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Three-mensional sustainability profile in the agricultural valley autlán-El Grullo-El Limón, Jalisco, Mexico

GÓMEZ, José Eduardo*†, FALLAD, Jalil, HUESO, Eva Judith and CASTAÑEDA, Alfredo

University of Guadalajara

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Abstract

In the last decades, a high awareness of the environmental, economic and social impact studies as a result of productive activities, including agriculture, has been promoted worldwide. This need led to a compelling need to make a shift towards agriculture under the sustainability approach. The IRS Methodology used in this research allowed a specialized study of ecological, social and economic issues. Based on the objectives and hypotheses of this study, we concluded that the sustainability of the Autlán-El Grullo-El Limón Valley located in the state of Jalisco, Mexico is very low; there is a difference between municipalities and communities and between the contributions of dimensions. The evaluation allowed detecting the deficiencies that can have the model at the time of its execution, in such a way, that it allows improving its processes.

IRS, Sustainable, Autlán, El Grullo, El Limón

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* Correspondence to Author (email: jgomez@cucsur.udg.mx)

† Researcher contributing first author.

Introduction

In the last decades, a high awareness of the environmental, economic and social impact as a result of productive activities including agriculture has promoted worldwide. This impact has led to the imperative need to make a shift towards agriculture under the sustainability approach. All of this has allowed the development of different methodologies to evaluate sustainability in agricultural production systems through various weights and analysis strategies (Kú, *et al.*, 2013).

The Sustainable Development (SD) promotes an integral and equitable development mainly in its three dimensions; Social and environmental.

From the perspective of DS, economic growth is understood as not synonymous with development and that increasing quantity does not induce improvements in quality. Its formulation comes to express a rejection of the belief that science and technology infallibly lead to an improvement of the human condition. Sustainable development challenges fundamental tenets of capitalism as unlimited economic growth. It shares an ideology of solidarity, redistributive justice, and egalitarian ethics, and is concerned with the rapid development of the world's population (Ferrás & Paredes, 1999).

Sustainable development, as a model under construction, presents its work, its innovation, its construction, its invention, to overcome the old and current problems of humanity. It is, therefore, a different way of thinking, doing and living based on the needs of its actors, and is different from what some authors already pointed out as a patchwork of continued growth, as their detractors are supposed to confuse. (WECD, 1987, Brown, *et al.*, 1987; Bowers, 1997).

Ruckelhauss (1989) points out that the achievement of sustainable development could be balanced through with the Neolithic agricultural revolution and the Industrial Revolution. Apparently, this is a new utopia, a new challenge for humanity, an opportunity for development models. This agricultural revolution is a utopia, which unlike previous ones, has greater tools for its achievement, but also, its challenges are more significant (Casas, 2002).

The present study, from the perspective of Ruckelhauss, carried out the evaluation of the Sustainability of the several productive communities located in the Agricultural Valley Autlán-El Grullo-El Limón, Jalisco, Mexico. The study was performed through the application of the Relative Index Sustainability (IRS) designed by Casas and Cols (Casas, *et al.*, 2009) which allows quantifying sustainability and identifying the key elements of a strategy for regional agricultural development.

The relative sustainability index (IRS) is an ad hoc methodology to evaluate sustainability at the community or agro-ecosystem level proposed by Casas *et al.* (2001), which in this essay is described and complemented for its application. The IRS starts with the vision of the concept of sustainability.

Given the relatively recent creation of the IRS proposal, it is desirable to give general indications of its development. The IRS assumes that Sustainable Development could achieve with some degree of development and integration of its economic, social and environmental dimensions. Ideally, sustainability concept is represented as a triangle in which the combination of the dimensions coincides and whose values are > 0.5 on a scale of 0 to 1. Values <0.5 denote an absence of sustainability. Finally, the lack of the contribution of its dimensions (Casas *et al.*, 2001).

Methodology

The IRS methodology integrated variables of three different natures (social, economic, environmental) and the units in a dimensionless product.

To this end, a process of standardization of environmental variables such as water, soil, biodiversity, management and area of crops (temporary, irrigation, chemical or organic fertilizers and productivity levels) was carried out.

Social variables are characteristics of the human population, their density, employment, health, food, education, migration, social participation, politics, and instruments.

Finally, economic variables are such as technological and capital goods and tools to carry out their activities and the balance of their economic activities (income-expenditure).

This methodology was not a specialized study of ecological, social and economic issues. The themes and variables selected were considered, as those in which there is more or less coincidence to evaluate sustainability.

The variables that have been chosen to assess sustainability in this study are not the only ones nor restrictive to be modified to the needs of the objectives of other studies.

The study was carried out on four components. The first is a characterization of the valley in generic terms. The second with the application of IRS quantified the sustainability and contribution of the dimensions (environmental, social and economic) of the region, municipalities, and communities. It also allowed the quantitative and qualitative identification of the core strategy variables for regional agricultural development.

The third component was complemented based on the analysis of the information obtained from the 19 producers leaders and representatives of Federal, State and Municipal institutions. And finally, the fourth component was the analysis of Strengths, Opportunities, Weaknesses and Threats (SWOT), which ranked the variables according to their importance to promote regional agricultural development. All variables are presented in a list according to the hierarchy of the current valley situation of the valley concerning the primary constraints to sustainable development. The hierarchy of SWOT variables is characterized in agricultural terms.

The sustainability assessment considered the information of 153 units of family farming, and 18 final variables (six social, six economical, and six environmental) in the nine communities located in the Agricultural Valley of the Autlán, El Grullo, and El Limón municipalities, Jalisco Mexico.

Sample Size:

The sample size was determined statistically according to Rendón and Cervantes (1991) with a 7.5% variance ratio.

The sample size was increased in the communities where the sample size was 153 producers to have more certainty during the process of quantifying sustainability on applying the IRS. The proportional distribution of the sample to each ejido or community can be seen in Table 1.

Municipality	# of Producers	% of Producers	N
Autlán de Navarro, Jalisco, México			
Ahuacapán	126	21	29
El Chante	132	22	30
Lagunillas	73	12	17
El Grullo, Jalisco, México			
Ayuquila	49	8	11
El Aguacate	11	2	8
Puerta del Barro	25	4	10
El Limón, Jalisco, México			
La Ciénega	126	21	28
San Juan de Amula	43	7	10
San Miguel	20	3	10
Total	602	100	153

Table 1 Distribution of agricultural producers by community interviewed in the Municipalities of Autlán, El Grullo, and El Limón, Jalisco, Mexico

Geographic area location of the study:

The present research was carried out in the Autlán-El Grullo-El Limón Agricultural Valley, Jalisco, Mexico, with geographic coordinates 19 ° 35' to 19 ° 54' N and 104 ° 07' to 104 ° 29' W (INEGI, 2000).



Figure 1 Geographical location of the municipalities that make up the Autlán-El Grullo-El Limón Agricultural Valley, Jalisco

The communities that were the object of study are: for the Municipality of Autlán de Navarro: Ahuacapán, El Chante, and Lagunillas. For the Municipality of El Grullo: Ayuquila, El Aguacate, and Puerta del Barro. For the Municipality of El Limón: La Ciénega, San Juan de Amula, and San Miguel, respectively (see Table 1).

Criteria for selection of communities

For the selection of the communities, it obeyed the predominant conditions of the valley that the communities presented as they are: plain and slopes, with areas of irrigation and temporary.

The technique of the survey consisted in the systematic interrogation of individuals to know the functioning of the economic, environmental and social logic of the system, through its subsystems (family, agricultural, forestry, and livestock), which allowed capturing the qualitative and quantitative elements Of sustainability. Both the guides and the questionnaires were structured according to the elements of strategic planning. In the reagents, care was taken to use a language appropriate to the members of the communities studied.

Application of surveys

The survey technique consisted of the systematic use of a questionnaire to the individuals living in the communities mentioned above. All the subjects studied were of both sexes and adults and could read and write.

All respondents were aware of the objective of the survey and the nature of the ongoing research. They were also asked to answer the questionnaire voluntarily and were made aware of the policy of confidentiality of data provided by them.

The aim of the survey was to know the functioning of the economic, environmental and social logic of the system, through its subsystems (family, agricultural, forestry, and livestock), which allowed capturing the qualitative and quantitative elements of sustainability.

Before the general application of the questionnaire, it was applied to 25 producers, to verify the understanding of the questions, and clarification of doubts and, thus, to eliminate design errors that might arise in the instrument. The reliability of the questionnaires was determined throughout Spearman and Brown's Split-half reliability test (cited in Mason and Bramble (1997), which included a sample of 17 producers from the three municipalities, resulting in $r = 0.74$.

The application of the IRS quantified the sustainability and contribution of the dimensions (environmental, social and economic) of the region, municipalities, and communities.

The IRS determination was complemented by a third component based on the analysis of the information obtained from interviews with 19 producer leaders and representatives of federal, state and municipal institutions.

Sustainability

The concept of sustainability used in this research was developed based on (f) the relationships between humans (social dimension), the transformation they make of nature through the instruments and available technology (economic dimension), and the Capacity of nature to develop and recover from human activity (environmental dimension). Where: S = sustainability and the environmental dimension (Da), social dimension (Ds) and economic dimension (De). The degree of sustainability obtained for any system depends on the contribution or inhibition of each dimension. Under the scope of our Model, we assumed that sustainable development is a process in time and space.

The calculated values was a relative value of modern development, so sustainability index is estimated with the IRS, which includes the same components of sustainability, That is, $IRS = f (Da, Ds, De)$.

Process of Selection of Variables in the IRS

The original variables were selected based on their greater ecological, economic and social variation among the communities, based on the higher values of the standardized canonical coefficients of the new variables, called discriminant functions. To compare the interest groups, in this case, the communities, a series of multivariate statistics tests were applied.

Quantification and Qualification of Sustainability

The rating of each variable was related to its tendency towards sustainability and the location of the average real values in an interval that has been established on a scale proposed by the evaluator. Variable's limits are defined by a proportional range (X_p). X_p is the Minimum value average and the absolute maximum that the variable takes between communities. The Likert's scale (Casas, et al., 2009) is a discrete assessment scale that proposes the evaluator to convert natural values into classes; these classes are whole natural numbers that can vary, from -5, to +5.

Range condition for variable values	Range Condition for average values:		
	Are positives and trend is positive *	Are negatives and trend is positive, or trend is 0	Are positives y negatives with a positive trend
Value == 1	$X \leq X_{(1)} - \bar{X}_m$	$X > X_{(1)} - \bar{X}_m$	$X \leq 0 = \bar{X}_m$
Value == 2	$X_{(1)} + \bar{X}_m > X \leq X_{(1)} + 2X_p$	$X_{(1)} + 3X_p > X \leq X_{(1)} + 4X_p$	$\neq \bar{X}_m > X \leq \neq 2X_p$
Value == 3	$X_{(1)} + 2X_p > X \leq X_{(1)} + 3X_p$	$X_{(1)} + 2X_p > X \leq X_{(1)} + 3X_p$	$\neq 2X_p > X \leq \neq 3X_p$
Value == 4	$X_{(1)} + 3X_p > X \leq X_{(1)} + 4X_p$	$X_{(1)} + \bar{X}_m > X \leq X_{(1)} + X_p$	$\neq 3X_p > X \leq \neq 4X_p$
Value == 5	$X > X_{(1)} - \bar{X}_m$	$X \leq X_{(1)} + \bar{X}_m$	$X > X_{(1)} - \bar{X}_m$

Note: X is the value of the variable under evaluation in each community; $X_{(1)}$ is the lowest absolute value of the evaluated communities that the variable takes; \bar{X}_m is the largest absolute value of the variable in the communities; And X_p is the proportional part of the evaluation space of the variable divided by five $IX (1) X (1) : 5$.

Table 2 Transformation and qualification of the real values of a variable continue on a discrete scale, using five ranges, according to its tendency to promote (+) or inhibit (-) sustainability.

Results

The variables showed differences in the averages between the communities for the evaluation of sustainability, which are listed by dimension: Environmental, Social, and Economic in Tables 1, 2 and 3.

With the 18 variables (see Table 3) a database was created in which the discriminant function analysis procedure was applied, and from this analysis, the following results are obtained.

The analysis showed that the first three discriminant functions (FD1, FD2, and FD3) contain the highest proportion of variance (81.24%). This analysis demonstrated that the model is appropriate given the nature of the variables (see Table 4).

With the applications of the equations used in this study, the sustainability of the Autlán-El Grullo-El Limón Agricultural Valley presented an IRS of 0.5512 or 10.24% of sustainability (see Table 4). In which sustainability qualifies as very low. The dimension with no contribution to sustainable development is the environmental dimension with an IRS of (0.4775%), which becomes its limiting. In fact, except for two communities; Ciénega and San Juan de Amula in the municipality of El Limón, which are barely in the minimum contribution, the rest of the seven communities presented values lower than 0.5. So this dimension is growing, lacking development to make contributions to sustainable development, and therefore requires more attention. Although the IRS is almost similar between the Autlán municipalities of Navarro, El Grullo and El Limón; 0.5516%, 0.5363%, and 0.5597%, respectively, their sustainability rating identified the difference between them.

El Grullo presented the relative sustainability lower than Autlán and EL Limón, with 7.26%, 10.32%, and 11.94% sustainability, respectively. The communities within the municipalities also presented differences in their sustainability in the range of 4.04 to 14.00%.

The difference is remarkable when comparing the communities of the three municipalities. Thus, Ayuquila is the community that relatively presented the lowest sustainability with 4.04%, whereas San Juan de Amula of the Municipality of El Limón, is the community that showed a greater sustainability (14%). The rest of the communities are between 7 and 12% sustainability. These results are shown in Table 4.

In summary, sustainability at the valley level classified as very low with an IRS of 0.55 or 10.25% of sustainability. The environmental dimension under a scope of at the regional level presents no contribution to sustainable development, with an IRS of (0.48%), considered as a limitation for the sustainable development of the region.

List	Variable	Units
De1	Family Wages	\$
De2	Per capita expenditures	\$
De3	Time dedicaced to farming activities	Month
De4	No farming work	Number of individuals
De5	Farming prfit	\$
De6	Annual Per capita balance	\$
Ds1	Age	Years
Ds2	Family school level average	Years
Ds3	Educational gender equity	Years
Ds4	Nutricional index	Units
Ds5	Bedroom density	Units
Ds6	Income family participation	%
Da1	Per capita surface	Ha
Da2	Production stability	Tons./ha
Da3	Consumed electric energy average	Kwatts/annual
Da4	Raining season surface	Ha
Da5	Sugar cane cultivated area	Ha
Da6	Corn cultivated area	Ha

Table 3 Description of the studied variables: Economic (De), Social (Ds) and Environmental (Da) selected to quantify sustainability

discriminant functions	Canonical Correlation	Canonical Correlation	Standard error	Canonical Correlation	Values	Eigenvalues of DNV(E)PH - $\frac{C_{11}^2}{C_{22}}$ (1-CanFag)		Accumulated
						Difference	Proportion	
FD1	0.7926	0.7516	0.0301	0.6282	1.69	0.9418	0.4744	0.4744
FD2	0.6542	0.5809	0.04639	0.4279	0.74	0.2921	0.21	0.6844
FD3	0.559647	0.475437	0.055706	0.313205	0.456	0.2207	0.128	0.8124
FD4	0.436438	0.254832	0.065661	0.190478	0.235 3	0.0348	0.066	0.8784
FD5	0.408698	.	0.067562	0.167034	0.200 5	0.0669	0.0563	0.9347
FD6	0.343323	.	0.07155	0.117871	0.133 6	0.0584	0.0375	0.9722
FD7	0.264521	0.178734	0.075435	0.069972	0.075 2	0.0516	0.0211	0.9934
FD8	0.152049	-0.015633	0.079236	0.023119	0.023 7	.	0.0066	1

Table 4 Contribution of the discriminant functions to the population variance

Municipality	Community	DE	DS	DA	IRS	% de Contribution to sustainability	Sustainability Asesa	Attention Priority
7	Obispo	0.5735	0.5701	0.4735	0.5390	7.80	Very low	6
	Loreto	0.6431	0.5705	0.4627	0.5588	11.76	Very low	6
	El Clante	0.5988	0.5944	0.4855	0.5596	11.92	Very low	6
El Grullo		0.5991	0.5798	0.4758	0.5516	10.32	Very low	6
	Obispo	0.5303	0.5878	0.4424	0.5202	4.04	Very low	6
	Puerto del Barro	0.5766	0.6186	0.4366	0.5433	8.66	Very low	6
	El Obispo	0.5875	0.575	0.4875	0.5500	10	Very low	6
		0.5620	0.5942	0.4528	0.5363	7.26	Very low	6
El Limón	La Grulla	0.5940	0.5857	0.5011	0.5603	12.06	Very low	6
	San Mateo Hicijao	0.5966	0.5933	0.4533	0.5477	9.54	Very low	6
	San Juan de Obispo	0.6066	0.5833	0.5200	0.57	14	Very low	6
		0.5972	0.5888	0.4951	0.5597	11.94	Very low	6
Dimension Contribution		0.5915	0.5847	0.4775	0.5512	10.24	Very low	6
Dimension uses		Very low contribution	Very low contribution	Very low contribution				
% of contribution		18	16.94	4.5				
Attention Priority		6	6	6				

Table 5 Sustainability Assessment and Contribution of Dimensions for Sustainable Development in three municipalities of the Autlán-El Grullo-El Limón Agricultural Valley based on statistical data

Discussion

In the valley, there is dynamic in sustainability between municipalities and communities, the Municipality of El Limón presents higher values both in contribution and in dimensions and its IRS. El Grullo presented the lowest values of relative sustainability trend. Autlan, at this moment, is in an intermediate situation in values of sustainability in the contribution of its dimensions, as well as in the IRS. This dynamic can be explained by a degradation of the environmental variables due to a greater exploitation of natural resources, as well as deterioration in the social and economic variables. These effects were more marked in

El Grullo and Autlán, and not so much because the Conditions in the municipality of El Limón, but relatively has deteriorated less with respect to the other two municipalities studied, but nevertheless, goes in the same trend as Autlán and El Grullo.

The standardized canonical coefficients identified the variables Z2 (annual external income), Z7 (Agricultural Utility), Z17 (Balance) of the economic dimension and variables X1 (Per Capita) and X18.1 (Maize) of the environmental dimension; as the variables that had the highest standardized canonical value (Table 5). It should be remarkable that although the social dimension did not identify variables with a high standardized canonical value, it was proposed to select the variables of this dimension that presented the highest values, assuming that they contain the greatest social variation among communities. Among the social variables that showed this characteristic are Y2 (Age) and Y9 (Density of room). By using these variables or related activities, a strategy proposal was elaborated as an element of strategic planning.

Conclusions

Based on the objectives and hypotheses of this research, it is concluded that the sustainability of the Autlán-El Grullo-El Limón Valley located in the state of Jalisco, Mexico are very low. Also there being a difference between municipalities and communities and between the dimensional contributions. According to Casas (1994), Claussewitz (1942), Luck & Prell (1968), Colón and Rodríguez, Bateman and Snell, El BID, Kauffman (cited in Cano & Olivera, 2008), the evaluation made it possible to detect deficiencies Have the model at the time of its execution, in such a way, that it allows to improve its processes.

Therefore, the evaluation process of the Sustainable Regional Development Plan for the Autlán - El Grullo and El Limón Agricultural Valley; It is proposed to be carried out every three years based on a diagnosis and to the qualitative and quantitative variables resulting from the evaluation of sustainability through the Relative Sustainability Index applied for the Autlán-El Grullo-El Limón Agricultural Valley.

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Implementation of a quality management system to obtain production approvals in mexican companies of the aeronautical sector

PURATA-SIFUENTES, Omar Jair†*, RAMOS-ESTRADA, Cecilia, RODRÍGUEZ-LARA, Ricardo Alejandro and NAVARRETE-REYNOSO, Ramón

Universidad de Guanajuato. Lascuráin de Retana No. 5, Col. Centro C.P. 36000. Guanajuato, Gto

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Abstract

An exploratory analysis of the requirements established for obtaining the production approvals by the General Directorate of Civil Aeronautics of the Ministry of Communications and Transportation of Mexico is presented. The requirements established for the Quality Management System in the Mandatory Document CO AV-29/11-R2, against the strategies offered by the ISO 9001 standards in their 2008 and 2015 versions, are compared. It was observed that ISO 9001: 2008 provides a sufficient scheme to achieve compliance with the requirements established in the mandatory document. However, if quality management is to be pursued in an avant-garde way, robust and prepared for the coming changes in national regulations, it is advisable for companies to focus their efforts towards the implementation of management systems, preferably integrated, that have high-level structures, such as those required by ISO 9001: 2015, among others.

Manufacturing certificate, aeronautics, quality management

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Correspondence to Author (email: opurata@ugto.mx)

† Researcher contributing first author.

Introduction

Two years after the update of the most popular management systems standard in the world, the ISO 9001 standard, it would be impossible to deny the acceptance that the management systems (SG), and in particular the quality SGs (SGC), have had in companies internationally. Mexico has not been the exception, which can be seen in the growth of SGC certifications of companies in the national territory under the ISO 9001 standard from 978 companies in 1998 to 7 418 in 2015, while the aeronautical sector global level presents figures of 1 052 and 1 783 certificates issued from ISO 9001, in the same period of time (ISO, 2016). It is important to note that to date there is no specific ISO standard for the aeronautical sector, such as the AS 9100 or the EN 9100.

In Mexico, the Directorate General of Civil Aeronautics (DGAC), belonging to the Ministry of Communications and Transportation, establishes in the document called Compulsory Circular CO AV-29/11-R2 (SCT, 2016) the requirements to be met for companies that they intend to obtain some of the production approvals, necessary documents to be able to legally carry out operations related to the manufacture, distribution and purchase of different goods and services, necessary in the aforementioned turn.

In this practical application, the requirements established in (SCT, 2016) are contrasted with respect to the QMS that the manufacturer must implement, in order to obtain the approval of the production of aeronautical products or articles.

It is observed that the ISO 9001 standard, in its 2008 version (ISO, 2008) offers a sufficient scheme to achieve compliance with the requirements established in (SCT, 2016).

But if you want to have a robust scheme for quality management, it is better to implement a QMS based on a high level structure, as outlined in the ISO 9001: 2015 standard (ISO, 2015)..

Methodology

(SCT, 2016) lists four different types of production approvals (Table 1). For the first three, the same circular establishes in its Appendix B the requirements to be met by the QMS, while for the fourth type of approval the structure of the required QMS is left to free choice..

KIND	Scope
Production Certificate (PC)	Aeronautical products and their articles involved
Authorization of Standard Mexican Technical Order (ASMTO)	Items that meet a specific TSO
Approval of the Parts Manufacturer (APM)	Replacement and modification items
Manufacturing Evidence (ME)	Items produced through a PC, TSOA, PMA or equivalent, granted by a Civil Aviation Authority

Table 1 Types of Production Approvals. Source: (SCT, 2016).

The methodology used is a comparison of the requirements imposed by the DGAC, as regards the QMS, for each of the production approvals cited in Table 1.

In the heading "Responsibilities of the owner", (SCT, 2016) requires maintaining the conformity of the SGC with respect to the approved data and procedures, which is specified in the elements: 8.1.4 b) for the PC; 8.2.4 b) for the TSOA; 8.3.4 b) for the PMA; and 8.4.3 b) for the CM. (ISO, 2008) in its element 5.6 "Review by management", allows to satisfy this item.

In the item "Inspections and / or verifications and tests", (SCT, 2016) requires that every manufacturing body or manufacturer must cooperate with the Aeronautical Authority and allow it to inspect and / or verify its QMS, facilities, technical information and any other aeronautical product or article produced, and witness any evidence, including inspections and / or verifications or tests at the facilities of its suppliers, necessary to determine compliance. All the above is specified in the elements: 8.1.7 for the PC; 8.2.7 for the TSOA; 8.3.6 for the PMA; and 8.4.5 for the CM. (ISO, 2008) in its elements 8.1 "General" and 8.2 "Monitoring and measurement", allows to satisfy the present item.

In the heading "Changes in the SGC", (SCT, 2016) requires that after the issuance of the production approval the holder must submit to the Aeronautical Authority any change in the SGC for its revision; and immediately notify the Aeronautical Authority, in writing, of any change that may affect the inspection, compliance or airworthiness of its aeronautical product or article. The above is specified in the elements: 8.1.8 for the PC; 8.2.8 for the TSOA; 8.3.7 for the PMA; and 8.4.6 for the CM. (ISO, 2008) in its element 5.4.2 "Planning of the SGC", allows to satisfy the present item.

Finally, in the "Documents to deliver" category, (SCT, 2016) requires:

- *Document the function relationships between those responsible for quality management and identify a Responsible Manager, who will be the main contact with the Aeronautical Authority, which is specified in the elements: 8.1.9 h) for the PC; 8.2.9 h) for the TSOA; 8.3.8 i) for the PMA; and 8.4.7 i) for the CM. (ISO, 2008) in its element 5.5 "Responsibility, authority and communication", allows satisfying this part of this item.*
- *Provide for approval by the Aeronautical Authority, a manual describing its QMS, in English or Spanish, in an electronic format that is not editable and acceptable to the Aeronautical Authority, which was specified in the elements: 8.1.9 j) for the PC; 8.2.9 j) for the TSOA; 8.3.8 k) for the PMA; and 8.4.7 k) for the CM. (ISO, 2008) in its element 4.2.2 "Manual of quality", allows to satisfy this part of the present item.*
- *Establish and describe a QMS in accordance with the requirements of Appendix "B", which is specified in the elements: 8.1.9 i) for the PC; 8.2.9 i) for the TSOA; and 8.3.8 j) for the PMA. For the CM, 8.4.7 j) indicates that a QMS should be established that is applicable to the production facilities of the supplier or subcontractor located in national territory. In the following paragraphs this part of this item is addressed in particular.*

As can be seen, only for the CM it is specified that the establishment of a QMS may not conform to that described in Appendix "B" of (SCT, 2016). However, it is possible to compare the requirements of Appendix "B" of (SCT, 2016) with (ISO, 2008), in order to corroborate that a QMS that complies with the requirements of the latter will also do so with those established in the First. Table 2 shows this comparison.

APPENDIX "B"	ISO 9001: 2008
a) Control of design data	7.3 Design and development
b) Document control	4.2.3 Control of documents
c) Control of Suppliers	7.4.1 Purchasing process
d) Control of production processes	7.5.1 Control of production and service provision
e) Inspection and testing	8.2.4 Monitoring and measurement of the product
f) Control of the inspection, measurement and test equipment	7.6 Control of monitoring and measuring equipment
g) Inspection and test status	7.5.3 Identification and traceability
h) Control of aeronautical products and non-compliant items	8.3 Control of nonconforming product
i) Corrective and preventive actions	8.5.2 Corrective action and 8.5.3 preventive action
j) Handling and storage	7.5.5 Preservation of the product
k) Control of quality records	4.2.4 Control of records
l) Internal audits	8.2.2 Internal audit
m) Feedback in service	8.2.1 Customer satisfaction
n) Quality leaks	8.3 Control of nonconforming product
o) Issuance of airworthiness release documents	8.2.4 Monitoring and measurement of the product

Table 2 Appendix "B" of (SCT, 2016) vs ISO 9001: 2008 (ISO, 2008). Source: self made.

Results and Discussion

Table 2 makes it clear that each of the requirements detailed in Appendix "B" of (SCT, 2016) can be fully covered by one or more elements of ISO 9001: 2008 (ISO, 2008). Then, it is possible to implement a QMS based on ISO 9001: 2008 (ISO, 2008), which will satisfy the requirements of (SCT, 2016) for any of the production approvals listed in Table 1. However, it is important to note that some of the requirements of Appendix "B" are prescribed, that is, it indicates in detail how things should be done, while ISO standards have never been intended to be prescriptive, but descriptive and even abstract at the levels of the SGC or the processes that integrate it, but not in the levels of the procedures and instructions.

However, with respect to ISO 9001: 2015 (ISO, 2015), its high-level structure has evolved and ISO is betting on fewer specific documentary requirements (fewer prescriptions). For example, a Quality Manual is no longer required in a specific way, or the figure of the Representative of the Directorate has disappeared, as well as the concept of preventive action. However, many elements of the new ISO 9001: 2015 (ISO, 2015) were already present in the immediate previous version of the standard, such as design and development, control of production and service provision, identification and traceability, control of nonconforming product, product preservation, internal audit, and some others. In these elements, only changed its accommodation in the structure of ten elements of the so-called Annex SL.

Conclusions

The requirements established to obtain the four production approvals documented in (SCT, 2016) were analyzed in an exploratory manner. The analysis indicated that the QMS requirements established by (SCT, 2016) can be met with the implementation of a QMS based on ISO 9001: 2008 (ISO, 2008). However, if you want to be prepared for less prescriptive requirements, it would be convenient to implement a QMS that has a high level structure, such as the one specified in Annex SL for ISO 9001: 2015 (ISO, 2015).

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Innovation through marketing strategies for microenterprises in Cancun

BOLAÑOS-LÓPEZ, Verónica†* & MARTÍNEZ-MENA, Elda Verónica

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Abstract

Small and medium organizations confront big challenges in our country, during their opening, their growth and even during their business consolidation, and one of the most important tasks is their survival. Technological University of Cancun's students, in the area of Marketing and Business Development accomplish an investigation project, supervised by two teachers, which consisted in finding ten local microenterprises that presented some marketing problems such as a bad product or service design, lack of information about their target market, no promotion and communication or an inappropriate client service. The purpose of this project is that the students present the investigation results to the business owners, in order to make the correspondent suggestions or proposed solutions, to innovate through the application of marketing strategies, which ease the microenterprises survival in commercial scenarios.

Innovation, marketing strategies, microenterprise

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* Correspondence to Author (email: vbolanos@utcancun.edu.mx)

† Researcher contributing first author.

Introduction

According to INEGI figures (2015) one of the states with the highest percentage of "business mortality" is Quintana Roo, along with other entities such as Baja California, Baja California Sur, Sonora, Coahuila, Nuevo Leon, Tamaulipas, Guerrero, Morelos, State of Mexico, Tabasco and Campeche. The percentages within each state range between 40% and 53%. It should be noted that one of the sectors with the greatest mortality is commerce. The detection of this problem motivated the students of two groups of the third quarter of the career of Business Development in the Marketing Area at the Technological University of Cancun, to carry out a research project, which consisted of forming teams of four or five members who took on the task of finding a microenterprise in their locality, which presented some problem in the marketing area, specifically in the commercial part, such as ignorance of their market niche, an inadequate design of some of the elements that they make up their product, lack of integral communication or poor customer service.

Justification

In the country and in the entity, there are a variety of programs for the generation of companies and for their growth, but few of them focus on strengthening their commercial capacities, that is, they are supported with loans and financing, but in Sometimes important aspects such as the market, the client and the product or service are left out. Therefore, through the present research and in accordance with the State Development Plan 2016-2022 of Quintana Roo, in axis 1 "Economic Development and Diversification with Opportunities for All".

It is intended to innovate through the design of marketing strategies for the companies involved, with the aim of achieving the insertion and positioning of their products or services in the various types of markets.

Problem

There are concurrent elements related to the market, the client and the product or service, which limit or impede the survival of microenterprises in Mexico.

With respect to the market, it is observed that microenterprises have little knowledge and information about it, which means that they are not able to identify the segment to which they are directed or design commercial strategies according to their product or service.

Concerning the customer, by not identifying it fully and by not knowing the characteristics, they do not adapt their products or services to their needs and desires. Regarding the product, the quality is usually low, they do not develop innovations, and they neglect important aspects such as design and image, and their sales, promotion and distribution efforts are insufficient or are channeled in a different way.

Hypotesis

Most of the micro businesses that sell products or provide services in the city of Cancun, lack a business plan that includes marketing strategies, to ensure the success of their businesses, a situation that affects the mortality of a high index of them. or the lack of innovation.

Objectives**General objectives**

Contribute to the reduction of the mortality rate of microenterprises, addressing the main causes of business closure through the design of marketing strategies, consistent with the market, customers and products or services of the subjects of study, to provide them with tools, that contribute to the insertion or positioning in the market.

Specific objectives

- Provide marketing tools to ten microenterprises in Cancun to contribute to their incorporation or positioning in the market, in order to reduce the mortality rate registered in the entity.
- Encourage the linkage and collaboration between the educational and productive sectors, based on strategic alliances that impact the curricula, teachers and students.
- Generation of new knowledge based on experiences of current business reality.

Theoretical framework

According to the definition made by the Ministry of Economy on its page "economia.gob.mx", micro businesses are all those businesses that have less than ten workers, generate annual sales up to 4 million pesos and represent 95 percent of all companies and 40 percent of employment in the country; In addition, they produce 15 percent of the Gross Domestic Product.

Based on the last Economic Census published by the National Institute of Statistics and Geography (INEGI), of the universe of economic units in Mexico: a) 95.2% are microenterprises, b) generate 45.6% of employment, and c) contribute 15% of the added value of the economy.

The authors cite Márquez & Samper, (2002) in the longitudinal study on the microenterprises of Cancún, elaborated by Hernández, L., May, F. and Martínez, M. They mention that "... although trade constitutes the main activity of those who have created micro-enterprises, their world is very heterogeneous. It includes, among many others, the housewife who operates a small homemade business of making birthday cakes, the lady who with her children operates the kiosk at the exit of the metro station and the young mechanic who operates his workshop in the middle of the street. "Inclusive the same authors denominate to this type of emprendimiento like "business of district".

Companies represent a very important role in society when it comes to talking about innovation, since these are the ones that generate knowledge when introducing new products or services, or improved to differentiate themselves from their competitors.

On the other hand, the authors González, T., Hernández, N., and Oostrom, M., state that the literature on innovation and business highlights three issues:

1. Small businesses have specific conditions when innovating, among which are:

- Human capital and social capital, related to the educational levels of the company's personnel and the collaboration and association networks in which they are immersed.

- Capacity to absorb knowledge of the environment, related to collaboration with research centers and other companies in the sector, as well as in the contracting of specialized services to other companies.

- Innovative environments and sectors: the economic activity sector of the company is relevant to be innovative, as well as the socioeconomic environment, local and regional or global, with which they establish relationships.

2. The "culture of innovation", its absence or presence, its availability and its validity in the socioeconomic environment of the companies or, on the contrary, its inaccessibility and its obsolescence in the sociocultural configurations of the business fabric have been relevant factors the time of success of the cases studied at various levels.

3. Innovation is best understood when it is conceived as a result of the set of interactions and social relationships established between companies, producers of knowledge of interest to the economic sector of the company and the institutional and regulatory framework in which they live, regulate and conditions your economic activities.

Currently, microenterprises are in a highly competitive environment, where factors such as technological development, the globalized economy and the relationship with customers through social networks are the determining factor for its success or failure, and that is why that marketing strategies play a fundamental role for their survival.

In the manual titled Marketing and Microenterprise Business Plan, Vargas (2014) mentions that marketing is the discipline dedicated to the analysis of the behavior of markets and consumers, and that analyzes the commercial management of companies in order to capture, retain and retain customers through the satisfaction of needs.

Every company must know that marketing strategies, in the long term will lead to their survival and growth according to the opportunities that are presented, as well as their specific objectives and resources.

As mentioned by Kotler (2008), marketing plays a key role in strategic business planning in several ways. First, it provides a guiding philosophy on the concept of marketing, which suggests that the company's strategy must revolve around satisfying the needs of important consumer groups. Second, marketing provides information to strategic planners by helping them identify attractive market opportunities and assessing the company's potential to take advantage of them.

Any micro enterprise that pretends to survive in the market must have a competitive advantage. According to Lamb, Hair and McDaniel (2011), it is a set of unique characteristics of a company and its products, perceived by the target market as significant and superior to that of the competition. It is the factor or factors that cause customers to be loyal to the company and not to the competition.

Research Methodology

According to the problem to be solved, the present research will have a qualitative approach oriented towards exploration, description, statistical analysis and understanding of needs and their resolution..

Kind of investigation

This project will be carried out through a conclusive investigation with a descriptive transversal non-experimental design.

The sources used for the project were based on:

Hernández, Sampieri (2003), who corroborates that the non-experimental design is divided taking into account the time during which the data is collected.

In this sense, the transversal design will be used, where data is collected in a single moment, in a single time, whose purpose is to describe variables and their incidence of interrelation at a given time.

Results

According to the analysis carried out in the ten microenterprises of the city of Cancun, most of them were found to be deficient in the management of social networks, as well as ignorance on the part of businessmen regarding the necessary innovation in marketing strategies, so that your businesses continue to operate.

Among the suggestions by the students, is to generate a business plan appropriate to the particular situation of each company, after analysis of the market study, as well as a structure of digital marketing campaign, image and comprehensive communication.

The importance of training staff is mentioned, so that they know and apply the updates of a marketing campaign so that in the end, the impact of the strategies can be measured.

Conclusions

For the students of the Technological University of Cancun, involved in the research project, it was not difficult to find microentrepreneurs with problems in the area of marketing, and in some cases, with a total ignorance of the adequate strategies for their operation.

The managers or owners of the microenterprises (according to each case in particular), were open to provide the necessary information so that the students could carry out the research and carry out the solution proposals. The time invested in this activity was four months, which correspond to a four-month career study period.

The presentation of the project will culminate when the event takes place in which a formal invitation will be made to each entrepreneur in order that the students present orally and in writing the analysis of the detected problem, as well as the proposed solutions and innovation through the use of marketing strategies.

In the same way, the students will continue with the consultancies towards the microentrepreneurs and the results obtained in the medium term will be determined, with the objective of starting up the strategies that the companies will innovate, especially in the mercadological field, achieving with this their survival in the market.

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Web Development: Evidence of follow-up for compliance with the UN Global Compact in Construction companies

MACÍAS-BRAMBILA, Hassem Rubén†*, LÓPEZ-LAGUNA, Ana Bertha, PEÑA-MONTES DE OCA, Adriana Isela and ÁLVAREZ-JIMÉNEZ, Hugo Rosendo

Universidad Tecnológica de Jalisco. Luis J. Jiménez 577, Primero de Mayo, Guadalajara, Jalisco, México. C.P. 44979

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Abstract

This article describes the process of designing, developing and implementing a web application for the Information and Communication Technologies project in Los Reyes: Evidence of the follow-up for compliance with the UN Global Compact, which is developed through an agreement of Collaboration signed in 2016 between the Universidad Tecnológica de Jalisco (UTJ) and the Cámara de la Industria de la Construcción (CMIC) capítulo Jalisco, through the coordination and collaboration of the Academic group UTJAL-CA02 Social Responsibility, Sustainability and Development Integral for SMEs and companies that are members of the chamber, which are in process or follow up of adherence to the UN Global Compact. This web development process consisted in the creation of a portal that will allow the company Los Reyes to fulfill the commitments acquired in its adhesion process in the letter sent in 2015 by its CEO. This application will allow to be a mechanism of diffusion of the practical measures that the company has taken in the implementation of the 10 principles of the UN Global Compact, besides being a process of implementation of new technologies in its business model.

Global Compact, TIC's in Global Compact

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* Correspondence to Author (email: hmacias@utj.edu.mx)

† Researcher contributing first author.

Introduction

The technological progress, globalization, international cooperation and international agreements that have taken place since the end of the Second World War were the preamble for the Secretary General of the United Nations at the World Economic Summit in Davos in 1999. , Kofi Annan, will speak not only to the UN conforming countries, but to the companies that collaborate and establish commercial plans among themselves, to extend a cooperation, an alliance, a global agreement, which they called the UN Global Compact, from which are derived 10 universal principles in the field of human rights, labor and the environment, which contain: The Universal Declaration of Human Rights, The Declaration of Principles of the International Labor Organization concerning fundamental rights at work, The Declaration of Rio on Environment and Development and the United Nations Convention against Corruption of 2004.

In this framework, the UTJ signed a collaboration agreement in 2016 with the CMIC, so that through the CA UTJAL-CA02 it could contribute to the adhesion of the members of said chamber to the UN Global Compact.

As of the date of preparation of this article, projects have been carried out with more than 25 companies, where it has collaborated with professors and students of the Higher Technician educational programs in: Human Resources Area Management, Information Technology and Communication area Computer Systems, Industrial Processes, Plastics area; and Engineering in: Business Development and Innovation, which pay to the Lines of Generation and Application of Knowledge (LGAC) of the CA.

Social Responsibility and Sustainability, Industrial Projects, Strategic Management and Marketing, Management, Total Quality and Finance and Technology Information and Communication for SMEs.

It is in the lines of Information and Communication Technologies (ICTs) and Social Responsibility and Sustainability where the present article is directed, since in the month of January of this year, the collaboration with the company Obras began y Proyectos Los Reyes, SA de CV, located in the municipality of Guadalajara, in the state of Jalisco, which has as a commercial area the construction industry in general and the concrete structures.

The company Obras y Proyectos Los Reyes began its process of adhesion to the UN Global Compact in August 2015, through its declaration, in which it included a description of the practical measures for the implementation of the 10 Principles of the Global Compact, among which was the disclosure of the policies, procedures and activities of the company.

These practical measures will be achieved through the creation of a web portal for the company, through an agile development methodology; and stable technologies and development frameworks, which will contain the descriptive information of the company, the services it provides, its developments and clients, as well as its policies and procedures, where its process is evidenced as a Socially Responsible Company.

Justification

The UN Global Compact requires that companies committed to establishing practices in human rights, the environment, standards and the fight against corruption, establish mechanisms that allow the disclosure of the policies, procedures and activities of the company, so that it determines the development of a web application that allows the company to have a profound diffusion impact that goes beyond the employees, customers and suppliers of the company. Which will also allow other MyPyMES of the state, country or continent to observe their process, learn from their practices and allow more and more companies to be committed and socially responsible.

Problem

Works and Projects Los Reyes, SA De CV does not have high-impact technological mechanisms that allow its clients, suppliers, employees and its entire value chain to communicate its ethical principles, philosophy, work method, its main works in the field, as well as its policies and procedures evidencing its work in alignment with the UN Global Compact Principles.

Objectives**General objectives**

Analysis, design and development of a web application that allows the projection and dissemination of the policies and procedures of the company Obras y Proyectos Los Reyes, S.A. From C.V.

Specific objectives

- Development of the Concept of Operations document (CONOPS) according to the IEEE 1362 standard for the specification of web application requirements.

- Search of multimedia elements for the design of the corporate image respecting the author's rights.

- Layout of the navigation layout of the application.

- Development of the web application with HTML, Bootstrap, CSS and Javascript.

- Obtain domain services and hosting account for distribution.

Theoretical framework

The pages or websites located on the World Wide Web (www) of the internet are files written or programmed in the HyperText Markup Language (HTML), this language is based on tags, where its simple programming and its easy understanding has made it take great strength over time.

According to Gauchat (2013) the origin of this language lies in the 80s designed by the physicist Tim Berners-Lee, member of the European Organization for Nuclear Research (CERN) to distribute documents.

This language used for the development of most web pages needs an interpreter, somewhere where they can be viewed, Internet browsers such as Google Chrome, Mozilla Firefox and others have this role for the interpretation of files written with HTML that, although not all web pages are written in this language, it is the most used and the most simple.

According to Gauchat (2013) Cascading Style Sheets (CSS) is the mechanism for assigning color and appearance to the website, it contains the attributes of each component or label placed on the skeleton.

This sheet contains the attributes of the components, such as the appearance, buttons, width and height of an image, the size and style of a font, or the positions of those components.

Likewise; Gauchat (2013) describes that JavaScript was originally developed by Brendan Eich of Netscape with the name of Mocha, to later receive the name with which it is currently known, being an object-oriented language and with syntax similar to that of Java and c ++ to avoid the new and tedious concepts.

One of the ways in which web pages have grown in terms of their robust structure and development are frameworks (development frameworks), which have facilitated the creation of websites that have been the starting point of large creations, of such different models and complexities.

According to Gutiérrez (2007) frameworks are a software structure composed of customizable and interchangeable components for the development of an application. In other words, a framework can be considered as an incomplete and configurable generic application to which we can add the last pieces to build a specific application.

One of the main frameworks for web development is Bootstrap, it is a specialized framework for making web applications that can be shared with CSS, where it is easy and simple to manage when assembling it in the website file, it has classes and types of components along with a large number and variety of utilities to improve the display of the page.

Among the components of Bootstrap are tables, panels, buttons, images carousel, lists, columns, labels, navigation bars and forms, as well as a variety of templates with which you can work quickly and efficiently, taking into account that these components have an HTML base which is modifiable is the CSS style of that component. In addition, it has a group of icons (Glyphicons) which, like the previous components, manages a class, which is defined by attributes like any other, such as color and size, with a total of 260 Glyphicons available to the user developer.

Methodology

The development methodology used in the creation of the application was SCRUM, this due to the high index of changes and how flexible this methodology is for its management.

The first phase of the development included the design, planning and conducting of interviews with the company, from which data, images and multimedia were obtained that allowed to determine the requirements of the application.

For the detection of needs, in addition to the interviews, it required close work with the company's collaborators, which allowed determining a design according to the corporate image of the company. Likewise; Activities such as brainstorming sessions were carried out, which allowed establishing a layout proposal for the application.

This allowed to start with the second phase of the development, considered as the analysis of the application for which the specification of requirements was made according to the 1362 standard of the IEEE (Institute of Electrical and Electronic Engineering), thus generating a document that was presented to the client and signed by both parties by mutual agreement.

The third phase of the project consisted in the design and layout of the application, in which by means of drawings, strokes, illustrations and any other visual aid it was supported in the elaboration of a prototype of the site, which contained: panels, carousels, buttons, and divisions within the layout.

The fourth phase of the project consisted in the development, in this stage the technologies were used: PhpMyAdmin, IcoMoon App, JQuery and JQuery Mobile, BootStrap and Sublime Text was used as an HTML editor, the tags were added that would indicate to the browser what type of content would be used and in what positions.

Likewise; During the development with the HTML tagging language the database was also built in PHPMyAdmin which allows us to work with MySQL in a graphical environment.

Next in image No.1 the module of: Who we are is shown.



Figure 1 Module Who we are

Once the construction of both the web application and the database was completed, the fifth phase was carried out, which consisted in doing tests locally to observe the behavior in different browsers, no flaws were found in desktop view or view mobile, the images were displayed correctly, the size of the letter, the colors and the navigation between pages responded correctly.

Once the local tests were completed, the content was uploaded to a hosting service for remote testing, FileZilla was used as a free software which allows files to be managed via FTP (File Transfer Protocol) and the base was configured of data by accessing the Godaddy control panel and selecting the database option. From there, phpMyAdmin was accessed and the previously created database was imported using the phpMyAdmin of the wampserver, later a user with privileges was created in the database. By last; access to the IP (Internet Protocol) was granted remotely so that it will connect to the database and tests of connection to the website were made, just after configuring the redirect with the new domain.

Results

The implementation of this web application will allow the company Works and projects Los Reyes SA De CV has the necessary means to disseminate its activities as a company adhering to the UN Global Compact, as well as having the innovation of a means of Mass communication that will impact the business model of the company. Below is an image of the home page of the web application.



Figure 2 Home page

Likewise, the web application evidences the commitment acquired with the signing of the commitment letter that was sent to the UN Global Compact in August 2015 by the general director of the company, following is the policy section, in where the company's code of ethics is shown.



Figure 3 Code of ethics (policy section)

Derived from the previous section, the web application Values page is shown below.



Figure 4 Values Page

Conclusions

The analysis, design and development of this project allows the company Obras y proyectos Los Reyes SA De CV to support the 10 Principles of the UN Global Compact regarding Human Rights, Labor Rights, the Environment and the Fight against Corruption, working inside and outside the sphere of influence, making the principles part of the strategy, culture and daily actions of the company.

Therefore, in the communication of the annual progress made by the company to the UN, it will be able to fulfill the commitment acquired with the dissemination of the practical measures acquired in the process of adhesion to the UN Global Compact.

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Figure 1 Public Policy Process

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