10 gives an example of a continuous 1/3 - homogeneous that is obtained by gluing copies of the same homogeneous and locally connected continuum.

2. Preliminaries

The symbol $\mathbb{N}$ will denote the natural numbers. If A is a set, its cardinality will be denoted by $|A|$. We say that A is degenerate if $|A| = 1$ and, otherwise, we say that A is not degenerate. Let X be a space and $A \subset X$. We will denote by 1_X the function identity of X in X, by $Cl_X (A)$ and $Int_X (A)$ to the lock and the interior of A in X, respectively. If X is metric, by diam (A) we refer to the diameter of the set A. In addition, if f is a function with domain X, we denote by f|A| A the restriction of f to the set A.

Throughout this work, we will consider spaces T_1 and, in general, continuous. A continuum is a compact, connected, metric space and, for this writing, with more than one point. If X is a continuum, then a subcontinuum of X is a subset of X that is closed, connected, and not empty. We will denote by I to the unit interval [0,1]. The continuous homeomorphs to interval I are called arcs. If A is an arc and h is a homeomorphism from I to A, the extreme points of the arc A are h (0) and h (1).

Let X be a topological space. If x ∈ X, we say that X is locally connected in x, if for open U having ax, there is an open and connected subset V of X that contains a and is contained in U. In addition, X is locally connected if X is locally connected in each of its points. We say that X is small connected at the point x∈X, if for every open U containing x, there is a connected subset V of X that has x in it and is contained in U. Finally, X is arcconexo if for each pair of points p and q in X, there is an arc whose ends are p and q.

Clearly, if X is locally connected at x, then X is connected in small at x. The other implication is not always fulfilled (Theorem 7.6, Pacheco, 2009, p.69]). However, it is known that a space X is locally connected if and only if X is connected in small in all its points (Theorem 7.8, Pacheco, page 73]).

Let X be a continuum that is not connected in small at some point x. From Theorem 5.12 (Nadler, 1992, p.76) it is deduced that there exists a non-degenerate subcontinent K of X that contains a x and such that X is not connected in small at each point of K. So, if a continuous it is not connected in small at a point, then it is not connected in small in an uncountable number of points.

In Theorem 4.2 (Dugundji, 1966, p.123) the locally connected spaces are characterized as those in which the components of the open sets are open sets. Throughout the present work, we will use these results in more than one occasion.

The proof of the following Theorem can be found in Theorem 3.3 (Dugundji, 1966, p.121).

Theorem 2.1
If f: X → Y is a homeomorphism between the electric spaces X and Y, then the following statements are fulfilled: if A is a component of a subset C of X, then f (A) is a component of f (C).

Theorem 2.2
Let X be a metric and compact space, A and B two subsets of X, not closed, and c, d two points in X such that $Cl_X (A) = A \cup \{c\}$ and $ClX (B) = B \cup \{d\}$. If f: A → B is a homeomorphism between A and B, then the function g: ClX (A) → ClX (B), defined, for each x ∈ $Cl_X (A)$ by

$$g(x) = \begin{cases} f(x), & si \ x \in A; \\ d, & si \ x = c \end{cases}$$

homeomorphism extending to f.

Demonstration
Since f is bijective, clearly g is also bijective. To see that g is continuous, we only need to see that it is continuous in c. For this, suppose that $\{a_n\}_n$ is a sequence of points of $Cl_X (A)$ converging to c such that $\{g (a_n)\}_n$ converges to an element b ∈ $Cl_X (B)$. We want to see that b = d. Suppose, on the contrary, that b ∈ B and let a = g^{-1} (b) = f^{-1} (b). Note that a∈ A. Without loss of generality let us suppose that each $a\_n \in A$, with which $g(a_n)=f(a_n)$. Since f^{-1} is a homeomorphism of B in A and $\{f(a_n)\}_n$ is a succession of elements of B whose limit is an element of B, by Proposition 6.1. 5 (Margalef, 1979, p.6) we obtain the following:

$$a = f^{-1}\left(\lim_{n\to\infty} f(a_n)\right) = \lim_{n\to\infty} f^{-1}(f(a_n)) = \lim_{n\to\infty} a_n = c$$

This implies that c = a, and as a ∈ A, c is an element of A. Then, A is closed in X. Since this is a contradiction, it turns out that b = d = g (c): This proves that g is continuous in c. As g a function of a compact to a metric space, it is closed and thus, it is a homeomorphism.

Part 1) of the following result is known as the Border Strikes Theorem. Its proof can be seen in Theorem 5.6 of (Nadler, 1992, p.74). Part 2) is a consequence of part 1), and its demonstration can be seen (Nadler, 1992, p.75).

Theorem 2.3
Let X be a continuum and E a subset of its own and not empty of X. Then the following statements are fulfilled:

1. If A is a component of E; then $Cl_X(A) \cap Cl_X (X - E) \neq \emptyset$.
2. If E is a subcontinent of X, then, for each component A of X -E, it happens that A∪E is a subcontinent of X.

Let X be a connected space. We say that c∈X is a cutoff point of X if X- {c} is not connected. The symbol $C_{ut}(X)$ will denote the set of all the cut points of X (note that $C_{ut}(X)$ can be the empty set). Also, if c ∈ X; we will denote by Ac the family of all the components of X - {c}.

The following result shows properties of the components of the complement of a cut point in a topological space. Recall that two non-empty sets H and K of a space X are mutually separated if the lock H does not intersect K and the lock of K does not intersect H. In addition, it is known that a space is connected if and only if they do not exist two mutually separated sets whose union is space.

Theorem 2.4
Let X be a continuum and c ∈ X. For each component A of X - {c}; the following warnings are fulfilled:

1. $Cl_X (A) = A \cup \{c\}$ and $C_{ut} (Cl_X (A)) \subset A$.
2. If A is open in X, then every cut point of $Cl_X (A)$ is a cut point of X.
3. If $C_{ut}(X) = \{c\}$ and A is open in X, then $Cl_X (A)$ is a subcontinent of X without cut points.

Demonstration
Let A be a component of X - {c}: Since X - {c} is a proper and non-empty subset of X; by part 1) of Theorem 2.3 (applied to E = X - {c}), it happens that:

ISSN-Print: 2007-1582- ISSN-On line: 2007-3682
ECORFAN® All rights reserved.

PACHECO-JUÁREZ, Yaziel. Different types of homogeneity. ECORFAN Journal-Mexico 2018

$\emptyset \neq Cl_X(A) \cap Cl_X(X - (X - \{c\}) = Cl_X(A) \cap \{c\}.$

Then $c \in Cl_X$ (A) and $A \cup \{c\} \subset Cl_X$ (A). From part 2) of Theorem 2.3 (applied to E = {c}), it happens that $A \cup \{c\}$ is a subcontinuum of X. This proves that Cl_X (A) = $A \cup \{c\}$. Now suppose that a is a cut point of Cl_X (A). As Cl_X (A) - {c} = A and A is connected, a ≠ c. Therefore, to ∈A. This proves 1). Now suppose that A is open in X and that a is a cut point of Cl_X (A). From 1), we obtain that a ∈ A. Let's define:

$B = \cup\{C \in \mathcal{A}_c : C \neq A\}.$

For 1), for each C ∈ A_c - {A} it is satisfied that $c \in Cl_X$ (C) $\subset Cl_X$ (B). Since A is open, XA = B∪ {c} is a closed subset of X that contains B. Then, Cl_X (B) = B∪ {c} y, since Cl_X (A) = A∪ {c} and A∩B = ∅, we deduce that A∩Cl_X (B) = ∅ and Cl_X (A) ∩B = ∅. Now, since a is a cut point of Cl_X (A), there are two sets that are not empty and mutually separate H and K such that Cl_X (A) - {a} = H∪K. Suppose without loss of generality that c∈ K. Then H⊂ A and

$X - \{a\} = (Cl_X(A) - \{a\}) \cup B = (H \cup K) \cup B = H \cup (K \cup B).$

In addition, H and K ∪ B are non-empty subsets of X such that

$Cl_X (H) \cap (K \cup B) = (Cl_X(H) \cap K) \cup (Cl_X(H) \cap B) = Cl_X(H) \cap B \subset Cl_X(A) \cap B = \emptyset$

And

$H \cap Cl_X(K \cup B) = (H \cap Cl_X(K)) \cup (H \cap Cl_X(B) = H \cap Cl_X(B) \subset A \cap Cl_X(B) = \emptyset$

This implies that a is a cut point of X, thus proving 2). To prove 3), suppose that Cut (X) = {c} and that A is a component of X - {c} such that A is open in X. Then Cl_X (A) is a subcontinuum of X such that, for 1) and 2), Cut (Cl_X (A)) ⊂A∩Cut (X) = A∩ {c} = ∅. Thus, $Cut(Cl_X(A)) = \emptyset$.

3. 1/n-homogeneous spaces

Given a space X, we denote by H (X) the group of homeomorphisms of X in X. The orbit of x in X is the orbit under the action of H (X) at a point x ∈ X, that is, it is the set:

$Orb(x) = \{h(x) : h \in \mathcal{H}(X)\}.$

It is easy to notice that the family of the orbits of a space X is a partition of X and that a set $\mathcal{O}$ is an orbit of X if and only if it exists $x \in X$ such que $\mathcal{O} = OrbX(x)$.

The degree of homogeneity of a space X, is the cardinality of the family of the orbits of X. We say that X is 1/n-homogeneous, to refer to that X has a degree of homogeneity n. We are interested in spaces whose degree of homogeneity is finite. The following result provides some additional properties of the orbits of a space.

Theorem 3.1
Let X be a space and O an orbit of X. Then the following statements are fulfilled:

1) If $f \in \mathcal{H}(X)$, happens that $f(\mathcal{O}) = \mathcal{O}$.
2) If $\mathcal{O}_1$ is an orbit of X such that $\mathcal{O} \cap Cl_X(\mathcal{O}_1) \neq \emptyset$, so $\mathcal{O} \subset Cl_X(\mathcal{O}_1)$.
3) If $Int_X(\mathcal{O}) \neq \emptyset$, then O is open in X.

Demonstration
Suppose that O = Orb$_X$ (z), for some z ∈ X. Take f ∈ H (X), x ∈ O and a homeomorphism h: X → X such that h (z) = x. Since (f∘h) (z) = f (h (z)) = f (x), then f (x) ∈Orb$_X$ (z) = O. Then, f (O) ⊂O and, similarly, f $^{-1}$ (O) ⊂ O. Therefore, O = f (O). To see 2) let x ∈ O and U be open in X that have x. Take y∈O∩ Cl_X (O$_1$). Then there exists f ∈ H (X) such that f (x) = y. Since f (U) is an open in X such that y ∈f (U) and y ∈ Cl_X (O$_1$), it happens that f (U) ∩ O_1 ≠ ∅. Using this and part 1) with the homeomorphism f $^{-1}$ we obtain that

$\emptyset \neq f^{-1}(f(U) \cap \mathcal{O}_1) = U \cap \mathcal{O}_1.$

Then, x∈Cl_X (O$_1$). This proves 2). To see 3), let y ∈ O and x ∈ Int$_X$ (O). Since x, y ∈ O, there exists f ∈ H (X) such that f (x) = y. Then f (Int$_X$ (O)) is an open of X that has y. Also, for 1), f (Int$_X$ (O)) ⊂ f (O) = O. Therefore, O is open in X. This proves 3). The following theorem generalizes part 1) of Theorem 3.1 and the test is tested in a similar way.

Theorem 3.2
Let X and Y be two spaces and f: X → Y a homeomorphism. If z ∈ X, then:

$f(Orb_X(z)) = Orb_Y(f(z))$

Corollary 3.3
Homeomorphic spaces have the same degree of homogeneity.

Theorem 3.4

Let X be a locally connected continuum with a single cut point c. If A and B are elements of A_c and are homeomorphic, there is a homeomorphism F: X → X that sets c such that F (A) = B and, for each year.

$$F\big(Orb_A(a)\big) = Orb_B\big(F(a)\big)$$

Demonstration

Let's fix an element A ∈ A_c. Let B∈A_c be homeomorphic to A. For part 1) of Theorem 2.4, Cl_X (A) = A ∪ {c} and Cl_X (B) = B∪ {c}. Since A and B are homeomorphic, by Theorem 2.2, we can take a homeomorphism g: A ∪ {c} → B ∪ {c} such that g (A) = B and g (c) = c (if B = A we take g as the identity). Since X is locally connected and, A and B are components of the open X- {c}, A and B are open in X, so X- (A∪B) is closed in X. Define F: X → X as follows:

$$F(X) = \begin{cases} g(x), \ si \ x \in Cl_X(A); \\ g^{-1}(x), \ si \ x \in Cl_X(B); \\ x, \ si \ x \in X - (A \cup B). \end{cases}$$

Clearly, F is a homeomorphism and F (A) = B. Furthermore, if a∈A, as F|_A is a homeomorphism of A in B, by Theorem 3.2, F (Orb_A (a)) = Orb_B (Fa)). This concludes our test.

4. N-homogeneous spaces

Definition 4.1

Let X be a space and n∈ N. We say that X is n-homogeneous if, for each pair of sets with n elements A and B, there exists h ∈ H (X) such that $\mathcal{H}(A) = B$. *We say further that X is n-homogeneous at a point c ∈X if, for each pair of sets A and B of n elements and having ac, there exists h∈H (X) such that h (A) = B and h (c) = c.*

In the following result, we show that being n-homogeneous at a point is a topological invariant. Therefore, being n-homogeneous is also a topological invariant.

Proposition 4.2

Let f be a homeomorphism between the spaces X and Y, and n ∈ ℕ. If X is n-homogeneous in p, then Y is n-homogeneous in f (p).

Demonstration

Let A and B be two subsets of Y with exactly n elements such that f (p) ∈ A∩B. Note that f^{-1} (A) and f^{-1} (B) are two subsets of X that have p, each with exactly n elements. Since X is n-homogeneous in p, there is a homeomorphism h: X → X such that h (f^{-1} (A)) = f-1 (B) and h (p) = p. Luego, $f \circ h \circ f^{-1}$ es un homeomorfismo, de Y en Y, que manda A en B y que fija a $f(p)$, lo que prueba que Y es *n*-homogéneo en $f(p)$.

Note that the definitions of 1-homogeneous space and 1/1-homogeneous space coincide, these are simply called homogeneous spaces. Also, all spaces are trivially 1-homogeneous in each of their points. For this reason, for the study of the n-homogeneous continuums at a point, we will always consider n ≥ 2.

Part 1) of the following theorem is proved in Theorem 1 (Burges, 1954, p.137), while part 2) is shown in Corollary 2 (Brown, 1959, p.647).

Theorem 4.3

Let X be a space and n ∈ N. If X is n-homogeneous, then the following statements are fulfilled.

1. X is homogeneous,
2. If n ≥ 2, X is (n - 1) -homogeneous.

Next we present a version of Theorem 4.3, but for n-homogeneous spaces in a point.

Theorem 4.4

Let X be a continuum and n ∈ ℕ. If X is n-homogeneous at a point p ∈ X, then the following statements are fulfilled.

1. X is homogeneous or X is 1/2-homogeneous and its orbits are X - {p} and {p},
2. If n ≥ 2, X is (n -1) -homogeneous in p.

Demonstration

Suppose that X is n-homogeneous at the point p ∈ X. First let's see that X - {p} is contained in an X orbit. For this, let's take two points x and y in X - {p}. Let's consider n-2 points $x_1, x_2, \ldots, x_{n-1}$ in X-{x, y, p}. Since X is n-homogeneous in p, there exists h ∈ H (X) such that:

$$h(\{x, x_1, x_2, \ldots, x_{n-2}\}) = \{y, x_1, x_2, \ldots, x_{n-2}\} \ y$$
$$h(p) = p.$$

If h (x) = y, then x and y are in the same orbit of X. Suppose that h (x) ≠ y. Consequently, there exists $i_1 \in$ {1,2, ..., n - 2} such that h (x) = x_{i1}. If h (x_{i1}) = y, then $h^2 \in$ H (X) is such that h^2 (x) = y and, thus, x and y are in the same orbit of X. Continuing this finite process, we can find m∈ {1,2, ..., n - 1} such that h^m (x) = y. Then x and y are in the same orbit. Therefore, X - {p} is contained in an O orbit of X.

If X is not homogeneous, the only point of X that is not an element of O is the point p. Consequently, the two orbits of X are X - {p} and {p}. This proves 1).

To prove 2) note that, if n = 2, then 3) is trivially met. Then, we can assume that n ≥ 3. From Definition 4.1, it follows that X- {p} is (n-1) -homogeneous. Furthermore, by the second part of Theorem 4.3, we have that X - {p} is also (n - 2) -homogeneous. Let A and B be two subsets of X, with exactly n - 1 elements each, and such that p ∈ A∩B, there exists a homeomorphism h: X- {p} → X - {p} such that h (A - {p}) = B- {p}. Now, using Theorem 2.2, we can extend h to a homeomorphism g: X → X, with g (p) = p. Consequently, g (A) = B and g (p) = p. Therefore, X is (n - 1) -homogeneous at point p.

Definition 4.5
If X is a continuum and p∈X, the component of p in X is the union of all the subcontinents proper to X that have p. We say that X is a decomposable continuum if there are two subcontinents of A and B of X such that X = A∪B. Finally, we say that X is an indecomposable continuum if X is not decomposable.

Part 1) of the following theorem is proved in Theorem 2 (Kuratowski, 1968, p.209). Part 2) can be found in Theorem 11.15 (Nadler, 1992, p.203) and, finally, part 3) is found in Theorem 11.17 (Nadler, 1992, p.204).

Theorem 4.6
Let X be a continuum. The following statements are fulfilled.

1. Each component of X is dense in X;
2. If X is undecomposable, then X has an uncountable amount of Composers.
3. If X is indecomposable, then the composants of X are foreign two to two.

Theorem 4.7
Let X be a continuum and m≥2. If X is m-homogeneous or m-homogeneous at some point, then X is decomposable.

Demonstration
Suppose that X is m-homogeneous at some point c∈X and that X is indecomposable. From the third part of Theorem 4.4, it follows that X is 2-homogeneous in c. Let K_c be the component of X that has a c. Since the composants in a continuum are dense (Theorem 4.6, section 1)), we can take a∈K_c- {c}. If h is a homeomorphism of X in itself, which fixes to c, then h (K_c) = K_c. Luego $h(\{a, c\}) \subset K_c$. For parts 2) and 3) of Theorem 4.6, X has an uncountable number of composants, all of which are foreign to two. Now, if we take b in another component of X, it is not possible to find a homeomorphism that sets c and sends a in b, which contradicts that X is m-homogeneous in c.

Now we will assume that X is m-homogeneous and indecomposable. By the second part of Theorem 4.3, X is 2-homogeneous. Let K be a component of X, a, b∈ K and c∈ X-K. Since X is 2-homogeneous, there is a homeomorphism h: X → X such that h ({a, b}) = {a, c}. *This indicates, on the one hand, that h (K) ∩ K ≠ Ø, where h (K) = K but, on the other hand, also indicates that c∈h (K) = K. Since this contradicts the choice of c, we infer that X is decomposable.*

As indicated in part 1) of Theorem 4.3, if a space is n-homogeneous, it is homogeneous. However, given a homogeneous space Y, n> 1 does not always exist such that Y is n-homogeneous. To see this, by Theorem 4.7, it is enough to consider a homogenous and indecomposable continuum, for example, the pseudoarco. Next, we present in the following results, some cases in which n-homogeneity at some point implies homogeneity or n-homogeneity. The following result generalizes Lemma 4.4 of (Nadler, 2007, p.2188).

Theorem 4.8
Let X be a space and n∈N. If X is n-homogeneous at two different points, then X is homogeneous.

Demonstration
Suppose that a and b are two points in X such that X is n-homogeneous in each of them and that X is not homogeneous. Since X is n-homogeneous at point a, by part 1) of Theorem 4.4, X is 1/2-homogeneous and its two orbits are X- {a} and {a}. Similarly, since X is also n-homogeneous at point b, it happens that X- {b} and {b} are the two orbits of X. This is a contraction, because a ≠ b. Therefore, X is homogeneous.

Theorem 4.9
Let X be a homogeneous space and n∈N. If X is n-homogeneous at some point, then X is n-homogeneous.

Demonstration
Suppose that X is n-homogeneous at a point p∈X. Since X is homogeneous, X=Orb$_X$ (p). Thus, by Proposition 4.2, X is n-homogeneous in each of its points. Let {x$_1$, ..., x$_n$} and {y$_1$, ..., y$_n$} be two subsets of X with exactly n elements and h, g∈H (X) such that:

$h(\{x_1,\ldots,x_{n-1},x_n\}) = \{y_1,\ldots,y_{n-1},x_n\}$, $h(x_n) = x_n$,
$g(\{y_1,y_2,\ldots,y_{n-1},x_n\}) = \{y_1,y_2,\ldots,y_n\}$
y $g(y_1) = y_1$.

Then,

$$(g \circ h)(\{x_1,\ldots,x_n\}) = \{y_1, y_2, \ldots y_n\}.$$

Therefore, X is n-homogeneous.

From Theorems 4.8 and 4.9 we obtain the following result.

Theorem 4.10

Let X be a space and n∈ N. If there are two distinct points in X such that X is n-homogeneous in each of them, then X is n-homogeneous.

5. Relationship with local connection

We have proved that the continuous m-homogeneous, with m ≥ 2, are decomposable (Theorem 4.7). It turns out that, for each m ≥ 2, the m-homogeneous continuums are locally connected (Corollary 5.2). However, not all m-homogeneous spaces are locally connected, nor are all continuous m-homogeneous at any point locally connected (Example 5.3).

In (Theorem 3.12, Ungar, 1975) the following result is tested.

Theorem 5.1
If X is a 2-homogeneous continuum, then X is locally connected.

Corollary 5.2
Let X be a continuum and m≥2. The following statements are fulfilled.

1. If X is m-homogeneous, X is locally connected,

2. If X is m-homogeneous in p∈X, then X is locally connected if and only if X is connected in small at some point in X - {p}.

Demonstration
Part 1) is obtained from Theorems 4.3 and 5.1. To prove 2) suppose that X is connected in small at some point of X- {p}. Since X- {p} is contained in an orbit of X (Theorem 4.4 part 1)), then X is connected in small at each point of X- {p}. Since the set of non-smallness points of a continuum is infinite (Corollary 5.13, Nadler, 1992, p.78)), X is also connected in small at p. Therefore, X is connected in small in each of its points and thus, X is locally connected. The other implication is clear.

Example 5.3
There are m-homogeneous spaces, m-homogeneous spaces at some point, even continuous m-homogeneous at some point that are not locally related.

Demonstration
It is known that, for each m ,N, the set of Cantor C is m-homogeneous (it is not difficult to see this if we consider that C is homeomorphic to {0,1}^{ω}) and C is not locally connected.

Let Y = {0} ∪ {1 / n: n∈ ℕ}. It is easy to see that, for each m∈N, Y is m-homogeneous at point 0 and not locally connected at point 0. Now, take the circumference S^1 and a fixed point s∈S^1. Let C be the usual Cantor set, X the continuous (S^1 × C) / ({s} × C) and q: S^1 × C → X the quotient function (See Figure 1). Note that q ({s} × C) = p, for some p ∈ X, and {p} is an orbit of X. In addition, X - {p} is homogeneous and has no local points of connection.

Let's see X is 2-homogeneous in p. To do this, let's take a, b∈X- {p}. Since X - {p} is homogeneous, there exists a homeomorphism f of X - {p} in itself such that f (a) = b. Then, by Theorem 2.2, we can extend f to a homeomorphism g ∈ H (X) such that g (p) = p. Since g is the extension of f and a∈X- {p} this implies that g (a) = f (a) = b. Therefore, we have proved that X is a 2-homogeneous continuum in p. It is easy to notice that X is not locally connected at any point in X - {p}.
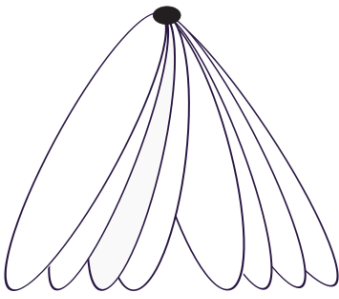
Figure 1 Continuous X of Example 5.3. Own elaboration

6. n-homogeneity and cutting points

In this section we present two simple results that show a relationship between the different types of homogeneity we have considered, when one of the orbits is degenerate. The following proposition generalizes Lemma 4.3 of (Nadler, 2007, p.2188).

Proposition 6.1

Let X be a continuum with a degenerate orbit $\{c\}$. The following statements are equivalent.

1. X is 1/2-homogeneous,
2. There is $m \geq 2$ such that X is m-homogeneous in c,
3. X is 2-homogeneous in c.

Demonstration

Suppose that X is 1/2-homogeneous. Since $\{c\}$ is an orbit of X, it follows that X - $\{c\}$ is the second orbit of X. Consequently, if x and y are two points on X- $\{c\}$, there exists $h \in H (X)$ such that h (x) = yy, since c is the only element of its orbit, h (c) = c. Then, X is 2-homogeneous in c. This proves that 1) implies 3). It is clear that 3) implies 2). Now suppose that there is $m \geq 2$ such that X is m-homogeneous in c. Since X is not homogeneous, by part 2) of Theorem 4.4, X is 1/2-homogeneous. This proves that 2) implies 1).

Theorem 6.2

Let X be a continuum such that Cut $(X) \neq \emptyset$. Then the following statements are fulfilled.

1. If $m \in N$, then X is not m-homogeneous;
2. If X is 2-homogeneous at some point c, then Cut (X) = $\{c\}$,
3. If $m \in N- \{1,2\}$, then X is not m-homogeneous in any of its points.

Demonstration

By Theorem 6.6 (Nadler, 1992, p.89), X has at least two non-cutting points. Since Cut $(X) \neq \emptyset$, we have that X is not homogeneous. Then, from part 1) of Theorem 4.3, we obtain 1). To see 2), suppose that X is 2-homogaeneous at a point c. Since X is not homogeneous, using part 2) of Theorem 4.4, its two orbits are X - $\{c\}$ and $\{c\}$. On the other hand, Cut (X) and X-Cut (X), are also the two orbits of X. Since X-Cut (X) is not degenerate, necessarily Cut (X) = $\{c\}$. This proves 2).

To see 3), suppose that X is m-homogeneous at a point $c \in X$, for some $m \geq 3$. For part 3) of Theorem 4.4, X is 2-homogeneous in c and, by 2) of this theorem, Cut (X) = $\{c\}$. Lets take a component C of X - $\{c\}$, and $A \subset C$, with exactly m - 1 elements. How is the cutoff point of X, $C \neq$ X- $\{c\}$. Since $m \geq 3$, we can take a subset B of X- $\{c\}$, with exactly m - 1 elements, such that $B \cap C \neq \emptyset \neq B \cap$ (X-C). As the image of a component of X - $\{c\}$, under a homeomorphism of X in X, is a component of X - $\{c\}$, for each $h \in H (X)$, h (A) B. Therefore, X is not m-homogeneous in c.

7. $\frac{1}{n} -$ homogeneity and cutting points

Let X be a connected space and $c \in X$. Recall that A_c is the family of all the components of X - $\{c\}$. Begin this section show some results that relate the orbits of a continuum with a single cut point c, with the orbits of the components of X - $\{c\}$. The following theorem says, among other things, that if the continuum X is locally connected, then each orbit of X intersects, at most, one orbit of each component and, in addition, that orbit can be obtained as the union of the orbits of the components to the intersects.

Theorem 7.1

Let X be a continuum with a single cut point c. If $A \in A_c$ and $a \in A$, the following statements are fulfilled.
1. $Orb_X(a) \cap A \subset Orb_A(a)$.
2. $Orb_X(a)$ it is a subset of $\cup \{Orb_B(b) : B \in \mathcal{A}_c$ y $b \in Orb_X(a) \cap B\}$.

Also, if X is locally connected, equalities are obtained in 1) and 2).

Demonstration

To prove 1), let $y \in OrbX (a) \cap A$ and $h \in H (X)$ such that h (a) = y. Since a and h (a) are elements of A, by Theorem 2.1, it is true that h (A) = A. In this way, $h|_A : A \rightarrow A$ is a homeomorphism, with which $y \in Orb\_A (a)$. This proves 1).

To test 2), take y∈Orb_X (a). Since c is the only cut point of X, a x and c are not in the same orbit. Therefore, y ≠ c and, thus, exists B∈A_c such that y∈ B. Therefore, y∈Orb_X (a) ∩B. Since y∈Orb_B (y), this proves 2). Now suppose that X is locally connected and let us prove that the equalities are obtained in 1) and 2). First let's take a point y∈Orb_A (a). Then there is a homeomorphism f → A → A such that f (a) = y. From 1) of Theorem 2.4, it follows that Cl_X (A) = A∪ {c}. Furthermore, by Theorem 2.2, we can extend f to a homeomorphism g, of Cl_X (A) in itself, such that g (c) = c. Now consider the function h: X → X defined, for each x∈X, as

$$h(x) = \begin{cases} g(x), & si\ x \in Cl_X(A); \\ x, & si\ x \in X - A. \end{cases}$$

Since X is locally connected, A is open in X and X-A is closed in X. In addition.

$Cl_X(A) \cap (X - A) = (A \cup \{c\}) \cap (X - A) = \{c\}.$

Since X is locally connected, A Then, h is continuous, $hc = c$ y, since g and $1X\text{-}A$ are homeomorphisms, h is a homeomorphism. As $h \in \mathcal{H}(X)$ and $h (a) = g (a) = f (a) = y$, $y \in Orbx (a) \cap A$. This proves that $Orb_A (a) \subset Orbx (a) \cap A$. Consequently it is open in X and X-A is closed in X. In addition

$Orb_A(a) = Orb_X(a) \cap A,$ \hfill (7.1)

To prove equality in 2), let's take and in ∪ {$Orb_B(b): B \in \mathcal{A}_c$ y $b \in Orb_X(a) \cap B$}. Then there are B∈A_c and b∈Orb_X (a) ∩B such that y∈Orb_B (b). For the equality in the previous clause, Orb_B (b) = Orb_X (b) ∩B, with which y∈Orb_X (b). As also b∈Orb_X (a), we have Orb_X (a) = Orb_X (b). This proves that y ∈Orb_X (a).

Motto 7.2
Let X be a locally connected continuum with a single cut point c. If every two elements of A_c are homeomorphic, for each x∈X- {c} and each B∈A_c, we have to Orb_X (x) ∩B ≠ ∅.

Demonstration
Suppose that elements of A_c are homeomorphic to each other, then they have the same degree of homogeneity. Let A FiA_c and be, B∈A_c and a∈A. As we demonstrate in Theorem 3.4, there is $h_B \in \mathcal{H}(X)$ such that $h_B(c) = c,\ h_B(A) = B$ y $h_B(Orb_A(a)) = Orb_B(h_B(a)).$

If B = A, homeomorphism is identity and, for equality in 1) of Theorem 7.1,

$Orb_X(a) \cap A = Orb_A(a).$ \hfill (7.2)

Suppose then B ≠ A. Let's prove that

$Orb_X(a) \cap B = Orb_B(h_B(a)).$ \hfill (7.3)

Let x∈Orb_X (a) ∩B and g∈H (X) such that g (x) = a. Then h_B∘g:X → X is a homeomorphism such that (h_B "∘" g) (x) = h_B (a). Then, x∈Orb_X (h_B (a)) and, of 1) of Theorem 7.1, we obtain that x∈Orb_B (h_B (a)). This proves that Orb_X (a) ∩B⊂Orb_B (h_B (a)). Now let's take x∈ Orb_B (h_B (a)). Notice that x∈ B y, again by 1) of Theorem 7.1, x∈Orb_X (h_B (a)). Let g∈ H (X) such that g (x) = h_B (a), then h_B-1 ∘ g is a homeomorphism of X in X such that

$(h_B^{-1}\circ g)(x) = h_B^{-1}\left(g(x)\right) = h_B^{-1}\left(h_B(a)\right) = a$

Therefore, x∈Orb_X (a) ∩B. This proves that Orb_B (h_B (a)) ⊂Orb_X (a) ∩B. With what we obtain (7.3). From (7.2) and (7.3) it follows that the orbit of a in A intersects each element of Ac. To finish the test, let's take x∈X- {c} and B∈Ac. Suppose without loss of generality that x∈ A. Applying (7.2) and (7.3) with a = x, we have that Orb_X (x) ∩B = Orb_B (h_B (x)) ≠ ∅.

Motto 7.3
Let X be a 1 / n-homogeneous continuum such that Cut (X) = {c}, A∈A_c and n_A the number of orbits of X that intersect A. Then n_A <n and the degree of homogeneity A is less than or equal to n_A, equality being met when X is locally connected.

Demonstration
Let X_A be the family of the orbits of X that intersect A. Since {c} is an orbit of X that does not intersect A, then n_A <n. For part 1) of Theorem 7.1, each element of X_A is contained in an orbit of A, which implies the degree of homogeneity of A is at most | X_A | = n_A.

Now if X is locally connected, of Theorem 7.1, each element of X_A is an orbit of A, implies that the degree of homogeneity of A is | X_A | = n_A.

Theorem 7.4
Let X, c and $\mathcal{A}c$ as in Lemma 7.2 and $n \geq 1$. Then X is $1n + 1$ -homogeneous if and only if each $B \in \mathcal{A}c$ is $1n$ -homogeneous.

Demonstration

First suppose that each B∈Ac is 1 / n - homogeneous and that its orbits are. $Orb_B(a_{1_B}), Orb_B(a_{2_B}), \ldots, Orb_B(a_{n_B})$. Let's set an element A∈A_c. For each B is h_B a homeomorphism of X in itself such that h_B (c) = c, h_B (A) = B and the image of an Orb_A (a), low h_B, is Orb_B (h_B (a)) (Theorem 3.4). Observe that h_B provides a bijection between the orbits of A and those of B, rearranging the indices 1_B, 2_B, ..., n_B, if necessary, we can assume that for each $i \in \{1, 2, \ldots, n\}$,

$$h_B\left(Orb_A(a_{i_A})\right) = Orb_B(a_{i_B}) \text{ and}$$
$$h_B(a_{i_A}) = a_{i_B}.$$

For all $i \in \{1, 2, \ldots, n\}$ and each $b \in Orb_B(a_{i_B})$, happens that $Orb_B(b) = Orb_B(a_{i_B})$. Since X is locally connected, applying (7.2), (7.3) and equality in part 2) of Theorem 7.1, it is true that:

$$Orb_X(a_{i_A}) =$$
$$\cup \{Orb_B(b) : B \in \mathcal{A}_c \ y \ b \in Orb_X(a_{i_A}) \cap B\}$$
$$= \cup \{Orb_B(b) : B \in \mathcal{A}_c \ y \ b \in Orb_B(a_{i_B})\}$$
$$= \cup_{B \in \mathcal{A}_c} Orb_B(a_{i_B}).$$

It follows that, for i ≠ j, the orbits in X of $a_{(iB)}$ and $a_{(jA)}$ are different and

$$X - \{c\} = \bigcup_{B \in \mathcal{A}_c} \left(\bigcup_{i=1}^{n} Orb_X(a_{i_A}) \right)$$
$$= \bigcup_{i=1}^{n} Orb_X(a_{i_A}).$$

Then X- {c} is the union of exactly n orbits of X. Since c is the only point of intersection of X, we have that {c} is an orbit of X; that is, X is 1 / (n + 1) -homogeneous.

Now suppose that, for some n∈N- {1}, X is 1 / (n + 1) -homogeneous. Be B∈A_c. Since the elements of A_c are homeomorphic two to two, the only orbit of X that does not intersect B is {c}. Applying Lemma 7.3, it is satisfied that the degree of homogeneity of B is n. This concludes the test.

Corollary 7.5

Let X be a continuum with a single cut point c∈X. If X is 1/3-homogeneous, then each A∈Ac is homogeneous or each A∈Ac is 1/2-homogeneous.

Demonstration

Since X is 1/3-homogeneous, by Lemma 7.3, the elements of Ac have at most 2 orbits. Suppose B∈Ac is 1/2-homogeneous. Then, there exist b_1, b_2∈B such that OrbB (b_1) and Orb_B (b_2) are the two orbits of B. For part 1) of Theorem 7.1:

$$Orb_X(b_1) \cap B \subset Orb_B(b_1) \text{ and}$$
$$Orb_X(b_2) \cap B \subset Orb_B(b_2).$$

Since OrbB (b₁) and OrbB (b₂) do not intersect, Orbx (b₁) and Orbx (b₂) do not intersect either. So, Orbx (b₁), Orbx (b₂) and {c} are the three orbits of X. Now let B∈Ac and a∈A. Suppose, without loss of generality, that a∈Orbx (b₁).

Then, there exists h∈H (X) such that h (a) = b. By Theorem 2.1, it is satisfied that h (A) = B. Then A and B are homeomorphic and A is also 1/2 -homogeneous.

Figure 2 shows three examples of 1/3-homogeneous continuous with exactly one cut-off point. The first one is obtained by attaching, by a point, a sphere with a circumference. This continuum is, therefore, the union of two homogeneous, non-homeomorphic continuums, which intersect at a single point. The second continuum is achieved with a succession of disks, so that every two of said disks intersect at the cut point a (and so that the succession of said disks converges to a). Finally, the third continuum can be seen as (C × D) / (C × {1}), where C is the Cantor set and D is the unit disk. Note that the last example is not locally connected, but in each case, the lock of the components of the complement of the cutoff point is a locally connected subcontinuum.
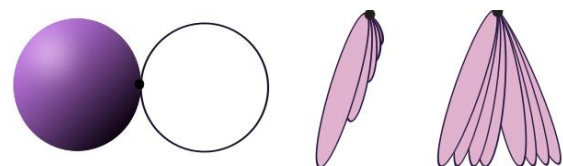

Figure 2 Examples of continuous 1/3-homogeneous. Own elaboration

Next, we will build a continuous M that will be useful for the following results in this section. Consider the cube $I^3 = [0,1]^3$. We divide each face of the cube into 9 equal squares, this generates a subdivision of the cube into 27 equal cubes. Let's make a hole through the inside of each central square, this gives us a continuous M_1 formed by 20 of the 27 small cubes.

Now let's apply this process to each of the twenty remaining cubes; that is, we divide each face of each cube in 9 equal squares and we make a hole through the interior of the central squares, in this way we obtain a continuum $M_2 \subset M_1$. We repeat this process to obtain a nested sequence of continuous $\{M_n\}_n$. Let's do:

$$M = \bigcap_{n \in \mathbb{N}} M_n.$$

M is a continuum called Menger's Universal Curve (Figure 3) and its name is due to the fact that it was first described by K. Menger in 1926 as it is a dimension 1 continuum containing a copy of any dimension separable metric space 1 (Theorem 6.1, Mayer, Oversteegen and Tymchatyn, 1986, p.42). In Theorems II and III (Anderson, 1958, pp. 320-322), it is proved that M is 2-homogeneous in any of its points. From this and from Theorem 4.10, it is satisfied that M is 2-homogeneous, and applying the second part of Theorem 4.3, we also obtain that M is homogeneous.

In the remainder of this section, the letter M will denote the universal Menger curve. The proof of the following result can be found in Corollary 4 of (Kennedy, 1984, p.97]).
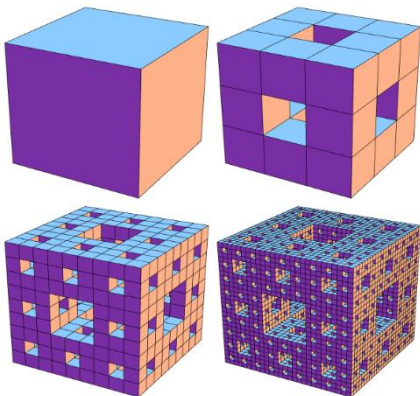
Figure 3 Construction of Menger's Universal Curve
Source:https://matemelga.wordpress.com/2015/01/09/la-esponja-de-menger/.

Theorem 7.6
If X is any continuum, then M × X is not 2-homogeneous

Given two continuous functions $f : X_1 \to Y_1$ and $g: X_2 \to Y_2$, we define the product function $f \times g: X_1 \times X_2 \to Y_1 \times Y_2$, for $(x_1, x_2) \in X_1 \times X_2$, for:

$$(f \times g)((x_1, x_2)) = (f(x_1), g(x_2))$$

Theorem 7.7
Let X be a continuum and c∈M × X, then M × X-{c} is not homogeneous

Demonstration
Suppose that Y = M × X- {c} is homogeneous. Let us take u, v∈Y, then there is a homeomorphism f → Y → Y such that $f(u) = v$.

By Theorem 2.2, there is a homeomorphism g: M × X → M × X that extends to f such that g (c) = c. Thus, g (u) = v and g (c) = c. Then, M × X is 2-homogeneous in c. Now, for part 1) of Theorem 4.4, M × X is homogeneous or M × X is 1/2-homogeneous. If M × X is homogeneous were homogeneous, Theorem 4.9 would tell us that M × X is 2-homogeneous. As this contradicts Theorem 7.6, we conclude that M × X is 1/2-homogeneous. From Theorem 4.4 we know that their orbits are:

$\{c\}$ y (M × X) − $\{c\}$.

Let c = (a, x) and take b ∈ M - {a}. Since (b, x) ≠ c, then (b, x) and c are in dsitintas orbits of M × X. On the other hand, M is homogeneous and thus, there is a homeomorphism k: M → M such that k (a) = b. Then h = k × 1_X: M × X → M × X is such a homeomorphism that:

$$h(c) = h((a,x)) = ((k(a), x)) = (b, x)$$

From this contradiction we conclude that (M × X) - {c} is not homogeneous.

In the following results, for a space Z, we will denote by Z^2 the space Z × Z.

Theorem 7.8
Let m> 1 and X be a m-homogeneous continuum at the point a ∈ X. Then Y = X^2 - {(a, a)} has at most two orbits.

Demonstration
First let's see that (X- {a})^2 is contained in an orbit of Y. For this we take (x, y) and (u, v) in (X - {a})^2. Since X is m-homogeneous in a, by part 2) of Theorem 4.4, X is 2-homogeneous in a. Then, there exist homeomorphisms f, g: X → X such that f (x) = u, g (y) = v and f (a) = a = g (a). Note that f × g: X ^ 2 → X^2 is a homeomorphism such that:

$$(f \times g)((x,y)) = (f(x), g(y)) = (u,v) \text{ y}$$
$$(f \times g)((a,a)) = (a,a)$$

This proves that the elements of (X - {a}) ^ 2 are in the same Y orbit.

Now let's see that [({a} × X) ∪ (X × {a})] - {(a, a)} is contained in an orbit of Y. It suffices to prove that if x, y ∈ X - {a}, then (a, y), (a, x), (y, a) y (x, a) are elements of the same Y orbit. Since X is 2-homogeneous in a, there is a homeomorphism f: X → X such that $f(x) = y$ and $f(a) = a$. Be $h_1 = (1_X \times f)|_Y$, $h_2 = (f \times 1_X)/_Y$ y h_3 the defined function, for each $(u, v) \in Y$, por $h_3(u, v) = (f(v), u)$. Así. $h_1, h_2, h_3: Y \to Y$ they are homeomorphisms such that:

$$h_1(a, x) = (a, y), \ h_2(x, a) = (y, a) \ y$$
$$h_3(a, x) = (y, a)$$

This proves that the four points are elements of the same orbit of Y.

As Y is the union of the sets $(X - \{a\})^2$ y $[(\{a\} \times X) \cup (X \times \{a\})] - \{(a, a)\}$, we have tested the result. □

Corolario 7.9

If $c \in M \times M$, so $(M \times M) - \{c\}$ is $\frac{1}{2}$- homogeneous

Demonstration

Be a∈M. As we mentioned before, Theorems II and III (Anderson, 1958, pp. 320-322), it is proved that M is 2-homogeneous in any of its points. Now, by Theorems 7.7 and 7.8, it is true that (M × M) - {(a, a)} is 1/2-homogeneous. Since M × M is homogeneous, there is a homeomorphism $h: M \times M \to M \times M$ such that $h(c) = (a, a)$. Then, $(M \times M) - \{c\}$ is homeomorphic to (M × M) - {(a, a)} and, therefore, is 1/2-homogeneous. □

From Theorem 7.4 and Corollary 7.9 we obtain the following result.

Corollary 7.10

Let c∈ M × M, and X be the space obtained by pasting two copies of M × M for point c. Then X is 1/3-homogeneous, the elements of Ac are homeomorphic two to two, 1/2-homogeneous and the lock of each of them is homogeneous.

Aknowledgement

References

Anderson, R. D. (1958). A characterization of the universal curve and a proof of its homogeneity. *Ann. of Math.*, (67, 2), 313-324.

Brown, M. (1959). Weak n-homogeneity implies weak $(n - 1)$-homogeneity. *Proc. Amer. Math. Soc.*, (10, 4), 644-647.

Burges, C. E. (1954). Some theorems on n-homogeneous continua. *Proc. Amer. Math. Soc.*, (5,1), 136-143.

Dugundji, J. (1966), *Topology*, Moscow, Idaho: BCS Associates.

Kennedy, J. (1984). A condition under which 2-homogeneity and representability are the same in continua. *Fundamenta Mathematicae*, (121), 89-98.

Kuratowski, K. (1968), *Topology Vol. 2*, NewYork/London/Warsawa: Academic Press/PWN.

Margalef Roig, J., Outerelo Domínguez, E. y Pinilla, F. (1979), *Topología II*, Madrid: Editorial Alhambra.

Mayer, J. C., Oversteegen, L. G. y Tymchatyn, E. D. (1986). The Menger curve. Characterization and extension of homeomorphisms of non-locally separating closed subsets. *Dissertationes Mathematicae*, (252), PWN, Warsawa 1986.

Nadler Jr., S. B. (1992), *Continuum Theory*, Monographs and Textbooks in Pure and Applied Math., Vol. 158, New York: Marcel Dekker.

Nadler Jr., S. B., Pellicer-Covarrubias, P., Puga, I. (2007). $\frac{1}{2}$ –homogeneous continua with cut points. *Topology and its Applications,* (154), 2154-2166.

Pacheco Juárez, Y. (2009). *Propiedades del Producto de Espacios topológicos* (Tesis de Licenciatura). Benemérita Universidad Autónoma de Puebla, Puebla, México.

Patkowska, H. (1989). On $\frac{1}{2}$-homogeneous ANR-spaces. *Fundamenta Mathematicae,* (132), 25-58.

Ungar, G. S. (1975). On all kinds of homogeneous spaces. *Trans. Amer. Math. Soc.*, (212), 393-400.

ISSN-Print: 2007-1582- ISSN-On line: 2007-3682
ECORFAN® All rights reserved.

PACHECO-JUÁREZ, Yaziel. Different types of homogeneity. ECORFAN Journal-Mexico 2018

The competitiveness of the NAFTA countries members in the imports demand of Japanese meat market

La competitividad de los países miembros del TLCAN en la demanda de carne de importación en el mercado japones

PASTOR, Guillermo†[1], GÓMEZ, Alma Alicia*[2] and GARCÍA- FIGUEROA, Francisco

[1]*Instituto Tecnológico Autónomo de México, Río Hondo No. 1, México 01000 DF*
[2]*Universidad Autónoma Chapingo, Km 38.5 Carretera México-Texcoco, Chapingo 56230, Edo. de México*

ID: 1st Author: *Guillermo, Pastor* / **ORC ID**: 0000-0002-1614-811X, **CVU CONACYT ID**: 859

ID: 1st Coauthor: *Alma Alicia, Gómez* / **ORC ID**: 0000-0002-7820-6629, **CVU CONACYT ID**: 15624

ID: 2nd Coauthor: *Francisco, García* / **ORC ID**: 0000-0001-8710-3878

Abstract

Japan is one of the largest importers of meat products. The United States of America has provided a large proportion of these products during the last decade, but Canada and Mexico have steadily increased their share of these imports. NAFTA countries furnished a large proportion of these imports, namely, 60% of the swine meat and 40% of the bovine meat imported by Japan in 2016. In this article we apply a Source Differentiated Almost Ideal Demand System to estimate the pork and beef meat demands of Japan from the NAFTA countries during the 2006-2016 period. Both block separability and aggregation over product sources hypothesis were rejected at the conventional levels of significance. Hence, the data support differentiating by sources both individually and as a whole. Empirical results suggest that in order to increase their exports, all NAFTA countries must produce beef and swine more efficiently and be more competitive with the international market.

Japan, NAFTA, SDAIDS, Swine, Bovine

Resumen

Japón es una de los principales importadores de carne a nivel mundial. Los Estados Unidos de América ha sido tradicionalmente uno de sus principales proveedores, pero recientemente Canadá y México han incrementado constantemente su presencia en este mercado. Los países del TLCAN concentraron el 60% de las importaciones japonesas de carne de cerdo así como el 40% de las de carne de res durante la década 2006-2016. En este trabajo se aplica un Sistema de Demanda Casi Ideal con Orígenes Diferenciados (*Source Differentiated Ideal Demand System*) para estimar las demandas de carne de puerco y de res durante el periodo 2006-2016. Se rechazaron las hipótesis de separabilidad en bloques y de agregación a los niveles de significancia convencionales. Por lo tanto, los datos se ajustan a la distinción de orígenes tanto de manera individual como global. Los resultados sugieren que para incrementar sus exportaciones los países del TLCAN deben producir las carnes de res y puerco de forma más eficiente para ser competitivos con el mercado internacional.

Japón, TLCAN, SDCIOD, Puerco, Res

* Correspondence to Author (email: almaaliciamx@yahoo.com)
† Researcher contributing first author.

Introduction

International meat trade has a long history, but recent decades have seen fast growth of trade volume and value. One of the main reasons for this increase is undoubtedly associated to global reductions on protectionism. Associated with the reduced protectionism, either as casual factors or as consequences of liberalized trade, are important changes in diets, distribution technology, and multinational business structures. (Dyck J. H. and Nelson K. N., 2003: 12).

Meat trade flows among countries and world regions are determined largely by differences among countries in their resource base, preferences for meat types and cuts, the extent and character of barriers to trade, and the industry structure. Poultry meat, beef, and swine are the three most important meats in world trade. (DYCK J. H. AND NELSON K. N., 2003: III).

Back in 1994 Yang and Koo found that USA, Canada, Australia, Taiwan, and a group for European countries were the most important supplier countries of meat to Japan (YANG AND KOO, 1994). However, due to the policies mentioned above, nowadays USA, Canada and Australia continue be important suppliers, but a group of new countries from Europe (Italy, Spain, France, Hungary and Denmark), Asia (Philippines, New Zealand and Taiwan) and from Latin America (Argentina, Brazil, Chile and Mexico) have a significant share of the meat imports to Japan. (See tables 1 and 2).

Year	Total Q	NAFTA	Can	Usa	Mex
2006	460614	3.40%	0.45%	1.59%	1.36%
2007	473651	9.45%	0.71%	7.21%	1.53%
2008	458017	14.88%	1.03%	11.81%	2.04%
2009	481133	18.15%	1.77%	14.38%	2.00%
2010	499529	23.32%	2.59%	18.34%	2.39%
2011	517233	28.71%	1.97%	23.38%	3.37%
2012	514186	31.86%	2.23%	25.66%	3.98%
2013	534256	40.86%	2.38%	34.83%	3.66%
2014	518707	41.09%	2.72%	36.37%	2.00%
2015	493980	37.90%	2.01%	33.49%	2.40%
2016	503232	42.31%	2.67%	38,18%	1.46%

Table 1 Proportional participation of the NAFTA countries in the imports of bovine meat by Japan. Total imports expressed in metric tons
Source: Japan Trade Statistics, Ministry of Finance, www.customs.go.jp/toukei/srch/indexe.htm

It is apparent from Table 1 the dramatic increase in the share of NAFTA countries the imports of bovine meat where the total imports have expanded from 3.4% to 42.3% in just 10 years. This is due to the authorization of imports of bovine meat to Japan from the USA and Canada once the spongiform encephalopathy (mad cows) disease was over. However, Mexico is the only NAFTA country whose share in the market has been steady in this period.

Year	Total Q	NAFTA	Can	Usa	Mex
2006	724797	61.29%	20.92%	34.80%	5.57%
2007	760273	63.73%	21.77%	35.59%	6.36%
2008	817619	69.49%	21.36%	41.21%	6.92%
2009	702887	71.80%	24.52%	41.07%	6.21%
2010	752967	68.77%	23.72%	39.62%	5.43%
2011	793046	67.96%	21.94%	40.82%	5.20%
2012	778762	68.32%	22.16%	40.30%	5.86%
2013	738417	65.37%	19.26%	38.07%	8.04%
2014	829366	58:73%	17.84%	33.28%	7.60%
2015	790622	62.60%	20.97%	32.82%	8.81%
2016	861156	60.13%	20.74%	30.66%	8.73%

Table 2 Proportional participation of NAFTA countries in the imports of swine meat by Japan. Total imports expressed in metric tons Meat of Swine
Source: Japan Trade Statistics, Ministry of Finance, www.customs.go.jp/toukei/srch/indexe.htm

It is interesting to observe that the share of the imports of swine meat from the NAFTA countries have also increased in the past 7 years, even though the imports of swine meat have not been banned recently. East Asian countries (Japan, South Korea and Taiwan) form the world's largest meat-importing region. The region is densely populated, with mountains and forests that limit the land available for agriculture, so that large-scale feed production is relatively expensive. Furthermore, the region has relatively high labor costs. (DYCK J. H. AND NELSON K. N., 2003: 1).

Japan is the third largest economy in the world, with a GDP of US$4383,076 millions, a population size of almost 127 million people, and a per capita income of US$38,840 (WORLD BANK, 2015). Expenditure on food products accounts in average for 20 percent of households budgets. Sea food and meat make up the largest share of the food budget at 21 percent.

This increased disposable household income, over the past half century, has changed dramatically the food consumption patterns of Japanese consumers. Consumption of rice as the staple item has declined while the consumption of livestock products, oils and fats, and beverages has increased.

There is in fact a marked change in dietary habits towards Western style foods, partly due to strong marketing efforts, notably by major exporters as the US and Australia (VEEMAN M. M., VEEMAN T.S., ADILU S., 2002: 4).

Increases in expenditure for food are mainly due to qualitative rather than quantitative changes in the Japanese diet. Food consumption in Japan is mature and saturated for the hotel, restaurant and institution sector, and in the retail sector, for non- grain crops, livestock, meat and dairy products, as well as processed foods (VEEMAN M.M., VEEMAN T. S., ADILU S., 2002: 4).

Agricultural production including cereals, rice, beef, swine, fruits and vegetables has been steadily contracting in Japan, though Japan still maintains price and income supports and some protective measures on imported commodities in favor of its agriculture producers. These measures include tariffs, quotas and non-tariff barriers such as sanitary and phytosanitary requirements and administered prices on various commodities and products. Most domestically produced commodities, including rice, beef, swine, and dairy products, are affected by one or more of these measures (VEEMAN M.M., VEEMAN T.S., ADILU S., 2002: 4 AND 5).

Japan's domestic beef production is predominantly a byproduct of diary production with nearly 60 percent of total cattle slaughter coming from dairy breeds. Though beef production has increased in Japan, its self-sufficiency in beef has dropped over the years. (VEEMAN M.M., VEEMAN T.S., ADILU S., 2002: 5 AND 6).

Major reasons for increased Japanese beef consumption have been the rise in disposable household income, population growth and changes in relative prices. The rise in beef imports in the first half of the 1990's is also attributable to tariff reductions and appreciation of the yen (VEEMAN M.M., VEEMAN T.S., ADILU S., 2002: 6).

Domestic pig meat production, accounting for 8 percent of total agricultural output, is the second most important agricultural output (after rice) in Japan. Domestically produced swine is mainly sold fresh and chilled for table use. Hence, the decline in local production has resulted in a significant increase in fresh and chilled imports (VEEMAN M.M., VEEMAN T.S., ADILU S., 2002: 7).

Japan is one of the largest net importers of agriculture products of the world; it meets 50 percent of domestic food requirements through imports. The gain from Japanese food imports have been mainly captured by the United States, which accounts for about 37 per cent of this food import market. In fact, Japan is the largest importer of US beef (FIELDS, K.H., *ET.AL.*, 2018:18). Canada, the fifth largest supplier, possesses about 5 per cent of the Japanese agri-food market. For Canada, Japan is the second largest agri-food export market. Financial crises in 1997-98 affected Japan's economy but the effects in agricultural trade were very small (VEEMAN M.M., VEEMAN T.S., ADILU S., 2002: 5).

Japan's largest meat firms produce meat both in Japan and in exporting countries (such as the United States, China and Australia) for shipment to Japan as well as to other markets. Importing lower cost meat produced in foreign markets allows the Japanese firms to offer competitive prices in Japan while controlling cutting specifications to use those best suited for Japanese consumers. (DYCK J. H. AND NELSON K. N., 2003: 18).

There are thus good reasons to analyze Japan's import meat market. The primary objective of this study is to estimate a meat demand system for Japan, differentiating meats by type and by source of origin from the North America Free Trade Agreement (NAFTA) countries.

We present first a review of the meat trade policies in the last thirty years of countries of the North America Free Trade Agreement (NAFTA). In the next section the Source Differentiated Almost Demand System (SDAIDS) model for imports is introduced. Data and estimation procedures are explained in the fourth section, followed by a presentation and analysis of empirical results. Conclusions are presented in the final section.

International meat trade policy

Most international trade models are based on the classical theory of comparative advantage developed by David Ricardo at the beginning of the nineteenth century. He showed that, in a free market, if two countries capable of producing two commodities exchange products, then both countries will increase its overall consumption by exporting the good for which it has a comparative advantage while importing the other good (BAUMOL AND BINDER, 2009:50).

Canada and USA had been open economies for a long period and both signed the original GATT (General Agreement on Tariffs and Trade) agreement back in 1947. Hence, both countries acquired experience in import and export goods and the internal prices of their production were the same as the international prices. On the other hand, the case of Mexico was totally different until 1986 when signed the agreement. As a result, Mexico reduced considerably trade barriers among GATT members. Japan assigned to Mexico the same tariffs as to any developing country. Later in 1994, Mexico opened more dramatically its economy by signing NAFTA agreement (North America Free Trade Agreement) with Canada and the USA As a consequence, all the tariffs and barriers for meat between these countries were eliminated.

After the discovery of the first cases of Bovine Spongiform Encephalopathy (BSE) in the USA and Canada in 2003, Japan interrupted the imports of beef from Canada was in May, and later on from USA in December. Two years later Japan once again allowed imports of USA beef provided the animals were under 20 months and without brain and spine (WTO, bulletin 21620063). It should be also pointed out that when President Obama was running for his first presidency term, he said that he would demand to Japan an increase of the beef meat quota. (The Japan Times On Line. may 18 2008). Just a few months later after Japan opened its beef meat imports to USA and Canada, Mexico signed a trade agreement with Japan increasing the quotas for the Mexican meat. Table 3 shows the special quotas of beef and swine allowed in the agreement.

Meat	Free quotas (Tons)	2016 Mexican imports
Swine	80,000	75,143
Beef	6,000	7,352

Table 3 Free quotas of Mexican Meat to Japan
Source: Secretaria de Economia. www.secretariadeeconomia.gob.mx, (Accessed March 2017), and Japan Trade Statistics, Ministry of Finance, www.customs.go.jp/toukei/srch/indexe.htm,

Mexican livestock producers face considerable problems to export their product. Amongst these difficulties one should point out:

1. There are only 113 abattoirs in the whole country certified to handle the meat with international standards (Sagarpa, 20013).

2. Mexico imports a great proportion of the feed grain needed for the production of meat. As a result, the meat production in Mexico is expensive. In fact, retail prices tend to be higher than the prices of imported meat from the USA. Moreover, this difference in price increases due to the existence of a substantial illegal importation of meat (Mutondo, 2007: 72).

3. The lack of the design of adequate policies to mitigate these problems.

For these reasons, Mexico needs to find alternative markets for its high quality meat production.

Related studies

In 1994 Yang and Koo introduced the *Source Differentiated Almost Ideal Demand System* (SDAIDS) model to estimate the demands of similar goods produced in different countries. In fact, they analyzed the Japanese meat import demands from the European Community and as well as some countries from Asia and America during the 1973-1990 period. For this study they selected the countries that were Japan's most important meat suppliers.

After Yang and Koo seminal work, the SDAIDS model has been used extensively to study the demands of import markets. In the case of meat markets related either to Japan or the NAFTA countries we should mention (Veeman et.al., 2002) where the prospects for Canadian meat exports to Asian countries is analyzed as well as the two works of Henneberry and Mutondo from 2007 and 2009 where both imports and exports of the U.S. meat market is taken into a careful consideration.

The Source Differentiated AIDS Model

As previously mentioned, the *Source Differentiated AIDS* model (SDAIDS) was first introduced by Yang and Koo (Yang and Koo, 1994). It is an ingenious generalization of the original AIDS model of Deaton and Muellbauer (Deaton and Muellbauer, 1980). In the SDAIDS model imports from different sources are treated as if they were totally different goods. In this section we will recall some of its main properties.

In what follows, we shall denote the imported goods (beef or swine meats) by the subindices i and j, while the origins (countries or regions) will be denoted by the subindices h and k. In this manner, the subindex ih is associated to the good i imported from k. If E represents the total expenditure of the imported goods, u denotes an utility level and p a system of prices, then the SDAIDS model assumes that

$$\ln(E(u,p)) = (1-u)\ln(a(p)) + u\ln(b(p)) \qquad (1)$$

where:

$$\ln(a(p)) = \alpha_0 + \sum_{ih} \alpha_{ih} \ln(p_{ih}) + \frac{1}{2}\sum_{ih,jk} \gamma^*_{ihjk} \ln(p_{ih}) \ln(p_{jk}) \ (2)$$

and

$$\ln(b(p)) = \ln(a(p)) + \beta_0 \prod_{ih} p_{ih}^{\beta_{ih}} \qquad (3)$$

In this expression the α's, β's and $\gamma^{*'}$s are parameters, while $a(p)$ and $b(p)$ can be regarded as the costs of subsistence and bliss. Thus,

$$\ln(E(p,u)) = \alpha_0 + \sum_j \alpha_{ih} \ln(p_{ih}) + \frac{1}{2}\sum_{j,k} \gamma^*_{ihjk} \ln(p_{ih}) \ln(p_{jk}) + u\beta_0 \prod_{ih} p_{ih}^{\beta_{ih}}. \qquad (4)$$

The budget share of the good ih can be obtained by differentiating the above expression with respect to $\ln(p_{ih})$ and applying the Shephard's lemma, since

$$\frac{\partial \ln(E)}{\partial \ln(p_{ih})} = \frac{\frac{\partial \ln(E)}{\partial p_{ih}}}{\frac{\partial \ln(p_{ih})}{\partial p_{ih}}} \qquad (5)$$

$$= \frac{\frac{\partial E/\partial p_{ih}}{E}}{\frac{1}{p_{ih}}} \qquad (6)$$

$$= \frac{p_{ih} x_{ih}}{E} \qquad (7)$$

$$= w_{ih}, \qquad (8)$$

where x_{ih} represents the imports of ih and w_{ih} the proportion of the budget associated to ih. Thus,

$$w_{ih} = \alpha_{ih} + \sum_{jk} \frac{1}{2}\gamma^*_{ihjk} \ln(p_{jk}) + \sum_j \frac{1}{2}\gamma^*_{jk\,ih} \ln(p_{jk}) + \beta_0 \beta_{ih} u \prod_{jk} p_{jk}^{\beta_{jk}}. \qquad (9)$$

If we define $\gamma_{kj} = \frac{1}{2}(\gamma^*_{kj} + \gamma^*_{jk})$, the expression reduces to

$$w_{ih} = \alpha_{ih} + \sum_{jk} \frac{1}{2}\gamma_{ihjk} \ln(p_{jk}) + \beta_0 \beta_{ih} u \prod_{jk} p_{jk}^{\beta_{jk}} \qquad (10)$$

Solving the equation (*) for u and substituting in the previous equation produces

$$w_{ih} = \alpha_{ih} + \sum_{jk} \gamma_{ihjk} \ln(p_{jk}) + \beta_{ih} \ln(E/P^*) \qquad (11)$$

where
$$\ln(P^*) = \alpha_0 + \sum_{jk} \alpha_{jk} \ln(p_{jk}) + \frac{1}{2}\sum_{jk,ih} \gamma^*_{jk\,ih} \ln(p_{jk}) \ln(p_{ih}). \qquad (12)$$

In order to simplify the estimation of the parameters of the model, the Price index P^* is replaced by the Stone price index P given by

$$\ln(P) = \sum_{jk} w_{jk} \ln(p_{jk}), \qquad (13)$$

so that

$$w_{ih} = \alpha_{ih} + \sum_{jk} \gamma_{ihjk} \ln(p_{jk}) + \beta_{ih} \ln(E/P). \qquad (14)$$

Properties of the compensated demands

$$x_{ih} = \frac{w_{ih}}{p_{ih}} E \qquad (15)$$

impose some algebraic conditions. Namely,

Additivity: $\sum_{ih} \alpha_{ih} = 1$, $\sum_{ih} \gamma_{ihjk} = 0$, $\sum_{ih} \beta_{ih} = 0$. $\qquad (16)$

Homogeneity: $\sum_{jk} \gamma_{ihjk} = 0$. $\qquad (17)$

Symmetry: $\gamma_{ihjk} = \gamma_{jkih}$. $\qquad (18)$

Marshallian elasticities can be derived in the following manner.

$$\varepsilon_{ihjk} = \frac{\partial \ln(x_{ih})}{\partial \ln(p_{jk})} \qquad (19)$$

$$= \frac{\partial \ln(w_{ih}E/p_{ih})}{\partial \ln(p_{jk})} \qquad (20)$$

$$= \frac{\partial \ln(w_{ih})}{\partial \ln(p_{jk})} - \frac{\partial \ln(p_{ih})}{\partial \ln(p_{jk})} + \frac{\partial \ln(E)}{\partial \ln(p_{jk})} \qquad (21)$$

$$= \frac{\frac{\partial w_{ih}}{\partial \ln(p_{jh})}}{w_{ih}} - \delta_{ihjk} + 0, \qquad (22)$$

where the last term is zero since the expenditure remains constant for Marshallian demands. From (**) we see that

$$\frac{\partial w_{ih}}{\partial \ln(p_{jk})} = \gamma_{ihjk} - \beta_i \frac{\partial \ln(P)}{\partial \ln(p_{jk})} \qquad (22)$$

$$= \gamma_{ihjk} - \beta_{ih} w_{jk}, \tag{23}$$

producing finally

$$\varepsilon_{ihjk} = -\delta_{ihjk} + \frac{\gamma_{ihjk}}{w_{ih}} - \frac{\beta_{ih} w_{jk}}{w_{ih}}. \tag{24}$$

The expenditure elasticities can be obtained in an analogous manner. The formula reduces to

$$\varepsilon_{ihE} = \frac{\beta_{ih}}{w_{ih}} + 1. \tag{25}$$

The restricted SDAIDS Model

In the source-differentiated model it is assumed that buyers discriminate every good by the origin. This means in our study that Japanese buyers discriminate say between swine meat from Canada or from the USA, and so on. This assumption has the inconvenience of a degrees of freedom problem. To reduce the number of parameters it is assumed that the cross price effects of different goods are independent of the countries of origin. Following Yang and Koo (Yang and Koo, 1994), we will refer to this assumption as *block substitutability* and has to be tested. For example, this assumption says that Japanese demand for USA beef exhibits the same cross-price response to swine from either Mexico, Canada, or from the Rest of the World. The corresponding model under block substitutability is known as *restricted source differentiated AIDS model (RSDAIDS)*.

In the SDAIDS model cross price effects are parametrized by the coefficients γ_{ihjk}, with $i \neq j$. The block substitutability imposes some conditions on these γ_{ihjk}. Clearly the effect on changes in p_{jk} and p_{jm} on the demand of say x_{ih} depend on the sizes of the corresponding markets, i.e., the sizes of w_{jk} and w_{jm}. It is assumed then that the parameter γ_{ihjk} is proportional to w_{jk}. More precisely, we define first weights u_{jk} by first setting

$$w_j = \sum_k w_{jk}, \tag{26}$$

and then,

$$u_{jk} = w_{jk}/w_j. \tag{27}$$

So, for the RSDAIDS model there is a common value $\gamma_{ih\,j}$ such that for all origins k

$$\gamma_{ihjk} = u_{jk} \gamma_{ih\,j}. \tag{28}$$

It is convenient also to replace prices by the corresponding weighted mean, that is, to replace $\ln(p_{jk})$ by $\ln(p_j)$ for all origins k, where

$$\ln(p_j) = \sum_k u_{jk} \ln(p_{jk}). \tag{29}$$

Moreover, in order to simplify the notation the parameters $\gamma_{ih\,ik}$ will be simply denoted by $\gamma_{i\,hk}$. Expenditure proportions are now given by

$$w_{ih} = \alpha_{ih} + \sum_k \gamma_{i\,hk} \ln(p_{ik}) + \sum_{\substack{jk \\ (j \neq i)}} u_{jk} \gamma_{ih\,j} \ln(p_{jk}) + \beta_{ih} \ln\left(\frac{E}{P}\right) \tag{30}$$

$$= \alpha_{ih} + \sum_k \gamma_{i\,hk} \ln(p_{ik}) + \sum_{\substack{j \\ (j \neq i)}} \gamma_{ih\,j} \ln(p_j) + \beta_{ih} \ln\left(\frac{E}{P}\right) \tag{31}$$

Block substitutability conditions are very restrictive and some of the conditions on the parameters for the SDAIDS model are no longer applicable. For the RSDAIDS model the following conditions are imposed:

Additivity: $\sum_{ih} \alpha_{ih} = 1, \quad \sum_{ih} \beta_{ih} = 0 \tag{32}$

Homogeneity: $\sum_h \gamma_{i\,hk} + \sum_{\substack{jk \\ (j \neq i)}} \gamma_{ih\,j} = 0 \tag{33}$

Symmetry: $\gamma_{ih\,k} = \gamma_{ik\,h}$

The expressions for the Marshallian elasticities are now

$$\varepsilon_{ih\,j} = \frac{\gamma_{ih\,j}}{w_{ih}} - \frac{\beta_{ih} w_j}{w_{ih}} \tag{34}$$

for $i \neq j$, and

$$\varepsilon_{i\,hk} = \frac{\gamma_{i\,hk}}{w_{ih}} - \delta_{hk} - \frac{\beta_{ih} w_{ik}}{w_{ih}} \tag{35}$$

The formulas for the expenditure elasticities do not change in the restricted case.

The block separable SDAIDS Model

A further reduction on the number of parameters to be considered comes from assuming that if $i \neq j$, then

$$\gamma_{ih\,j} = u_{ih} \gamma_{ij}, \tag{36}$$

Where

$$u_{ih} = w_{ih}/w_i \qquad (37)$$

As above, and γ_{ij} is the cross-price parameter between groups i and j. Thus, sources are not differentiated when $i \neq j$. If we set

$$\beta_i = \sum_h \beta_{ih,} \qquad (38)$$

It is not difficult to establish the following formula for the Marshallian elasticities for $i \neq j$ under the block separability assumption:

$$\varepsilon_{ij} = \sum_h u_{ih}\, \varepsilon_{ih\,j} \qquad (39)$$

$$= \frac{1}{w_i}(\gamma_{ij} - \beta_i w_j) \qquad (40)$$

Data and estimation procedures

Monthly data from August 2006 through September 2016 were used for the analysis. We considered two goods, beef and swine, being imported from four different origins, USA, Canada and Mexico (the members of NAFTA) as well as the imports coming from elsewhere. All data come from the Japan Trade Statistics, Ministry of Finance of Japan, and can be obtained from the website www.customs.go.jp/toukei/srch/indexe.htm

Due to the large number of observations, 122 in total for the above mentioned period, we were able to estimate the linear SDAIDS model under three different assumptions, namely, a complete SDAIDS model, a restricted RSDAIS model, and finally a RSDAIDS model assuming further block separability. In order to estimate all the parameters we used the SAS Syslin Iterated seemingly unrelated regression procedure with homogeneity and symmetry conditions imposed.

Estimated results

Hypothesis of product aggregation and block separability are both tested with the Wald F-test with the necessary parameters obtained by means of the Ordinary least squares estimation procedure. The corresponding results are presented in Table 4. Both product aggregation and block separability hypothesis are rejected at the significance level of 1%. Thus, the data support differentiating by sources both individually and as a whole.

The estimated Marshallian elasticities based on AIDS models with three different assumptions (block separability, block substitutability or RSDAIDS, complete SDAIDS) are presented in tables 5, 6 and 7, respectively.

Expenditure elasticities are all positive as theory asserts. However, they are not significant except for the case of the Mexican swine (0.667) in the restricted SDAIDS model. As expenditures on both beef and swine imports increase, most Japanese imports from NAFTA countries increase proportionally to their market sizes, as all expenditure elasticities are relatively close to 1.

Block Separability	Ho: Beef is separable from all other meats. F = 44.26** df: 1 for numerator and 115 for denominator Ho: Swine is separable from all other meats. F = 960.25** df: 1 for numerator and 115 for denominator Ho: All of the above. F = 968.2** df: 2 for numerator and 117 for denominator
Product Aggregation	Ho: Beef can be aggregated. F = 33.8** df: 4 for numerator and 116 for denominator Ho: Swine can be aggregated. F = 26.48** df: 4 for numerator and 116 for denominator Ho: All of the above F = 7.42** df: 8 for numerator and 107 for denominator

Note: Single and double asterisks (*) denote significance at the 5% and 1% levels, respectively.

All own-price significant elasticities for individual meats from different origins are negative, as it should be expected, except for the Mexican swine (3.806) in the separable case. The only elastic significant market corresponds to the Mexican beef in the three models: -2.351, -2.246 and -2.059, for the complete, restricted and separable SDAIDS models, respectively.

Cross price elasticities reflect competitiveness among certain products. Particularly, between the US and Mexican beef with 1.684 and 1.482 in the block separable model, 0.129, 1.462 in the restricted SDAIDS model and, 0.141, 1.600 in the complete SDAIDS model.

Competition between Canadian and Mexican beef is also strong, where all elasticities are positive and significant in the three models: 0.707, 0.538 in the separable case, 0.980, 0.743 in the restricted case, and 0.812, 0.616 in the complete case.

It is interesting to observe that cross price elasticities between the US and Canadian beef are significantly negative in the restricted (-0.108 and -1.608) and in the complete (-0.139 and -0.617). Even in the separable case the elasticities remain negative (-0.039 and -0.617), even though these are not significant. This numbers reflect some complementary relationship contrary to what theory predicts. This may be related to the fact that both US and Canada suffered from the Bovine Spongiform Encephalopathy (BSE) between 2003 and 2005, and somehow Japanese consumers identify the two products as a single one.

	ub	cb	mb	rb	us	cs	ms	rs
pub	-1.339	-2.083**	1.600**	0.126	0.121	-0.281	0.127	0.020
pcb	-0.139**	-1.672	0.616**	0.005	0.031	0.331**	-0.157	-0.159*
pmb	0.141**	0.812**	-2.351**	-0.019	-0.125*	0.152	0.486	-0.068
prb	0.353	0.192	-0.494	-0.579**	-0.464**	-0.623**	-0.058*	0.268*
pus	0.258	1.064	-3.414*	-0.484**	-0.783	0.189	-1.046	0.421
pcs	-0.408	6.789**	2.372	-0.358**	0.109	-1.337	-2.306	0.871*
pms	0.041	-1.056	2.418**	-0.028	-0.199	-0.746	0.709	0.296
prs	0.072	-5.182**	-1.625	0.233*	0.439	1.436*	1.565*	-2.799
Y	1.022	1.135	0.879	1.102	0.871	0.881	0.681	1.150
$R^2 = 0.675$								
1% = ** 5%=*								

Table 5 Marshallian Elasticities of Japanese Meat Import Demand Using the SDAIDS Model

	ub	cb	mb	rb	us	cs	ms	rs
pub	-1.358	-1.608**	1.462**	0.135*				
pcb	-0.108**	-1.705*	0.743**	-0.005				
pmb	0.129**	0.980**	-2.246**	-0.021				
prb	0.372*	-0.213	-0.591	-0.604**				
pus					-0.898	0.185	-0.684	0.548
pcs					0.103	-0.934	-2.252	0.592
pms					-0.133	-0.729	1.499*	0.044
prs					0.559	113.000	0.324	-2.076
$\varepsilon_{ih\,j}$	-0.067	1.453**	-0.324	-0.602**	-0.500**	-0.382**	0.444**	-0.281
Y	1.031	1.093	0.957	1.098	0.869	0.854	0.670*	1.172
$R^2 = 0.656$								
1% = ** 5%=*								

Table 6 Marshallian Elasticities of Japanese Meat Import Demand Using the Restricted SDAIDS Model

The SDAIDS models allow us to analyze the relationship between the different beef and swine products. In the complete case the strongest substitute relationship is given between Canadian beef and Canadian swine whose elasticities are 6.789 and 0.331. The Mexican beef and Mexican swine also show a substitute behavior as the elasticities are now 2.418 and 0.486 in the complete case, and 1.4531 and 0.444, in the restricted case.

	ub	cb	mb	rb	us	cs	ms	rs
pub	-1.131	-0.617	1.684**	0.172**				
pcb	-0.039	-1.529	0.538**	0.022				
pmb	0.148**	0.707**	-2.059**	-0.022				
prb	0.449**	0.789	-0.622	-0.677**				
pus					-2.096	0.564	1.647	1.549**
pcs					0.321	-0.837	-4.432**	1.008**
pms					0.281	-1.437**	3.806**	-0.203
prs					1.456	1.655	-0.851	-2.592
$\varepsilon_{i\,j}$	-0.581				-0.835			
Y	1.110	1.448	0.969	1.099	0.875	0.870	0.433	1.154
$R^2 = 0.657$								
1% = ** 5%=*								

Table 7 Marshallian Elasticities of Japanese Meat Import Demand Using the Block Separable Restricted SDAIDS Model

Summary and Conclusions

The Source Differentiated AIDS model was applied to analyze the Japanese imports of beef and swine from the NAFTA countries. Both block separability and aggregation over product sources hypothesis were rejected at the conventional levels of significance (See Table IV). Hence, the data support differentiating by sources both individually and as a whole. The complete and the restricted SDAIDS models provide a more accurate description about the beef and swine Japanese imports from NAFTA.

As Yang and Koo (Yang and Koo, 1994: 407) point out, a country is regarded as having strong export potential in an import market if demands are for the product is insensitive to price change, but increases with import expenditure. The three NAFTA countries satisfy the second condition (large positive Y expenditure elasticities), but none satisfy the first one (due to large own price elasticities). Thus, in order to increase their exports all NAFTA countries must produce beef and swine more efficiently and be more competitive with the international market.

In the case of Mexico it is imperative to encourage the production of feed grain in order to make the production of Mexican meat more competitive in prices. This market is too important to be left aside. Mexican government should design policies to encourage the meat production and should provide the basic structure for the preservation and transportation of the meat exports in airports and ports of the country.

References

Baumol, W J. and Binder, A.S., 'Economics: Principles and Policy', South-Western Cengage Learning, 11rd edition (2009), Marson, OH, USA, p. 50.

Cadena Carnica Bovina. Internet site: www.cadenacarnicabovina.org (Accessed September 2009).

Deaton, A., and Muellbauer, J. An Almost Ideal Demand System. Amer. Econ. Rev. 70(1980):312-326.

Dyck J.H. and Nelson K.E. Structure of the Global Markets for Meat. Agriculture Information Bulletin. Number 785. USA 2007.

Fields, K.H., Therrien, D.A., Halstrom, D., Haggard, J. and Clayton, P., International beef trade: a value proposition, Animal Frontiers, 8(3)(2018), 16-22.

Henneberry S. R. and Hwang S. H. Meat Demand in South Korea: An Application of the Restricted Source-Differentiated Almost Ideal Demand System Model. Journal of Agricultural and Applied Economics. 39, 1(April 2007):47-60. 2007 Southern Agricultural Economics Association

Henneberry S. R, and Mutondo J. E., Agricultural Trade Among NAFTA Countries: A Case Study of U.S. Meat Exports, Review of Agricultural Economics 31 (2009), 424-445.

Instituto Nacional de Estadística y Geografia (INEGI).

Internet site: http://www.inegi.gob.mx (Accessed in April 2009).

International Monetary Found. Financial Statistics Year Book

Internet site: www.imf.org/external/index.htm (Accessed August 2009).

Japan Animal Quarantine Service. Internet site : www.maff.go.ja/aqs/english/product/import.html (Accessed October 2009).

Jetro.Internet site: http://www.jetro.org.jp (Accessed April 2009).

Mutondo, J. E. Global demand for United States meats. Pro Quest Dissertations and Theses 2007. Vol. 0503, Iss.0664; p. n/a

OECD Statistics: Economic Outlook No. 85: Annual and quarterly data. Internet site: http://oecdstats.ingenta.com/OECD/TableViewer/tableView.aspx (Accessed in August 2009).

The Japan Times on Line. Obama calls for Japan to drop limits on beef. (05-18-2008).

Trades statistics of Japan, Ministry of Finance, www.customs.go.jp/toukei/srch/indexe.htm.

Veeman M. M., Veeman T. S., Adilu S. Analysis of East Asian Meat Import Demand: Market Prospects for Alberta and Canada. Project Report 02-04, AARI Project#990030. RURAL ECONOMY. Project Report. Department of Rural Economy. Faculty of Agriculture & Forestry and Home Economics. University of Alberta. Edmonton, Canada. 2002

WTO Bulletin Internet site: www.mre.gov.py/paginas/..../boletin 21620063.asp (Accessed in September 2009).

Yang S. R. and Koo W. W. Japanese Meat Import Demand Estimation with the Source AIDS Model. Journal of agricultural and Resource Economics, 19(2): 396-408 Copyright 1994 Western Agricultural Economics Association.

ECORFAN-Mexico Journal

Investigation of the effect of cognitive dissonance and customer brand engagement an customer's Luxury brand aspiration

Investigación del efecto de la disonancia cognitiva y el compromiso de la marca del cliente con la aspiración de la marca de lujo del cliente

AHMADVAND, Shiva[1]† & SHIRAZIAN, Zahra[1]*

[1]*Department of Management, Malayer Branch, Islamic Azad University, Malayer, Iran*

ID 1st Author: *Shiva, Ahmadvand* / **ORC ID**: 0000-0003-2824-1204, **Researcher ID Thomson**: Q-6779-2118

ID 1st Coauthor: *Zahra, Shirazian* / **ORC ID**: 0000-0003-2457-9216, **Researcher ID Thomson**: I-1315-2018

Abstract

The objective of the present study is investigation of the effect of cognitive dissonance and customer brand engagement on customer's Luxury brand aspiration this study is a quantitative survey and applied and spatial research. The population of this study include kia brand customers in automobile manufacturing industry in the city of Tehran that members were selected by simple random method and without sample placement the tool for data collecting was questionnaire method. The structural partial modeling based on partial least square modeling was used for data analysis. The obtained results indicate that the cognitive dissonance has a significant effect on customer brand engagement and customers luxury brand aspiration. Also there are some evidences that indicate customer brand engagement has a positive and direct effect on the customers Luxury brand aspiration.

Cognitive dissonance, Customer brand engagement, Customers luxury brand aspiration

Resumen

El objetivo de este estudio es investigar el efecto de la disonancia cognitiva y la participación de la marca del cliente en la aspiración de marca de lujo del cliente. Este estudio es una encuesta cuantitativa e investigación espacial y aplicada. La población de este estudio incluye clientes de la marca kia en la industria de fabricación de automóviles en la ciudad de Teherán, en la que los miembros fueron seleccionados mediante un método aleatorio simple y sin una herramienta de colocación de muestras para la recolección de datos fue el método de cuestionario. El modelo estructural parcial basado en el modelo de mínimos cuadrados parciales se utilizó para el análisis de datos. Los resultados obtenidos indican que la disonancia cognitiva tiene un impacto significativo en el compromiso con la marca del cliente y en la aspiración de la marca de lujo de los clientes. También hay algunos indicios de que el compromiso con la marca del cliente tiene un efecto positivo y directo en la aspiración de los clientes de la marca Luxury.

Disonancia cognitiva, Compromiso con la marca del cliente, Clientes, Aspiración de la marca de lujo

* Correspondence to Author (email: zahra.shirazian@gmail.com)
† Researcher contributing first author.

Introduction

Nowadays, there are many variables in the field of business and customer behavior If the customer be dissatisfied with the quality of a product and feels that there is a lot of differences between the actual performance and his expectance he will experience a cognitive dissonance that will result in his dissatisfaction. According to Festinge's (1957) theory, the cognitive dissonance is a kind of feeling of anxiety and discomfort in La person that is a result of the conflict between cognitive elements in a person between the cognitive elements is the basis of the changing attitudes.

This state occurs when a person has conflicting beliefs or even attitudes and behaviors .Bedar, Desil and Lamarsh 2002,109) The field of purchasing behavior also is made when there is a significant difference between the expected performance and the actual performance of the product that causes a person adjust his future behavior in a manner that less cognitive dissonance arises f Harmon Jones and Milles, 2009). As a result if a consumer observes some dissonance in his attitudes he will go to other product so that avoid this dissonance. on the other hands when buying products the customers will make many decision about the product and its purchasing and using.

The researchers of consumer's behavior do many efforts for better understanding of such a decision making. There are many effective parameters in purchasing and consuming a product some of them are as follows: value of perceived brand the origin country and luxury products the fancy consumption is considered as display of wealth in order acquirer maintain a position or prestige and social credence tails (Heidar Zadeh and I Raies Rohani 2014). The fancy consumption is a relatively global phenomenon that has an increasing popularity in the developed countries. This subject is observed in the growing middle class in the developing countries.

It can be said that fancy consumption is more common in the cultures that tend to be materialistic The Luxury products that are purchased on a daily basis are different because they satisfy the individuals need for social prestige and individuals show their personality through the purchases of this kind of products (Heidar Zadeh and Rais Rohani 2014)Also the cognitive elements can effect on the customer brand engagement.

Accordingly the intensity of the cognitive dissonance is depended on the unique characteristics of the customer and the variables that Leads to a cognitive conflict in the consumer (Harmon jones and Milles 2009). In the previous studies the consumers purchase behavior such as the fear of product in accuracy, the level of a structuralism of the individual life, pessimism and optimism of the consumer are some of the factors that influence on the cognitive dissonance (Pins, Amons Larsen and Griffin 1985 , Riff and kais, 1995) and Beck Rush Shaw and Amar 1979) one on the other effective factors on the cognitive dissonance is customer's mental involvements. The customers mental involvement is defined as the quantity product importance or the individual's interest for selection, consumption and avoiding of the products or services.

The rate of consumed energy, money and time for doing a purchasing may be the results of the consumer's mental engagement (Bity and Cale 1988 one of the important aspects of the consumers mental involvement is the formulation of the purchasing decision which is a cognitive response to the control of uncertainty or duplicity as a result of purchasing (Mittal, 1989)).

In other words purchases will less mental involvement in comparison to high mental involvement result in more cognitive dissonance(Badamsi,2009). Considering the symbolic performance of the brands in consumer identity creation, the present study was conducted to investigate the effect of the cognitive dissonance and custom brand engagement on customer's luxury brand aspiration.

Literature review

Cognitive dissonance

The cognitive dissonance theory states that a person has different cognitive elements such as cognition of himself, environments, attitudes ,beliefs and behaviors. In the literature of consumer's behavior, the dissonance accrue when, after on important purchasing the individual obtains new information that is in conflict with his previous experiences and information (kan ,Buck & Lee 2007 kaser Jane and kahen 1965) also describe the process of creating dissonance in the consumer's mind as follows: when a purchase is made the buyer's mind analysis it's positive and negative aspects that this reaction result in creating conflict thoughts in the purchaser mind.

The positive aspects of purchase are forgotten and the negative aspect create an increasing stress in the buyer's mind that result in the changing of buyer's decision about purchasing and creating dissonance(Ozma and Rashma 2012, Sountar & Sweeney (2003) categorized the dissonance in to three levels of emotional, wisdom of purchase and concern over deal. This model is showed in the following figure :
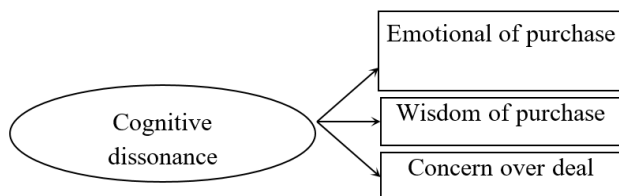

Figure 1 The cognitive dissonance model
Santar & Sweeney, 2003

Customer brand engagement

consumer's mental involvement is a psychological social concept and generally is a basis for mental involvement recognition in the consumer's behavior (Michaildo and Dib, 2006) The consumer's mental involvement is defined as the perceived personal importance of the interest associated with the acquisition , consumption and avoiding of products, services and ideas (Moone and Minor, 2001). Moone and Minor believe that the level of consumer's mental involvement after perception is the second most important factor that influence on the information process.

Indeed when the consumer's mental involvement increases the motivation of consumer will increase considering the understanding and analysis of information that is important in purchasing a product, Generally, the consumer's mental involvement describe this subject that why the consumers are interested in purchasing more than other activities and how they receive different messages from commercial advertising and during purchasing communications. In many of studies, mental involvement is considered as an internal situation of motivation that has three attributes as follows:

1. Intensity.
2. Direction.
3. Stability and durability (Broderick, 2007).

Among these three attributes the " intensity" refers to the rate of mental involvement and arousal which encompasses a spectrum of maximal and minimal consumer's mental involvement. The "direction" is defined as a purpose that results in arousal of consumer (i.e., advertisements and finally the" stability and durability" refers to the time of consumer's mental involvement time of consumers mental involvement (Broderick, 2007).
 The researchers identified two different Kinds of mental involvement (Moone and Minor 2007):

A.   Situational involvement.
B.   Enduring involvement.

The situational involvement occurs in a short term and is associated with individual situation such as need to replacing a damaged commodity(i.e., a car) .On the other hand the enduring involvement State a longer commitment, associated with the product class (Moone and Miner, 2007). The enduring involvement occurs when a consumer spend his time on thinking about a commodity.

The combination of situational involvement leads to mental involvement responses. The involvement responses depend on the complexity of information processing and decision making of consumer, the main feature of the enduring involvement is having desire for product or brand which is always along with enjoyment and special interest (kapferer & lauvents, 1993). On the other hand the situational involvement (in contrast to the enduring involvement that shows an stable interest) indicates a short term desire that is aroused by a special cause such as the perceived risk (Michaildo & Dib 2006) what happens when a person who has enduring involvement toward a commodity and suddenly needs to buy that product? The research show that in such a situation the effects of situational and enduring involvement come together. As a result many of involvement responses will occur.

Because a total amount of mental involvement is equal to the sum of the rate of situational involvement and enduring involvement (Moone and Minor 2001). In addition, the levels of mental involvement leads the consumers toward a wider decision making process and in passing of each of decision making process stages they proceed with a more complete method. he difference in the type of decision making process in the context of the high and low mental involvement is an important discussion of two groups of decision making.In other words the limited decision making occurs in low mental involvement.

Moon and minor (2001), Apnes Solm (2016) presents a theoretical model of the concept of customer brand engagement that includes conceptions of the emotional engagement, the cognitive engagement and self-engagement. The following figure show his theoretical models:
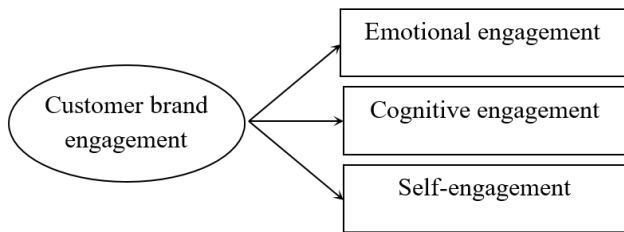

Figure 2 Customer brand engagement
Apnes Solm, 2016

Customer's Luxury brand aspiration model (CLBA)

Sreejesh et al. (2016) developed a measuring device with four components of identity signaling Social recognition, self-esteem and achievement signaling for measuring the customer's Luxury brand aspiration (CLBA). This model has been shown in the following figure:
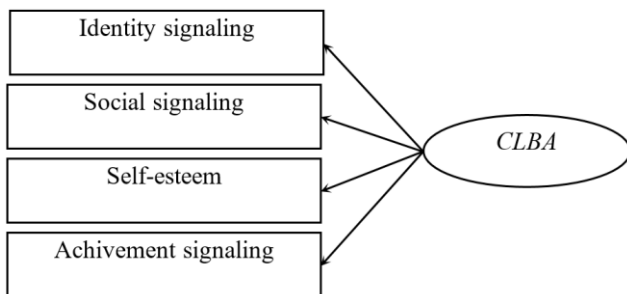
Figure 3 Customer's luxury brand aspiration (CLBA)
Sreejesh .et al 2016

Customer's Luxury brand aspiration (CLBA): Refers to aspiration to luxury brand consumption that show some characters for showing the purposes and special desires, personal identity, achievement and self-esteem of customer and creates the social recognition of customer in other person's mind (Sreejesh et al 2016). Identity signaling: Refers to this concept that how much using a luxury brand cause his distinction and credibility in the community (Sreejesh et al, 2016).

Social recognition: Means being recognized and respected by community due to using a luxury brand.

Self-esteem: Refers to this concept that by using a luxury brand how much a person achieve a sense of respect, pride and achievement of goals.

Achievement signaling: This variable shows this concept that how much using a luxury brand shows it's consumer achievement of goals.

Conceptual model on research:
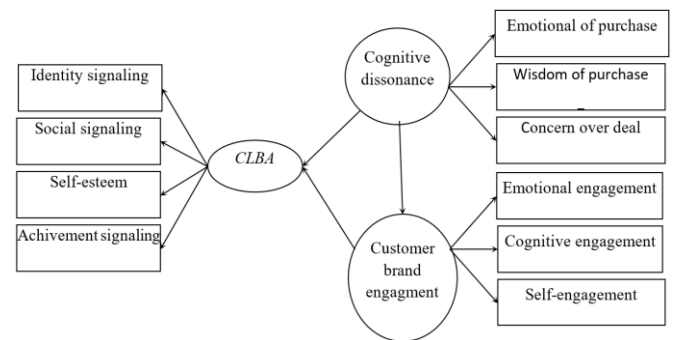
Figure 4 Conceptual model

Research assumptions:

1. The cognitive dissonance has a significant effect on the customers luxury brand aspiration.

First sub- hypothesis:

1.1. The emotional dimension of purchasing has a significant effect on customer's Luxury brand aspiration.
1.2. Wisdom of purchase has a significant effect on the customer's Luxury brand aspiration .
1.3. Concern over deal has a significant effect on the customer's Luxury brand aspiration.
2. Customers brand engagement has a significant effect on the customers luxury brand aspiration.
2.1. Emotional engagement has a significant effect on the customer's luxury brand aspiration.
2.2. Cognitive engagement has a significant effect on the customers Luxury brand aspiration.
2.3. Self-engagement has a significant effect on the customers luxury brand aspiration.
3. The cognitive dissonance has a significant effect on the customer brand engagement.
3.1. The emotional dimension of purchase has a significant effect on the customer brand engagement.
3.2. The cognitive engagement has a significant effect on the customer brand engagement.
3.3. Concern over deal has significant effect on the customer brand engagement.

Literature Reviews

Heydarzadeh ,et al. (2014) in an exploratory study under the title of the investigation of the effect of demographic factors and brand perception on the desire to buy luxury cars among the consumers tried to explain why the consumers have more desire to by luxury car.

The obtained results indicate that the variables of the value of enjoyment, the value of uniqueness and the quality of value play a more important poet than two variable of luxury value and Social value in the formation of perception of luxury brand from Iranian consumers point of view. Molla Hoseini and Tajedini (2015) in a Similar study under the title of the investigation of the effect of distribution canal variability of foreign luxury brands on brand value and consumer loyalty in Kerman garment market have tried to study the value of brand and consumers loyalty the existing luxury brands and distribution canals for luxury brands. The obtained results indicate that the participants examine the brand value in a different way the depends on distribution canal.

Alhoseini Almedaresi and Abravi (2017) in a descriptive survey under the title of the effect of psychological characteristics on the attitude and purchase intention toward luxury brand, investigated the effect of psychologic characteristics on the attitude and purchase intention of the consumers of luxury cars. The present research that its population includes 150 members of the owners of luxury cars in Isfahan city was done in a simple random method and the needed data was gathered using questionnaire.

The obtained results indicate that brand equity and brand leadership have a positive and significant effect on the attitude and purchase intention of the luxury brand consumers Salim and Ali (2012) studied the effect of consumer's mental engagement about the product and suddenly purchases (without planning) on the cognitive dissonance in this study , data analysis about 422 student was performed. The obtained results indicate that consumers mental engagement about the product and unplanned purchased has important role in the cognitive dissonance that the first one has a invers and the second one has a direct relationship with the cognitive dissonance.

Bus and Sarker (2012) investigated the effect of the cognitive dissonance on the purchase intention among the buyers of the consuming goods in the kholena metropolitan of Bangeladesh .The data gathering tool in this study was a 10 items questionnaire that measured the effective factors on creating dissonance in purchase decision. The studied factors were beliefs, norms, traditions, family status, political thinking emotional response, personal performance, culture, spiritual value and the influence of peer group. The obtained results showed that there are several effective factors on the cognitive dissonance such as norms spiritual values, culture and traditions.

Research Methodology

The present study is a descriptive -applied and quantitative and sectional study from purpose point of view. The population of this research includes all of the customers of kia brand in automotive industry in Tehran. It should be mentioned that the total number of the studied population is not certain and actually is regarded as an unlimited population. Using Morgan table, 384 people were selected by means of a simple random method as sample.

The research data were gathered by means of library method and questionnaire. In the present research the standard questionnaire of Cognitive dissonance of Satter and Svoni (2003),customer brand engagement of Apnes Solm (2016) and customer's luxury brand aspiration (CLBA) of Sreegish ,et al (2016) were used in order to validity examination of the questionnaire after questionnaire distribution the factor validity by means of factor analysis was used. In the first step the rate of KMO index and Bartlett index significance should be considered.

Statistics KMO	0/773
Chi-squar rate	1923/604
Degree of freedom	36
Sig level	0/000

Table 1 Estimation of KMO index and Bartlett statistics for the cognitive dissonance questionnaire

statistics KMO	0/642
Chi-squar rate	434/393
Degree of freedom	36
Sig level	0/000

Table 2 Estimation of the KMO index and Bartlett Statistics for customer brand engagement questionnaire

statistics KMO	0/810
Chi-squar rate	2354/138
Degree of freedom	66
Sig level	0/000

Table 3 Estimation of the KMO index and Bartlett statistics for customer's Luxury brand aspiration questionnaire

As the obtained results indicate the KMO statistics rate is near one and significance level of Bartlett statistics is less than 0/05. These rates show that the rate of the obtained sample is sufficient for factor analysis performing. The researcher select the Cronbach's alpha method among the methods of determining the variability since the alpha coefficient for all of the three questionnaire is more than 0/7 ,it has an acceptable reliability (Momeni and Faal Byoomi 2010, 212).

Results Analysis

The descriptive and inferential statistics were used by means of the SPSS and smart PLS statistics software in order to data analysis. The obtained results indicate that the age mean of the participants in the present study is 35/37 that55,5% of them were male. 69,3% of the studied Sample members were married and 114 people of them. i.e. 29/05%were single. The chi-square test was used in order to examining the normality of the used sample data distributions since the significance level of the research variables is less than the assumed rate of 0/05, the normality of their Sample is not accepted. Accordingly the structural route modeling with minor least squares that is not sensitive to normality of the variables distribution is used. This method is performable by means of the Smart PLS software.

The research main hypothesis test:

In the following graphs the main hypotheses of the research in two states of path Coefficient and significance coefficients are presented.
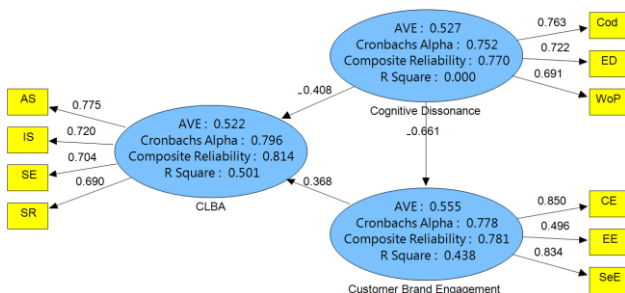
Graph 5 The rate of the path coefficient of the main hypotheses
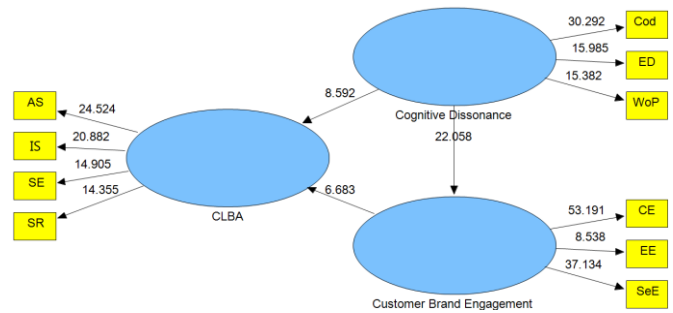
Graph 6 The significance coefficient (T values) of the main hypotheses

As you can see in the obtained graphs, the cognitive dissonance has an effect of -0/408 on the customers Luxury brand aspiration. Also the customer brand engagement has an effective effect of 0/368 on the customer's luxury brand aspiration.The cognitive dissonance has a significant effect of - 0/661 on the customer brand engagement The Tvalue Statistics rates Confirm its significance since this model in reliability level of 0/95 and the error rate of 0/05 is performed and tested and it's rate should be more than 1/96. According to these findings it can be said that the evidences based on the rejection of the research main hypothesis have not been observed and can be accepted.

| result	t-value	Total effect	Indirect effect	Direct effect	main hypothesis
confirmed	592/8	651/0-	243/0	408/0-	Cognitive dissonance← CLBA
confirmed	683/6	368/0	000/0	368/0	Customer brand engagment← CLBA
Confirmed	058/22	661/0-	000/0	661/0-	Cognitive dissonance← Customer brand engagment

Table 4 Tvalue rate and the coeffnients of the research. Structural path model for the main hypothesis

After interpreting the research hypothesis test the adequacy of the estimated model should be examined. In the method based on the minor Least squares the indices for external model evaluation (measurement model), internal model (structural models) and total model (external and internal) were introduced the have been examined as follows:

AHMADVAND, Shiva & SHIRAZIAN, Zahra. Investigation of the effect of cognitive dissonance and customer brand engagement an customer's Luxury brand aspiration. ECORFAN Journal-Mexico. 2018.

Model quality indices			Internal model indices		External model indices			متغيرها
GOF	Red	Com	^2Q	r^2	AVE	ρ	α	
	/189 0	/522 0	/257 0	/501 0	/522 0	/813 0	/795 0	CLBA
/50 0	---	/527 0	/527 0	---	/527 0	/769 0	/752 0	Cognitive dissonance
	/243 0	/554 0	/243 0	/438 0	/554 0	/780 0	/578 0	Customer brand engagment

Table 5 Investigation of the indices of the internal and external model and all of the main

As you can see the rates of the Cronbach's alpha and the composite reliability more than the recommended rates of 0/7 and AVE index are higher than the expected rate of 0/ 5. Therefor the external models have a good fit. Also r2 index show that the predictor variables have been able to predict the dependent variable to a high limit. Since the Q2 index is higher than zero it can be said that there is predictor relationship. Also the subscription index is higher than the expected rate of 0/5 and the redundancy index is not Zero. This indicates the goodness of fit of the research model for the first Sub-hypothesis. Gof index show that this model has 50% predictability.
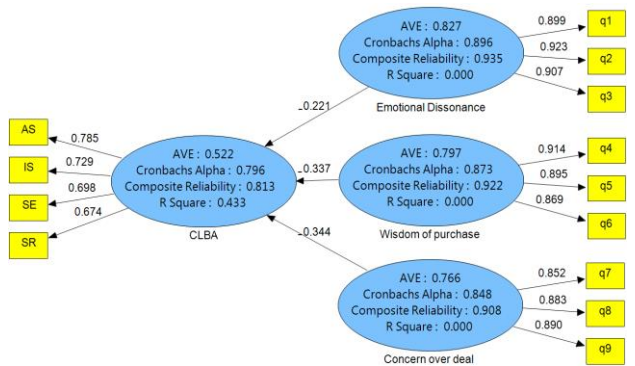
Graph 7 The path coefficient's on the first sub_hypotheses of the research
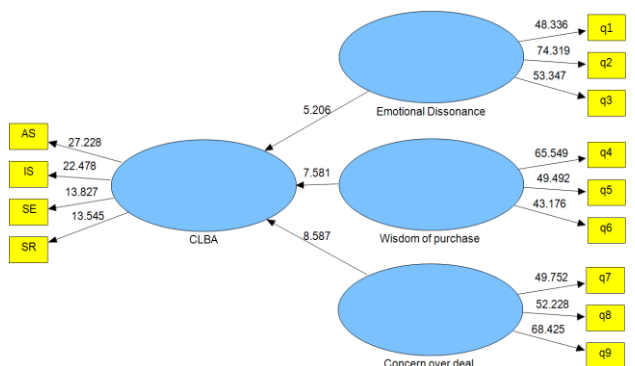
Graph 8 Significance efficients (T-value) of the first sub-hypotheses of the research
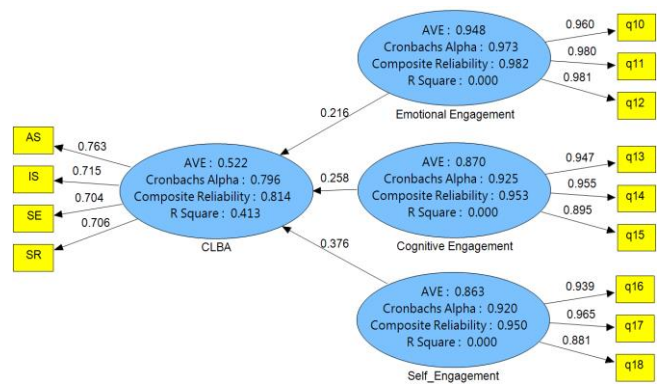
Graph 9 Estimation of the path coefficients for the second sub-hypotheses
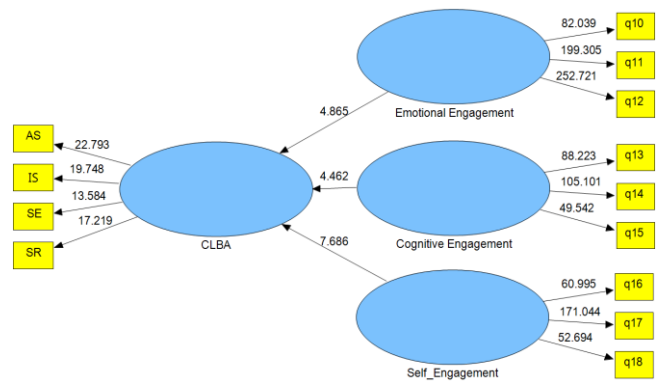
Graph 10 Estimation of Tvalues rates of the second sub-hypotheses
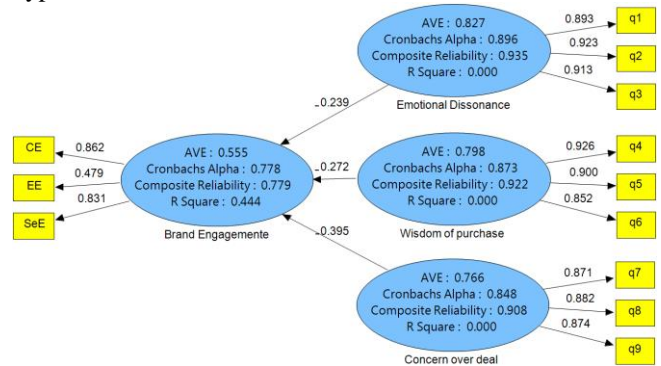
Graph 11 Estimation of the path coefficient o for the third sub-hypotheses
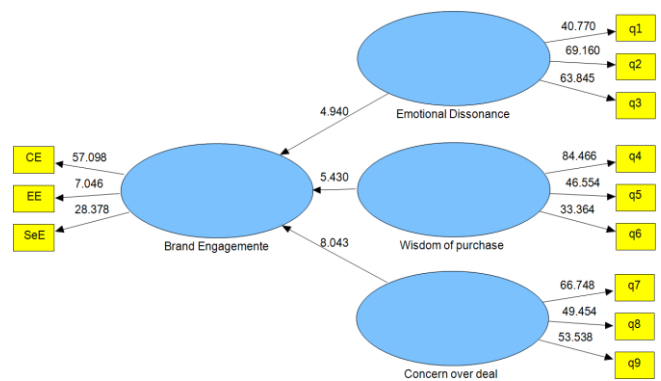
Graph 12 Estimation of Tvalues rates of the third sub-hypothesis of the research

AHMADVAND, Shiva & SHIRAZIAN, Zahra. Investigation of the effect of cognitive dissonance and customer brand engagement an customer's Luxury brand aspiration. ECORFAN Journal-Mexico. 2018.

Conclusion

The obtained results of the examination of the main hypothesis by means of the PLS method show that the cognitive dissonance has a significant effect of the rate of (n=384 ,Tvalues> 1/96,0/ 5% p=95%)-0/408 an luxury brand aspiration. According to the path coefficient rate the explained variance can be calculated. In such a way that if the path coefficient be squared we will obtain the explained variance or r2 (determination coefficient Accordingly we have r2 =0/77. In other words 17% of changes in variable of luxury brand aspiration is explained by cognitive dissonance.

This rate of the determination coefficient is small and is the most important and the most significant result of this study. The rates of the determination coefficient are equal to 0/67,0/33 and 0/19 that are high, average and low respectively. Accordingly the determination coefficient for the main hypothesis of the present research is considered in high level. In the interpretation it can be said that the obtained results indicate that this level of relationship is in higher level of 1% and is significant that indicate a high relationship between two variables. It can be expected that by increasing one unit in the cognitive dissonance variable a decrease of 11% be occurred in the customer's Luxury brand aspiration.

Thus, it can be said that any evidence for rejection of this hypothesis was not observed. According to the obtained results of the structural path model method, the cognitive dissonance separately has an inverse and significant effect on the customer's luxury brand aspiration. The emotional dimension of purchasing has an effect of T-value=5/206 and-0/ 221the wisdom of purchase has an effect of T-values=7/581, -0/337 and concern over deal has an effect of TValue = 8/587 on the customer's Luxury brand aspiration. The examination of the obtained results of the second main hypothesis indicate that the customer brand engagement has an effect of (n=384, T-value)1/96, 0/5%, p=95%)0/368 on the customer's Luxury brand aspiration.

The calculation of the determination coefficient indicates that 14% of the changing the variable of customer's luxury brand aspiration explain the customer brand engagement. This is a very small rates but because of its significance is very important.

This subject shows that with improving the customer brand engagement to one unit, a 0/14 improvement will occurs in the customer's luxury brand aspiration. By considering the results of the structural path model estimation of the paths of emotional engagement, cognitive engagement and self-engagement on the customer's luxury brand aspiration it can be said that the emotional engagement (B=0/276 , n=384 d-value> 1/96)cognitive engagement (B=0/258, n=384 t-values 1/96) and self-engagement (B=0/376,n=384, t=value >1/96) are estimated.

According to the obtained results of testing these hypotheses it is recommended to the marketing managers that evaluate the consumer's mental engagement profile that help them to can focused on the more important dimensions and achieve to attractive clues for creating difference and company advertisement strategies planning. The customer brand engagement is the customer brand engagement is used for partitioning of the used company because this variable has the ability of description and prediction of the consumer's behavior The estimation of the structural path model indicate that the cognitive dissonance effect on the customer brand engagement is equal to (n=384, Tvalue> 1/96,0/5 % ,p=95%)- 0/667.

Determination coefficient show that the cognitive dissonance can explain 44% of the changing in the customers brand engagement. This rate of the determination coefficient is large and significant and has an important role in communities and because of its significance it is important. this subject predicts that with an one unit increasing in the cognitive dissonance a 44% decrease can be observed in the customer brand engagement. considering the obtained results of the structural path model of the effect paths of the emotional dimension of purchasing the wisdom of purchasing and the concern over deal on the customer brand engagement it can be said that the emotional dimension of purchasing (B=0/239, n=384 t-value> 1/96) the wisdom of purchase (B=0/272 ,n=384, t-value> 1/96) and concern over deal (B=-0/395 n=384, t-value> 1/96) have a significant and inverse effect on the customer brand engagement These rates of the effect are high and significant, the obtained evidences of the examination of this hypothesis indicate that the cognitive disharmony has an inverse and significant effect on the customer brand engagement.

Thus it is recommended that the marketing managers try to decrease the customers cognitive dissonance. At this regard the fallowing measures are recommended.

1. Decrease the number or importance of the disparate elements
2. Increase the number or the importance of the harmonious cognitions.
3. Decrease dis orientation: In other words one of the disparate elements should be changed so that the be consistent with other cognitions.
4. Challenge the validity of the incompatible information source.
5. Make doubts about the validity of information.

References

Aaker, J. (1997), " Dimensions of brand personality". Journal of Marketing Research, Vol 34, pp347-356.

Aaker,J .Fournier,S.Brasel,SA.(2004), " When good brands do bad". J Consumer Res, Vol31, No1, pp1–16.

Alhosseini Almedavesi, seyed mehdi & Abravi,neda (2016), The effect of the brand properties on the attitude and purchasing intention of the luxury brand, the third international conference of economies, management and accounting with value creation approach.

Apenes Solem, B.A. (2016),"Influences of customer participation and customer brand engagement on brand loyalty", Journal of Consumer Marketing, Vol. 33 Iss 5 pp. 332 – 342.

Auer, M., & Griffiths, M. D. (2018). Cognitive dissonance, personalized feedback, and online gambling behavior: an exploratory study using objective tracking data and subjective self-report. International journal of mental health and addiction, 16(3), 631-641.

Azar, Adel, Momani, Mansour (2006),The statistics and its applications in the management vol 2. Tehran, Samt.

Beatty, S. & Kahle, R. (1988). Alternative hierarchies of the attitude- behavior relationship: The impact of brand commitment and habit, Journal of the Academy of Marketing Science, 16(2): 1- 10.

Beck, A., Rush, A., Shaw, B. & Emery, G. (1979). Cognitive therapy of depression, Guilford Press, New York.

Bedar, L., Deziel, J. & Lamarche, L. (2002). Social psychology, Translated by Ganji H., Savalan, Tehran. (in Persian)

Berry, Leonard L. (2000), " Cultivating service brand equity". *Journal of Academy of Marketing Science*,Vol 28, pp 126-135.

Biel, A.L. (1993)," Converting image into equity". j Brand Equity and Advertising. Lawrence Erlbaum Associates, *Hillsdale*, pp. 67–82.

Blech, George & Blech, Michael A. (**2001**) «*Advertising and Promotion*», Pub.Mc Graw-Hill, New York, ED.

Bose, T. K. & Sarker, S. (2012). cognitive dissonance affecting consumer buying decision making: A study based on khulna metropolitan area, Journal of Management Research. 4(3): 191-220.

Brodrick, Amanda J. (**2007**) A Cross national Study of the Individual and Naitional-culture Nomological Network of & Consumer Involvement, *Psychology Marketing*, Vol.24, No.4, pp.343-374.

Celsi ,Richard L. & Olson, Jerry C. (**1988**) The Role of Involvement in Attention and Comprehension Processes, *Journal of Consumer Research*, Vol.15, No.2, pp.210-224.

Cummings, W. & Venkatesan, M. (1976). Cognitive dissonance and consumer behaviour: A review of the evidence, Journal of Marketing Research, 13(3): 303– 308.

Diener, E., Emmons, R., Larsen, R. J. R. & Griffin, S. (1985). The Satisfaction With Life Scale, Journal of Personality Assessment, 49(1): 71– 75.

Erdem, T. Swait, J. Valenzuela, A. (2006). "Brands as signals: Acrosscountry validation Study". *Journal of Marketing*, Vol 70, pp34–49.

Fennis BM, Pruyn AThH, Maasland M.(2007). " brand effects on consumer self-perceptions of personality traits". In: Menon G, Rao A, editors. Advances in Consumer Research, Provo, UT: *Association for Consumer Research*, Vol 32, pp 635-649.

Fred, D. (2006), "User acceptance of information technology system & behavioral impacts", John Wiley. PP 90-100.

Gbadamosi, A. (2009). Cognitive dissonance The implicit explication in low-income consumer′s shopping behaviour for low-involvement grocery products, International Journal of Retail & Distribution Management, 37(12): 1077-1095.

Geuens, M. and Weijters,B. and De Wulf ,K.(2009), "A new measure of brand personality"*Journal of Research in Marketing*, Vol 26, pp97–107.

Graham, R. (2007). Theory of cognitive dissonance as it pertains to morality, Journal of Scientific Psychology, 1(1): 20- 24.

Hamza, V. & Zakkariya, K. (2012). Determinants of cognitive dissonance and its relative importance to consumer product purchase, Excel International Journal of Multidisciplinary Management Studies, 2(1): 157- 169.

Harmon-Jones, E. & Mills, J. (2009). Cognitive Dissonance: Progress on a pivotal theory in social psychology, American Psychological Association, Washington, DC.

Heidarzadeh kambiz , Rais Rouhani fereshteh(2014), Investigation of the demographic factors and brand perception on tendency to purchasing.

Hollebeek, L.D. (2011), Demystifying customer brand engagement: Exploring the loyalty nexus, Journal of Marketing Management, 27:7-8, 785-807.

Hollebeek, L.D. (2011), Demystifying customer brand engagement: Exploring the loyalty nexus, Journal of Marketing Management, Vol. 27, Nos. 7–8, 785–807.

Hsiao Ming- Hsiung. (2009), "Shopping mode choice: Physical store shopping versus e-shopping". Transportation Research, Part E 45, pp. 86-95.

Huang , Ming-Hui (**2006**) Flow, Enduring and Situational Involvement in the Web Environment: Atripartite Second-order Examination, *Psychology & Marketing*, Vol.23, No.5, pp.384-411.

Internet World Stats. (2010), "Internet usage statistics: World internet users and population stats". Available at: http://www.internetworldstats.com/stats.htm.Accessed15.05.10

Jiang, Z. and Benbasat, I. (2004), "Virtual Product Experience: Effects of Visual & Functional Control of Products on Perceived Diagnosticity and Flow in Electronic Shopping", Journal of Management Information Systems, vol. 21, No. 3, pp. 111-147

Jin, S.S.A. (2012), The potential of social media for luxury brand management, Marketing Inteligence & Planning, Vol.30 Iss: 7, pp.687 – 699.

Kapferer, Jean-Noel & Laurent, Gilles (1993) Further Evidence on the Consumer Involvement Profile: Five Antecendent of Involvement, *Psychology & Marketing*, Vol.10, No.4, pp.347-355.

Kapferer, Jean-Noel & Laurent, Gilles (1993) Further Evidence on the Consumer Involvement Profile: Five Antecendent of Involvement, *Psychology & Marketing*, Vol.10, No.4, pp.347-355.

Keller, K. L and Hoeffler, S. (2002)," Building Brand Equity Through Corporate Societal Marketing", *Journal of Public Policy & Marketing*, Vol.21 (1), pp 78–89.

Keller, K.L. (2003), " Strategic Brand Management: Building, Measuring and Managing Brand Equity" , 2nd ed., Prentice-Hall,Englewood Cliffs, NJ.

Kuan, H. H., Bock, G. W. & Lee, J. (2007). A cognitive dissonance perspective of customer′s Online trust in multi-channel retailers, In Proceedings of ECIS, 1(1): 13- 23.

Lee K. C, Chung N. (2008), "Empirical analysis of consumer reaction to the virtual reality shopping mall", Computers in Human Behavior, 24, pp. 88-104

Liu, Y. 2006. Word of Mouth for Movies: Its Dynamics and Impact on Box Office Revenue. Journal of Marketing, 70(3), 74-89.

lohse & spiller, (1999) Internet Retail Store Design _ Availible at www.ascusc.org/jcmc

Maehle,N. Shneor,R. (2010) "On congruence between brand and human personalities" *Journal of Product & Brand Management*, Vol19, No1, pp44–53.

Menasco, M. & Hawkins, D. (1978). A field test of the relationship between cognitive dissonance and state anxiety, Journal of Marketing Research,15(4): 650– 655.

Michaelidou, Nina & Dibb, Sally (**2006**), Product Involvement: An Application in Clothing, *Journal of Consumer Behavior*,Vol.5, No.5, pp.442-453

Mittal, B. (1989). A theoretical analysis of two recent measures of involvement, Advances in Consumer Research, 16(1): 697- 702.

Mohammadian , Mahmud, Farahmand, Sina, and Yousefi dastgerdi mohammad Hassan(1388) Investigation of the Toshiba reputation in comparison to four other worldwide competitors in the market of Iran , commercial management magazines,VOL.2, period 2, NO.4. pp 129-144.

Molla Hosseini, Ali Tajeddini farideh (2015) Investigation of the effect of the foreign luxury distribution channels variety on the brand value and consumer's Loyalty in the garment market of kerman Business management period7, No.l- p-p 187-208.

Moven, John C. & Minor, Michaels S. (2001) «Consumer Behavior: A Framework», Prentice Hall, New Jersey.

Panda, Tapan K. (2004) "Consumer Response to Brand Placements in Films Role of Brand Congruity and Modality of Presentation in Bringing Attitudinal Change Among Consumers with Special Reference to Brand Placements in Hindi Films" *South Asian Journal of Management*, Vol 11, pp 7-19.

Papavassiliou Nikolas.K ; (1989) ; "The involvement model in advertising consumer product abroad"; *European journal of marketing*, Vol.23, No.1 , pp.17-31

Paul peer, Jerry olson, Klans grunert, (1999) "Consumer Behavior and marketing strategy", Macgraw-hill, p: 110.

Pennesi, J. L., & Wade, T. D. (2018). Imagery rescripting and cognitive dissonance: A randomized controlled trial of two brief online interventions for women at risk of developing an eating disorder. International Journal of Eating Disorders, 51(5), 439-448.

Ramadan, Z., Farah, M. F., & Dukenjian, A. (2018). Typology of social media followers: the case of luxury brands. Marketing Intelligence & Planning.

Ross,J.Harradine,R.(2010) " Fashion Value brands:the relationship between identity and image". *Journal of Fashion Marketing and Management*, Vol. 15 No. 3, pp. 306-325.

Roy, R. Chau, R,(2011),"Consumer-based brand equity and status-seeking motivation for a global versus local brand". *Asia Pacific Journal of Marketing and Logistics*, Vol 23, No 3, pp 270-284.

Ryff, C. & Keyes, L. (1995). The structure of psychological well-being revisited, Journal of Personality and Social Psychology, 69(4): 719–727.

Schnebelen, S., & Bruhn, M. (2018). An appraisal framework of the determinants and consequences of brand happiness. Psychology & Marketing, 35(2), 101-119.

Seggie SH, Cavusgil E, Phelan SE. (2007), "Measurement of return on marketing investment: a conceptual framework and the future of marketing metrics", Ind Marketing Management, Vol 36, No 6, pp 835-841.

Shin kim, H. (2000), " Examination of brand personality and brand attitude within the apparel product category " , *Journal of Fashion Marketing and Management*, Vol 4, pp 243-252.

Shukla, P., (2008), Conspicuous Consumption Among Middle Age Consumers: psychological and Brand Antecedents, Journal of Product & Brand Management, Vol. 17, No. 1, pp. 25-36.

Shwu-Ing Wu,;(**1997**) ; " Relationship between Consumer Involvementand Advertising Effectiveness" ; *Asia Pacific Journal of Marketing and Logistics* ; 1997, pp.43-57

Silveira,C. Lages,,C. Simoes,C.(2011), " Reconceptualizing brand identity in a dynamic environment", *Journal of Business Research*, pp 1-9.

Soutar, G. & Sweeney, J. (2003). Are There Cognitive Dissonance Segments, Australian Journal of Management, 28(3): 227- 249.

Sreejesh S. Sarkar, A. Roy, S. (2016), "Validating a scale to measure consumer's luxury brand aspiration", Journal of Product & Brand Management, Vol. 25 Iss: 5, pp.465 – 478.

Srinivasan S, Pauwels K, Hanssens D, Dekimpe M. (2004), "Do promotions benefit manufacturers, retailers, or both?" *Management Science*, Vol 50, No5, pp 618-629.

Sunmee Baeck, J.O.J. (2016),"What drives consumer's responses to brand crisis?: the moderating roles of brand associations and brand-customer relationship strength", Journal of Product & Brand Management, Vol. 25 Iss 6 pp. (In Press)

Svantesson D., Clarke R. (2010), "A best practice model for e-consumer protection", computer law & security review, 26, pp. 31-37.

Sweeney, J and Swait, j (2008) " The effect of brand credibility on customer loyalty" *Journal of Retailing and Consumer Services*,Vol 15, pp180-200.

Sweeney, J., Hausknecht, D, & Soutar, G. (2000). Measuring cognitive dissonance:A multidimensional scale, Psychology and Marketing, 17(5): 369– 386.

Telci, E.E.; Maden, C. & Kantur, D. (2011). (The theory of cognitive dissonance: A marketing and management perspective). Procedia - Social and Behavioral Sciences, 24: pp. 378-386.

Turban E, King D, Viehland D, Lee J. (2006), "Electronic Commerce: A Managerial Perspective". Prentice Hall, New Jersey

Uzma, H. & Reshma, N. (2012). Cognitive dissonance and its impact on consumer buying behaviour, IOSR Journal of Business and Management (IOSRJBM), 1(4): 7- 12.

Uzma, H. & Reshma, N. (2012). Cognitive dissonance and its impact on consumer buying behaviour, IOSR Journal of Business and Management (IOSRJBM), 1(4): 7- 12.

Valette-Florence, p. Guizani, H. Merunka. (2011). "The impact of brand personality and sales promotions on brand equity". *Journal of Business Research*, Vol 64, pp 24-28.

Wang, S. W., Pelton, L. E., & Hsu, M. K. (2018). Analysis of consumers' attitudinal and emotional factors on luxury apparel brand purchase intentions. The Service Industries Journal, 1-19.

Wood, L.M. and Pierson, B.J. (2006), "The brand description of Sainsbury's and Aldi: price and quality positioning", Int*ernational Journal of Retail & Distribution Management*, Vol.34, No. 12, pp. 904-917.

Yee Chan. F.F. Lowe, B. Petrovici, D. (2016),"Processing of product placements and brand persuasiveness", Marketing Intelligence & Planning, Vol. 34 Iss 3 pp. 355 – 375.

Yi Lin, L.(2010), "The relationship of consumer personality trait, brand personality and brand loyalty: an empirical study of toys and video games buyers". *Journal of Product & Brand Management*, pp 4-17.

Zehir.C. Sahin,A. Kitapci,H.Ozsahin.A.(2011) "The Effects of Brand Communication and Service Quality In Building Brand Loyalty Through Brand Trust; The Empirical Research On Global Brands". *Procedia Social and Behavioral Sciences*, Vol 24, pp 1218–1231.

Zentes, J., Morschett, D., Schramm-Klein, H,(2008). " Brand personality of retailers– an analysis of its applicability and its effect on store loyalty", *International Review of Retail, Distribution and Consumer Research*, Vol.18 , No2, pp 167–18

[Title in Times New Roman and Bold No.14 in English and Spanish]

Surname (IN UPPERCASE), Name 1st Author†*, Surname (IN UPPERCASE), Name 1st Coauthor, Surname (IN UPPERCASE), Name 2nd Coauthor and Surname (IN UPPERCASE), Name 3rd Coauthor

Institutional Affiliation of Author including Dependency (No.10 Times New Roman and Italic)

International Identification of Science - Technology and Innovation

ID 1er Autor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Autor ID - Open ID) y CVU 1er Autor: (Becario-PNPC o SNI-CONACYT) (No.10 Times New Roman)

ID 1er Coautor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Autor ID - Open ID) y CVU 1er Coautor: (Becario-PNPC o SNI-CONACYT) (No.10 Times New Roman)

ID 2do Coautor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Autor ID - Open ID) y CVU 2do Coautor: (Becario-PNPC o SNI-CONACYT) (No.10 Times New Roman)

ID 3er Coautor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Autor ID - Open ID) y CVU 3er Coautor: (Becario-PNPC o SNI-CONACYT) (No.10 Times New Roman)

Abstract

Objectives, methodology

Contribution

(150-200 words)

Keywords

Indicate (3-5) keywords in Times New Roman and Bold No.11

Abstract (In Spanish, 150-200 words)

Objectives

Methodology

Contribution

Keywords (In Spanish)

Indicate 3 keywords in Times New Roman and Bold No. 10

† Researcher contributing as first author.

Instructions for Scientific, Technological and Innovation Publication

Introduction

Text in Times New Roman No.12, single space.

General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

Development of headings and subheadings of the article with subsequent numbers

[Title No.12 in Times New Roman, single spaced and Bold]

Products in development No.12 Times New Roman, single spaced.

Including graphs, figures and tables-Editable

In the article content any graphic, table and figure should be editable formats that can change size, type and number of letter, for the purposes of edition, these must be high quality, not pixelated and should be noticeable even reducing image scale.

[Indicating the title at the bottom with No.10 and Times New Roman Bold]
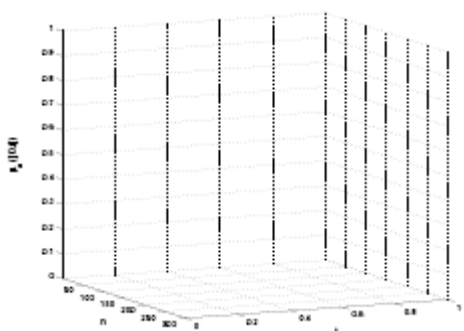
Graphic 1 Title and Source (in italics).

Should not be images-everything must be editable.
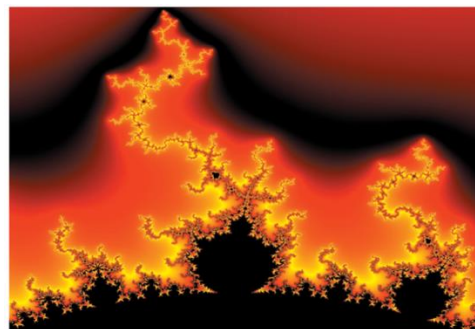
Figure 1 Title and Source (in italics).

Should not be images-everything must be editable.

Table 1 Title and Source (in italics)**.**

Should not be images-everything must be editable.

Each article shall present separately in **3 folders**: a) Figures, b) Charts and c) Tables in .JPG format, indicating the number and sequential Bold Title.

For the use of equations, noted as follows:

$$Y_{ij} = \alpha + \sum_{h=1}^{r} \beta_h X_{hij} + u_j + e_{ij} \qquad (1)$$

They must be editable and number aligned on the right side.

Methodology

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

Results

The results shall be by section of the article.

Annexes

Tables and adequate sources thanks to indicate if they were funded by any institution, University or company.

Conclusions

Explain clearly the results and possibilities of improvement.

Last name -First name (in uppercase) -1st † Last name - First name (in uppercase) -2nd. Paper Title. Title of the Journal. 2015 1-1: 1-11 - [All in Times New Roman No.9]

References

Using APA system, should **Not** be numbered, either bulleted, however, if necessary, will be because reference number or referred to in any of the article.

Data Sheet

Each article must submit your dates into a Word document (.docx):

Journal Name
Article title
Abstract
Keywords
Article sections, for example:

1. Introduction
2. Description of the method
3. Analysis from the regression demand curve
4. Results
5. Thanks
6. Conclusions
7. References

Author Name (s)
Email Correspondence to Author
References

Intellectual Property Requirements for editing:

-Authentic Signature in Color of <u>Originality Format</u> Author and Coauthors

-Authentic Signature in Color of the <u>Authorization Format</u> of Author and Coauthors

Reservation to Editorial Policy

ECORFAN Journal México reserves the right to make editorial changes required to adapt the Articles to the Editorial Policy of the Journal. Once the Article is accepted in its final version, the Journal will send the author the proofs for review. ECORFAN® will only accept the correction of errata and errors or omissions arising from the editing process of the Journal, reserving in full the copyrights and content dissemination. No deletions, substitutions or additions that alter the formation of the Article will be accepted.

Code of Ethics - Good Practices and Declaration of Solution to Editorial Conflicts

Declaration of Originality and unpublished character of the Article, of Authors, on the obtaining of data and interpretation of results, Acknowledgments, Conflict of interests, Assignment of rights and Distribution

The ECORFAN-Mexico, S.C Management claims to Authors of Articles that its content must be original, unpublished and of Scientific, Technological and Innovation content to be submitted for evaluation.

The Authors signing the Article must be the same that have contributed to its conception, realization and development, as well as obtaining the data, interpreting the results, drafting and reviewing it. The Corresponding Author of the proposed Article will request the form that follows.

Article title:

–   The sending of an Article to ECORFAN Journal México emanates the commitment of the author not to submit it simultaneously to the consideration of other series publications for it must complement the Format of Originality for its Article, unless it is rejected by the Arbitration Committee, it may be withdrawn.

–   None of the data presented in this article has been plagiarized or invented. The original data are clearly distinguished from those already published. And it is known of the test in PLAGSCAN if a level of plagiarism is detected Positive will not proceed to arbitrate.

–   References are cited on which the information contained in the Article is based, as well as theories and data from other previously published Articles.

–   The authors sign the Format of Authorization for their Article to be disseminated by means that ECORFAN-Mexico, S.C. In its Holding Mexico considers pertinent for disclosure and diffusion of its Article its Rights of Work.

–   Consent has been obtained from those who have contributed unpublished data obtained through verbal or written communication, and such communication and Authorship are adequately identified.

–   The Author and Co-Authors who sign this work have participated in its planning, design and execution, as well as in the interpretation of the results. They also critically reviewed the paper, approved its final version and agreed with its publication.

–   No signature responsible for the work has been omitted and the criteria of Scientific Authorization are satisfied.

–   The results of this Article have been interpreted objectively. Any results contrary to the point of view of those who sign are exposed and discussed in the Article.

Copyright and Access

Article Title:

Name and Surnames of the Contact Author and the Coauthors	Signature
1.	
2.	
3.	
4.	

Principles of Ethics and Declaration of Solution to Editorial Conflicts

Editor Responsibilities

The Publisher undertakes to guarantee the confidentiality of the evaluation process, it may not disclose to the Arbitrators the identity of the Authors, nor may it reveal the identity of the Arbitrators at any time.

The Editor assumes the responsibility to properly inform the Author of the stage of the editorial process in which the text is sent, as well as the resolutions of Double-Blind Review.

The Editor should evaluate manuscripts and their intellectual content without distinction of race, gender, sexual orientation, religious beliefs, ethnicity, nationality, or the political philosophy of the Authors.

The Editor and his editing team of ECORFAN® Holdings will not disclose any information about Articles submitted to anyone other than the corresponding Author.

The Editor should make fair and impartial decisions and ensure a fair Double-Blind Review.

Responsibilities of the Editorial Board

The description of the peer review processes is made known by the Editorial Board in order that the Authors know what the evaluation criteria are and will always be willing to justify any controversy in the evaluation process.

In case of Plagiarism Detection to the Article the Committee notifies the Authors for Violation to the Right of Scientific, Technological and Innovation Authorization.

Responsibilities of the Arbitration Committee

The Arbitrators undertake to notify about any unethical conduct by the Authors and to indicate all the information that may be reason to reject the publication of the Articles. In addition, they must undertake to keep confidential information related to the Articles they evaluate.

Any manuscript received for your arbitration must be treated as confidential, should not be displayed or discussed with other experts, except with the permission of the Editor.

The Arbitrators must be conducted objectively, any personal criticism of the Author is inappropriate.

The Arbitrators must express their points of view with clarity and with valid arguments that contribute to the Scientific, Technological and Innovation of the Author.

The Arbitrators should not evaluate manuscripts in which they have conflicts of interest and have been notified to the Editor before submitting the Article for Double-Blind Review.

Responsibilities of the Authors

Authors must guarantee that their articles are the product of their original work and that the data has been obtained ethically.

Authors must ensure that they have not been previously published or that they are not considered in another serial publication.

Authors must strictly follow the rules for the publication of Defined Articles by the Editorial Board.

The authors have requested that the text in all its forms be an unethical editorial behavior and is unacceptable, consequently, any manuscript that incurs in plagiarism is eliminated and not considered for publication.

Authors should cite publications that have been influential in the nature of the Article submitted to arbitration.

Information services

Indexation - Bases and Repositories

LATINDEX (Scientific Journals of Latin America, Spain and Portugal)
DIALNET (Dialnet Foundation - University of La Rioja, Spain)
CLASS (Citations Social Sciences and Latin American Humanities-UNAM)
DULCINEA (Spanish scientific journals)
HISPANA (Information and Bibliographic Orientation-Spain)
SHERPA (University of Nottingham - England).
SUDOC. (France)
UNIVERSIA (University Library-Madrid)
ESCI (Index of Appointments of Emerging Sources- Thomson Reuters)
RESEARCH GATE (Germany)
GOOGLE SCHOLAR (Citation indices-Google)
REDIB (Ibero-American Network of Innovation and Scientific Knowledge- CSIC)
MENDELEY (Bibliographic References Manager)

Publishing Services:

Citation and Index Identification H.
Management of Originality Format and Authorization.
Testing Article with PLAGSCAN.
Article Evaluation.
Certificate of Double-Blind Review.
Article Edition.
Web layout.
Indexing and Repository
ArticleTranslation.
Article Publication.
Certificate of Article.
Service Billing.

Editorial Policy and Management

244 – 2 Itzopan Street La Florida, Ecatepec Municipality Mexico State, 55120 Zipcode, MX. Phones: +52 1 55 2024 3918, +52 1 55 6159 2296, +52 1 55 4640 1298; Email: contact@ecorfan.org www.ecorfan.org

Management Offices
244 Itzopan, Ecatepec de Morelos–México.
21 Santa Lucía, CP-5220. Libertadores -Sucre–Bolivia.
38 Matacerquillas, CP-28411. Moralzarzal –Madrid-España.
18 Marcial Romero, CP-241550. Avenue, Salinas l - Santa Elena-Ecuador.
1047 La Raza Avenue -Santa Ana, Cusco-Peru.
Boulevard de la Liberté, Immeuble Kassap, CP-5963.Akwa- Douala-Cameroon.
Southwest Avenue, San Sebastian – León-Nicaragua.
6593 Kinshasa 31 – Republique Démocratique du Congo.
San Quentin Avenue, R 1-17 Miralvalle - San Salvador-El Salvador.
16 Kilometro, American Highway, House Terra Alta, D7 Mixco Zona 1-Guatemala.
105 Alberdi Rivarola Captain, CP-2060. Luque City- Paraguay.
YongHe district, ZhongXin, Street 69. Taipei-Taiwan.

ECORFAN-Journal Mexico

"Indicators that potentiate the quality of service in tourist accommodation centers"
MORALES-MORALES, Jaime, VALDEZ-ACOSTA, Nadia, OVALLES-TOLEDO, Luiz and VÁZQUEZ-RUEDA, Leonardo
Universidad Autónoma de Sinaloa

"Investment in environmental protection in the textile sector: Influence of legal, environmental and economic-financial factors"
CARREGAL-CASTRO, Laura, ALLÓ-PAZOS, María and LONGARELA-ARES, Ángeles
Universidade da Coruña

"MILLENNIALS ... A new way of truly meaningful learning?"
ESCAMILLA-REGIS, Daisy, MARTÍNEZ-BAHENA, Elizabeth and LUNA-MÁRQUEZ, Marco Antonio
Tecnológico de Estudios Superiores de Cuautitlán Izcalli

"Green economy and investment in environmental protection in the technologi¬cal sector: The electronics manufacturing case"
DARRIBA-LINDÍN, Helena, GAGO-CORTÉS, Carmen and LONGARELA-ARES, Ángeles
Universidade da Coruña

"The process of management of integral change in educational organizations"
SOTO-MUCIÑO, Luis Enrique, INFANTE-MENDOZA Benjamin and ALPUCHE-DE LA CRUZ Ezequiel
Instituto Politécnico Nacional
Dirección General de Educación Normal y Actuación del Magisterio
Tecnológico de Estudios Superiores de Chimalhuacan

"Different types of homogeneity"
PACHECO-JUÁREZ, Yaziel

"The competitiveness of the NAFTA countries members in the imports demand of Japanese meat market"
PASTOR, Guillermo, GÓMEZ, Alma Alicia and GARCÍA- FIGUEROA, Francisco
Instituto Tecnológico Autónomo de México
Universidad Autónoma Chapingo

"Investigation of the effect of cognitive dissonance and customer brand engagement an customer's Luxury brand aspiration"
AHMADVAND, Shiva & SHIRAZIAN, Zahra
Islamic Azad University