

Volume 5, Issue 8 — January — June — 2021

Journal-Financial Economy

ISSN-On line: 2531-2995

RINOE®

RINOE-Spain

Editor in chief

BLANCO - GARCÍA, Susana. PhD

Executive director

RAMOS-ESCAMILLA, María. PhD

Editorial Director

PERALTA-CASTRO, Enrique. MsC

Web designer

ESCAMILLA-BOUCHAN, Imelda. PhD

Web Diagrammer

LUNA-SOTO, Vladimir. PhD

Editorial Assistants

TREJO-RAMOS, Iván. BsC

Translator

DÍAZ-OCAMPO, Javier. BsC

Philologis

RAMOS-ARANCIBIA, Alejandra. BsC

RINOE Journal-Financial Economy,

Volume 5, Issue 8, June 2021, is a journal edited semestral by RINOE. 38 Matacerquillas street, Postcode: 28411. Moralarzal –Madrid: www.rinoe.org,journal@rinoe.org. Editor in Chief: BLANCO-GARCÍA, Susana. PhD. ISSN- 2531-2995. Responsible for the latest update of this number RINOE Computer Unit. ESCAMILLA-BOUCHÁN, Imelda, LUNA-SOTO, Vladimir 38 Matacerquillas street, Postcode: 28411. Moralarzal –Madrid last updated June 30, 2021.

The opinions expressed by the authors do not necessarily reflect the views of the editor of the publication.

It is strictly forbidden to reproduce any part of the contents and images of the publication without permission of the National Institute for the Defense of Competition and Protection of Intellectual Property.

RINOE Journal-Financial Economy

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 of General financial markets: Portfolio choice, Asset pricing, Contingent pricing, Futures pricing, Information and market efficiency, Event studies, International financial markets, Government policy and regulation; Financial institutions and services: Banks, Other depository institutions, Mortgages, Insurance, Insurance companies, Pension funds, Other private Financial Institutions, Investment banking, Venture capital, Brokerage, Government policy and regulation; Corporate finance and governance: Capital budgeting, Investment policy, Financing policy, Capital and ownership structure, Bankruptcy; Liquidation, Mergers, Acquisitions, Restructuring, Corporate governance, Payout policy, Government policy and regulation.

RINOE® 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-RENIICYT 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

RINOE Journal-Financial Economy is a Journal edited by RINOE® in its Holding with repository in Spain, 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 General financial markets: Portfolio choice, Asset pricing, Contingent pricing, Futures pricing, Information and market efficiency, Event studies, International financial markets, Government policy and regulation; Financial institutions and services: Banks, Other depository institutions, Mortgages, Insurance, Insurance companies, Pension funds, Other private Financial Institutions, Investment banking, Venture capital, Brokerage, Government policy and regulation; Corporate finance and governance: Capital budgeting, Investment policy, Financing policy, Capital and ownership structure, Bankruptcy; Liquidation, Mergers, Acquisitions, Restructuring, Corporate governance, Payout policy, Government policy and regulation 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 RINOE® 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.

Editorial Board

BLANCO - GARCÍA, Susana. PhD
Universidad Complutense de Madrid

BANERJEE, Bidisha. PhD
Amity University

LUO, Yongli. PhD
Universidad de Chongqing

YAN - TSAI, Jeng. PhD
Tamkang University

VARGAS - HERNANDEZ, José G. PhD
Keele University

SUYO - CRUZ, Gabriel. PhD
Universidad Nacional de San Antonio Abad del Cusco

VARGAS - DELGADO, Oscar René. PhD
National Chengchi University

AZIZ - POSWAL, Bilal. PhD
University of the Punjab Lahore Pakistan

BLANCO - ENCOMIENDA, Francisco Javier. PhD
Universidad de Granada

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

Arbitration Committee

DIMAS - RANGEL, María Isabel. PhD
Universidad Autónoma de Nuevo León

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

DE LA GARZA - CIENFUEGOS, Sandra Patricia. PhD
Universidad Autónoma de Coahuila

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

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

MORALES - GONZALEZ, Maria Antonia. PhD
Instituto Tecnológico de Mérida

GARCÍA - ROJAS, Jesús Alberto. PhD
Universidad de Puebla

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

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

ALCARAZ - SUÁREZ, Oswaldo Israel. PhD
Universidad Tecnológica Metropolitana

ELIZUNDIA - CISNEROS, María Eugenia. PhD
Universidad Nacional Autónoma de México

Assignment of Rights

The sending of an Article to RINOE Journal-Financial Economy 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 Format of Authorization for their Article to be disseminated by means that RINOE® In its Holding Spain 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 General financial markets: Portfolio choice, Asset pricing, Contingent pricing, Futures pricing, Information and market efficiency, Event studies, International financial markets, Government policy and regulation; Financial institutions and services: Banks, Other depository institutions, Mortgages, Insurance, Insurance companies, Pension funds, Other private Financial Institutions, Investment banking, Venture capital, Brokerage, Government policy and regulation; Corporate finance and governance: Capital budgeting, Investment policy, Financing policy, Capital and ownership structure, Bankruptcy; Liquidation, Mergers, Acquisitions, Restructuring, Corporate governance, Payout policy, Government policy and regulation and other topics related to Social Sciences.

Presentation of the Content

In the first article we present, *Strategic planning in the business sector, to promote the sustainability of small and medium enterprises*, by AGUILAR-PÉREZ, Esmeralda, with affiliation in the Tecnológico Nacional de México Campus San Martín Texmelucan, as following article we present, *Macroeconomic variables of the United States and their effect on Mexican migration and remittances*, by FIGUEROA-HERNÁNDEZ, Esther, PÉREZ-SOTO, Francisco, GODÍNEZ-MONTOYA, Lucila and PÉREZ-FIGUEROA, Rebeca A., with ascription in the Universidad Autónoma del Estado de México, Universidad Autónoma Chapingo and University of Bristol, as the third article we present, *Circular economy and waste management in the textile manufacturing industry*, by RESENDIZ-VEGA, Marisol, SÁNCHEZ-TRUJILLO, Gabriela and MONTAÑO-ARANGO, Oscar, as the last article we present, *Impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (inverted classroom) year 2022*, by AYALA-RÍOS, Irma Amelia, GONZÁLEZ-CRUZ, Saúl and LÓPEZ-SÁNCHEZ, Iván, with ascription in the Tecnológico de Estudios Superiores de Jocotitlán.

Content

Article	Page
Strategic planning in the business sector, to promote the sustainability of small and medium enterprises AGUILAR-PÉREZ, Esmeralda <i>Tecnológico Nacional de México Campus San Martín Texmelucan</i>	1-5
Macroeconomic variables of the United States and their effect on Mexican migration and remittances FIGUEROA-HERNÁNDEZ, Esther, PÉREZ-SOTO, Francisco, GODÍNEZ-MONTOYA, Lucila and PÉREZ-FIGUEROA, Rebeca A. <i>Universidad Autónoma del Estado de México</i> <i>Universidad Autónoma Chapingo</i> <i>University of Bristol</i>	6-19
Circular economy and waste management in the textile manufacturing industry RESENDIZ-VEGA, Marisol, SÁNCHEZ-TRUJILLO, Gabriela and MONTAÑO-ARANGO, Oscar	20-25
Impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (inverted classroom) year 2022 AYALA-RÍOS, Irma Amelia, GONZÁLEZ-CRUZ, Saúl and LÓPEZ-SÁNCHEZ, Iván <i>Tecnológico de Estudios Superiores de Jocotitlán</i>	26-32

Strategic planning in the business sector, to promote the sustainability of small and medium enterprises

La planeación estratégica en el sector empresarial, para fomentar la sustentabilidad de las pequeñas y medianas empresas

AGUILAR-PÉREZ, Esmeralda†*

Tecnológico Nacional de México Campus San Martín Texmelucan, México.

ID 1^{er} Autor: *Esmeralda, Aguilar-Pérez* / ORC ID: 0000-0001-6794-9630, Researcher ID Thomson: O-3376-2018, CVU CONACYT ID: 625314

DOI: 10.35429/JFE.2021.8.5.1.5

Received January 10, 2021; Accepted June 30, 2021

Abstract

With this project, improvement e innovation, leadership and market strategies are proposed to promote the sustainability of SMEs in the San Martín Texmelucan region. The project was initially developed by establishing contact with the business sector, preparing a questionnaire to collect and analyze information, later the factors that hinder the sustainability of SMEs were analyzed. Afterwards, a pilot test was carried out applying the strategies to the 150 selected SMEs. The study was developed through statistical analysis to promote sustainability, which have an effect on the participation of directors of micro and small companies in corporate responsibility. In this research, the participants that were studied were the micro and small companies of the commercial sector of the municipality of San Martín Texmelucan, according to the SIEM in the last quarter of 2021 there are 1127 registered companies that were taken as a basis, of which 45% They are commercial, 30% are services and the rest are industrial. The variable that represents the greatest relationship with the sustainability of SMEs is that of leadership strategies by showing a positive relationship of 4.56, while the variable market strategies is the second most representative by yielding 3.65 and the one that least impacts on the sustainability of SMEs is that of improvement and innovation with a ratio of 0.98.

Resumen

Con este proyecto se proponen estrategias de mejora e innovación, de liderazgo y de mercado para fomentar la sustentabilidad de las PyMes de la región de San Martín Texmelucan. El proyecto se desarrolló inicialmente estableciendo contacto con el sector empresarial, elaborando un cuestionario para recopilación y análisis de información, posteriormente se analizaron los factores que obstaculizan la sustentabilidad de las PyMes. Después se realizó una prueba piloto aplicando las estrategias a las 150 PyMes seleccionadas. El estudio se desarrolló mediante un análisis estadístico para fomentar la sustentabilidad, las cuales tienen un efecto en la participación de los directores de la micro y pequeña empresa en la responsabilidad empresarial. En esta investigación los participantes que se estudiaron fueron los micro y pequeñas empresas del sector comercial del municipio de San Martín Texmelucan, de acuerdo al SIEM en el último trimestre de 2021 existen 1127 empresas registradas que se tomaron como base, de las cuales el 45% son comerciales, 30% de servicios y el resto son industriales. La variable que representa mayor relación con la sustentabilidad de las PyMes es la de estrategias de liderazgo al mostrar una relación positiva de 4.56, mientras que la variable estrategias de mercado es la segunda más representativa al arrojar 3.65 y la que menos impacta en la sustentabilidad de las PyMes es la de mejora e innovación con una relación de 0.98.

SMEs, Strategic Planning, Sustainability

PyMe, Planeación Estratégica, Sustentabilidad

Citation: AGUILAR-PÉREZ, Esmeralda. Strategic planning in the business sector, to promote the sustainability of small and medium enterprises. Journal-Financial Economy. 2021. 5-8:1-5.

* Correspondence to Author (Email: esmeralda.aguilar@smartin.tecnm.mx)

† Researcher contributing first author.

Introduction

This research is based on the commerce sector in the central-south region of Mexico as this sector is the largest contributor to the tertiary activity of the national GDP with 15.5%, followed by 11% for real estate and rental services, 6.2% for the transport sector and 4.1% for educational services. In the fourth quarter of 2021, INEGI indicates that tertiary activities correspond to 64% of the percentage structure of GDP while secondary activities represent 32% and primary activities only 4%. It is therefore necessary to attend to the companies that belong to this economic sector, since in Mexico there are 5.1 million economic units in the commerce sector that employ more than 27 million people and every year another 400,000 are incorporated; of these, 52% are micro companies (up to 10 employees), 35% are small companies (with up to 30 employees) and 10% are medium-sized companies (up to 100 employees).

Sustainability is the set of institutions, policies and factors that determine the level of productivity of a country (World Economic Forum, 2016), Ibarra, González and Demuner, (2017) mention that there is sustainability when there is an increase in the productivity of companies, as this will allow the level of income of a country to increase, Dussel (2001) also states that sustainability should also be considered as the process of dynamic integration of countries and products to international markets, depending on both supply and demand conditions.

In recent decades sustainability has taken on great importance in the country's economy where its development has been supported by the implementation of different strategies (Meraz, 2014); according to Porter (1991), companies manage to obtain competitive advantages when they have an environment of dynamic competition, which is characterised by an integration of advantages, as well as a constant stimulus to improve their products and processes.

In an entrepreneurial environment, the development of a business strategy should consider aspects of the company within the framework of the environment, with a clear growth orientation.

To find out whether strategic planning is a factor influencing company sustainability, in the study of a group of Austrian companies Kraus, Harms and Schwarz (2016) identified a positive relationship between strategic planning and sustainability and emphasised that the formality of strategic planning increases the likelihood of execution, which in turn influences performance. Meanwhile, Rudd, Greenley, Beatson and Ian (2014) in their study conducted in Australia, conclude that strategic planning is a key tool in sustainability and that it has a positive and significant impact on performance.

Taking into consideration the above, this research work has considered strengthening the sustainability of the business sector in MSMEs, by designing strategies for improvement and innovation, leadership and market in the business sector in the region of San Martin Texmelucan.

Methodology

The study had a sample of 1127 micro and small enterprises in the commercial sector of the municipality of San Martin Texmelucan. The information was collected between October and November 2021; the interviewer contacted the participant and asked him/her to answer an online form (28%), by telephone (20%) or in person (52%). This analysis shows the results of the study conducted in San Martin Texmelucan, Puebla, in which 150 surveys were administered, due to the current pandemic this was the maximum number of data possible. The study was developed using statistical analysis to promote competitiveness, which has an effect on the participation of micro and small business managers in corporate responsibility. In this research the participants that were studied were the, according to SIEM in the last quarter of 2021 there are 1127 registered companies that were taken as a base, of which 45% are commercial, 30% services and the rest are industrial.

Results

To address the general objective of designing strategies capable of promoting sustainability in the business sector in the region of San Martin Texmelucan.

First, the improvement and innovation strategies to make SMEs in the San Martin region more competitive are analysed, as shown in table 1.

Strategy	Description
Clear sense of direction	Sense of mission clarifies where common efforts to innovate and improve should be directed.
Open communication	Open communication between management and employees lays the foundation for a climate of trust.
Reducing bureaucracy	Bureaucracy slows down change and is a serious impediment to innovation.
Sense of ownership	Every employee should know how his or her work affects the effectiveness of the companies.
Compatible recognition and rewards	It is not competition; it is motivation to innovate.
Tolerance for risk and failure	Failures are simply necessary steps in the learning process.
Elimination of projects and processes that don't work	Innovation requires optimism.

Table 1 Improvement and innovation strategies for SMEs
 Source: Own elaboration with data obtained with the research, 2021

The current leadership strategies of SMEs in the region of Sint Maarten are analysed in order to verify their sustainability, the 12 most important of which are listed below.

- 1) Provide knowledge of the company's industry and the challenges to be faced.
- 2) To reinforce motivation and involvement towards the fulfilment of the same.
- 3) Motivate or foster a work environment in which people can work in harmony, but without interruptions.
- 4) Provide continuous training for employees in their professional field and in leadership tools.
- 5) Encourage confidence in each employee, decision-making skills, responsibility and teamwork.

- 6) Teach by example. Executives, managers or heads of business must have integrity, *i.e.*, a deep sense of fairness in dealing with their team and delegating in a timely manner.
- 7) Be flexible in modifying ways of working and strategies, if and when necessary.
- 8) Share the effort with the team and provide security and a sense of belonging to the team members.
- 9) Create a connection with your team members, be empathetic and listen to their needs.
- 10) Give positive feedback and be willing to receive it.
- 11) Prioritise communication, recognise the work of others and provide opportunities for growth.
- 12) Teach employees to build their own development plan and encourage them to follow it until they reach their goals.

Figure 1 below shows the design of the process of implementing market strategies to foster the sustainability of SMEs in the San Martin Texmelucan region.



Figure 1 Market strategies
 Source: Own elaboration with data obtained with the research, 2021

Differences between improvement and innovation strategies, leadership and market strategies. In order to compare the different strategies and determine which one has the greatest impact on the sustainability of the SMEs, in table 3 we present the descriptive statistics of the three strategies. We find that the most noticeable difference appears in the Leadership Strategy.

San Martín Texmelucan			
Variable	Items	Mean	Standard Deviation
Market strategy	7	3.98	0.701
Improvement and innovation strategy	7	3.81	0.756
Leadership strategy	6	2.97	1.164

Table 2 Descriptive statistics 3 different strategies
Source: Own elaboration with data obtained from the research, 2021

Assessment of the effect of strategies on the propensity of SME managers in San Martín Texmelucan to promote sustainability.

There is some discussion about the validity of running linear regressions on ordinal variable scales. While it is clearly not relevant to apply it to ordinal items, results with more than 10 levels are usually accepted as a continuous variable. For the purposes of this study, the regression shown in table 4 shows a regression of the three strategies to promote sustainability and the results were assessed both assuming continuity and keeping the variable as ordinal with 15 levels of response.

Variables	Coefficient	Standard error	t	p.value
Market strategy	3.65	0.383	4.710	0***
Improvement and innovation strategy	0.98	0.093	-3.070	0.002**
Leadership Strategy	4.56	0.080	0.701	0.484

Significance codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 3 Linear regression for San Martín Texmelucan
Source: Own elaboration with data obtained with the research, 2021

Conclusions

As can be seen in the results of the present investigation, the sustainability of the companies in the municipality of San Martín Texmelucan, according to what was revealed in the surveys applied, indicates that the owners, proprietors and managers of the companies must resort to applying leadership strategies that allow them to make the right decisions to define the direction of the company.

Therefore, in order to compare the market, improvement and innovation and leadership strategies of the SMEs of San Martín Texmelucan analysed, based on the basic descriptive statistics of the variables, it can be seen that the most notable difference appears in the leadership strategy. This means that Texmelucan entrepreneurs have not yet applied these competencies to promote sustainability in their operations because it is a new topic and the future benefits that this represents, such as tax incentives, reduced staff turnover, recognition and certifications, to mention a few, have not yet been foreseen.

With regard to the impact of these strategies for the companies in the municipality of San Martín Texmelucan, it is observed that the market strategy and the improvement and innovation strategy have a significant effect on the sustainability of the companies, as shown by the responses of the directors of the SMEs in San Martín Texmelucan.

The variable with the strongest relationship with the sustainability of SMEs is leadership strategies, with a positive relationship of 4.56, while market strategies is the second most representative variable with 3.65 and the variable with the least impact on the sustainability of SMEs is improvement and innovation with a relationship of 0.98.

This means that an area of opportunity for the development of these entrepreneurs would be training in sustainable issues, specifically with regard to the benefits of sustainability, which would allow Texmeluquense entrepreneurs to change their perspective in order to enter into the sustainable practices that are required by today's world and that have repercussions not only on the competitiveness of the company itself but also on the development of the region and the country's economy, the aim of the project is to help them perceive an economic and financial benefit that will allow their businesses and companies to have a better position in the market and to present a satisfactory economic recovery in favour of competitiveness..

References

- Banco Interamericano de Desarrollo. (2021). Micro, pequeñas y medianas empresas. Retrieved from: <https://idbinvest.org/es/soluciones/servicios-de-asesoria/micro-pequenas-y-medianas-empresas>
- CONCANACO (2021). Confederación de Cámaras Nacionales de Comercio, Servicios y Turismo, Accessed 13 January 2020 from: <https://www.concanaco.com.mx/>
- Confederación de Cámaras Nacionales de Comercio, Servicios y Turismo (Concanaco Servytur)
- COPARMEX (2021). Confederación Patronal de la República Mexicana, Accessed 13 January 2020 from: <https://coparmex.org.mx/>
- Dussel, P.E. (2001). Estrategias y políticas de sustentabilidad en Centroamérica. De la integración externa a la integración interna. Publicación por parte de CEPAL (LC/MEX/L.447), México, 124 págs.
- Enciclopedia de los municipios y poblaciones de México. (2021). <http://inafed.gob.mx/work/enciclopedia/EMM21puebla/municipios/21132a.html>
- Ibarra, M. A., González, L. A. y Demuner, M. del R. (2017). Sustentabilidad empresarial de las pequeñas y medianas empresas manufactureras de Baja California [Business competitiveness in small and medium-sized enterprises of manufacturing sector in Baja California]. *Estudios Fronterizos*, 18(35), 107-130, doi:10.21670/ref.2017.35.a06.
- Instituto Nacional de Estadística y Geografía (INEGI). (2021). Directorio estadístico de unidades económicas (DENUE). Aguascalientes, México. Retrieved from: <http://www3.inegi.org.mx/sistemas/mapa/denue/default.aspx>
- Kraus, S., Harms, R., y Schwarz, E. (2016). Strategic planning in smaller enterprises – new empirical findings. *Management Research News*, 29(6), (pp. 334-344).
- Meraz, R.L. (2014) Estrategias de sustentabilidad de las micro, pequeñas y medianas empresas vinícolas de la ruta del vino del valle de Guadalupe, en Baja California, México. Tesis de doctorado Universidad Autónoma de Baja California Facultad de Ciencias Administrativas y Sociales.
- Porter, M. (1991). La ventaja competitiva de las naciones. España: Plaza y Janes Editores.
- Rudd, J., Greenley, G., Beatson, A., e Ian, L. (2014). Strategic planning and performance: Extending the debate. *Journal of Business Research*, 61(2), (pp. 99–108).
- Sistema de Información Empresarial Mexicano. (2021). <https://siem.economia.gob.mx/ui/pubconsultaes/talecimientos>
- Sistema Nacional de Información Municipal. (2021). <http://www.snim.rami.gob.mx/>
- World Economic Forum (2016). ¿Qué es la competitividad? Retrieved from: <https://es.weforum.org/agenda/2016/10/que-es-la-competitividad>.

Macroeconomic variables of the United States and their effect on Mexican migration and remittances

Variables macroeconómicas de Estados Unidos y su efecto en la migración y las remesas de mexicanos

FIGUEROA-HERNÁNDEZ, Esther^{†*}, PÉREZ-SOTO, Francisco^{''}, GODÍNEZ-MONTOYA, Lucila['] and PÉREZ-FIGUEROA, Rebeca A.^{'''}

[']Centro Universitario UAEM Texcoco, Universidad Autónoma del Estado de México, Mexico.

^{''}Division of Economic and Administrative Sciences (DICEA), Universidad Autónoma Chapingo, Chapingo, Mexico.

^{'''}Department of Geography, University of Bristol, UK.

ID 1st Author: Esther, Figueroa-Hernández / ORC ID: 0000-0001-9680-8984, CVU CONACYT SNI: 75431

ID 1st Co-author: Francisco, Pérez-Soto / ORC ID: 0000-0002-7982-420X, CVU CONACYT SNI: 42478

ID 2nd Co-author: Lucila, Godínez-Montoya / ORC ID: 0000-0002-8571-9043, CVU CONACYT- SNI: 45103

ID 3rd Co-author: Rebeca A. Pérez Figueroa / ORC ID: 0000-0002-7634-5385, CVU CONACYT ID: 259904

DOI: 10.35429/JFE.2021.8.5.6.19

Received January 15, 2021; Accepted June 30, 2021

Abstract

The objective was to analyse the influence of GDP per capita, the unemployment rate, the United States interest rate, and the exchange rate on migration and remittances of Mexican migrants in the United States. A model of simultaneous equations of the number of migrants and Mexican remittances in the United States with respect to the unemployment rate, the interest rate, the United States' Gross Domestic Product per capita, of the exchange rate, the number of migrants and remittances from Mexicans United States of the previous period. The results were: for the NMt equation, given an increase of 10.0% of the GDPpercaEUt, of the GDPpercaEUt-1, and of the NMt-1, migrants increased by 5.1%, 5.5%, and 4.9% on average respectively. For the remittances function, by increasing the UEUt by 1.0%, the GDP percaEUt, and Ret-1 would increase by 0.3%, by 6.5, and remittances by 3.7% on average, ceteris paribus. In conclusion, for the number of migrants the most significant were the GDP per capita of the United States and the number of migrants from the previous period; for remittances, the Gross Domestic Product per capita, the number of migrants and remittances from the previous period.

Gross Domestic Product per capita, Unemployment Rate, and inflation rate of the United States, Mexican migration, Remittances

Resumen

El objetivo consistió en analizar la influencia del PIB per-cápita, de la tasa de desempleo, de la tasa de interés de Estados Unidos, y el tipo de cambio sobre la migración y las remesas de los migrantes mexicanos en Estados Unidos. Se elaboró un modelo de ecuaciones simultáneas del número de migrantes y las remesas de mexicanos en Estados Unidos con respecto a la tasa de desempleo, la tasa de interés, el Producto Interno Bruto per-cápita de Estados Unidos, del tipo de cambio, el número de migrantes y las remesas de mexicanos Estados Unidos del periodo anterior. Los resultados fueron: para la ecuación del NMt, ante un incremento de 10.0% del PIBpercaEUt, del PIBpercaEUt-1, y del NMt-1, los migrantes aumentan en 5.1%, 5.5%, y en 4.9% en promedio respectivamente. Para la función de las remesas al aumentar en 1.0% el UEUt, el PIBpercaEUt, y de Ret-1 se incrementarían en 0.3%, en 6.5%, y en 3.7% las remesas en promedio, ceteris paribus. En conclusión, para el número de migrantes las más significativas fueron, el PIBper-cápita de Estados Unidos y número de migrantes del periodo anterior; para las remesas, el Producto Interno Bruto per-cápita, del número de migrantes y de las remesas del periodo anterior.

Producto Interno Bruto per-cápita, Tasa de desempleo, Tasa de inflación de Estados Unidos, Migración mexicana, Remesas

Citation: FIGUEROA-HERNÁNDEZ, Esther, PÉREZ-SOTO, Francisco, GODÍNEZ-MONTOYA, Lucila and PÉREZ-FIGUEROA, Rebeca A. Macroeconomic variables of the United States and their effect on Mexican migration and remittances. Journal-Financial Economy. 2021. 5-8:6-19.

* Correspondence to Author (Email: esther.f.her@gmail.com)

† Researcher contributing first author.

Introduction

International migration consists of a movement of people across borders with the intention of residing in a country other than their own, which is a complex phenomenon with strong economic, political, social and cultural implications, both for the countries of origin and of destiny; with a growing influence from the local to the international sphere due to the integration of economies, the development of the media, economic growth, the needs of labor markets and military and political conflicts (BBVA Bancomer and CONAPO, 2016).

In 1965, the world population was 3,332 million people, of which 2.4% were international migrants. By 2017, the global population increased to 7.55 billion and international migrants accounted for 3.4%. The increase in migration is due to different factors: environmental, economic and cultural, among others. Simultaneously, mechanisms emerged for mobility to destination countries to occur under selectivity schemes (BBVA Bancomer and CONAPO, 2019).

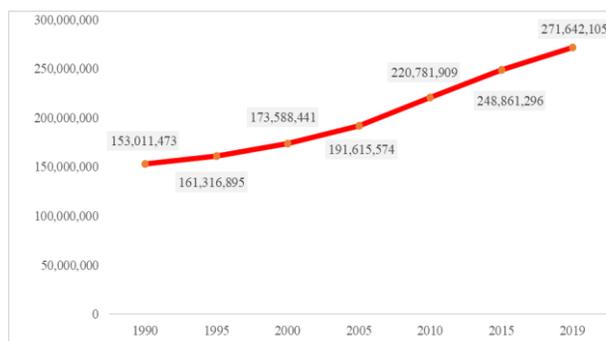


Figure 1 Migrants worldwide, 1990-2019

Source: Prepared with data from the United Nations, 2019

The migratory phenomenon has grown remarkably during the last decades. In 1990 it was estimated that 153 million people lived in a country other than the one where they were born, which increased to 244 million in 2015 (BBVA Bancomer and CONAPO, 2016).

The number of migrants worldwide in 2019 was estimated at 270 million, with the United States being the main destination, with almost 51 million. "This number is a very small percentage of the world's population, barely 3.5%, which means that the vast majority of people reside in the country where they were born, that is, 96.5%."

According to the United Nations (UN, 2019), more than half of international migrants (141 million) live in Europe and North America, it was estimated that 52.0% of the world number were men and that almost two thirds of they leave their country in search of work.

The number of international migrants increased from 153 million in 1990 to about 272 in 2019. Although the number of international migrants worldwide represents a small proportion of the total population, it has increased from 2.8% in 2000 to 3.5% in 2019, that is, in recent years the number of them has grown more than the world population (UN, 2019).

In 2017, there were 258 million international migrants representing 3.4% of the world's population. About 64.0% lived in high-income countries, where the percentage of immigrants went from 10.0% in 2000 to 14.0% in 2017 with respect to the total population. In the United Arab Emirates, Kuwait and Qatar, immigrants made up the majority group. For middle-income countries, immigration rates were two to three times higher than the world average, including Costa Rica, Côte d'Ivoire, Malaysia and South Africa. While in Albania, Georgia, Jamaica, Kyrgyzstan and Nicaragua they exceed 5.0% of the population. The busiest migration corridor goes from Mexico to the United States of America. Other routes run from Eastern Europe to Western Europe, from North Africa to Southern Europe, and from South Asia to the Gulf States (UNESCO, 2018).

The International Monetary Fund (IMF) pointed out that foreign migration can reduce economic growth in the countries of origin through a decrease in the supply of labor and productivity, especially when it comes to workers who are skilled. However, it also considered that remittances sent by migrant workers to their countries of origin are a mitigating factor (to the reduction of economic growth) as they constitute an important and relatively stable source of financing (Hernández, 2017); since remittances are the most visible and tangible benefit of labor migration. At the macroeconomic level, they contribute foreign currency and help to correct the current account balances in the countries of origin. In many countries, remittances represent a high percentage of the Gross Domestic Product (GDP).

Through their direct and multiplier effects, they sustain demand, and therefore stimulate economic activity. As a result, they generate employment, at the family level remittances can contribute to the reduction of poverty and the development of human capital through investments in education and health care (Awad, 2009).

The crisis that affected most of the economies in the world during 2008 and 2009 led to a reduction in international mobility. However, the recovery of the labor market in various countries, particularly the United States, contributed to the reactivation of migratory flows (BBVA Bancomer & CONAPO, 2016). In Latin America, economic crises and the difficulties in overcoming them awaken an interest in people to migrate to other economies, encouraged either by the differences between supply and demand of work or by salary discrepancies. This migratory phenomenon has been presenting a considerable flow of remittances for the economies of Latin America, which have effects on the economic dynamics of these countries (Tarazona, Cuadra, Romero, and Fajardo, 2018).

Mexico does not escape this situation, in 2015 it ranked second with the highest number of migrants worldwide with 12.3 million, surpassed by India (15.6 million). Mexican migration has been concentrated primarily in the United States with 98.0% of nationals to this country, Canada and Spain complete the list of the three main destinations of Mexican migration with 1.0%, and the rest to other countries of the world total (BBVA Bancomer and CONAPO, 2016, p. 38).

In the period 2007-2009, a decrease in global migratory mobility was observed due to the international financial crisis, however, the rebound that was perceived in 2010 revealed that mobility would continue to increase due to growing demographic, economic, and political inequalities and social, to the effects of environmental change, to the new world political and economic dynamics, to technological revolutions and social networks (Domínguez, 2011).

International migration has shown changes in volume, trends, modalities and sociodemographic characteristics (Ramírez & Aguado, 2013). An important feature was that the migrants came from almost every country in the world and a considerable part migrated between border countries or within their own region. An increasing proportion of migrants are heading in particular to some important and renowned (global) cities that concentrate economic decisions, financial activities and specialized services of international companies, as well as production in innovative companies (Pellegrino, 2008).

During 2019, the dataset showed that 38 of international migrants represented 14.0% of those under 20 years of age globally. The majority of youth of all international migrants were from sub-Saharan Africa about 27.0%, followed by Latin America and the Caribbean, and North Africa and West Asia, about 22.0% each. Likewise, three out of every four international migrants, or 202 million are of working age, that is, between 20 and 64 years of age. Regarding distribution by sex, women represented about half of all migrants (48.0%), most of them were registered in North America (52.0%) and Europe (51.0%), and the smallest in sub-Saharan Africa (47.0%) and in Northern Africa and Western Asia (36.0%) (UN, 2019a).

Another characteristic of international migrants indicates that of every two people who carry out an international movement (emigrate or immigrate), one of them does so at a productive age (from 20 to 39 years old). This is consistent with the average age of emigrants from 2008 to 2014 (from 29.9 to 31.7 years). Regarding the level of schooling, without instruction and with basic education, it decreased from 74.7% in 2008 to 68.1% in 2014. On the other hand, people who emigrated with a high school and higher level increased from 25.3% in 2008 to 31.9% in 2014 (INEGI-ENOE, 2008-2014).

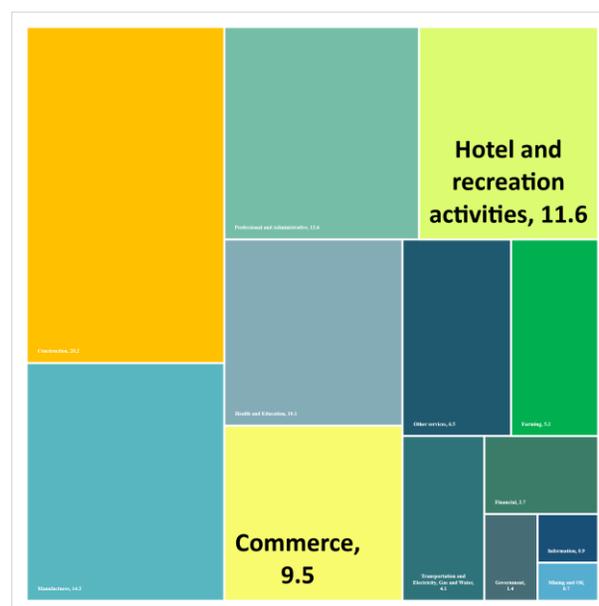
Mexican migration and remittances in the face of the economic crisis in the United States

According to the geographic characteristics and the socioeconomic stability of the United States, it is attractive for migrants (especially Mexicans) to go to that country (Jiménez, 2010).

However, the current panorama of Mexico-United States migration is different from the one that prevailed a few years ago, since the migratory flow to that country has decreased and the Mexican population living there has stagnated (Ramírez and Meza, 2011). Until 2007, Mexican immigration showed a growing and high rate, reaching 11.9 million people. As of that year, this trend slowed down to decrease in 2008 to 11.8 million in the American Union (Canales, 2012). One of the influencing factors was the economic recession resulting from the credit and mortgage crisis that affected the US economy since late 2007 and spread to all the world's economies in 2008. This crisis marked a setback in the growth of the economy. Mexican migration to that country since the 1980s (Ramírez and Meza, 2011).

According to the National Population Council (CONAPO), the phenomenon of Mexican migration to the neighboring country is due to an eminently labor process, immersed in a context of great economic inequalities. According to Jiménez (2010), this displacement occurred under the premise that human beings sell their workforce outside their place of origin, due to lack of minimum conditions to obtain adequate remuneration in the local market and, consequently, a positive social reproduction, for which there is a displacement categorized as cheap labor, which satisfies the demand in different productive branches, from technology to agricultural work in the United States.

The sectors where Mexican migrants mainly concentrated in the United States were construction, commerce, and manufacturing. In each of these, the number of employees that existed at the beginning of the crisis was close to two million people, the loss was greater in construction with about 26.0% of jobs, compared to manufacturing with 16.0 % and trade with 8.0%. For manufacturing and commerce, they began to show improvement, for workers of Mexican origin, in the first quarter of 2010 (BBVA Bancomer, 2010).



Note: * Employed population aged 15 and over. People who work in the US military are excluded

Figure 2 Distribution of the Mexican migrant population in the United States according to economic activity *, 2018 (%)

Source: Prepared with data from BBVA Bancomer and CONAPO, 2019

In 2018, the main economic activities in which the Mexican migrant population worked in the US were construction (20.2%), manufacturing (14.3%), professional and administrative activities (12.6%), hospitality activities and recreation (11.6%), health and education (10.1%) and commerce (9.5%) and to a lesser extent those of Government (1.4%), Information (0.9%), Mining and oil (0.7%), see figure 2.

The main consequence of the reduction in migration from Mexico to the United States was the drop in monetary remittances sent by migrants to their families in their communities of origin. According to Banco de México, sustained growth had been registered since the first years of the last decade, which accelerated after 2003 and remained until 2007 with around 26 billion dollars. At the end of 2007 these decreased, and in 2009 they were 21,245 million. In 2010, they grew by 21.271 million dollars, a lower level than the total remittances received in 2007, which represented a fall of 18.3% between 2007 and 2010 (Ramírez and Meza, 2011).

For 2014, Mexican families received close to 24.231 million dollars in remittances, 7.3% higher than that registered by foreign direct investment (FDI) and 49.0% higher than foreign exchange from international tourism. According to the Migration and Remittances Yearbook produced by BBVA Research, in 2014 Mexico was ranked fifth among the countries that received the most remittances, below India, China, the Philippines and France. Mexican households that receive remittances are characterized by belonging to rural localities with a high degree of marginalization. And with an average level of primary schooling by the heads of the family (Esquivel, 2015).

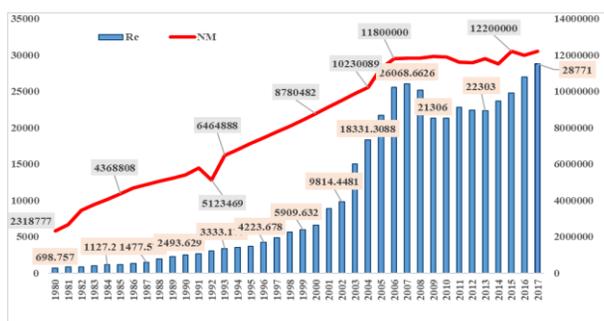


Figure 3 Behavior of the number of migrants and remittances, 1980-2017

Source: Own elaboration with data from Banxico and BBVA Bancomer, 2015, 2017 and 2018.

From figure 3, it can be seen how the number of migrants has been increasing at a rate of 4.72% and for remittances of 10.88% on average for the study period of migrants in the United States.

Literature review

The migration of Mexicans has existed since the beginning of the 19th century, going through times of ups and downs explained by different factors (economic asymmetries and complementarities, economic ups and downs, war events), but at the end of the so-called "lost decade" there was a restructuring of the migratory patterns of Mexicans to the United States. This change was preceded by the different crises in the Mexican economy (1976, 1982, 1994-95 and 2008), manifesting itself in a large number of people employed in the informal economy, unemployed and emigrants. On the other hand, the characteristics of the North American economy: an increase in the demand for low-skilled labor due to a gradual aging process of its population (Figueroa-Hernández and Pérez-Soto, 2011).

In the literature there are various research works that relate remittance flows with economic growth and other macroeconomic variables. In this regard, Meyer and Shera (2017) observed the impacts of remittances on the economic growth of Albania, Bulgaria, Macedonia, Moldova, Romania and Bosnia Herzegovina during the period 1999-2013, because these countries had experienced an increase in the flow of remittances. Economic growth as a dependent variable and using a multiple regression analysis obtained that workers' remittances contributed positively and significantly to economic growth in these countries, and that the productive use of these flows could contribute to maintaining and improving growth through consumption and investment.

The contribution to economic growth of Mexican migrants who work and reside in the United States almost quadrupled from 1994 to 2010, for the latter (2010) it increased to 586 billion dollars, which represented 4.0% of the GDP of the United States and 38.0% of that of Mexico, as well as 76.0% of the FDI captured in the country (Canales, 2011).

On the other hand, Macias (2016) carried out a study to determine the relationship of the flow of remittances in Mexico with macroeconomic variables. He proposed two econometric models, placing remittances as a dependent variable in both according to the GDP of Mexico, the GDP of the United States, the National Consumer Price Index of Mexico (INPC), the INPC of the United States, the exchange rate, the 28-day interest rate, exports and imports. The first model showed that remittances arriving in Mexico from the United States were unproductive, since most of them were used for family consumption. The second showed that this flow increased when the United States economy grew, but if prices rose, remittances fell, since immigrants will have to allocate a greater amount of their salary for their consumption in that country, it also revealed that if the Mexico's economy was not growing or was going into crisis, migrants would have to send a greater amount of remittances. This increase would have the purpose of maintaining the purchasing power of families in Mexico.

Batu (2017) used the standard model of the open economy of the Real Business Cycle (RBC), in order to evaluate the effectiveness and economic impact of worker remittances on the growth of GDP per capita taking data from 81 countries in a period between 1970 and 2012. The methodology used was a calibration of the RBC model of a small open economy. Analyzing data from the model, he estimated that only worker remittances that were temporary in nature had a positive impact on GDP per capita in the long run. The two previous investigations agreed that the remittances generated by workers had a positive participation in GDP, whether temporary or permanent, however, this effect on GDP was considered as the increase in capital flows without taking into account that the ultimate purpose of these resources was intended for consumption or investment (Tarazona et al., 2018). In accordance with the above, the contribution of this research consists in analyzing the influence of GDP per capita, the unemployment rate, the United States interest rate, and the exchange rate on migration and remittances from Mexican migrants in the United States. The hypothesis proposes that the number of migrants and remittances from Mexicans in the United States are directly related to GDP per capita, the exchange rate, and inversely to the interest and unemployment rates in the United States.

Theoretical framework

Simultaneous Equation Models (MES) is a set of equations where there is a two-way relationship. Such models focus on the estimation and / or prediction of the mean value of Y conditional on the fixed values of the variables X. Consequently, the cause-effect relationship in these models ranges from `from X to Y` or `from X to Y`. This happens when Y is determined by X and some X, in turn are determined by Y. That is, there is a two-way relationship. In these models, the jointly dependent variables are called endogenous, and the non-stochastic, exogenous or predetermined, in which there is more than one equation: one for each of the mutually dependent or endogenous variables, and it is not possible to estimate the parameters of an equation `by itself` without taking into account the information of the others in the system. In order to estimate the parameters of the system of equations, each equation in the model has to be checked (Gujarati and Porter, 2010, p. 673 and 691).

The equations that are known as structural or behavioral equations: they are so called because they `show the structure (of an economic model) of an economy or the behavior of an economic agent (for example, a consumer or a producer). The unknowns α and β are known as structural parameters or coefficients. From the structural equations it is possible to solve for the M endogenous variables, but not necessarily to derive the equations in reduced form and the corresponding coefficients in reduced form. An equation in reduced form is one that expresses only an endogenous variable in terms of the predetermined variables and stochastic shocks (Gujarati and Porter, 2010, p. 673 and 691).

The identification problem tries to establish whether the numerical estimates of the parameters of a structural equation can be obtained from the estimated coefficients in reduced form. If it can be done, the particular equation is considered to be (exactly) identified or over-identified if more than one numerical value can be obtained for any of the parameters of the structural equations, if not, the equation under consideration is unidentified or under-identified. In a model of M simultaneous equations, for an equation to be identified, the number of predetermined variables excluded (K - k) said equation must not be less than m-1 (Gujarati and Porter, 2010, p. 699), that is:

If, $K - k = m - 1$, the equation is exactly identified.

If, $K - k > m - 1$, the equation is overidentified.

If, $K - k < m - 1$, the equation is under identified.

Where K is the number of predetermined variables in the model, including the intercept, k is the number of predetermined variables in each equation, M is the number of endogenous variables in the model, and m is the number of endogenous variables in each equation. It should be noted that an exactly identified equation can be estimated using Indirect Least Squares (ICM). An over-identified equation can be estimated using Two-Stage Least Squares (LS2E) and an under-identified one cannot be estimated by any method (Gujarati and Porter, 2010, p. 699).

Methodology

To carry out the research, different sources of information were consulted: such as the World Bank (WB), Food and Agriculture Organization of the United Nations (FAO), United Nations (UN), United Nations Department of Economic and Social Affairs United Nations (DESA), International Labor Organization (ILO), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Organization for Migration (IOM), the National Institute of Statistics and Geography (INEGI), Banco de México (B de M or Banxico), Center for Public Finance Studies of the Chamber of Deputies (CEFP), BBVA Bancomer Foundation (BBVA Bancomer, AC), National Population Council (CONAPO), among others; from where data were obtained on remittances, number of Mexican migrants, exchange rate, per-capita GDP, unemployment rate and the interest rate of the United States.

With the information obtained, a database for the period 1980-2018 was generated for the mentioned variables. Due to the interrelation between endogenous and predetermined variables, an econometric model of simultaneous equations was formulated with the objective of analyzing the relationship between the number of migrants and remittances from Mexicans in the United States with the unemployment rate, the interest rate, the annual GDP per capita of the United States, the exchange rate, the number of migrants and the remittances of Mexicans delayed one period.

The econometric model of simultaneous equations in this investigation consists of two fundamental relationships:

The first equation relates the number of Mexican migrants in the United States (NMt), as a function of remittances (Ret), the unemployment rate of the United States (UEUt), the annual Gross Domestic Product per-capita (GDP percaEUt) and delayed a year (PIBpercaEUt-1) from the United States, and number of migrants delayed one year (NMt-1). The second relates remittances (Ret) according to the number of migrants (NMt), Exchange rate (Et), Mexican remittances delayed one year (Ret-1), the United States unemployment rate (UEUt), the Annual per-capita Gross Domestic Product of the United States (GDP percaEUt) and the interest rate of the United States (iEUt).

Variables of the system of simultaneous equations

The model proposed in this work is shown below:

Endogenous variables (M): NMt = Number of Mexican migrants in the United States, Ret = Remittances from Mexicans for the year.

Default variables (K): Ret-1 = Family remittances delayed one year (Millions of dollars); NMt-1 = Number of migrants delayed one year (Number of people); Et = FIX nominal exchange rate (\$ / Dollar); UEUt = United States Unemployment Rate (% of the Civilian Labor Population); it = United States interest rate (%); GDP percaEUt = Annual per capita Gross Domestic Product of the United States (Billions of dollars at 2009 prices); GDP perchEUt-1 = Annual per-capita Gross Domestic Product of the United States lagged one year (Billions of dollars at 2009 prices).

$$NM_t = \beta_0 + \beta_1 Ret_t + \beta_2 UEUt_t + \beta_3 NM_{t-1} + \beta_4 PIBpercaEU_t + \beta_5 PIBpercaEU_{t-1} + \varepsilon_t \quad (1)$$

$$Ret_t = \alpha_0 + \alpha_1 NM_t + \alpha_2 E_t + \alpha_3 Ret_{t-1} + \alpha_4 UEUt_t + \alpha_5 PIBpercaEU_t + \alpha_6 i_t + \varepsilon_t \quad (2)$$

Identification of the model

To carry out the identification of the structural equations of the system of simultaneous equations, the order condition was considered (Gujarati and Porter, 2010). In practice, this condition is generally adequate to ensure identifiability.

Equation number	K-k	m-1	K-k ≥ m-1	ID
1	7-4	2-1	3 > 1	Over identified
2	7-5	2-1	2 > 1	Over identified

Table 1 Identification of order of the model of simultaneous equations of NMt and Ret

Source: Own elaboration

As shown in Table 1, the two structural equations of the model were over-identified, therefore, to estimate the structural parameters of the equations, the method of least squares in two stages (LS2E) was used using the statistical package Statistical Analysis System (SAS), which is designed to handle over-identified equations (Gujarati and Porter, 2010).

Analysis and discussion of results

In this section, the statistical and economic analysis was carried out on the basis of the structural coefficients estimated from the LS2 method and its relationship with economic theory. Finally, the elasticities were calculated and interpreted.

Statistic analysis

In the results of the analysis of variance, emphasizing the coefficient of determination (R²), the value of the calculated F (Fc), the mean square of the error and the value of the partial t's for each of the estimators. To test the statistical significance of each of the regression equations, the following sets of hypotheses were considered:

- 1) $H_0: \alpha_1 = \alpha_2 = \dots = \alpha_n = 0$ contra $H_a: \alpha_i \neq 0$,
- 2) $H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$ contra $H_a: \beta_i \neq 0$ para $i \geq 1$.

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
Model 1					
NM_t	Re_t	UEU_t	$PIBpercaEU_t$	$PIBpercaEU_{t-1}$	NM_{t-1}
Coefficient	-	50902.76	93.63	100.15	0.49
t_c	-	0.95	1.07	1.26	3.19
P	0.31	0.34	0.29	0.21	0.0032
R ² = 0.992 R ² adjusted = 99.109 F-value = 823.76 Prob>F = <.0001					

Table 2 Analysis of variance of model 1

Source: Own elaboration with the output of the statistical package SAS

The results of the analysis of variance (Table 2) indicated that for the equation of the number of migrants (NMt) the Fc = 823.76 was greater than the Ft, 0.05 (5, 32) = 2.51, therefore the null hypothesis was rejected (Ho) in favor of the alternative hypothesis (Ha), that at least one of the parameters estimated by the LS2E regression was different from zero. The number of migrants according to the determination coefficient (R²) was explained in 99.2% by the variables included in the equation. Regarding the individual test, the highly significant variable was: NMt-1 with a t value of 3.19 > 1; Among the least significant according to the statistical results were: GDPperchEUt-1 and PIBperchEUt with t values of 1.26 and 1.07 > 1 respectively. However, the Re and UEU were not significant.

DEPENDENT VARIABLE	INDEPENDENT VARIABLES					
Equation 2						
Re_t	NM_t	E_t	iEU_t	UEU_t	$PIBpercaEU_t$	Re_{t-1}
Coefficiente	-0.004	51.23	204.19	528.03	1.67	0.96
t_c	-2.34	0.18	0.55	0.94	2.26	9.93
P	0.025	0.86	0.58	0.35	0.031	<.0001
R ² = 0.97636 R ² adjusted = 97.178 F-value = 213.35 Prob>F = <.0001						

Table 3 Analysis of variance of model 2

Source: Own elaboration with the output of the statistical package SAS

Regarding the global test, Fc = 213.35 was greater than Ft, 0.05 (6, 31) = 2.41 with a probability of <0.0001, so the null hypothesis (Ho) was rejected in favor of the alternative hypothesis (Ha), which indicates that at least one of the parameters estimated by means of the LS2E regression is non-zero. The coefficient of determination (R²) indicates that the variable Ret was explained in 97.6% by the variables included in the equation (Table 4). The variables Ret-1, NMt and PIBpercaEUt turned out to be highly significant with a t value of 9.93 > 1, -2.34 > 1 and 2.26 > 1 respectively. Those that were not significant UEUt, iEUt and Et with a value of t of 0.94, 0.55 and 0.18 > 1 (Table 3).

Economic analysis

The estimated model for the number of migrants (NM), based on equation (1) and with the previously estimated parameters, was the following:

$$NM = -4705891 - 4.62Re - 50902.76UEU + 93.63PIBpercaEU + 100.15PIBpercaEU_{t-1} + 0.49NM_{t-1} \quad (3)$$

According to equation 3, the Gross Domestic Product per capita of the United States in the period 1980 to 2018, the number of Mexican migrants will increase. Due to an increase in unemployment in the United States, it will cause fewer migrants to the American Union.

This situation has been evident since 2000, Mexican migrants have increased their importance in the United States labor market, for every Mexican migrant employed in that country, there were four retired American workers, so some Mexican migrants active in the labor sector contributed to pensions and social security benefits for some of the retired Americans.

The contribution of Mexicans in taxes (direct and indirect) to the US economy was much higher than what they sent to their relatives in Mexico, it was around double. According to figures from the Information System on International Migration and Development (SIMDE), Mexican migrants paid taxes in 2008 about 53 billion dollars, an amount well above the 25 billion dollars they sent in remittances. Social security benefits in the US include more than just health care. About 60.0% of Mexican migrants do not have access to health services. Furthermore, in most cases, basic education was received in Mexico (BBVA Research, 2011); this investment was not financed by the United States.

The estimated model for remittances (Re), based on equation (2) and with the previously estimated parameters, was the following:

$$\bar{Re} = -46892.5 - 0.004NMt + 51.23E + 204.19UEU + 528.03UEUt + 1.67PIBpercaEU + 0.96Re_{t-1} \quad (4)$$

Remittances (Re) showed an increase in the face of an increase in the exchange rate (E), the interest rate of the United States and the Gross Domestic Product per-capita of the United States, as unemployment in the United States increased, the amount increased of employed Mexican migrants, causing an increase in remittances. Finally, the exchange rate also increases remittances.

Vargas-Silva (2009) analyzed the relationship between remittances, the exchange rate and demand in Mexico. The author found that there is a two-way relationship between remittances and the exchange rate. Furthermore, positive changes in remittances tend to appreciate the real exchange rate in Mexico. Although remittances can serve as a source of external financing for the country; The results also suggest that as remittances appreciate the Mexican peso, but harm exports to the world market.

López and Cruz (2016) concluded that remittances are determined by variables that directly affect the income of emigrants (growth of the GDP of the host country and of the real salary of migrants).

Second, that the macroeconomic variables belonging to the host or issuing country have a greater effect on the flow of remittances than the variables of the emigrant's country of origin, when judging by the magnitude of the coefficients of real GDP growth per capita of the United States and of the real wage of Hispanics, in contrast to the coefficients of the growth of the real GDP per capita and the open unemployment of the country of origin. Finally, it is clear that senders from the United States send remittances to Central America and the Dominican Republic for altruism reasons rather than for investment reasons, given the weak significance and small magnitude of the coefficient of the interest rate differential.

Economic interpretation of elasticities

The economic results of the elasticities in their structural form for each of the equations are shown in the following table:

$\varepsilon_{Re}^{NM} = -0.006$	$\varepsilon_{Re_{t-1}}^{Re} = 3.72$	$\varepsilon_{NM}^{Re} =$
-2.82		
$\varepsilon_{UEU}^{NM} = 0.038$		$\varepsilon_E^{Re} =$
0.029		
$\varepsilon_{PIBpercaEU}^{NM} = 0.516$		$\varepsilon_{iEU}^{Re} =$
0.079		
$\varepsilon_{PIBpercaEU_{t-1}}^{NM} = 0.548$		$\varepsilon_{UEU}^{Re} =$
0.281		

Table 4 Elasticities of the model in its structural form
Source: Own elaboration with data from SAS outputs

The short-term elasticities, which were obtained from the model estimators, are presented in table 4, among the most outstanding are the following: in the case of the NMT equation, in the face of an increase of 10.0% in GDP percaEUt, Migrants will increase by 5.16%, while, for the GDP percaEUt-1 of the previous period, it will cause an increase of 5.48% in national migration and for the NMT-1 the number of migrants will increase by 4.86%. On the other hand, for the function of remittances, as UEUt increases by 1.0%, GDP percaEUt and Ret-1 will increase by 0.28%, by 6.5, from 3.7% remittances on average, ceteris paribus.

When talking about remittances and their macroeconomic impact on economic development, the World Bank in its *Global Economic Prospects* (2006), World Bank (2005), the United Nations (UN, 2006) and the Inter-American Development Bank (IDB, 2000, 2011) consider that when remittances increase continuously, predictably and meet a certain level of stability over time, they can: Reduce the instability of growth, promote the development of localities, regions and countries of origin (depending on its size), sustain the country's foreign exchange, withstand external crises, heal macroeconomic accounts, contribute to reducing poverty and inequality (especially when remittances reach the poorest households) (Reviewed in: Agudelo Tascón, 2016).

On the other hand, remittances can reduce labor market pressures, increase investment and aggregate growth, serve as a conduit to link international markets and also for access to technology, therefore, remittances have direct and indirect positive effects on income (Koc & Onan, 2001; Catrinescu, Leon-Ledesma, Piracha & Quillin, 2009). Papademetriou and Martin (1991) already stated since the beginning of the 1990s that there is no guarantee to affirm that cross-border migration processes accompanied by remittances can become a development factor for the migrants' countries of origin. Fajnzylber and López, (2007) point out that it should not be forgotten that remittances are above all a complement and not a substitute for good and appropriate government economic policies (Reviewed in: Agudelo Tascón, 2016, p. 46).

The future growth of the United States economy, Latinos, especially Mexicans, will play a leading role. Of a population of almost 57 million Latinos, more than 63.0% were of Mexican origin (more than 36 million people). This includes Mexican immigrants residing in the country and Americans who, in the census, identified themselves as of Mexican origin. Who are the "hispanials" and why they have the power to transform America's economy. Although the migration of Mexicans to the United States has been driven for years by workers without higher education who worked mainly in the agricultural and construction sectors, the picture has changed recently.

Children of that generation that migrated to the United States will be more likely to obtain higher education, and to earn, spend, and invest more of their income. Latinos born in this nation are younger than the general population average, projecting them as a key workforce and consumer for the country's economic growth. Almost half of all Latinos born are under the age of 18, according to data from the Pew Center, and only 20.0% of non-Hispanic white Americans were under the age of 18 (Sulbarán, 2019).

Salas Alfaro & Pérez Morales (2006) affirmed that at least in the short term, the GDP of Mexico, that of the United States, and inflation in Mexico, exert a significant linear statistical influence on the amounts of remittances sent to the country. According to the assumptions of the migration economy, it is corroborated that, as the national GDP increases, the amounts of remittances sent will tend to decrease, due to the reduction of pressures on family income. In addition, they explained that the GDP of the United States grew, which will stimulate shipments since there will be greater employment opportunities. On the other hand, they indicated that remittances contributed to improving the distribution of income among the deciles of households, and in some cases, they reduce the inequality in the distribution of income within the deciles.

The flow of remittances increases when the United States economy grows, but if prices increase, remittances fall, since immigrants will have to allocate a greater amount of their salary for consumption in the country. In the case of the exchange rate, when the peso depreciates against the dollar, there will be a greater amount of remittance flows. This increase is intended to maintain the purchasing power of families in Mexico. For 2015, remittances in Mexico represented 2.5% of GDP according to Banxico and were mainly destined for consumption, which is why the demand of households receiving remittances increases, generating investment in businesses creating a multiplier effect in local and regional economies. local consumption in food, rent payment, and employment is created, among other things (Macías, 2016).

Conclusions

Based on the results obtained from the model, the following is concluded: for the equation of the number of migrants, the variables that most influenced were the GDP per capita of the United States and the number of migrants from the previous period, for remittances the Gross Domestic Product was per capita for the period, the number of migrants and remittances from the previous year. In the case of the hypotheses raised, it was corroborated that remittances and the number of migrants there is a direct relationship with the per-capita Gross Domestic Product of the United States, and inverse with the unemployment rate, but only in the case of the number of migrants.

The reasons for migration were related to the possibility of accessing jobs that will allow obtaining higher salaries than those established in the country of origin, which is why, given the geographic characteristics and relative socioeconomic stability of the United States, it was attractive to migrants. Mexicans (Avendaño, Rivera, & Díaz, 2015).

According to Tarazona et al (2018), the migratory phenomenon has been presenting a considerable flow of remittances, which have effects on the economic dynamics, which have been analyzed from different perspectives, there are various works and investigations that relate the flows of remittances with economic growth and other macroeconomic variables. Likewise, other authors analyze remittances as a dependent variable, as in the case of (Macías, 2016), who analyzed such as the Gross Domestic Product of Mexico, the Gross Domestic Product of the United States, the National Consumer Price Index of Mexico, the United States Consumer Price Index, the exchange rate, the 28-day interest rate, exports and imports determine remittances in Mexico.

In 2017, 94.7% of shipments came from the United States, according to a report by BBVA Bancomer and estimated that, in 2018, remittances that arrived in Mexico would reach 33,000 million dollars, which would represent an annual growth of 9.0%, while that for 2019 the expectation was 35,000 million dollars, an increase of 6.0%.

Serrano explained in the presentation of the Yearbook of Migration and Remittances 2018, that this would be due to the growth of the migration of nationals to the United States, once the migratory flows to that country recover and that employment levels are on the rise due to the behavior of the economy (Juárez, 2018).

References

- Agudelo Tascón Luis Fernando. (2016). Remesas y su relación con variables macroeconómicas: efecto sobre el crecimiento económico, desempleo e inflación en Colombia: 2001-2010. Tesis Doctoral, Facultad de Ciencias Económicas y Empresariales, Departamento de Economía Aplicada I (Economía Internacional y Desarrollo), Universidad Complutense de Madrid. Madrid, España.
- Amuedo Dorantes, C. y Pozo S. (2004). Worker's Remittances and the Real Exchange Rate: A Paradox of Gifts. *World Development*, volume 32, (8), 1407–1424. Available in: https://econpapers.repec.org/article/eeewdevel/v_3a32_3ay_3a2004_3ai_3a8_3ap_3a1407-1417.htm
- Agudelo Tascón Luis Fernando. (2016). Remesas y su relación con variables macroeconómicas: efecto sobre el crecimiento económico, desempleo e inflación en Colombia: 2001-2010. Tesis Doctoral, Facultad de Ciencias Económicas y Empresariales, Departamento de Economía Aplicada I (Economía Internacional y Desarrollo), Universidad Complutense de Madrid. Madrid, España.
- Avendaño, M.; Rivera, J. M., & Díaz, R. (2015). Crisis económica: migrantes más vulnerables. Casos en Berrien, Michigan. *Perfiles Latinoamericanos*, 23(45 enero-junio), 105-125.
- Awad, I. (2009). Antes de esta crisis, las remesas estaban aumentando en todos los países de origen. ¿La crisis revirtió esta tendencia? Retrieved from Estados Unidos: text-indent: -35.45ptline-height:">
http://www.ilo.org/global/about-the-ilo/newsroom/features/WCMS_112543/lang--es/index.htm

Bourdet, Y. y Falck, H. (2007). Emigrant's Remittances and Dutch Disease in Cape Verde. *International Economic Journal*, 20, (3), 267–284.

<https://doi.org/10.1080/10168730600879323>

BBVA Bancomer y CONAPO. (2019). Anuario de migración y remesas México 2019. Fundación BBVA Bancomer, A.C. y Consejo Nacional de Población (CONAPO). Impreso en julio. Cd. de México, México. Available in: https://www.bbva.com/wp-content/uploads/2019/09/Anuario_Migracion_y_Remesas_2019.pdf

BBVA Research. (2011). Los efectos económicos de la Migración en el país de destino. Los beneficios de la migración mexicana para Estados Unidos. Análisis económico, núm.11/17. Available in: https://www.bbva.com/wp-content/uploads/migrados/WP_1117_Mexico_tcm346-257505.pdf

BBVA Bancomer (2010). Situación Migración México. La Crisis Global y sus Efectos en la Migración y las Remesas en México. Servicio de Estudios Económicos, Fundación BBVA Bancomer. Disponible en: <https://www.bbva.com/SitMigracionMexico.pdf>.

BBVA Bancomer y Consejo Nacional de Población (CONAPO). (2013). Anuario de Migración y Remesas 2013. In. México: Fundación BBVA Bancomer y Consejo Nacional de Población (CONAPO). Available in: http://www.omi.gob.mx/work/models/OMI/Resource/869/1/images/AnuarioMigracionMexico_2013.pdf

BBVA Bancomer y CONAPO. (2016). Anuario de migración y remesas México 2016. Migración internacional. Fundación BBVA Bancomer y Consejo Nacional de Población (CONAPO). Available in: <https://www.gob.mx/conapo/documentos/el-anuario-de-migracion-y-remesas-mexico-2016>

BBVA Bancomer y CONAPO. (2018). Anuario de migración y remesas México 2018. Fundación BBVA Bancomer y Consejo Nacional de Población (CONAPO). Available in:

<https://www.gob.mx/conapo/documentos/anuario-de-migracion-y-remesas-mexico-2018-173515>

Batu, M. (2017). International worker remittances and economic growth in a Real Business Cycle framework. *Structural Change and Economic Dynamics*, (40), march, 81-91. Available in:

<https://www.sciencedirect.com/science/article/abs/pii/S0954349X16301667>.

<https://doi.org/10.1016/j.strueco.2016.12.004>

Canales, A. I. (2011). Hacia una visión comprehensiva del anexo entre migración, desarrollo y derechos humanos. *Migración y Desarrollo*, 9(16). Available in: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-75992011000100002

Canales, A. I. (2012). La migración mexicana frente a la crisis económica actual. Crónica de un retorno moderado. *Rev. Inter. Mob. Hum., Brasília*, Año XX (39), 117-134. Available in: <https://www.redalyc.org/pdf/4070/407042016007.pdf>

Domínguez, G. R. (2011). El fenómeno migratorio desde una perspectiva global; entendimiento y apuestas teóricas. *Escenarios XXI*, Año II (11), Año 2, Núm. 11, sep.-oct., pp. 1-10. Available in: <http://uaer.humanidades.unam.mx/investigacion/investigador.php?12>.

Dumas Lloyd J. (2003). Economic Multipliers and the Economic Impact of DOE Spending in New Mexico. University of Texas at Dallas, March 2003). Available in: <https://www.nukewatch.org/facts/nwd/DumasReport033103.pdf>

Esquivel, E. (2015). La importancia de las remesas y la urgente necesidad del desarrollo regional. *SDPnoticias*, 3 de septiembre, 2015. Available in: <https://www.sdpnoticias.com/columnas/importancia-necesidad-urgente-remesas.html>

- Figueroa-Hernández, E., y Pérez-Soto, F. (2011). El proceso de asentamiento de la migración México-Estados Unidos. *Papeles de población*, 17(68), 161-190. Available in: <https://www.redalyc.org/pdf/112/11219270008.pdf>
- Gujarati N. D. Porter, D.C. (2010). *Econometría*. 5ta edición. McGraw-Hill/Interamericana Editores, S.A. DE C.V. México, D.F. https://www.academia.edu/33064534/Gujarati-Econometria_5ta_Edicion.pdf
- Hernández, L. (2017). Migración y remesas, riesgos para AL: FMI. *El Financiero*, 22 de mayo. Available in: <https://www.elfinanciero.com.mx/economia/migracion-y-remesas-riesgos-para-al-fmi>
- INEGI-ENOE. (2008-2014). Encuesta Nacional de Ocupación y Empleo (ENOE). from Instituto Nacional de Estadística y Geografía. Available in: http://187.237.133.170/seieg/doc/Informacion_de_migracion_internacional_ENOE_Tercer_Trimestre_de_2015_1455557983.pdf
- Jiménez, M. I. (2010). El proceso migratorio México-Estados Unidos: el caso del valle de Tangancícuaro, Michoacán, México. In *Migraciones laborales: nuevos flujos, rutas e identidades*, parte I. Available in: <http://www.saber.ula.ve/bitstream/handle/123456789/33531/migraciones-laborales.pdf?sequence=1&isAllowed=y>
- Juárez, E. (2018). Remesas a México alcanzarán 33,000 millones de dólares en el 2018. *El Economista*, 5 de septiembre. Available in: <https://www.economista.com.mx/sectorfinanciero/Remesas-a-Mexico-alcanzaran-33000-millones-de-dolares-en-el-2018-20180905-0120.html>
- López Parra Elibeth y Cruz-Rodríguez Alexis. (2016). Determinantes macroeconómicos de las remesas en los países del DR-CAFTA. *Ciencia y Sociedad*, vol. 41, núm. 2. Available in: <https://www.redalyc.org/jatsRepo/870/87046120006/html/index.html>
- Macías, V. J. F. (2016). El flujo de las remesas en México y su relación con variables macroeconómicas. Paper presented at the 21° Encuentro Nacional sobre Desarrollo Regional en México, 15 al 18 de noviembre en Mérida, Yucatán. Available in: <http://ru.iiec.unam.mx/3317/1/163-Macias.pdf>
- Meyer, D., y Shera, A. (2017). The impact of remittances on economic growth: An econometric model. *Economía*, 18(2), 147-155. Available in: <https://www.sciencedirect.com/science/article/pii/S1517758016300753>
<https://doi.org/10.1016/j.econ.2016.06.001>
- UN. (2019). Los migrantes internacionales suman 270 millones en 2019. Organización de las Naciones Unidas, noticias del 27 noviembre. Available in: <https://news.un.org/es/story/2019/11/1465971>.
- UN. (2019a). La cifra de migrantes internacionales crece más rápido que la población mundial. International migrant stock 2019. United Nations. 17 de septiembre. Department of Economic and Social Affairs Population. Available in: <https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates19.asp>
- UNESCO. (2018). Resumen del Informe de Seguimiento de la Educación en el Mundo 2019: Migración, desplazamiento y educación: Construyendo puentes, no muros. Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO), Paris, Francia. Available in: <https://www.acnur.org/5bf4858d4.pdf>
- Pellegrino, A. (2008). La migración calificada en América Latina. *Revista de Foreign Affairs* (abril -junio).
- Ramírez, G. T., y Meza, L. G. (2011). Emigración México-Estados Unidos: balances antes y después de la recesión económica estadounidense [La situación demográfica de México]. In CONAPO (Ed.), *La situación demográfica de México*.

Ramírez, T., y Aguado, D. (2013). Determinantes de la migración de retorno en México, 2007-2009. La situación demográfica de México, 175-190. Available in: http://www.conapo.gob.mx/work/models/CONAPO/Resource/1725/1/images/10_Determinantes_de_la_migracion_de_retorno_en_Mexico_2007_2009.pdf

Red Internacional de Migración y Desarrollo. (2008). Contribución de los migrantes mexicanos a la economía de Estados Unidos. *Migración y Desarrollo*, núm. 11, pp. 137-138, segundo semestre. Red Internacional de Migración y Desarrollo México. Available in: <http://www.redalyc.org/articulo.oa?id=66011754007>

Salas Alfaro R. y Pérez Morales, M. (2006). Determinantes macroeconómicos de las remesas y su efecto en la distribución del ingreso en México. *Economía y Sociedad*, XI (18 julio-diciembre), 11. Available in: <https://www.redalyc.org/pdf/510/51001802.pdf>

Sulbarán Lovera, P. (2019). Mexicanos en Estados Unidos: las cifras que muestran su verdadero poder económico. *BBC News Mundo en Los Ángeles*, del 6 febrero. Available in: <https://www.bbc.com/mundo/noticias-internacional-46705825>

Vargas-Silva, C. (2009). The Tale of Three Amigos: Remittances, Exchange Rates, and Money Demand in Mexico. *Review of Development Economics*, Vol. 13, Issue 1, pp. 1-14, february. Available at SSRN: <https://ssrn.com/abstract=1330661> or <http://dx.doi.org/10.1111/j.1467-9361.2008.00468.x>

Tarazona, S. J., Cuadra, A. P., Romero, H., y Fajardo, E. J. (2018). Remesas y crecimiento económico en Colombia para el periodo (2000-2016"). *Revista Espacios*, 39(03), 22. Available in: <https://www.revistaespacios.com/a18v39n03/18390322.html>.

Circular economy and waste management in the textile manufacturing industry

Economía circular y gestión de residuos en la industria textil

RESENDIZ-VEGA, Marisol†, SÁNCHEZ-TRUJILLO, Gabriela* and MONTAÑO-ARANGO, Oscar

ID 1st Author: *Marisol, Resendiz-Vega* / ORC ID: 0000-0001-8199-6548, Researcher ID Thomson: T-7946- 2018, CVU CONACYT ID: 819939

ID 1st Co-author: *Gabriela, Sánchez-Trujillo* / ORC ID: 0000-0002-9093-1081, CVU CONACYT ID: 346119

ID 2nd Co-author: *Oscar, Montaña-Arango* / ORC ID: 0000-0002-4093-2529

DOI: 10.35429/JFE.2021.8.5.20.25

Received January 20, 2021; Accepted June 30, 2021

Abstract

The Circular Economy presents a new logic for producing and consuming through the optimization of resources, technological innovation and the development of new business models. It is a model to advance towards a productive transformation that invites industries, the public sector, academia and civil society to adopt different actions. Such as the case of the textile and clothing industry, in which every season change a large number of garments become waste without being used. A paradigm shift opposed to the linear economy is proposed, based on a circular economy in which important cultural changes could be reached in society and lead to zero waste, where everything we produce and consume can safely return to nature or society, for this purpose, an application model is proposed in the textile manufacturing industry, for the detection of counting, handling, reduction and disposal of waste.

Circular economy, Life Cycle Analysis (LCA), Waste, 9R

Resumen

La Economía Circular presenta una nueva lógica para producir y consumir a través de la optimización de los recursos, la innovación tecnológica y el desarrollo de nuevos modelos de negocios. Se trata de un modelo para avanzar hacia una transformación productiva que invita a las industrias, sector público, academia y la sociedad de civil a adoptar diferentes acciones. Tal es el caso de la industria textil y de la confección, en la que cada temporada se cambia una gran cantidad de prendas que se desperdician sin ser utilizadas. Se propone un cambio de paradigma opuesto a la economía lineal, basado en una economía circular en la que se puedan alcanzar importantes cambios culturales en la sociedad y desembocar en un residuo cero, donde todo lo que producimos y consumimos pueda volver de forma segura a la naturaleza o sociedad, para tal fin, Se propone un modelo de aplicación en la industria textil, para la detección de conteo, manejo, reducción y disposición de residuos.

Palabras clave

Economía circular, Análisis del ciclo de vida (ACV), Residuos, 9R

Citation: RESENDIZ-VEGA, Marisol, SÁNCHEZ-TRUJILLO, Gabriela and MONTAÑO-ARANGO, Oscar. Circular economy and waste management in the textile manufacturing industry. Journal-Financial Economy. 2021. 5-8:20-25.

* Correspondence to Author (Email: magdags@uaeh.edu.mx)

† Researcher contributing first author.

Introduction

The linear economy has led to a rapid and global increase in resource extraction. Its basic logic is to extract primary natural resources, producing an ever-increasing quantity of products, generally designed not to last long, involving dubious environmental standards and toxic effects. The products are then transported around the world by means of intensive use of energy, ensuring their fast and compulsive consumption, where they are finally disposed of in landfills or incinerators. In this sense, the linear economy is not only driving excessive consumption and unsustainable exploitation of natural resources, but also contributes to increasing waste production, a problematic aspect in itself, (Fischedick, M., et al., 2014).

The IPCC already recognizes that programs that reduce, reuse, and recycle municipal waste are effective and high-impact means of reducing greenhouse gas emissions. In fact, a zero-waste circular economy goes beyond the 3 Rs model and proposes a much more comprehensive transformation of our production and consumption patterns to achieve high resource efficiency and thus move towards a zero-waste society and zero emissions (Waste hierarchy, 2013).

As opposed to the linear economy, the basis of a circular economy is a zero-waste society, where everything we produce and consume can safely return to nature or society.

The best waste is the one that is never produced. In fact, waste prevention and reduction is the preferred option in the waste hierarchy in terms of sustainability (Fig. 1).

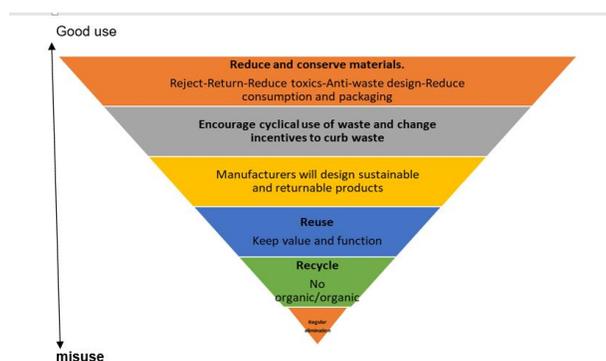


Figure 1 Waste hierarchy

Textiles, aluminum, food waste and plastic are among the main wastes that can be decisive for the mitigation of climate change, if they are reduced (Eunomia, 2015). In the production of textiles, for example, greenhouse gas emissions totaled 1,200 million tons of CO₂ equivalent in 2015, more than the total generated by all international flights and maritime transport combined, mainly due to the “fast fashion or fast fashion” of the global rates of production and consumption of clothing products. If only the average number of times a garment is worn were doubled, GHG emissions would be 44% lower (Ellen MacArthur Foundation, 2017). A zero-waste circular economy for textiles, including high utilization rates for clothing, improved recycling, and reduced waste in production, would reduce negative impacts.

One of Mexico's great challenges is waste management since it produces more than 44 million tons per year and this number is estimated to reach 65 million by 2030. Today, approximately 90 percent of solid waste ends in outdoor dumps or landfills (Gutiérrez, 2006)).

The textile sector in Mexico consists of approximately 20,000 companies, of which 90% are small and medium-sized (SMEs), responsible for around one million direct and indirect jobs Information from the System of National Accounts of Mexico of the National Institute of Statistics, Geography and Information Technology (INEGI), indicates that from 2003 to 2017, the sector has remained relatively stable and has generated more than 120 million pesos annually with a slight upward trend since 2012 (INEGI, 2018).

This project arises from the need for the Textile Manufacturing company established in Hidalgo State, México, to carry out a diagnosis of the current situation of the generation of waste and create a history of its management, developing and implementing a program in the clothing and embroidery area based on existing Mexican regulations.

The project focused on the following points: identify, classify, quantify the waste from the manufacturing and embroidery process.

The form of reduction from the source generation, economic, environmental valuation without forgetting the final disposal, through the participation of its personnel to create environmental awareness, through the reuse, recycling and reincorporation of some by-products to the process seeking to implement objectives of the circular economy.

Methodology to be developed

The focus of the study is quantitative descriptive experimental since it seeks to determine what waste is generated and in what quantity to make a management proposal that will be implemented and feedback will be given to the managers and personnel involved, with the consecutive training and to observe its effects on other variables.

Theoretical Methods

The methods used were those described in the Official Mexican Standards on waste: NOM-051-Semarnat, NOM-052-Semarnat-

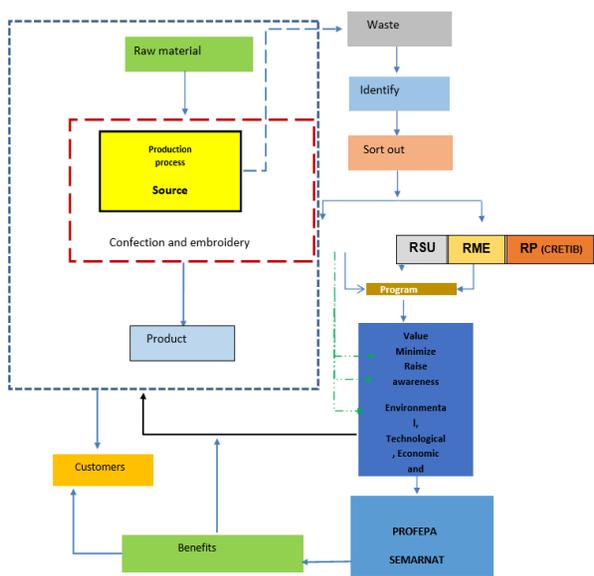


Figure 2 Methodology applied
Source: Own elaboration

Results

A daily count was made of each of the identified residues; Obtaining as a result that 73.68% of Solid Urban Waste and 13% of Hazardous Waste are generated and the same percentage of Special Handling Waste (Table 1). In each of the types of waste it is feasible: Avoid its generation, minimize it, reuse, recycle and, failing that, recycle.

Classification	Units	Percentage
Special Handling Waste	5	13.15%
Dangerous residues	5	13.15%
Municipal Solid Waste	28	73.68%
TOTAL	38	100.00%

Table 1 Results of the garment area waste classification
Source: Own elaboration

In figure 1 we can see that of the MSW the one that is generated in greater quantity is the fabric, followed by the paper and in third place of generation is the thread. All of them can be done through training and awareness of staff; eliminate or decrease its generation.

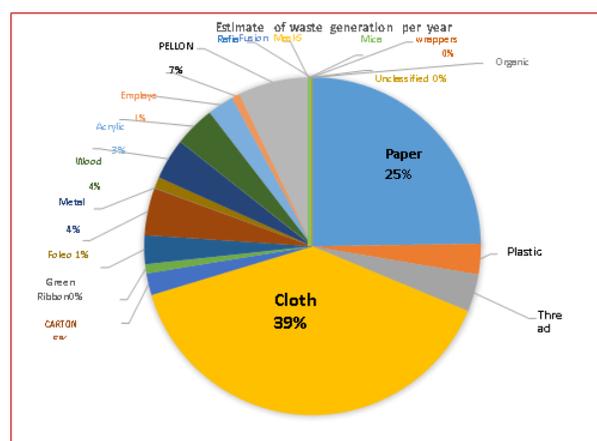


Figure 1 Estimation of MSW in one year
Source: Own elaboration

In table and figure 2 we can specifically review the hazardous wastes that were identified. These wastes were reviewed in their safety data sheets (SDS) and non-hazardous alternatives were identified to replace them.

Product	quantity	weight (Kg)	
		Weight per unit	Total
loose everything	12 piezas	0.121 Kg	1.452 Kg
Adhesive 620	72 piezas	0.121 Kg	8.712 Kg
silicone248	12 piezas	0.121 Kg	1.452 Kg
Oil	24.22 L *	0.90 Factor	21.798 Kg
Silicone 223	12 piezas	0.121 Kg	1.452 Kg
Plastic cleaner	6 piezas	0.121 Kg	0.726 Kg
Contaminated rags	2 bolsas		2.369 Kg
TOTAL			37.961 kilograms

Note: The conversion of the liters of oil generated to kilograms was carried out through the density of the lubricating oil, which is 900 kg / m3, so that 1 liter of oil weighs 0.900 kilograms, information taken from (LIQ-ES. A de CV (nd). safety data sheet soluble oil product 1: 20 and 1: 30)

Table 2 Kilograms of RP generated in one year (estimate)
Source: Own elaboration

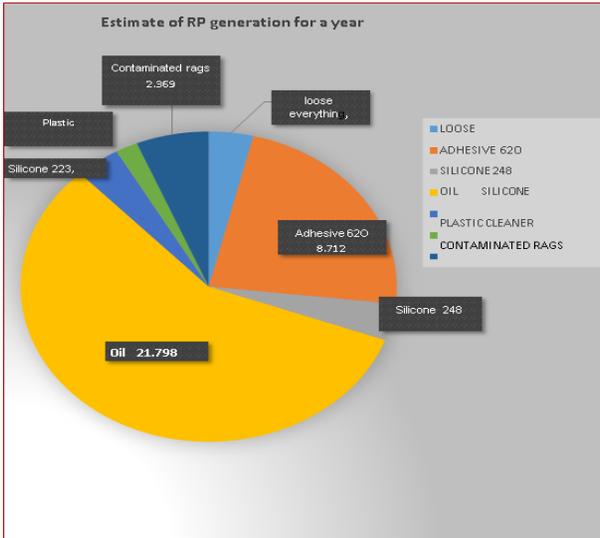


Figure 2 We can see that the RP that is most generated is Oil, followed by Adhesive and in third place, contaminated rags

The estimation of the RME generated in a year is made and the following graph is obtained, see (figure 3). Which shows the kilograms of each waste and the percentages they represent annually.

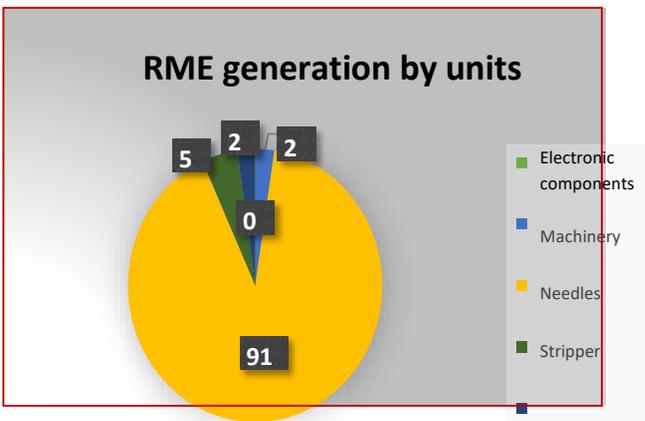


Figure 3 Results expressed in kilograms of SMR and their respective percentage

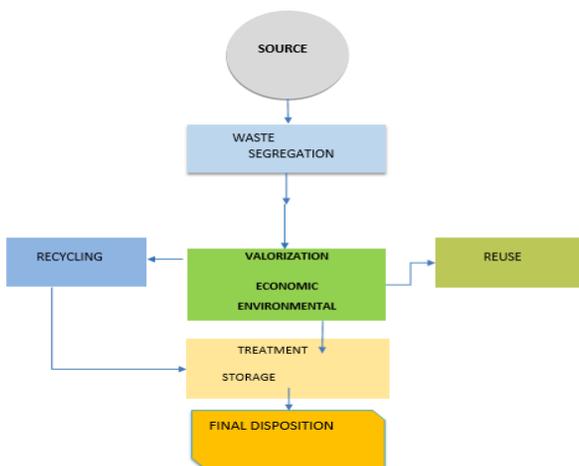


Figure 4 Process for waste reduction
Source: Own elaboration

Figures 4 and 5 represent the waste management procedure: MSW and RME; They will be economically valued once classified and separated and will be channeled for Recycling, Reuse and treatment. It is proposed to reduce the generation of those destined for Final Disposal.

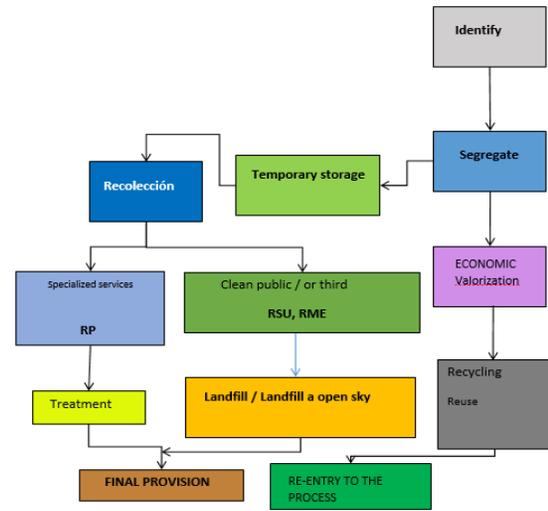


Figure 5 Process for the final disposal of waste
Source: Own elaboration

It is proposed to adopt the classification of waste by colors in accordance with the Design Guide for the Graphic Identification of the Integral Management of Urban Solid Waste of the (SEMARNAT, 2018).

For the identification and segregation of the waste generated in the clothing and embroidery area, separation by colors was proposed, in order to obtain a visual aid, and accelerate the learning process, reducing time for the staff.

In Hidalgo, state there is no a NOM that specifies the correct separation of waste by colors, for this reason the federal *Design Guide for the Graphic Identification of the Integral Management of Solid Urban Waste 2015* and the environmental standard were used for the federal district NADF-024-AMBT-2013, which establishes the criteria and technical specifications under which the separation, classification, selective collection and storage of waste from the federal district must be carried out. Following, the correct iconography is presented to classify the waste generated in the clothing and embroidery area, it is of vital importance that all the members of the departments know it. It is recommended to implement strategies to disseminate such information (figure 6).



Figure 6 Proposed iconography for the primary and secondary classification of urban solid waste
 Source: (SEMARNAT, 2018)

Subsequent, the location within the area of preparation and embroidery of the containers for the collection and classification of waste is proposed.

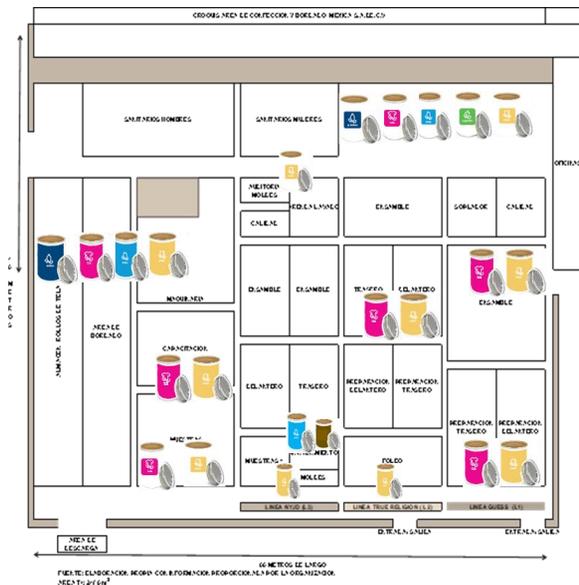


Figura 7 Container location in process area
 Source: Own elaboration

Conclusion

The Textile Manufacturing sector produces, to a greater extent (73%) Urban Solid Waste, which is viable for reuse, recycling and, above all, its reduction. It is important to note that the amounts were estimated without prior awareness and training. It is expected that after these events the generation of the different types of waste decreased. It is feasible in this sector to carry out the zero-waste policy.

A zero-waste circular economy needs the help of policies that make the sale of services in lieu of goods legally and economically viable, that goods are durable and repairable, reusable and upgradeable, that promote shared or leased ownership, and support programs. deposit and return.

In short, the consumption of resources should be discouraged and services around products, such as their maintenance and repair, should be encouraged, where in turn they should be more economical.

Also increase taxes on the use of virgin natural resources; This will help decrease the use of resources while encouraging companies to adopt circular patterns of production and consumption.

Reference

CMP. (2013). Centro Mexicano para la Producción Más Limpia. Technology, (133), 0–2. <https://doi.org/10.1177/0044118X09353437>

Diario Oficial de la Federación. (2006). Reglamento de Ley General Para La Prevención y Gestión (pp. 1–61). Retrieved from http://www.profepa.gob.mx/innovaportal/file/4140/1/reg_lgpggir.pdf

Diario Oficial de la Federación (DOF). Ley General para la Prevención y Gestión Integral de los Residuos. México. 2003. (última reforma 22 de mayo de 2015). SEMARNAT. Guía para la Gestión Integral de los Residuos Sólidos Municipales. SEMARNAT. México. 2001.

Ellen MacArthur Foundation. (2017). A new textiles economy: Redesigning fashion’s future. <https://www.ellenmacarthurfoundation.org/publications/a-new-textiles-economy-redesigning-fashions-future>

Fishedick, M., et al. (2014). Industry en IPCC, Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Gutiérrez, A.V. (2006). Diagnóstico básico para la gestión integral de residuos. (Secretaría de Medio Ambiente y Recursos Naturales e Instituto Nacional de Ecología, Eds.) (1st ed., p. 113). México. Retrieved from <http://www.semarnat.gob.mx/archivosanteriores/informacionambiental/singir/Documents/DiagnosticoBasico2006.pdf>

Waste hierarchy (2013). The 3Rs to the Zero Waste hierarchy', en Zero Waste International Alliance. <https://zerowasteurope.eu/2013/04/zero-waste-hierarchy/>

Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). (2005). Norma oficial mexicana NOM-052-semarnat-2005. Última Reforma Publicada DOF 23-06-2006, Pp.40.

Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) (2009). Guía para el cumplimiento de obligaciones contenidas en la Ley General para la Prevención y Gestión Integral de los Residuos y su Reglamento. http://biblioteca.semarnat.gob.mx/janium/Documentos/Ciga/libros2009/CD_002173.p

Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). (2015). Recuadro | Regulación ambiental para el manejo de los residuos en el país. Junio 15, 2019, de DGEIA Sitio web: https://apps1.semarnat.gob.mx:8443/dgeia/informe15/tema/recuadros/recuadro7_2.html

Secretaría de Medio Ambiente y Recursos Naturales. (SEMARNAT) (2016). Informe de residuos, 380. http://www.semarnat.gob.mx/dgeia/informe_12/pdf/Cap7_residuos.pdf

Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). (2019 a.). Empresas autorizadas para el manejo de residuos peligrosos. Retrieved 1 August 2019, from <https://www.gob.mx/semarnat/documentos/empresas-autorizadas-para-el-manejo-de-residuos-peligrosos>.

Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). (2019 b) ley General para la Prevención y Gestión Integral de los Residuos. (n.d.). http://www.diputados.gob.mx/LeyesBiblio/ref/lpggir/LGPGIR_orig_08oct03.pdf.

Impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (inverted classroom) year 2022

Impacto del uso de las herramientas tecnológicas en la administración de los procesos educativos del TESJO con la aplicación del modelo híbrido (aula invertida) año 2022

AYALA-RÍOS, Irma Amelia†*, GONZÁLEZ-CRUZ, Saúl and LÓPEZ-SÁNCHEZ, Iván

Tecnológico de Estudios Superiores de Jocotitlán, México.

ID 1st Author: Irma Amelia, Ayala-Ríos / ORC ID: 0000-0002-2303-089X, CVU CONACYT ID: 599469

ID 1st Co-author: Saúl, González-Cruz / ORC ID: 0000-0001-5221-5722, CVU CONACYT ID: 599471

ID 2nd Co-author: Iván, López-Sánchez / ORC ID: 0000-0002-7014-8137, CVU CONACYT ID: 1168654

DOI: 10.35429/JFE.2021.8.5.26.32

Received January 25, 2021; Accepted June 30, 2021

Abstract

In the current scenario and considering a progressive and adaptable radical change to the economic, educational and social conditions of our country exacerbated by the pandemic by COVID-19, motivates us to analyze various educational models, in which ICT are fundamental as tools for the proper management of virtual and face-to-face education models that are handled in higher education, we consider that the technological infrastructure for the face-to-face and online model should be increased, since their combination gives us a new model known as hybrid or inverted classroom, which is already applied in several institutions. It is relevant to highlight that both teachers and students assume an important role in the use and application of electronic platforms considering that it has revolutionised the teaching and learning process compared to the traditional model. In this sense, we know that the training of students and teachers must be constant because it is essential to have the skills for the proper management of technological platforms and resources.

Technologies, Electronic Platforms, Teachers, Higher Education, Infrastructure, Infrastructure

Resumen

En el escenario actual y considerando un cambio radical progresivo y adaptable a las condiciones económicas, educativas y sociales de nuestro país exacerbado por la pandemia por COVID-19, nos motiva al análisis de diversos modelos educativos, en los que las TICS son fundamentales como herramientas para el manejo adecuado de los modelos de educación virtual y presencial que se manejan en la educación superior, consideramos que se debe incrementar la infraestructura Tecnológica para el modelo presencial y en línea, dado que su combinación nos da un modelo nuevo conocido como híbrido o aula invertida, mismo que ya se aplica en varias instituciones. Es relevante destacar que tanto docentes como alumnos asumen un rol importante en el uso y aplicación de las plataformas electrónicas considerando que ha revolucionado el proceso de enseñanza aprendizaje comparado con el modelo tradicional. En ese sentido sabemos que la capacitación de alumnos y docentes debe de ser constante porque es fundamental contar con las habilidades para el manejo adecuado de plataformas y recursos tecnológicos.

Tecnologías, Plataformas Electrónicas, Docentes, Educación Superior, Infraestructura

Citation: AYALA-RÍOS, Irma Amelia, GONZÁLEZ-CRUZ, Saúl and LÓPEZ-SÁNCHEZ, Iván. Impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (inverted classroom) year 2022. Journal-Financial Economy. 2021. 5-8:26-32.

† Researcher contributing first author.

* Correspondence to Author (Email: irma.ayala@tesjo.edu.mx)

Introduction

In the 21st century, what is called the information society has been shaped, by virtue of this, technological tools flow instantaneously that contribute to generating important changes in many spheres of social and educational life. Information and communication technologies have played an important role in society by introducing a dynamic and immediate way of accessing information and establishing new communication structures at all levels. To adapt to these changes, educational institutions, especially at the higher level, have carried out various actions related to their introduction, use and specific applications, some of which are: the acquisition of an important technological base, the implementation of policies specific information on the diversified use of ICT in their administrative and academic processes, the integration of some technological tools in teaching and learning processes, and in some cases, the development of cutting-edge technologies. When returning to educational activities, it is necessary to avoid crowds in educational centers, so it is necessary to think about instituting educational alternatives such as the mixed hybrid model, which would help as an alternative for academic activities to be developed in a staggered manner. for the teaching-learning process, thus achieving those students develop specific competencies for their level of studies. In this way, teachers, in addition to the appropriation of content, must be oriented to a new contingent and methodological effort shared among students to improve didactic processes. The virtualization of the contents thus raises a new paradigm for ICT-assisted education, whose objective is to facilitate the performance of academic activities in any academic context, having the relationships between students and tutors in the creation of new knowledge through technological devices of information. At the Tecnológico de Estudios Superiores de Jocotitlán is no exception, the teachers belonging to it consider that information and communication technologies are an ideal tool to develop the hybrid model because it will allow planning and developing a globalized work with less effort and achieving the pedagogical innovation that favors both students of the same.

Problem statement and justification

Distance education is complex in nature and scope, involving a wide range of non-traditional forms of teaching and learning. Faced with unforeseen scenarios such as the COVID-19 pandemic, a real challenge was posed to the global socio-economic system.

In the case of education, the academic sector has been directly affected and has been forced to develop a context of digitization between the different productive sectors.

In general, it is teaching that occurs far from the place of learning, requires the use of technologies (Moore and Kearsley, 2012), allows flexible time management and gives students greater autonomy. (Vlachopoulos and Makri, 2019).

In that sense and according to what can be observed today and the experiences that leave us learning, education and its models have undergone an evolution over time, there are factors that accelerate changes, adapting to the future and combining the use of ICT in education.

The hybrid model is a mixed model where students are participatory, make better use of time and economic resources, achieving processes of reasoning and reflection, knowledge is deeper and is not based on a simple memorization of concepts.

However, it is important to highlight that the internet opens new horizons to create knowledge, formal and informal education is related to the hybrid model combining virtual education with face-to-face education. The new generations have used cyberspace as entertainment, leaving aside the wealth that this tool comprises with learning.

Among the advantages of the hybrid model, we can mention that they are related to the independent progress of the student through the search for information and critical thinking. It allows a better management, processing and distribution of information, in terms of the educational relationship and enhances the possibilities of reflective learning and collaborative work inside and outside the classroom.

The flipped classroom is an alternative that helps according to the interests of the students. In it, the teacher is not only an exhibitor of information and knowledge, his function is to be a tutor of learning, ensuring that the activities that were previously carried out at home are now carried out in the classroom and what was carried out in the classroom, now it is done at home, thus making the student responsible for their own knowledge and learning.

Based on the above, it is undeniable that the use of ICT can bring great advantages with greater and better use of time, ease of teamwork, more motivation and interest when developing their tasks, although there may be some disadvantages, such as the fact that teachers are not sufficiently trained or familiar with them, or that students do not take academic activities so seriously, given the ease with which they obtain the information. Still, the pros outweigh the potential cons, highlighting some of the benefits of incorporating technology into higher education:

- The ease of accessing information and the variety of information available.
- The high reliability parameters and the speed of information and data processing.
- The variety of communication channels they offer.
- The elimination of space-time barriers.
- The possibilities of feedback and great interactivity that they offer.
- The development of flexible spaces for learning.
- The empowerment of personal autonomy and the development of collaborative work.
- The optimization of the organization and the development of teaching and research activities.
- They streamline administrative and management activities, in addition to allowing them to be relocated from the immediate context.

It is undeniable that from these benefits the teaching-learning process must be transformed; both students and teachers have the opportunity to take advantage of the maximum capabilities offered by the use of the internet.

Educational technology does not consist only in the use of the internet, it is also possible to take advantage of it within the educational field to carry out activities both inside and outside the classroom, being part of the learning processes. Educational technology strengthens knowledge by achieving its understanding through audios, videos and images, and represents a support for the teacher in terms of its transmission.

By implementing technology in the classroom, two transcendent points in the life of the student are overcome, on the one hand, the acquisition of knowledge is facilitated and on the other, it prepares for their insertion into the labor field, since the profile of the graduate demands the use constant technology and communication, and in this way a participatory environment is generated within the educational community, managing to develop collaborative work.

It is necessary for students to become aware of their social reality. Political, economic and cultural, and to conclude that it depends on the proper use of information and communication technologies.

Undoubtedly the models will be face-to-face, hybrid and totally online, it will make use of artificial intelligence and various programs and platforms that are linked to self-learning guided by us as teachers, it is something that evolves by leaps and bounds at all levels. stop or return to the past, everything evolves. The hybrid flipped classroom model is a watershed in a new reality in the face of a changing world scenario and exposed to unforeseen situations, we are certain that the traditional model as a paradigm has totally changed, education is constantly changing and if it can be replaced traditional model through the hybrid model, which combines and merges the models, with the use of current technology, but requires the participation of all sectors involved in education, government organizations, management level, teachers, students, through a series of Well-designed, well-planned and well-implemented strategies in online and face-to-face mode, requires teamwork and foresight in the face of all new possible scenarios.

General objective

- Analyze the impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (flipped classroom) year 2022.

Specific objectives

- Investigate the theoretical context on the flipped classroom model in the Accountancy academy.
- Analyze the impact of the use of the hybrid model in the TESJO.
- Development of educational strategies for the implementation of the flipped classroom model in the career of Public Accountant of the TESJO

Theoretical reference

In this sense, Marc Prensky (2010, p. 5) points out the differences between being a native and being a digital immigrant, because they are substantial. The natives are all those who were born and trained using the digital language of computer games, video and the Internet; and digital immigrants are the ones who have been forced by necessity to train day by day, adapting to the environment and the environment, but always keeping a certain connection with the past. This is reflected in the teaching / learning process, since the students have all the experience in technology and digital matters, while the teachers have been constantly learning and incorporating this technology in our way of teaching. Likewise, through the use of technological tools, teachers could innovate their pedagogical practices, which would generate an important change in the educational process.

For Kustcher and St. Pierre (2001, p. 31), the ICTs that have an impact on the educational field are computers and peripherals (cameras, compact discs, printers and videos, for example), digital information (databases, web pages) and digital communication (electronic forums, messaging and videoconferencing).

In this way, the teaching / learning process goes beyond the traditional classroom hours and the teacher is no longer a simple transmitter of knowledge. Using ICT represents the opportunity and the challenge to innovate educational processes.

Cabero (2007) rightly points out that it is necessary to see technologies as educational means and resources, but not as the panacea that will solve the problems of the educational field. Therefore, the teacher must use them to help create an environment conducive to learning and reinforcing content seen in class.

In such an environment, learning must be active, responsible, constructive, intentional, complex, contextual, participatory, interactive, and reflective (Kustcher and St. Pierre, 2001). In this sense, Paulo Freire (2005) insists that education has to be a liberating space, facilitating learning, to train creative, critical, reflective and purposeful students in their own context; and, also, that you have to leave behind the banking or traditional education to which you were accustomed, to make way for the digital age.

Methodology

The present investigation was carried out from the quantitative approach by means of the design and application of a survey of closed reagents. The research was carried out in the 8 groups of Public Accountants that make up the Degree belonging to the Technological of Higher Studies of Jocotitlán, the above is due to the fact that the teachers received online courses on the subject under study, which allowed to put the knowledge into practice acquired.

From the aspects developed in this research, we intuit that the frequency with which teachers use the different technological tools and their mastery of them are two factors that support the results of the research.

Because they sought to measure specific variables related to the activities of the teacher, it was decided to design a new instrument that would adhere to the specific activities of research, teaching and extension, leaving aside the possibility of applying an instrument already developed on teachers and information technologies.

For the validation of the instrument, a pilot test was applied to 30 students, from the LN-0501 group, attaching a questionnaire to evaluate the congruence, writing, clarity and relevance of the questions. On the other hand, its internal consistency was calculated through Cronbach's Alpha, obtaining a score of 0.920. This same calculation was made from the 215 surveys collected, where a value of .0967 was obtained, considering it highly reliable.

The application of the survey was done virtually through the Microsoft forms platform, by means of a general invitation sent to the email accounts of the selected participants, through random numbers. It should be noted that, based on the experience of other researchers regarding the application of online instruments, the invitation was made to 10 teachers, which is why it was possible to collect the required number of the calculated sample.

To obtain the sample size, the statistical standards of 95% confidence level and a margin of error of 5% were followed, the calculation was made on a basis of 3 full-time teachers and 7 subject teachers who belong to the Technological of Higher Studies of Jocotitlán. The population is made up of 247 elements and 215 answered questionnaires were collected.

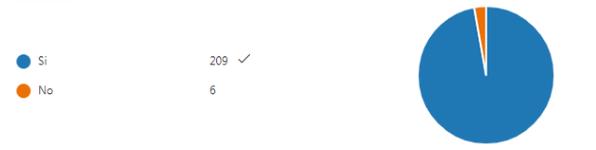
The data obtained were analyzed using the spss software and worked through a Chicuadrada test with a contingency table.

Partial or final results and discussion

Learning theories are the gateway for the enrichment of applications in different social areas, they provide the elements to open a wealth of experiences and experiences in any situation of daily life. Delving into each of them provides the tools, as well as the structures of their behavioral repertoire. (April, 2021). It is necessary to consider that if the institutions have the financial capacity to develop their own adaptive systems it would be great, however it cannot always be this way because the economic capacity for public universities is limited, however it can be tried with the resources that It is also important to mention that there are platforms and systems that are free and that only require an internet connection, the reality is that even with all these problems, it is necessary to try to continue immersed as active actors in this evolutionary educational model of continuous improvement.

Continuing the analysis of our results, we consider it pertinent to incorporate what was collected by the instrument applied to the students of the Public Accountant degree and based on their responses we refer that 97% of the respondents mention that the teachers of their subjects have relied on information technologies for the development of its agenda; The foregoing leads us to confirm that there has indeed been a positive impact and initiative of teachers in keeping students at the forefront of technology and migrating from the traditional model to the effective use of information technologies.

Más detalles



Graphic 1

It is important to note that it has not been an easy process for both parties, however, the effort and interest of both; allows us to conclude that it continues to innovate in the improvement of teaching-learning processes.

The quality of academic products is of vital importance in any teaching-learning process; and it allows the student to create and innovate in such a way that the use of knowledge in each of their subjects is reflected; Based on the above, 90% of the students surveyed answered that the use of technological platforms has helped them improve the quality of their academic products; It is of great importance to highlight this point; since students can now have much more information tools and sources of consultation to improve their academic production day by day in each subject they study.

Más detalles

Insights



Graphic 2

The academic training of each of the students is an accumulation of data that in the future will serve as a parameter in their working life; and we refer to the term parameter as a reference to follow; since in the workplace and according to the activity or line in which they work, they may fully or partially apply such knowledge seen in classrooms. It is very true and known to all that what we learn in our educational institutions is only a reference in working life; just as the policies, processes, environments, technologies, innovations, changes and updates of data and information will always be variable in each economic entity; Thus, 90% of our respondents consider that the technological platforms occupied in each of their subjects have helped them to have a broader vision in their future working life.



Graphic 3

We can see the above on a day-to-day basis, given that economic entities have had to adapt to such platforms also to stay within their different markets; Nowadays, with a world of technological applications and electronic platforms, it is how the business processes of each of them are generated.

We have heard of a well-known saying that practice makes perfect; and this is brought up by the following reference; 93% of the surveyed students responded that preparing their academic products and uploading them to digital platforms has allowed them to reinforce their technological skills; It is very true that as in all new knowledge there is a learning process; and surely that under the panorama that we continue living in the subject of public health; Such practice in the students has helped them to improve and of course to have a certain level of mastery of electronic platforms.



Graphic 4

The analysis of the level of knowledge about digital platforms shows us encouraging results given that the answers indicate that the interpretation of the students on this item indicates that 76% of all students have the knowledge and skills necessary to use it. platforms, while 24% do not have it.



Graphic 5

Regarding the use and assignment of videos, articles and technological tools to improve academic achievement and the knowledge acquired, it gives us a very favorable result with 95% of favorable responses and only 5% of unsatisfactory responses.



Graphic 6

In the sense of the traditional and digital models, the preference of the students leans 60% towards the traditional model because it allows them to assimilate and better understand the content of the program of each subject while 40% consider that the digital and the forms are better. to understand the topics of the programs.



Graphic 7

Finally, the respondents suggest that institutions work with faster digital platforms and that they are easy to install in mobile applications and on the personal computer, in the same way they ask for greater flexibility and tolerance for connection problems and lack of internet.

Conclusions

With the integration of information and communication technologies in higher education, teachers have been generating new strategies and activities that until a few years ago were not contemplated, as well as the integration of networks of teachers at a national and international level to exchange practical experiences and knowledge; participation in virtual forums and congresses that allow teachers to have training experiences that help strengthen their practice; the possibility of studying distance programs, both for updating and postgraduate training, thereby increasing the qualification of teachers without the need to move geographically, and in general, a modification of their teaching, communication, management, linking and research activities.

For higher-level students to be able to make effective use of technology to enrich their learning process, it is necessary that they have the appropriate orientation. In this sense, teachers bear most of the responsibility; first, because they have a closer and permanent contact in the entire training process of their students, and second, because those who can identify the specific actions where information technologies can support them, especially in the proper management of the large number of information to which we are exposed.

In this sense, teacher training and updating in the use of ICT is essential, because in this way we can channel and disseminate more efficiently the knowledge and content of the academic programs that we teach at our institution.

References

Etxeberri, J.M. y J.A. Blanco Gorrichóa. "Un método óptimo para la extracción de proteínas del mero en Bilbao," *Revista Castellana* (en línea) , Vol. 2, No. 12, 2003, consultada por Internet el 21 de abril del 2004. Dirección de internet: <http://revistacastellana.com.es>.

Puebla Romero, T., C. Dominguini y T. T. Micrognelli. "Situaciones inesperadas por el uso de las ecuaciones libres en la industria cocotera," *Congreso Anual de Ingeniería Mecánica*, Instituto Tecnológico y Científico Gatuno, 17 de Abril de 2005.

Instructions for Scientific, Technological and Innovation Publication

[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 1st author: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Author ID - Open ID) and CVU 1st author: (Scholar-PNPC or SNI-CONACYT) (No.10 Times New Roman)

ID 1st coauthor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Author ID - Open ID) and CVU 1st coauthor: (Scholar or SNI) (No.10 Times New Roman)

ID 2nd coauthor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Author ID - Open ID) and CVU 2nd coauthor: (Scholar or SNI) (No.10 Times New Roman)

ID 3rd coauthor: (ORC ID - Researcher ID Thomson, arXiv Author ID - PubMed Author ID - Open ID) and CVU 3rd coauthor: (Scholar or SNI) (No.10 Times New Roman)

(Report Submission Date: Month, Day, and Year); Accepted (Insert date of Acceptance: Use Only RINOE)

Abstract (In English, 150-200 words)

Objectives
Methodology
Contribution

Keywords (In English)

Indicate 3 keywords in Times New Roman and Bold No. 10

Abstract (In Spanish, 150-200 words)

Objectives
Methodology
Contribution

Keywords (In Spanish)

Indicate 3 keywords in Times New Roman and Bold No. 10

Citation: 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. Paper Title. Journal- Financial Economy. Year 1-1: 1-11 [Times New Roman No.10]

* Correspondence to Author (example@example.org)

† 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

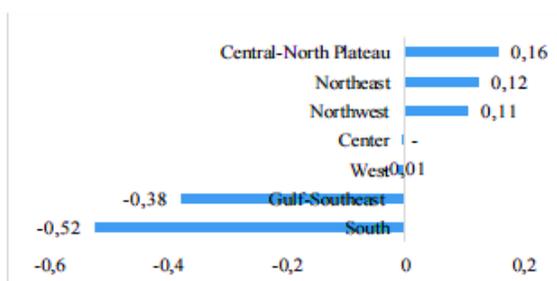
[Title No.12 in Times New Roman, single spaced and Bold]

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.

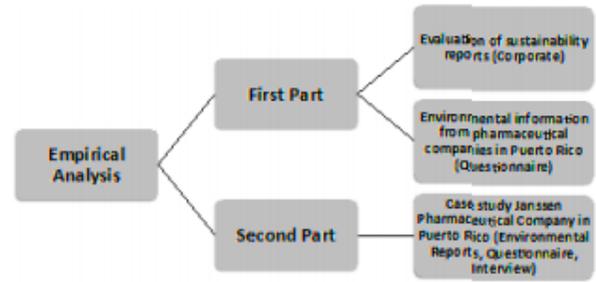


Figure 1 Title and Source (in italics).

Should not be images-everything must be editable.

Modality	Activities of the Value Chain
Financial cooperation	The need for financial resources and the difficulty in finding financing
Technological cooperation	The rapidity in the development of the technology and its complexity
Cooperation in production	The fundamental search for acquiring scale and within-reach economies that permit the reduction of production-associated costs and risks
Commercial cooperation	Seek the following objectives: reduce costs and risks in the commercialization process, penetrate new markets, complete the gamma of products offered, procure access to distribution channels, etc.

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:

$$Y_{ij} = \alpha + \sum_{h=1}^r \beta_h X_{hij} + u_j + e_{ij} \quad (1)$$

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.

Instructions for Scientific, Technological and Innovation Publication

Conclusions

Explain clearly the results and possibilities of improvement.

References

Use APA system. Should not be numbered, nor with bullets, however if necessary numbering will be because reference or mention is made somewhere in the Article.

Use Roman Alphabet, all references you have used must be in the Roman Alphabet, even if you have quoted an Article, book in any of the official languages of the United Nations (English, French, German, Chinese, Russian, Portuguese, Italian, Spanish, Arabic), you must write the reference in Roman script and not in any of the official languages.

Technical Specifications

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 Originality
Format Author and Coauthors

-Authentic Signature in Color of the Acceptance
Format of Author and Coauthors

Reservation to Editorial Policy

RINOE Journal-Financial Economy 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. RINOE® 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 RINOE® 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 RINOE Journal-Financial Economy 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 RINOE® in its Holding Spain 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

The publication of this Article supposes the transfer of the copyright to RINOE® in its Holding Spain for its RINOE Journal-Financial Economy, which reserves the right to distribute on the Web the published version of the Article and the making available of the Article in This format supposes for its Authors the fulfilment of what is established in the Law of Science and Technology of the United Mexican States, regarding the obligation to allow access to the results of Scientific Research.

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 RINOE® 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

RESEARCH GATE (Germany)

GOOGLE SCHOLAR (Citation indices-Google)

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

Article Translation

Article Publication

Certificate of Article

Service Billing

Editorial Policy and Management

38 Matacerquillas, CP-28411. Moralarzal - Madrid - Spain. Phones: +52 1 55 2024 3918, +52 1 55 6159 2296, +52 1 55 4640 1298; E-mail: contact@rinoe.org www.rinoe.org

RINOE® Journal-Financial Economy

Editor in chief

BLANCO - GARCÍA, Susana. PhD

Executive director

RAMOS-ESCAMILLA, María. PhD

Editorial Director

PERALTA-CASTRO, Enrique. MSc

Web designer

ESCAMILLA-BOUCHAN, Imelda. PhD

Web Diagrammer

LUNA-SOTO, Vladimir. PhD

Editorial Assistants

TREJO-RAMOS, Iván. BsC

Translator

DÍAZ-OCAMPO, Javier. BsC

Philologist

RAMOS-ARANCIBIA, Alejandra. BsC

Advertising & Sponsorship

(RINOE® - Spain), sponsorships@rinoe.org

Site Licences

03-2010-032610094200-01-For printed material, 03-2010-031613323600-01-For Electronic material,03-2010-032610105200-01-For Photographic material,03-2010-032610115700-14-For the facts Compilation,04-2010-031613323600-01-For its Web page,19502-For the Iberoamerican and Caribbean Indexation,20-281 HB9-For its indexation in Latin-American in Social Sciences and Humanities,671-For its indexing in Electronic Scientific Journals Spanish and Latin-America,7045008-For its divulgation and edition in the Ministry of Education and Culture-Spain,25409-For its repository in the Biblioteca Universitaria-Madrid,16258-For its indexing in the Dialnet,20589-For its indexing in the edited Journals in the countries of Iberian-America and the Caribbean, 15048-For the international registration of Congress and Colloquiums. financingprograms@rinoe.org

Management Offices

38 Matacerquillas, CP-28411. Moralarzal - Madrid – Spain.

Journal-Financial Economy

“Strategic planning in the business sector, to promote the sustainability of small and medium enterprises”

AGUILAR-PÉREZ, Esmeralda

Tecnológico Nacional de México Campus San Martín Texmelucan

“Macroeconomic variables of the United States and their effect on Mexican migration and remittances”

FIGUEROA-HERNÁNDEZ, Esther, PÉREZ-SOTO, Francisco, GODÍNEZ-MONTOYA, Lucila and PÉREZ-FIGUEROA, Rebeca A.

Universidad Autónoma del Estado de México

Universidad Autónoma Chapingo

University of Bristol

“Circular economy and waste management in the textile manufacturing industry”

RESENDIZ-VEGA, Marisol, SÁNCHEZ-TRUJILLO, Gabriela and MONTAÑO-ARANGO, Oscar

“Impact of the use of technological tools in the administration of the educational processes of the TESJO with the application of the hybrid model (inverted classroom) year 2022”

AYALA-RÍOS, Irma Amelia, GONZÁLEZ-CRUZ, Saúl and LÓPEZ-SÁNCHEZ, Iván

Tecnológico de Estudios Superiores de Jocotitlán

