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The works must be unpublished and refer to topics of political, science-economics-public, policy-economic, development-technology, innovation and other topics related to Social Sciences.

Presentation of the Content

In the first article we present, *Proposal for the improvement of the integral logistics of a courier, shipping and express delivery company in the city of Villahermosa, Tabasco*, by ELISEO-DANTÉS, Hortensia, MOREJÓN-SÁNCHEZ, Juana María, PÉREZ-GARMENDIA, Gloria and BALDERRABANO-BRIONES, Jazmín, with adscription in the TecNM Campus Villahermosa, TecNM Campus Mérida, TecNm Campus Úrsulo Galván, as the next article we present, *Culture moderates the intention to purchase tourist accommodation online*, by PÉREZ-PÉREZ, Isabel, GÓMEZ-HINOJOSA, Carolina, MUNDO-GÓMEZ, José Rodolfo and VELÁZQUEZ-CASTILLEJOS, Gabriel, with adscription in the Universidad Autónoma de Chiapas, as the next article we present, *Fertilization of peanut (Arachis hypogaea L.): effects on production and economic profitability in the context of Orinda, Rosales, Chihuahua*, by ONTIVEROS-GÓMEZ Samantha, ONTIVEROS-GÓMEZ, Guadalupe, ORTEGA-MONTES, Fabiola Iveth and RASCÓN-SOLANO, Joel, with adscription in the Universidad Autónoma de Chihuahua, as the last article we present *Exploration of bactericidal effects and disinfecting agents on microorganisms*, by GONZÁLEZ-GARCÍA, Arcelia, REYES-ESCOBEDO, Fuensanta del Rocío, GONZÁLEZ-MARTÍNEZ, Lilia and ÁLVAREZ-GONZÁLEZ, Patricia Montserrath, with adscription in the Universidad Autónoma de Zacatecas.

Content

Article **ECORFAN Journal-Republic of Paraguay**
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Proposal for the improvement of the integral logistics of a courier, shipping and express delivery company in the city of Villahermosa, Tabasco

Propuesta para el mejoramiento de la logística integral de una empresa de servicios de mensajería, envíos y entregas exprés en la ciudad de Villahermosa, Tabasco

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Abstract

Logistics activities currently represent variables of singular importance in the competitiveness of companies, which is evidenced by evaluating their impact on costs, their link with the level of customer service, their importance in the reliability of operations, safety, and their determining role with respect to many of the values perceived by the market. The purpose of this study is to evaluate logistics processes in an integral manner, considering the before, during and after of these processes. The methodology considers the Likert scale to collect qualitative aspects and transform them into quantitative aspects in order to obtain the necessary information to design a proposal that fits the requirements and needs of the company under study.

Productivity, Integral measurement, Instrument

Resumen

Las actividades logísticas representan en la actualidad, variables de singular importancia en la competitividad de las empresas, lo cual se evidencia al evaluar su incidencia en los costos, su vínculo con el nivel de servicio al cliente, su importancia en la confiabilidad de las operaciones, la seguridad, y su rol determinante respecto muchos de los valores percibidos por el mercado. El presente estudio tiene como finalidad evaluar os procesos logísticos de manera integral, considerando el antes, durante y después de estos procesos. La metodología considera la escala de Likert para recopilar aspectos cualitativos y transformarlos a aspectos cuantitativos y así obtener la información necesaria para diseñar una propuesta que se acople a los requerimientos y necesidades de la empresa objeto de estudio.

Logística, Likert, Instrumento de medición

Citation: ELISEO-DANTÉS, Hortensia, MOREJÓN-SÁNCHEZ, Juana María, PÉREZ-GARMENDIA, Gloria and BALDERRABANO-BRIONES, Jazmín. Proposal for the improvement of the integral logistics of a courier, shipping and express delivery company in the city of Villahermosa, Tabasco. ECORFAN Journal-Republic of Paraguay. 2023. 9-16:1-6.

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Introduction

Logistics activities currently represent variables of singular importance in the competitiveness of companies, which is evident when evaluating their impact on costs, their link with the level of customer service, their importance in the reliability of operations, safety, and their determining role with respect to many of the values perceived by the market.

This is why logistics is no longer just a way of managing regional, national or international distribution flows, opting for the optimization of operating costs, services and times.

Logistics today is understood as integrated and involves multiple key business relationships between the members of a value chain.

For companies dedicated to courier services, shipments and express deliveries, the study and analysis of integrated logistics for continuous improvement represents a competitive advantage. Therefore, it is necessary to consider not only internal aspects, but also external ones such as economic, social, cultural, technological, environmental and political variables.

Methodology

For the present research, the Likert scale was used, which is a rating scale used to question an individual on his or her level of agreement or disagreement with a statement. It is ideal for measuring reactions, attitudes and behaviours of a person, i.e., qualitative aspects.

Unlike a simple yes/no question, the Likert scale allows respondents to qualify their answers and broaden the spectrum to diversify the degree of their response.

The Likert scale is one of the types of measurement scales used primarily in marketing research for understanding a consumer's opinions and attitudes towards a brand, product or target market.

It is useful mainly for measuring and understanding the degree of agreement of a person or respondent to a certain affirmative or negative statement. It also has the following advantages:

- To have statistical elements that help you make intelligent decisions.
- Know the performance of the areas in relation to customer management.
- Know how satisfied customers are during their journey and what their relationship with the company is like.
- Have a tool to improve advertising, sales management and customer service.
- Get a support for the constant improvement of your inbound strategy by analysing the quality of interactions.

A measurement instrument was designed in three parts, elements integrated in the process before logistics, during logistics and after logistics, as shown in tables 1, 2 and 3.

Each section will be made up of questions essentially designed to assess in detail the current situation of the company in terms of logistics. It is worth mentioning that each question will be evaluated under the Likert scale where:

5 = Strongly agree

4 = Agree

3 = Undecided

2 = Disagree

1 = Strongly disagree

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	Measuring Instrument Questions	Likert scale 5	4	3	2	1
BEFORE	Does the company have adequate and efficient suppliers for its needs?					
	Do you consider that the company does not carry out a prior assessment when choosing a supplier?					
	Do you think the company evaluates its suppliers poorly?					
	Do you think that the methods they use to evaluate supplies and suppliers are not optimal?					
	Does the company not have the type of warehouse that suits its needs?					
	Does the company not have an adequate supply source?					
	Do you consider that the company meets today's sustainability needs?					
	Does the company adapt and innovate to the needs of its customers?					
	Is the company's technology adequate?					
	Do you consider that the company complies with the guidelines established by the different supplier, supply and sustainability standards?					

Table 1 Comprehensive evaluation instrument
Source: Own elaboration

	Measuring Instrument Questions	Likert scale 5	4	3	2	1
DURING	Do you have an efficient customer control system?					
	Do you consider customer service to be good?					
	Does the company promote the development of the company?					
	Is the packaging in an appropriate way?					
	Do they consider themselves a good innovation and technology company?					
	How flexible is the company to changes in the environment?					
	Are there frequent problems with orders?					
	What measures are taken to avoid problems in the process with the customer?					
	Do you consider the methods used to avoid problems in the logistics system to be efficient?					
	Do you consider that the company is not using the right technology to be competitive with others?					

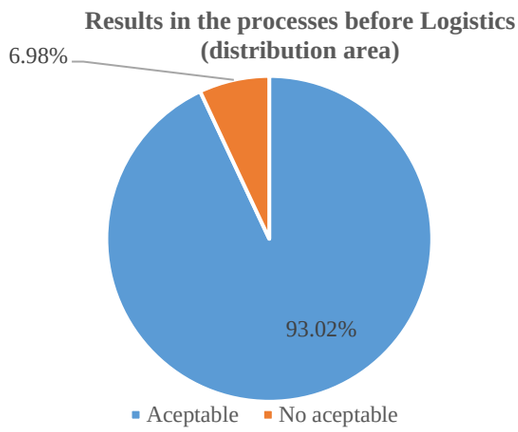
Table 2 Comprehensive evaluation instrument
Source: Own elaboration

	Measuring Instrument Questions	Likert scale 5	4	3	2	1
AFTER	Are the transport and cargo units in good condition?					
	Do you consider that the service is as efficient as they say it is?					
	Do you consider that the company is at the forefront of technology with respect to its service?					
	Is sustainability promoted by the company?					
	Does the company guarantee the fulfilment of the service in time and form?					
	Do you consider the company to be innovative and technological?					
	Does the company take measures to be able to avoid problems in the customer process?					
	How accessible is the company to current changes?					
	Is the company's communication with other departments adequate?					
	Do you think that the company is technologically up to date with regard to its services?					

Table 3 Comprehensive Evaluation Instrument
Source: Own elaboration

Results

The instrument was applied to two areas of the company; in the distribution area it was possible to obtain the data shown in graph 1, where it can be seen that 93.02% of the activities carried out in the different departments are acceptable, and that 6.98% of minor failures are registered due to different factors external to the organization.



Graphic 1 Results in the processes before Logistics (distribution area)
Source: Own elaboration.

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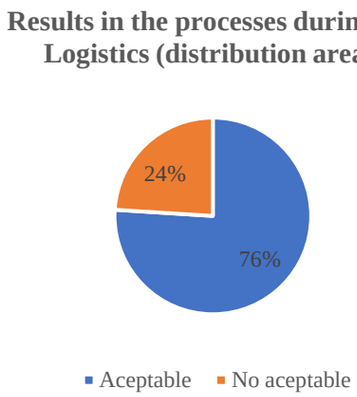
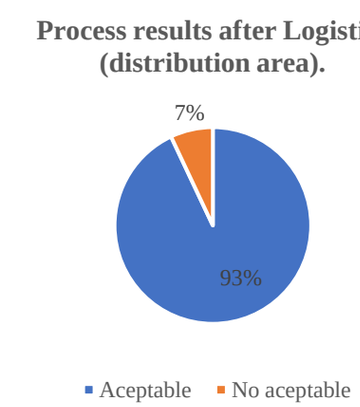
According to the data obtained in graph 2 it can be interpreted that the activities carried out in this department in the phase during the logistic process have 76% of acceptance with respect to the registered values and 24% also derived from minor problems because of the changing environment in which we are in.



Graphic 2 Results in the processes during the logistics (distribution area)
Source: Own elaboration

According to the information gathered and shown in Graph 3, it is interpreted that the activities carried out in the departments in the after phase of the logistics process have an efficient level of acceptance of 93% and 7% is due to the problems that still derive from the pandemic.

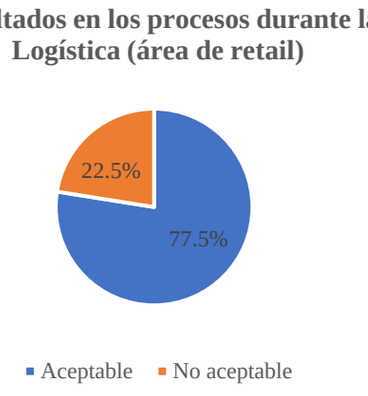


Graphic 3 Process results after logistics (distribution area)
Source: Own elaboration

The second area evaluated was retail, where it can be observed that 85.37% of the activities carried out in the different departments are acceptable, and that 14.63% of minor failures are registered due to different factors external to the organisation, as shown in graph 4.

Graphic 4 Results in the processes before Logistics (retail area)
Source: Own elaboration

In graph 5 it can be seen that the activities carried out in this department in the phase of during the logistic process have 77.50% of acceptance with respect to the registered values and 22.50% also derived from minor problems as a consequence of the changing environment in which we are living.



Graphic 5 Results in the processes during Logistics (retail area)
Source: Own elaboration

Graph 6 shows that the activities carried out in the departments in the after phase of the logistics process have an efficient level of acceptance of 87.50% and 12.50%.

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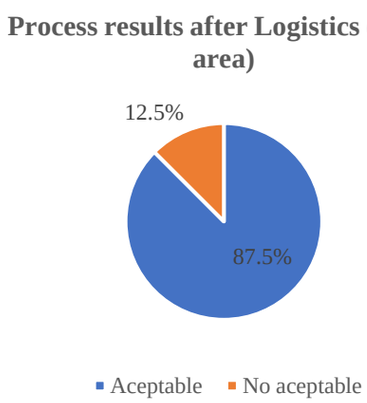

Graphic 6 Process results after logistics (retail area)
Source: Own elaboration

Proposal

Nowadays companies assume that the main assets of any organization are focused on people, i.e., customers.

Large companies depend on several factors for their stability in the market, these are: The quality of the product or service they offer to their customers, productivity, profitability, customer satisfaction and internal and external image.

The internal image is the reflection of the corporate policy within the organization. The external image is the actions in relation to the outside world: customers, partners, competitors.

For a company to function properly, the focus must be on the people who work in the organization so that they are committed and have all the necessary tools to carry out their day-to-day tasks.

Inadequate management of the people working in an organization can cause countless problems in the performance of an organization.

- Lack of motivation.
- Ignorance of responsibilities.
- Lack of training / information.
- Lack of internal communication.
- Lack of cooperation (Empathy, teamwork, etc.).
- Lack of coordination.
- Lack of leadership.
- Conflicts of interest.
- Work climate.

The internal communication of the organization towards the workers is a very important part of the organization, since by fulfilling this task, it can be said that there will be a good working environment where a commitment of all the parties involved will be achieved, an efficient leadership will be exercised and there will be an excellent coordination between all the people within an organization.

Internal communication goes hand in hand with productivity because if there is a good working environment within the organization there will be good planning and execution, but if there is no good communication then the opposite will happen and the reason for the problem must be verified.

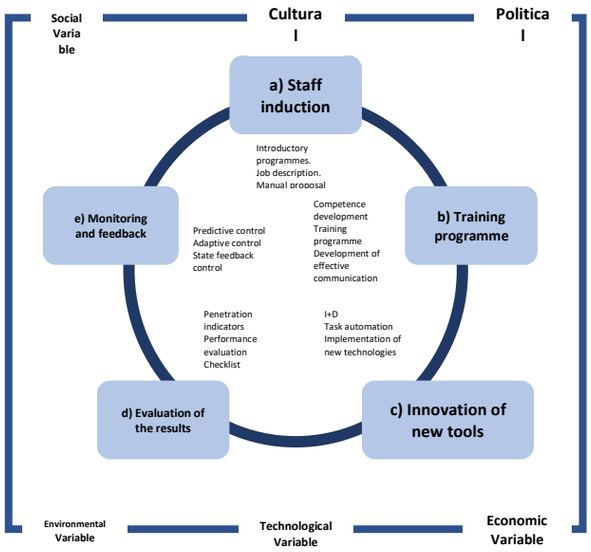

Figure 1 Improvement proposal for the improvement of Logistics
Source: Own elaboration, 2023

Conclusions

Today, we can say that integrated communication enables organisations to deliver a consistent message across channels to support the business objective and create a more seamless experience for stakeholders and to build trust and loyalty among them.

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Integral logistics seeks a balance from a systemic approach, which is of great importance for companies to be able to have the ability to respond in a reliable, courteous and accessible way that serves in the quality of communications as the fundamental objective and to develop strategies more attuned to the needs of customers.

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Culture moderates the intention to purchase tourist accommodation online

La cultura modera la intención de compra en línea de alojamiento turístico

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Abstract

The origin of the models of culture in electronic commerce is aimed at explaining the factors that influence the acceptance of this purchasing system, which is why they contemplate cultural differences of the consumer according to their nationality. Therefore, this research analyzed studies that have implicit models with moderating effects applied by Hofstede, (1980) *cultural values*. A questionnaire was administered to 500 buyers of tourist accommodation. Carrying out a descriptive study of the sociodemographic variables with the purpose of verifying the moderating effect of culture, a Multigroup Analysis -AMG-. Subsequently proceeding to contrast the structural model from the three antecedents raised theoretically -attitude, subjective norm and perceived control- which turned out to have a direct impact on the purchase intention.

Attitude, Subjective norm, Perceived control

Resumen

El origen de los modelos de cultura en el comercio electrónico está encaminado a explicar los factores que influyen en la aceptación de este sistema de compra, por lo que contemplan diferencias culturales del consumidor de acuerdo a su nacionalidad. Por ello, esta investigación analizó estudios que llevan implícitos modelos con efectos moderadores aplicados por Hofstede, (1980) *valores culturales*. Se administró un cuestionario a 500 compradores de alojamiento turístico. Realizando un estudio descriptivo de las variables sociodemográficas con el propósito de verificar el efecto moderador de la cultura, un Análisis Multigrupo –AMG-. Procediendo posteriormente a contrastar el modelo estructural a partir de los tres antecedentes planteados teóricamente –actitud, norma subjetiva y control percibido- lo que resultó tener un impacto directo sobre la intención de compra.

Actitud, Norma subjetiva, Control

Citation: PÉREZ-PÉREZ, Isabel, GÓMEZ-HINOJOSA, Carolina, MUNDO-GÓMEZ, José Rodolfo and VELÁZQUEZ-CASTILLEJOS, Gabriel. Culture moderates the intention to purchase tourist accommodation online. ECORFAN Journal-Republic of Paraguay. 2023. 9-16:7-14.

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Introduction

The factors involved in the acceptance of innovation in e-commerce purchasing are those related to culture, as culture represents a set of shared values that can influence consumer intentions, attitudes, preferences and acceptance (Correia, 2011; Cleveland and Chang, 2009; Dinev et al., 2009; Manrai and Manrai, 2011; Moghadam and Assar, 2008; Pookulangara and Koester, 2011; Ruiz-Mafe et al. 2013; Sabiote et al. 2012). It is therefore important to understand the influence of culture on consumer decision-making. However, the influence of culture on the acceptance of a technology still suffers from a lack of attention from researchers (Pookulangara and Koester, 2011; See-Pui, 2013).

Therefore, the purpose of this study is to propose an integrative model that captures the existing relationships between attitude, subjective norm and perceived control towards the intention to purchase tourist accommodation on the Internet and the moderating effect of culture; in a representative sample of 240 Mexican tourists and 260 Spanish tourists, in the period from August to December 2022.

Likewise, in the methodology, a descriptive analysis was carried out to contrast the theoretical hypotheses proposed, studying the goodness of the psychometric properties of the measuring instruments used, using the technique of Confirmatory Factor Analysis (CFA); once the goodness of the instrument was accepted, it was analysed using the Structural Equation Model, also known as the Covariance Structure Model (SCM), to conclude with the Multigroup Analysis (MGA). Finally, the results and conclusions of the study, the recommendations drawn from it, as well as proposals for future lines of research are presented.

Theoretical assumptions

The impact of culture and cross-cultural differences on purchase intention has re-emerged in the marketing literature (Putit and Arnott, 2007). Therefore, the aforementioned authors concluded in their study that social influence has a positive impact on attitudes, beliefs and values and is therefore well accepted for studying services offered in E-Commerce. In their results they have homogenised national culture with Hofstede's cultural dimensions and Triandis' syndrome.

Thus, it is argued that some societies are multicultural as would be Malaysia and assume that the national one is fundamentally monocultural.

The micro and intra-national culture hypothesis impacts on consumer behaviour and has been explored in conceptual work that integrates the cultural variable into the purchase intention model based on the Theory of Planned Behaviour (TPB) and the Theory of Reasoned Behaviour (TRA) models. Currently behaviour has been supported by the mediating role of intention between antecedents of behaviour and current behaviour and Internet purchase intention has been selected as the dependent variable. It is argued that the analysis of TPB and TRA, five antecedents of intention to adopt technology were identified: attitude, social norm (subjective), perceived control, self-efficacy and technological innovation.

In their model Zhou et al. (2007) study the relationship between consumer characteristics (demographic variables, culture, purchase orientation, perceived outcomes, normative beliefs and attitude) and online purchase intention. The authors concluded that the existing differences in this type of purchase between men and women have been decreasing and that in the future it will even be surpassed by this group (women). In addition, culture is a factor that directly and positively influences normative beliefs and perceived outcome, thereby reinforcing the attitude and intention to buy online.

Methodology, analysis and discussions

Descriptive sample analysis

The analysis of the results begins with a descriptive analysis of the information, aimed at characterising the sample used in this research in terms of the following socio-demographic variables: gender, age, occupation, educational level and income. Table 1 shows the frequency distribution of the variables for the total sample (n=500), and for the subsamples of Spain (n=260) and Mexico (n=240).

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Variable	Levels	N Total = 500	n Spain = 260	n Mexico = 240
Gender	Male	51,8%	52,6%	51%
	Female	48,2%	47,4%	49%
Age	Up to 24	33,7%	13,5%	54%
	25-34	24,9%	29,9%	20%
	35-49	27,6%	36,3%	19%
	50-64	11,2%	16,5%	6%
	>= 65	2,4%	3,8%	1%
Studies	Basic-Primary-Secondary	17,4%	16,9%	18%
	Baccalaureate -FP-BUP-COU	42,6%	40,8%	44,4%
	Univ. media	18,1%	12,5%	23,7%
	Univ. superiors	21,8%	29,8%	13,9%
Occupation	Student	19,6%	8,9%	30,3%
	Trab. x c/p	13,2%	11,3%	15,2%
	Trab. x c/a	46,7%	55,4%	38%
	Retired	4,4%	6,8%	2%
	Household chores	8,4%	5,3%	11,5%
	Unemployed	7,6%	12,3%	3%
Revenue	Below average	24,5%	22,3%	26,7%
	Similar to the average	40,1%	37,5%	42,8%
	Above average	28%	32,4%	23,6%
	Well above average	7,3%	7,8%	6,9%

Table 1 Socio-demographic variables
Source: Own elaboration

As can be seen, with respect to the distribution of the gender variable - 51.8% of men - there is proportionality in the characterisation of the sample. There is a significant proportion of individuals up to 24 years of age (33.7%), followed by those between 35 and 49 years of age (27.6%). Generally speaking, education is average -Bachillerato-FP-BUP and COU- (42.6%) or university education (39.9%). With regard to current occupation, a significant percentage of the subjects analysed are employees (46.7%), which, together with the 13.2% of self-employed workers, means that almost two thirds of the sample analysed is employed; furthermore, 19.6% of the individuals are students. In relation to the income level of their household, 40.1% of the subjects are classified as middle class, with 28% claiming to have an above-average level of income.

In relation to each of the sub-samples, in the case of Spain, there is a predominance of the 25-49 age range (66.2%), mainly employed workers (55.4%), with a fairly high level of education (42.3% with university studies) and medium (37.5%) or medium-high (32.4%) incomes. In the case of Mexico, a large percentage of the sample belongs to the under 35 age group (74%), with an average education (44.4% with Bachillerato-FP-BUP and COU studies), and with an average income level (42.8%), with a significant percentage of below-average income (26.7%).

Analysing and contrasting the moderating role of culture

The data analysis process consists of testing the proposed model, referring to the influence of culture on purchase intention. To this end, we proceed to analyse the moderating role played by culture in purchasing behaviour. In order to test this moderating effect, a Multigroup Analysis (MGA) is carried out. The model to be tested is a structural model in which the three theoretically proposed antecedents - attitude, subjective norm and perceived control - have a direct bearing on purchasing behaviour. Figure 1 shows the Model.

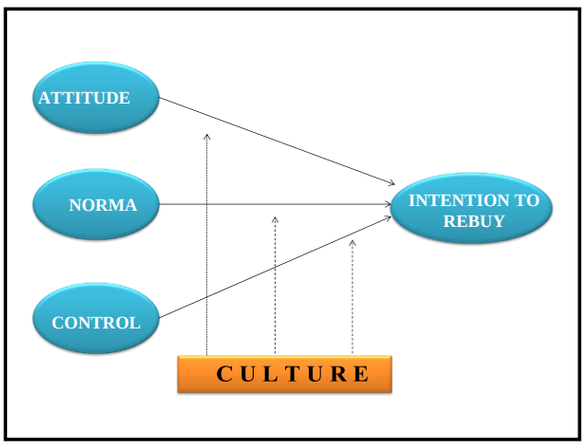

Figure 1 Model Culture and TPB
Source: Own elaboration

To validate the measurement instrument, a confirmatory factor analysis was carried out by EQS 6.2 using robust maximum likelihood estimation (Satorra and Bentler, 1988).

To ensure convergent validity, items whose factor loadings were non-significant or below 0.60 (Bagozzi and Yi, 1988) or for which the Lagrange multiplier test suggested significant relationships on a factor other than the one for which they were indicators (Hatcher and Stepansky, 1994) were eliminated. Specifically, the observed variables NORM1 and INTC3 were eliminated. After elimination, the measurement model presented a good fit - BBNFI= 0.900; BBNNFI=0.951; CFI=0.959; IFI=0.959; RMSEA=0.035-, confirming the convergent validity of the measurement model (see Table 2).

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Regarding reliability, all Cronbach's Alpha (Cronbach, 1951) exceeded the recommended value of 0.70 (Nunnally and Bernstein, 1994). The composite reliability index was also calculated, which was higher for all factors than the recommended value of 0.70, and the average variance extracted (AVE) showed values above 0.50 (Fornell and Larcker, 1981) (see Table 2).

Dimension	Indicator	Load	t robust	Average loads	α Cronbach's	Composite reliability	AVE
Attitude	ACTI1	.799	17.899	.83	.89	.90	.69
	ACTI2	.887	18.372				
	ACTI3	.858	17.060				
	ACTI4	.768	14.598				
Standard	NORM2	.751	17.401	.74	.71	.72	.56
	NORM3	.725	11.996				
Control	CONT1	.829	20.397	.83	.87	.87	.70
	CONT2	.895	17.792				
	CONT3	.780	15.803				
Purchase intention	INT1	.707	14.913	.77	.82	.82	.60
	INT2	.840	21.762				
	INT4	.774	17.658				
S-B □² (df = 47) =81.0012 (p<0.00); NFI=.96; NNFI=.97; CFI=.98; IFI=.98; RMSEA=.040							

Table 2 Reliability and convergent validity of the model measurement instrument
Source: Own elaboration

Regarding discriminant validity (see Table 3), it was found (1) that none of the 95% confidence intervals of the estimates of the correlations between each pair of factors contained the value 1 (Anderson and Gerbing, 1988) and (2) that the shared variance between each pair of constructs (squared correlation) was lower than their corresponding extracted variance ratios (Fornell and Larcker, 1981).

	1	2	3	4
1. Attitude	**.69**	.47	.61	.30
2. Standard	[.38;.58]	**.56**	.48	.51
3. Control	[.55;.70]	[.39;.60]	**.70**	.44
4. Intention	[.25;.52]	[.53;.82]	[.46;.70]	**.60**
Note: The diagonal represents the average extracted variance AVE. Above the diagonal is the variance shared by each pair of factors (squared correlation). Below the diagonal is the 95% confidence interval for the estimate of the correlation between the factors.				

Table 3 Discriminant validity of the proposed model measurement instrument
Source: Own elaboration

Analysis of causal relationships: contrasting the proposed theoretical model

The proposed model (illustrated in Figure 1), which has also been estimated using robust indicators (Satorra and Bentler, 1988), proposes that the intention to purchase tourist accommodation has three direct antecedents: attitude (H3), subjective norm (H1) and perceived control (H2).

Table 4 shows the testing of the hypotheses, the standardised coefficients of the tested structural relationships with their associated t-value, as well as the fit of the proposed model.

Hypothesis	Sign	Relation	Standardised coefficient	Robust t-value
H3	+	Attitude→Intention	.145*	2.138
H1	+	Norma→Intention	.414**	4.510
H2	+	Control→Intention	.274**	2.908
S-B χ^2 =82.9985; gl=48; p=0.000; BBNFI=.93; BBNNFI=.95; CFI=.96; IFI=.96; RMSEA=.056 **p<.01; *p<.05.				

Table 4 Hypothesis testing of the proposed model.
Source: Own elaboration

Again, it is found that the intention to book/purchase has three direct antecedents: attitude (α=0.145; p<0.05; acceptance of H3), perceived control (α=0.274; p<0.01; acceptance of H2) and subjective norm, with the latter variable having the strongest influence on purchase intention (α=0.414; p<0.01; acceptance of H1). The moderating role of culture in these relationships is then analysed.

The moderating role of culture

A step prior to carrying out the multi-group analysis (MGA) was to divide the total sample into two groups (Iglesias and Vázquez, 2001): the first group formed by Mexican Internet users who bought tourist accommodation (240 individuals) and the second group formed by Spanish Internet users who bought tourist accommodation (260 individuals).

The MGA is an analysis that has been developed in two distinct steps (Byrne, 2006; Brown, 2006).

First, the model was estimated for the two groups separately in order to test the significance of the structural relationships.

In the second step of the AMG, the model was tested jointly for the two groups, including the restriction that the standardised coefficients in the structural model are equal in both groups.

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To test whether there are significant differences in the causal parameters between the two groups, the variation of the $\chi 2$ statistic was observed by removing the restriction in the restricted model to equal a given parameter in the two groups. The Lagrange multiplier test provided such information. If the removal of a constraint leads to a significant change in the $\chi 2$ it means that allowing that parameter to be different in the two groups significantly affects the fit of the model. In that case it is assumed that there is a moderating effect of the variable considered to divide the sample into two groups.

Table 5 shows the standardised coefficients of the structural relationships of the model estimated for the two groups separately, the $\chi 2$ difference associated with each restriction of the joint model, as well as the goodness-of-fit indicators of the joint model.

Hip.	Relation	Mexico β (t)	Spain β (t)	Dif. $\chi 2$(df=1)	p
H10c	Attitude → Repurchase intention	.256 (2.702)	.049 (.498)	4.64	.025
H10a	Standard → Repurchase intention	.421 (3.292)	.378 (3.602)	4.70	.029
H10b	Control → Repurchase intention	.341(2.211)	.460 (4.723)	15.15	.000
Multisample model: S-B χ^2 (df = 99) =159.9598(p<0.00); NFI=.92; NNFI=.96; CFI=.97; IFI=.97; RMSEA=.049					

Table 5 Hypothesis testing for the two groups.
Source: Own elaboration.

As can be seen through the significance of the $\chi 2$ difference, and as predicted in the moderation hypotheses, the subjective norm has a stronger influence on purchase intention in the group of Mexican Internet users than in the group of Spanish Internet users (acceptance of H10a). This fact allows us to affirm that the positive relationship between norm and intention to book/purchase tourist accommodation is stronger in collectivist, normative cultures with a high degree of distance from power.

On the other hand, perceived control has a stronger influence on purchase intention in the sample of Spanish Internet users than in the sample of Mexican Internet users (acceptance of H10b), which again allows us to confirm that the relationship between both variables is stronger in individualistic cultures, more pragmatic and with less distance to power.

In relation to attitude, we found that its effect on intention is not significant in the case of Spain (B=.049; p<0.01), although it is significant in the case of Mexico (B=.256; p<0.01). This result leads us to reject H10c, which can be explained by the greater degree of experience of using the Internet as a shopping channel in the Spanish case and by the greater degree of indulgence in Mexico. Attitude in the Spanish sample takes a very high value (4.5 out of 5), so it is no longer a variable to consider when considering online purchase intention.

Results: conclusions and proposals for future studies

As can be seen in the list of results presented in this study, culture is one of the factors that has a considerable influence on online shopping attitudes. Culture allows us to present a set of highly relevant conclusions. Thus, the fact that Spain is more individualistic, pragmatic and with less distance from power means that perceived control has a stronger effect on the intention to book/purchase tourist accommodation than in the case of Mexico.

This shows that the Spanish sample has greater skills, resources and knowledge to be able to make purchases on the Internet, depending more on themselves to carry out the process/purchase, basing their behaviour on their own experiences. These tourists are more open to change and innovation, to try new products and new technologies, and are quicker to use electronic tools (Ruiz-Mafe et al. 2013; Yoon, 2009).

In relation to the subjective norm, the difference between the two countries can be explained by the degree of individualism/collectivism that exists. The subjective norm-intention relationship of 500 booking/purchase of tourist accommodation is stronger in the case of Mexico than in the case of Spain.

The literature review highlights that members of collectivist and normative societies, as is the case in Mexico, are more concerned with the opinion of their belonging group and society in general, than with their own ideas (Putit and Arnott, 2007). In a more individualistic and pragmatic society, such as Spain, people tend to make decisions based on their own criteria and not so much on the opinions of third parties.

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This fact leads to a number of studies showing that the influence of subjective norm on the intention to carry out a behaviour is less in individualistic societies than in collectivist societies (Abbasi et al. 2011; Dinev et al. 2009; Kim et al. 2012; Pookulangara and Koester, 2011; Ruiz-Mafe et al. 2013; Yoon, 2009).

Annex

	Construct	item description	Reference scale
TPB	Attitude	Using the Internet to book/purchase tourist accommodation.	Taylor & Todd (1995); Bhattacherjee (2002); George (2004).
		It's an idea I like	
		I think it's a smart idea	
		It's a good idea	
		I think it's a positive experience	
	Perceived control	Using the Internet to book/buy tourist accommodation is something I have mastered	Taylor & Todd (1995); Bhattacherjee (2002); George (2004).
		I have the resources, knowledge and skills to use the Internet to book/buy tourist accommodation.	
		I am capable of using the Internet to book/buy tourist accommodation	
	Standard subjective	People whose opinions I value approve of me using the Internet to book/buy tourist accommodation.	Taylor 6Todd (1995); Venkatesh y Davis (2000); Bhattacherjee (2002); George (2004).
		The people who influence my behaviour expect me to use the Internet to book/buy accommodation, rather than other means (physical agencies...)	
		People who are important to me think that I should use the Internet to book/buy tourist accommodation.	
PURCHASE INTENTION	Purchase intention	I plan to continue to use the Internet to book/purchase accommodation in the coming year.	Taylor & Todd (1995); Gefen & Straub (2000); Herrero et al. (2006).
		I expect to do some booking/purchasing of accommodation via the Internet in the coming year.	
		I will not use the Internet again to book/purchase tourist accommodation	
		I am likely to use the Internet again to book/purchase accommodation in the next year	

Table 6 Construct for the development of the culture model.
Source: Own elaboration.

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Fertilization of peanut (*Arachis hypogaea* L.): effects on production and economic profitability in the context of Orinda, Rosales, Chihuahua

Fertilización del cacahuate (*Arachis hypogaea* L.): efectos enla producción y rentabilidad económica en el contexto de Orinda, Rosales, Chihuahua

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Abstract

The peanut (*Arachis hypogaea* L.) is considered a nutritious food due to its nutritional value and is renowned as the most globally recognized snack. Chihuahua is one of the primary cultivating states of this crop in Mexico. In an effort to achieve global food security, agriculture developed and implemented new production practices to ensure increased productivity and food supply. However, finding a way to provide nutrients to peanut cultivation in an environmentally sustainable manner is crucial for the development of agricultural production in the region. The objective of this research was to determine the economic feasibility of peanuts (Virginia) in four fertilization scenarios in the community of Orinda in the municipality of Rosales, to identify the fertilization method that offers the best cost-benefit ratio. Four complete blocks were randomly established, each with five treatments and four repetitions for each treatment. Measurements of the plant and its fruits were taken from the establishment of the crop (April) to the harvest (September). Subsequently, the SAS statistical package was employed to obtain results through analysis of variance and Tukey's mean comparison test. The findings indicated that the mixed fertilization scenario provided the best results in terms of peanut production and profitability.

Soil, Nutrition, Production, Yield, Morphometric variables

Resumen

El cacahuate (*Arachis hypogaea* L.) es considerado un alimento con gran valor nutricional y es la botana más conocida a nivel mundial. Chihuahua es uno de los principales estados productores de este cultivo en México. En un afán de lograr la seguridad alimentaria en el mundo, la agricultura desarrolló e implementó nuevas prácticas de producción que garantizaran una mayor productividad y abastecimiento de alimentos. Sin embargo, encontrar una forma de proporcionar nutrientes al cultivo de cacahuate de forma ambientalmente sostenible, será significativo en la manera que se desarrolla la producción agrícola en la región. El objetivo de esta investigación consistió en determinar la factibilidad económica del cacahuate (Virginia) en cuatro escenarios de fertilización en la comunidad de Orinda en el municipio de Rosales, para identificar el método de fertilización que presenta la mejor relación costo beneficio. Se establecieron cuatro bloques completos al azar, con cinco tratamientos y cuatro repeticiones para cada tratamiento. Se realizaron mediciones de la planta y sus frutos, desde el establecimiento del cultivo (abril) hasta la cosecha (septiembre). Posteriormente, se empleó el paquete estadístico SAS para la obtención de resultados mediante análisis de varianza y la prueba de comparación de medias de Tukey. Obteniendo que el escenario de fertilización mixta es el que brinda mejores resultados de producción y rentabilidad en el cultivo de cacahuate.

Suelo, Nutrición, Producción, Rendimiento, Variables morfométricas

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Introduction

The peanut (*Arachis hypogaea* L.) belongs to the legume family and is native to South America (Pattee and Young, 1982), it is considered a good food, due to its nutritional value, it provides B vitamins, proteins and carbohydrates (Aparicio Fernández and Espinosa Alonso, 2015). In addition, peanuts are considered the world's most popular snack (Sánchez Ríos and Gutierrez López, 2019).

According to FAOSTAT (2023), considering only official figures, in 2021 there was a world production of 59.56 million tonnes of peanuts. In Mexico, according to the Ministry of Agriculture and Rural Development (2023), the agricultural closure in 2022, showed a volume of 86,165.09 tonnes of peanuts. The main producing states of this oilseed are: Chihuahua, Sinaloa, Chiapas and Puebla, with a group production of 62,365.10 tonnes, representing 72.38 % of national production. The Ministry of Agriculture and Rural Development (2023), indicates that the state of Chihuahua produced in 2022 a volume of 16,776.44 tonnes of peanuts, where the municipality of Rosales is the main producer in the Delicias district with 1,965.60 tonnes, representing 48.58 % of the district's production. This district is made up of the municipalities of Delicias, Rosales, Saucillo, Meoqui, Julimes, Camargo, La Cruz and San Francisco de Conchos.

To achieve food security in a rapidly growing population, agriculture evolved and moved into production practices that would guarantee greater productivity and food supply (Grasso and Díaz Sorita, 2020). However, even though great achievements have been made, there have also been negative effects in the process, with the excessive use of chemical fertilisers wreaking havoc on the environment (González Ulibarry, 2019). The decrease in crop yield per area is one of its main losses (Legaz Paredes and Primo Millo, 1988). Due to the above, it is important to have information on the use of chemical and organic fertilisers, as this information is currently lacking for the peanut crop and there is no updated fertilisation recommendation for the Delicias district.

The municipality of Rosales has been one of the main producers of peanuts in the Delicias district, where the community of Orinda contributes significantly to peanut production. In order to contribute with information for the decision making of the producers, it is essential to know the effects of chemical and organic fertilisation, as well as the adequate doses that improve the quality and yield of the production. In this sense, the objectives of this research are: 1) to identify the fertilisation scenario that generates the highest production in the peanut crop; 2) to quantify the costs for each fertilisation scenario for the peanut crop and 3) to determine the economic profitability for each fertilisation scenario.

Methodology to be developed

The experiment was established in the community of Orinda, municipality of Rosales, Chihuahua. In an ejido plot located in the coordinates 28° 26'91.24"N and 105°56'36.13"W.

The experimental design used was a randomised complete block design with four replications. The experimental unit was eight rows by ten metres, four rows were eliminated on each side and two metres at the beginning and two metres at the end to avoid the border effect. A useful plot of two rows by six metres was considered, so that the experimental plot had 8,000 plants and the useful plot had 400 plants.

Agronomic management

Sowing was carried out on 17 April 2023 under rainfed conditions with five auxiliary irrigations. The fertilization doses used for treatment I (TT1) was 40-60-00 of N-P-K, for treatment II (TT2) 40-60-00-10s of N-P-K (plus ammonium sulphate, sulphur), for treatment III (TT3) was 40-60-00 with 50% chemical and 50% organic application and for treatment IV (TT4) it was 40-60-00 covered 100% organically, all in a single application at the time of sowing. Treatment V (TT5) did not undergo any manipulation (control). The weed control used was Trifluralin® in pre-emergence and Diler120® in post-emergence, both at a dose of 1 L ha^{-1}. Pest control (whitefly) was carried out with the insecticide Citlalli 350 F® at a dose of 1 L ha^{-1} and disease control with the fungicide (cercospora) Cymoxanil® 1 Kg $ha^{-1.}$

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Variables evaluated

The morphometric variables measured were plant height (cm) from stem base to tip, plant cover (cm) from north to south and east to west (average), fresh and dry pod weight (gr), peanut moisture percentage, number of peanuts (in four m), kilograms of peanuts per ha, fresh and dry foliage weight (gr), foliage moisture percentage and kilograms of forage per ha. The financial variable that was calculated was the rate of return (ROI) and beneficial cost BC.

Benefit-cost analysis

Once the best evaluated treatment was determined, a cost-benefit analysis was carried out. To achieve this analysis, the simplest formula was used, i.e. the b/c ratio was calculated, where b represents the benefit and c the cost. The benefit is determined as a percentage and its interpretation is: if the result is greater than 1, it is acceptable or profitable; if the result is equal to 1, there is no profit or loss; and if the result is less than 1, it is not profitable, so the treatment or project is rejected. Its formula:

$$\text{Benefit Cost} = \left(\frac{\text{Beneficio neto}}{\text{Costo neto}}\right) \times 100$$

Results

Table 1 shows the mean squares of the analysis of variance for the 11 variables measured for the peanut crop. Showing that there is significance in each of them.

Source	DF	MC	Fvalor	Pr > F
Fresh weight	4	107116.5	17.62	**
Dry weight	4	69649.7	24.16	**
Peanut moisture %	4	7.75027	65.7	**
Number of peanuts	4	10373.675	22.19	**
Plant height	4	4.41675	6.25	**
Plant width	4	69.5475	13.15	**
Peanut kilograms	4	680172.852	24.16	**
Fresh foliage weight	4	198618.8	13.82	**
Dry foliage weight	4	25734.2	21.45	**
Foliage moisture %	4	1.3089325	25.23	**
Fodder kilograms	4	251310.547	21.45	**

DF: degrees of freedom, MC: mean squares, Pr: probability value.
**: P ≤ 0.01.

Table 1 Mean squares of the analysis of variance of the 11 measurement variables.

Peanut production

According to Tukey's test, for the variable kilograms per ha, treatments TT3 and TT2 do not show significant differences between them (figure 1), as they share the same group (group A). Treatments TT1 and TT4 do not differ significantly from each other, as they are both grouped together in group B. TT5 differs from all treatments. The treatment with the highest yield of kilograms per ha of groundnut with 4,054.7 is TT3.

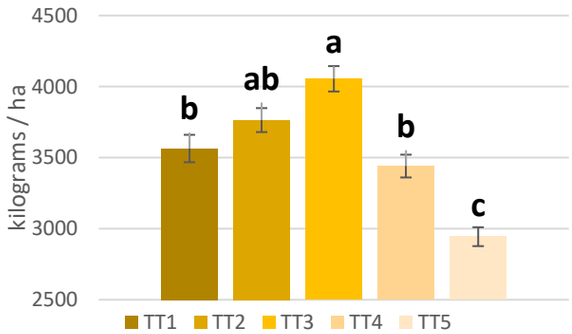

Figure 1 Kilograms of groundnut per hectare with determination of significant differences.

Fertilisation costs

Table 2 shows the costs associated with the different activities and concepts related to the establishment, growth and development of the crop. The costs are broken down for the five types of fertilisation (TT1, TT2, TT3, TT4 and TT5). TT5 by its nature has the lowest cost and of the treatments with some type of fertilisation it is TT1 that has the lowest cost. The treatment with the highest cost is TT4.

	TREATMENT COSTS				
Activity or concept	TT1	TT2	TT3	TT4	TT5
LAND RENT	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00
LAND PREPARATION	7,800.00	7,800.00	7,800.00	7,800.00	7,800.00
SOWING	10,620.00	10,620.00	10,620.00	10,620.00	10,620.00
IRRIGATION	4,200.00	4,200.00	4,200.00	4,200.00	4,200.00
FERTILIZATION	1,784.68	2,607.28	6,932.34	11,595.00	0
WEED CONTROL	5,265.00	5,265.00	5,265.00	5,265.00	5,265.00
PEST CONTROL	900.00	900.00	900.00	900.00	900.00
DISEASE CONTROL	675.00	675.00	675.00	675.00	675.00
HARVEST	13,595.71	14,485.18	15,078.69	13,257.99	12,076.67
TOTAL COSTS	**$ 64,840.39**	**$ 66,552.46**	**$ 71,471.03**	**$ 74,312.99**	**$ 61,536.67**

Table 2 Summarised costs for the 5 fertilisation treatments
Source: Own elaboration

Each of these results represents the total cost associated with all activities and concepts for that particular type of fertilisation. The costs include land rental, land preparation, seeding, irrigation, fertilisation, weed control, pest control, disease control, harvesting and transport.

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It is important to note that these costs are based on the unit cost and quantity values specified in the table, and may vary according to geographical location, plot size, inputs used and other factors specific to agriculture. These costs are an estimate for each type of fertilisation based on the data provided in the table.

Economic profitability

Estimates were made of prices that may occur in normal harvesting season, the prices range between $19.00, $21.00 and $23.00 per kilogramme. Table 3 shows the quantities of peanuts per ha and the possible income with the estimated selling prices. It shows that the highest income would be obtained with TT3. Similarly, table 4 shows the number of bales per ha and their possible selling prices, which range between $80.00, $90.00 and $100.00 per bale. TT2 obtained the highest number of bales with 96.51, only three bales above TT2 with 93.49. Very similar production.

		Price for groundnuts		
Treatment	Quantity	$19.00	$21.00	$23.00
TT1	3,564.1	$ 67,717.90	$ 74,846.10	$ 81,974.30
TT2	3,764.1	$ 71,517.90	$ 79,046.10	$ 86,574.30
TT3	4,054.7	$ 77,039.30	$ 85,148.70	$ 93,258.10
TT4	3,440.6	$ 65,371.40	$ 72,252.60	$ 79,133.80
TT5	2,943.8	$ 55,932.20	$ 61,819.80	$ 67,707.40

Table 3 Estimated selling prices for groundnuts
Source: Own elaboration

		Price for groundnut bales		
Treatment	Quantity	$80.00	$90.00	$100.00
TT1	81.41	$6,512.80	$7,326.90	$8,141.00
TT2	96.51	$7,720.80	$8,685.90	$9,651.00
TT3	93.49	$7,479.20	$8,414.10	$9,349.00
TT4	79.64	$6,371.20	$7,167.60	$7,964.00
TT5	78.85	$6,308.00	$7,096.50	$7,885.00

Table 4 Estimated selling prices for groundnut bales.
Source: Own elaboration

The total revenue in table 5 is the sum of the revenue with a selling price of peanuts of $21.00 per kilogram and $90.00 per bale of peanut fodder. RelBCTT1 shows a CBR of 1.27, which means that for every unit spent, .27 units in revenue are earned. RelBCTT2 has the highest CBR with a value of 1.32 and only one tenth below is RelBCTT3 with a CBR of 1.31.

The latter has the highest groundnut yield which gives it preference over TT2. RelBCTT4 and RelBCTT5 have slightly lower values, with 1.07 and 1.12 respectively. Although these are positive results, they suggest that, compared to the other cases, the inputs are slightly higher than the outputs.

Treatment	Total revenues	Total costs	Rel B/C
TT1	$ 82,173.00	$ 64,840.39	1.27
TT2	$ 87,732.00	$ 66,552.46	1.32
TT3	$ 93,562.80	$ 71,471.03	1.31
TT4	$ 79,420.20	$ 74,312.99	1.07
TT5	$ 68,916.30	$ 61,536.67	1.12

Table 5 Cost-benefit ratio for each treatment.
Source: Own elaboration

Table 6 shows that TT1 and TT3 share a rate of return of 34%, while TT2 obtained 35%. This represents the highest value; TT4 and TT5 show a positive rate of return, but have the lowest ROI values in the comparison. TT3 producing a higher amount of peanuts than TT2 is considered the more viable option over TT2, as the difference in ROI is minimal.

Treatment	Total revenues	Total costs	ROI
TT1	$ 82,173.00	$ 64,840.39	34%
TT2	$ 87,732.00	$ 66,552.46	35%
TT3	$ 93,562.80	$ 71,471.03	34%
TT4	$ 79,420.20	$ 74,312.99	17%
TT5	$ 68,916.30	$ 61,536.67	20%

Table 6 Rate of return (ROI) for each treatment
Source: Own elaboration

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Exploration of bactericidal effects and disinfecting agents on microorganisms

Exploración de los efectos biocidas y agentes desinfectantes en microorganismos

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Abstract

Disinfection is a process aimed at the eradication of infectious microorganisms through the use of chemical or physical agents. Its function is of utmost importance in the mitigation of infectious diseases prevalent in the population, since both viruses and bacteria can subsist on inanimate surfaces, thus serving as passive vectors of pathogens. This research addresses the application of disinfectant bactericides on microorganisms such as *Staphylococcus aureus* and *Klebsiella pneumoniae*. In addition to evaluating the efficacy of disinfectants such as Zalema Naturals, Dr Beckmann, Family Guard® and Lysol®, on highly frequented surfaces, such as desks, windows, locks, sampling areas, stretchers, among others. This type of research contributes to expanding knowledge about the effectiveness of agents in preventing the spread of infectious diseases, thus strengthening hygiene and safety measures in everyday environments

Effects, Uses, Biocides, Agents, Microorganisms

Resumen

La desinfección es un proceso dirigido a la erradicación de microrganismos infecciosos mediante el empleo de agentes químicos o físicos. Su función es de suma importancia en la mitigación de enfermedades infecciosas prevalentes en la población, ya que, tanto virus como bacterias pueden subsistir en superficies inanimadas, sirviendo así como vectores pasivos de patógenos. En esta investigación se aborda la aplicación de bactericidas desinfectantes en microorganismos como *Staphylococcus aureus* y *Klebsiella pneumoniae*. Además de evaluar la eficacia de desinfectantes como Zalema Naturals, Dr Beckmann, Family Guard® y Lysol®, en superficies altamente concurridas, tales como, escritorios, ventanillas, cerraduras, áreas de toma de muestras, camillas, entre otras. Este tipo de investigación contribuye a expandir el conocimiento sobre la efectividad de agentes en la prevención de la propagación de enfermedades infecciosas, fortaleciendo así las medidas de higiene y seguridad en entornos de uso cotidiano.

Efectos, Usos, Biocidas, Agentes, Microorganismos

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Introduction

Disinfection is a process aimed at the eradication of infectious microorganisms through the use of chemical or physical agents. Its function is of utmost importance in the mitigation of infectious diseases prevalent in the population, since both viruses and bacteria can subsist on inanimate surfaces, thus serving as passive vectors of pathogens; the risk of transmission of pathogenic microorganisms increases when controls on hygiene practices are insufficient, in addition to the increase of multidrug-resistant strains in the case of bacteria (3).

Bacteria are unicellular prokaryotic microorganisms, which reproduce by binary fission. Their complex surface structure, known as the bacterial cell wall, surrounds the cell membrane, providing rigidity, and their composition confers useful and determining characteristics for taxonomy, classification and understanding of pathophysiology, as well as being the site of action of some antibiotics (1).

In the health field, it is important to note that some bacteria are involved in foodborne diseases and can persist on inert food contact surfaces, such as *Bacillus*, *Staphylococcus*, *Streptococcus*, *Pseudomonas* and *Serratia* are relevant in this context. To combat them, biocides are used, substances that, thanks to knowledge of their physical, chemical or biological properties, can neutralise, control and/or reduce the pathogenic bacterial load (5).

The action of biocides on the bacterial cell can lead to changes in cellular targets by altering them chemically, inducing mutations or creating enzymatic modifications. This includes damage to metabolic enzymes essential to the bacterium and modification of the natural permeability of the outer membrane. In addition, biocides can affect the size or number of porins, as well as cause active excretion of accumulated metabolites from the cell via the proteins that make up the efflux systems (4).

Since the 1950s, bacterial strains capable of acquiring resistance to biocides through different mechanisms have been identified, either intrinsically or through mutation, plasmid or transposon acquisition. When a lethal agent, whether physical or chemical, is exposed to a bacterial population, a progressive reduction in the number of micro-organisms is observed, and if plotted on a graph, this phenomenon follows an exponential decreasing trend over time. In this context, an ideal disinfectant should possess attributes such as being a broad-spectrum germicide, being low cost, offering broad action, being readily available, not generating subsistence and lacking an unpleasant odour (2).

Methodology

The study was a descriptive cross-sectional longitudinal study. Highly frequented surfaces were monitored, such as desks, windows, locks, sampling areas, stretchers, among others, from which 60 random samples were obtained. The samples were cultured using the plaque casting method, under optimal conditions for the adequate development of microorganisms for 48 hours, from which samples were obtained at different times, as this varied according to the disinfectant that had been applied. The exposure time was as follows: Zalema Naturals was left to act for approximately 30 seconds, Family Guard® for 2 to 3 minutes, Lysol® for 5 minutes and Dr Beckmann disinfectant for 60 seconds.

Finally, sensitivity tests were carried out using the Kirby Bauer method with gram-positive and gram-negative organisms obtained from clinical isolates donated by the Autonomous University of Zacatecas, such as Staphylococcus aureus y Klebsiella pneumonia; These were incubated and checked after 24 hours, measuring inhibition halos with a vernier. In addition, for the samples cultured with the evaluation of the disinfectants with the pour-plate method, after 48 hours of incubation, the number of microorganisms was counted developed with the help of a colony counter.

Using the statistical programme GraphPad PRISM® ver. 8.0.1 and Excel spreadsheets, data analysis was carried out, taking into account the variables studied:

- Type of disinfectant.
- Efficacy of the disinfectant.

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Results

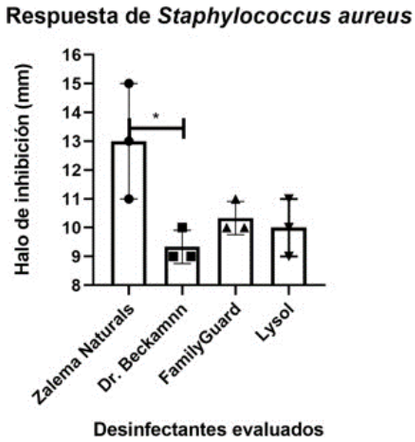
The Kirby Bauer technique was carried out in order to determine the inhibition halo size. (mm) in those that presented bactericidal activity (positive control). To interpret the inhibition halo diameters, the cut-off point tables of the commercial kit were taken into account, which take as a reference the values established in guidelines such as Clinical and Laboratory Standards (CLSI), Comnité de l'antibiogramme, French Society of Microbiology (CA-SFM) and European Committee on Antimicrobial Susceptibility Testing (EUCAST).

Firstly, the response of Staphylococcus aureus to the disinfectants was observed in 3 monitoring tests (Table 1).

Respuesta de *Staphylococcus aureus* frente a los desinfectantes Medición del halo de inhibición (mm)				
	1	**2**	**3**	**Promedio**
Zalema Naturals	13	11	15	13
Dr. Beckmann	9	9	10	9.33333333
FamilyGuard	10	10	11	10.3333333
Lysol	10	9	11	10

Table 1 Response of *Staphylococcus aureus* to disinfectants by sensitivity test

According to the results obtained in the statistical programme GraphPad PRISM® ver. 8.0.1 (Graphic 1), a greater response was obtained for the disinfectant Zalema Naturals in comparison with the rest of the disinfectants, followed by the disinfectants Family Guard®, Lysol®, showing a lower response for the disinfectant Dr Beckmann® and Lysol®.



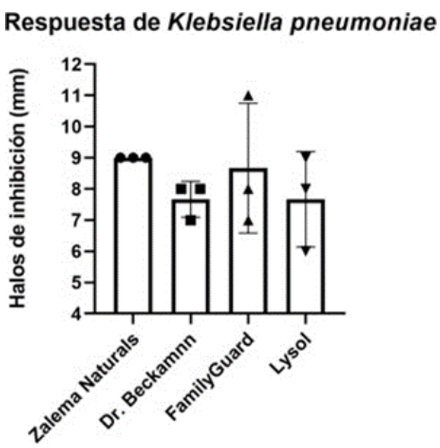
Graphic 1 Box plot for comparison of means of inhibition halos of the disinfectants evaluated against Staphylococcus aureus. Carried out in GraphPad PRISM® statistical software ver. 8.0.1
*Significant difference

On the other hand, with respect to *Klebsiella pneumoniae*, there was no difference in sensitivity due to the composition of the disinfectants tested against the strain (table 2).

Respuesta de *Klebsiella pneumoniae* frente a los desinfectantes Medición del halo de inhibición (mm)				
	1	**2**	**3**	**Promedio**
Zalema Naturals	9	9	9	9
Dr. Beckmann	7	8	8	7.66666667
FamilyGuard	7	11	8	8.66666667
Lysol	6	8	9	7.66666667

Table 2 Sensitivity test of Klebsiella pneumoniae to disinfectants tested

A higher response was shown for the disinfectant Zalema Naturals after Family Guard® and the disinfectants Dr. Beckamnn and Lysol® with the same average inhibition (Figure 2).



Graphic 2 Box plot for comparison of means of inhibition halos of the disinfectants evaluated against *Klebsiella pneumoniae*

Disinfectants evaluated against *Klebsiella pneumoniae*. Carried out in the statistical programme GraphPad PRISM®ver. 8.0.1

On the other hand, when evaluating the antimicrobial efficacy of disinfectant agents on inert surfaces, the following was observed:

The disinfectant Family Guard (quaternary ammonium derivative) presents an adequate effectiveness (Table 3), oscillating with a final average of 95.2%, presenting a greater response against *Staphylococcus aures* compared to *Klebsiella pneumoniae*.

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Dilución evaluada y desinfectante estudiado		Antes de desinfección UFC/100cm²	Después de desinfección UFC/100cm²	% de disminución población microbiana
FAMILY GUARD	1:10	10	<1	90%
	1:10	80	10	87.5%
	1:10	120	<1	99.16%
	1:100	<1	8,300	CONTAMINADA
	1:100	300	<1	99.66%
	1:100	500	<1	99.8%
	1:1000	<1	5,000	CONTAMINADA
	1:1000	<1	<1	SIN CAMBIOS
	1:1000	<1	<1	SIN CAMBIOS

Table 3 Effectiveness of Family Guard® disinfectant

In addition, it was observed that Zalema Naturals (derived from citrus extracts) has a higher bactericidal effectiveness than all the tested products applied in inert material, both in the evaluation of sensitivity against *Staphylococcus aureus* and *Klebsiella pneumoniae* strains, and in the evaluation of efficacy, with a final average ranging between 96% disinfection (Table 4).

Dilución evaluada y desinfectante estudiado		Antes de desinfección UFC/100cm²	Después de desinfección UFC/100cm²	% de disminución población microbiana
ZALEMA NATURALS	1:10	350	<1	99.71%
	1:10	<1	<1	SIN CAMBIOS
	1:10	10	<1	90%
	1:100	10	<1	90%
	1:100	100	<1	99%
	1:100	0	CONTAMINADA	CONTAMINADA
	1:1000	9,000	1,000	99.99%
	1:1000	<1	<1	SIN CAMBIOS
	1:1000	1,000	<1	99.9%

Table 4 Effectiveness expressed as a percentage of the disinfectant Zalema Naturals applied on inert matter

Likewise, the disinfectant evaluated, Lysol, shows some of its monitoring with a low percentage of reduction, thus calling into question an effective disinfection, however, it has favourable reduction percentages (Table 5). However, it has favourable reduction percentages (Table 5).

Dilución evaluada y desinfectante estudiado		Antes de desinfección UFC/100cm²	Después de desinfección UFC/100cm²	% de disminución población microbiana
LYSOL	1:10	<1	20	CONTAMINADA
	1:10	30	10	66.66%
	1:10	90	<1	98.88%
	1:100	600	<1	99.83%
	1:100	<1	<1	SIN CAMBIOS
	1:100	300	100	66.66%
	1:1000	3,000	<1	99.66%
	1:1000	<1	<1	SIN CAMBIOS
	1:1000	<1	<1	SIN CAMBIOS

Table 5 Effectiveness expressed as a percentage of the disinfectant Lysol®

On the other hand, the disinfectant Dr. Beckmann (quaternary ammonium derivative) showed a lower effectiveness compared to those tested, with an average effectiveness of 81.9% (Table 6).

Dilución evaluada y desinfectante estudiado		Antes de desinfección UFC/100cm2	Después de desinfección UFC/100cm2	% de disminución población microbiana
DR. BECKMANN	1:10	1,490	10	99.3%
	1:10	10	10	0%
	1:10	30	<1	96.66%
	1:100	6,900	<1	99.99%
	1:100	<1	<1	SIN CAMBIOS
	1:100	1,800	5,900	CONTAMINADA
	1:1000	9,000	<1	99.98%
	1:1000	<1	<1	SIN CAMBIOS
	1:1000	23,000	1,000	95.65%

Table 6 Effectiveness expressed as a percentage of Dr. Beckmann disinfectant

To conclude, one of the most important variables to consider when making a purchasing decision is the relationship between the cost and the benefit to be obtained (Graph 3). The calculations in relation to the cost were carried out with the price established in the months of September to December 2021.

From the above, it can be concluded that the surface disinfectant Family Guard is one of the most economical, followed by the disinfectant Lysol, concluding that the disinfectant Dr. Beckmann has a high cost due to its smaller presentation.

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	FamilyGuard 650mL	Lysol 650mL	Zalema Naturals 100mL	Dr Beckmann 50mL
Precio modificado a 100mL	$8.61	$10.10	$25	$63.20
Precio modificado a 650mL	$56	$65.70	$162.50	$410.80
Precio establecido	$56	$65.70	$25	$31.60

Graphic 3 Cost-benefit ratio for each of the disinfectants evaluated. Carried out in the Excel statistical programme

The analysis of the results corroborates the antimicrobial capacity of the agents evaluated in this research, as well as the comparison of each one in relation to their effectiveness.

Conclusions

From the results obtained, we can observe that, despite the fact that disinfection was not carried out using the classic method, i.e. prior cleaning (water and soap/detergent) and the microbicide agent, with the sole application of the disinfectant agent, more than 80% of the microorganisms on the surface were eliminated in most cases. This is of utmost relevance as it helps to mitigate infectious diseases prevalent in the population, protecting public health.

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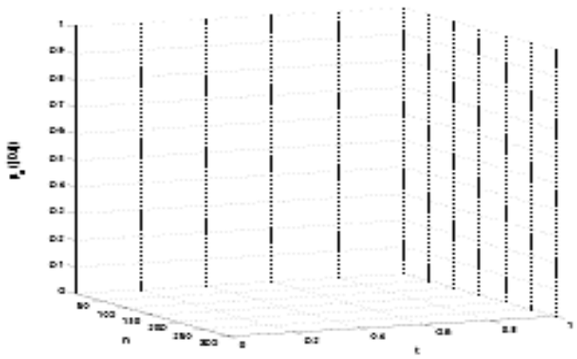

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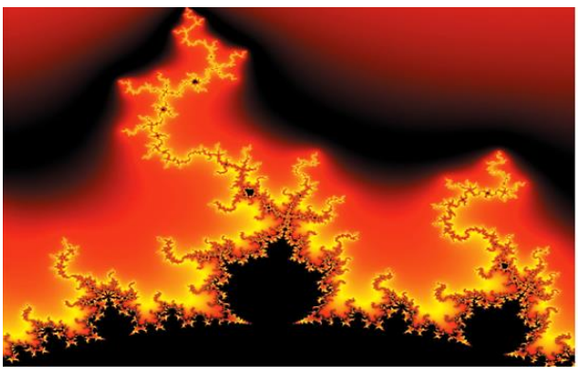

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