

A Model To Measure Competitiveness In Touristic Companies In Mexico

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ABSTRACT

The objective of this paper is to develop a model that measures competitiveness among tourism businesses in Mexico. To that end, this research consists of three parts: the first refers to the theoretical framework to define the competitiveness of a tourism company and proposes a theoretical business competitiveness model; the second deals with the development of a questionnaire upon the theoretical model; in the third part, the questionnaire and the theoretic model are validated using factor analysis and a competitiveness index, is presented.

Keywords: M210 Enterprise; M1 Business Administration; C3 Factor Analysis; Z390 Tourism Competitiveness

JEL: M210; M1; C3; Z390

INTRODUCTION

The notion of competitiveness involves a large number of variables that hinder its study. This is demonstrated by the multiplicity of definitions that try to account for it or summarize it (Alonso-Almeida, Bagur-Femenias, Llach, & Perramon, 2015; Bianco, 2007; Cetindamar & Kilitcioglu, 2013; Contreras Cueva, Macías Álvarez, & González Morales, 2018; Evans, 2016; Flak & Głód, 2015; Ibarra, González, & Demuner, 2017; Kožená & Chládek, 2012). In this sense we can talk of competitiveness in business at various levels such as industry, sector, economic region or country.

The analysis of competitiveness should consider the method that allows for operationalizing it in addition to knowing the unit of analysis with which the measurement will be applied. Also, the selection of the indicators to be used for measurement must be taken into account since this concept is multidimensional in nature (Bianco, 2007). It is possible to find more qualitative research, with proposed models to measure competitiveness but without operationalization of variables and even less with quantitative measure and multivariate techniques (Alonso-Almeida et al., 2015; Contreras Cueva et al., 2018). Furthermore, there is few research about tourism enterprises competitiveness in Mexico such as Molina Germán, Pérez Melo, Lizárraga Salazar, Larrañaga Núñez (2018).

Competitiveness is a concept in which its analysis must consider multiple dimensions and relationships, ranging from the definition of the subject to the relevance of public policies, including its scope, measurement and knowledge of its causes, components, variables and indicators; in this sense, it is able to find correlational studies that are not enough to show the way all the variables are related in between.

The objective of this paper is to propose and validate a model to measure competitiveness among tourism businesses, based on factor analysis, in order to develop an index of the competitiveness of touristic enterprises in Mexico.

The proposed model goes beyond other research that are only theoretical models (Evans, 2016; Goranov, 2014; Kožená & Chládek, 2012; Sainaghi, Phillips, & Zavarrone, 2017). This research operationalize the variables; develop and validate a questionnaire and goes forward with an initial measurement to validate the theoretical model.

From the statistic kind of measurement, this research shows wider relationships between the variables than those using correlations (Flak & Głód, 2015; Ibarra et al., 2017) or ponderations (Cetindamar & Kilitcioglu, 2013) and even offers more than those using multivariate techniques (Alonso-Almeida et al., 2015; Contreras Cueva et al., 2018) pointing to a longitudinal analysis of the firms using the Competitiveness Index.

On the other hand, it is not an objective of the research to make inference or generalization of the results between companies.

The manuscript is constructed in four parts, first the literature review, second the description of the process followed to develop a questionnaire, third the theoretic model and questionnaire validation (results) and fourth the discussion.

THEORETICAL FRAMEWORK

The discussion of the measurement of the competitiveness of a business is a matter of debate, and in recent years it has been discussed whether it can be measured through indicators of economic and financial profitability or whether it should be measured in a multidimensional way, covering management aspects, related to collaborators' motivation and commitment, client satisfaction, continuous improvement, among others (Hill, Jones & Schilling, 2014).

In that sense we start with the conviction that measuring the competitiveness of a touristic company has specific characteristics, including managerial and organizational aspects, among others. The tourism industry is mainly characterized because its product is primarily a service, different from other industries which speak of goods or property, something tangible, that can be owned by the consumer. In the case of tourism services, these are intangible, and they can be used but cannot be owned, in most cases, by the consumer, this is deeply studied by Evans (2016).

Touristic companies take into account certain particularities of the sector such as: the immobility of resources (for example, the location of a beach), the difficulty of substituting resources the ownership of resources (in many cases they belong to a community), seasonality (holiday periods are mostly concentrated during a certain period of time) and capacity restrictions, among others (Evans, Campbell & Stonehouse, 2006).

As with any business, the competitiveness of a tourist-service company lies in the capacity of its management to develop and position itself on the market, sustain it over time and grow continuously. It is based, fundamentally, on the growing and systematic innovation and incorporation of knowledge in the organization, to respond effectively to internal and external challenges, while maintaining its competitive advantages (Caird, 1992). The competitive advantage is a frequently used perspective to measure competitiveness (Evans 2016; Flak & Głód, 2015; Hill et al., 2014).

The competitiveness of touristic businesses is partially influenced by the economic context in which they operate, especially in terms of business regulation, the endowment of resources and infrastructure and the so-called business climate. However, the entrepreneurial capacity is, essentially, what leads a company to participate advantageously in a market and to be competitive (Gonzalez, & Ruiz, 2014, p.25).

In this sense when measuring the performance of touristic companies, we won't base research on the contributions made by authors on the basis of touristic destination level, such as Dwyer, Forsyth and Rao (2000), who talk of the construction of a price index of the competitiveness of each tourist destination. Neither on Ritchie and Crouch (2003) contributions who developed a competitiveness model of the tourist destination and examined factors that affect the competitiveness of a destination; in this model they analyzed macro and meso-environmental factors, which include qualitative determinants, tourism destination policy, planning and development, destination management, basic and attractive resources, support factors and resources, among others. We put aside these findings because the focus of this research is on the touristic enterprise, and the main objective is to consider the internal factors and/or management capacities that every company must develop or improve in order to obtain competitive advantages and position itself in the market.

By virtue of the above, it is important to build a theoretical model that allows us to measure the competitiveness of a touristic business, taking into account that it depends mainly on its own characteristics or management, and that it is

made up of a large number of variables, both tangible and intangible in nature, and includes varied dimensions (Rubio & Aragón, 2002; Sánchez, Bañón, Jiménez & Sangeado 2010). Even though we recognize the environment influences the competitiveness of companies, their entrepreneurial capacity is what leads a company to have superior performance.

Some popular models used to measure competitiveness are for example:

- 1) The European Foundation Quality Model (EFMQ) which includes 9 main criteria (management, policy and strategy, people, partnership and resources, processes, results with regard to customers and to the company and key performance results) (Kožená & Chládek, 2012). This model and the one proposed in this research have in common most of the dimensions taken into account but an important difference is the measurement in likert scale from 0 to 7 and that the proposed model takes into account some indicators already used by the enterprises which are certified by the Mexican tourism ministry in quality, management, and operation issues.
- 2) Ibarra et al. (2017) takes into account similar dimensions (strategic planning, production and operations, quality assurance, marketing, accounting and finance, human resources, environmental management and information systems) based upon international organizations recommendations such as Organisation for Economic Co-operation and Development (OECD) and competitiveness authors such as Rubio & Aragón (2002) its proposed model is for a manufacturing perspective not a service one.
- 3) Olaf and Grzegorz (2015) proposes a model from the timing perspective assuming that one company has four dependent competitive elements to measure such as competitive potential, strategy of competition, competitive advantage and competitive positioning.
- 4) One innovative proposed model is the one of Alonso-Almeida et al. (2015) which takes into account five dimensions and includes some sustainability issues and measures using Structural Equation Model, the dimensions are: quality management, environmental management, social management, market factors and financial performance. One of its main findings is that sustainable practices can benefit touristic enterprises by improving competitiveness.

All of the above mentioned models are compatible with that proposed in this research with a differentiation in the way to operationalize variables and the longitudinal perspective of the competitiveness enterprise index to be able to measure improvements in the companies in a longitudinal form. One possible improvement to the proposed model from the literature review is to include the sustainability perspective.

Before continuing with building the theoretical model of competitiveness, we must review some of the definitions of a competitive company or business. Those businesses that are able to produce quality, dynamic service will triumph.” However, it is also important to consider that competitiveness is determined by several dimensions “that allow a tourism company to innovate and continually improve their organization, products and services, to better face the environmental conditions” (Guarda, Rapiman, Rebien & Solis, 2006, p.9).

Taking into account the definitions reviewed in the previous paragraphs, we propose the following definition, in accordance with the competitiveness model suggested in this research. *The competitiveness of a tourism company is the capacity that the business has to maintain a relevant position in its context of operation and in the market, distinguishing itself from its competitors, through the presence of competitive advantages that arise from a strategy oriented mainly toward the differentiation of its tourism products, creating a unique experience for the tourist, in such a way that it is recognized by its customers and its competitors who come to adopt their practices. It also generates profits to distribute among "stakeholders" and maintains a sustained and sustainable growth in the long term.*¹

This definition allows us to point out that in order for a company to be recognized by its clients and the competition, it must achieve one or several "competitive advantages," which entails the development of a special ability or skill, placing the company in a preferential position in the market. That is, it differentiates itself from the competition, in some sense it is unique, and it is possible to maintain this position over time.

In the next section we present the competitiveness model that describes the dimensions and will serve as the basis for its operationalization.

The Model

The theoretical model proposes parts from Michael Porter's (1987) ideas and, particularly, on the research of Heskett, Sasser and Schlesinger (1997) in which they developed a value chain for businesses with successful services. In order to develop a model that can determine and measure business competitiveness, the concept of created value and the value chain are used.

According to Porter (1987) the competitive advantage comes, fundamentally, from the value that a business creates for its clients and surpasses the cost of it. The value created is divided in two parts. The first is the benefit of customers, which means paying for a service below the value generated by its consumption (consumer surplus), and the second occurs when shareholders obtain an above average return. The sum of both benefits is the value created, and a company obtains a competitive advantage if that value is greater than that of the competition.

The next concept is the value chain, which is defined as the combination of main activities and support which allows for generating goods and services with greater value. (Porter 1987). Therefore its analysis enables us to identify activities of value, which are interdependent and related to the chain, whose links can create a competitive advantage through optimization and coordination.

Criticism of Porter's value chain is based on the fact that his chain does not consider aspects such as corporate culture, leadership and other skills inherent to human talent (Aktouf, 2005), and it is more suited to organizations that produce goods, rather than services. In this sense Heskett, Sasser and Schlesinger (1997) (known as the HSS model) were relevant to the development of a value chain for service-oriented businesses.

The development of the HSS model focuses on the employees and their fundamental role in service-oriented businesses, as is the case in the tourism industry. Motivated employees serve customers adequately, and they then become loyal because of the value they receive. This is reflected in the financial results of the business. This perspective keeps evolving with further research of the authors. (Heskett, Sasser Jr., & Schlesinger, 2015, Heskett, 2014).

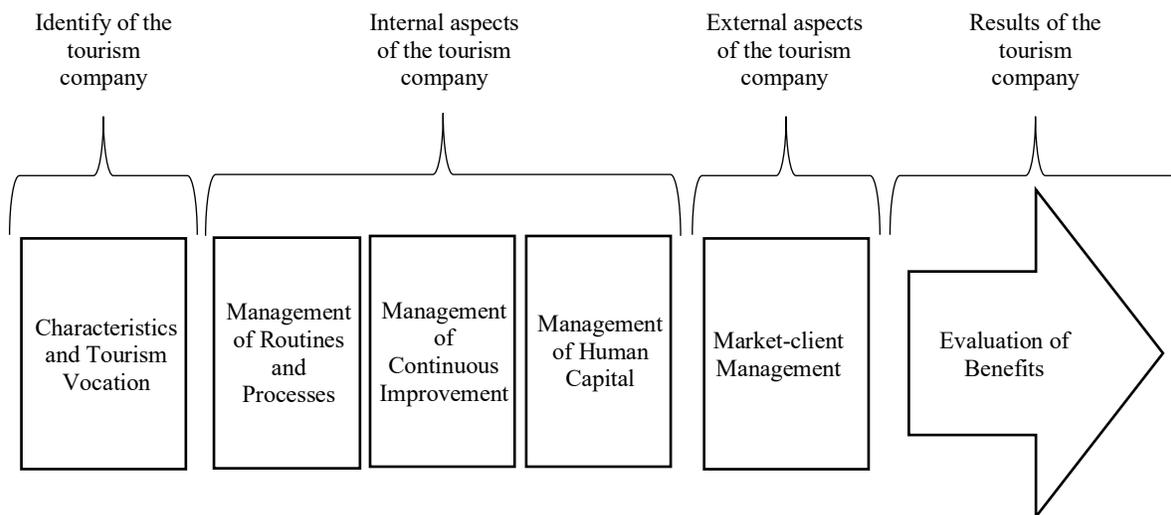
In summary the model proposes six dimensions which are: a) Characteristics and Touristic Vocation, b) Management of Routines and Processes, c) Management of Continuous Improvement, d) Management of Human Capital, e) Market-Client Management, and f) Evaluation of Benefits.

The proposed dimensions can be grouped into four categories. The first refers to the identity of the business, which is the set of actions that businesses can adopt to form alliances with public and private entities, in order to increase the quality of management, leadership, the organization and the internal will to behave as a tourism company, clearly defining their vision to be more competitive (Characteristics and Touristic Vocation).

The second category refers to internal aspects of the tourism business, which are the actions carried out by the company, on an internal level, to achieve permanence in the market, as well as to obtain earnings (Management of Routines and Processes, Continuous Improvement and Human Capital).

The third refers to external aspects of the business that allow it to adapt to its environment (Market-Client Management), facing changes in legislation, competitors, actions or new participants in the local market. All these dimensions, result in greater earnings (Evaluation of Benefits), which is an outcome of the application of a set of actions called competitive strategy (Figure1). This research differentiates from others (Olaf & Grzegorz, 2015), since it goes further to the company operations and not only from the general strategic vision.

Figure 1. Competitiveness Model



Source: Author’s elaboration based on Gonzalez and Ruiz (2014)

The advantage of this model is that it covers the main activities of the tourist service business, grouped in a value chain. Now the interest is to operationalize these concepts in an instrument that contains the proposed dimensions of the competitiveness model. The instrument includes perceptions and quantitative aspects.

On the other hand, we must consider that competitiveness is associated with the quality of service (Palacios & Vargas, 2009; Zhong, Chen & Xie, 2010), which is subjective and relates to what the client perceives as a unique experience. That is, the judgment he or she makes about the excellence or superiority of the service provided. The success of the result will depend on the capacity of the service provider to know and understand the client's needs, as well as the effort and efficiency with which the process is carried out and the cost incurred by the client to have access to the service. It should be noted that the cost not only implicates the price of the service, but also the utility of place, time and the way in which the service is provided (Fornell, Johnson, Anderson, Cha & Bryant, 1996). These ideas strengthen the dimension of market-client management in the proposed model.

However, for a service to be considered of quality, this positive perception must be consistent. It must occur repeatedly, not just once, but with several consumers on different occasions. This is no easy task, so the application of a model that takes into account all of the routines and processes will allow us to maintain a standard of quality, as well as contribute to the strategy to reduce costs. This management of service routines and processes must be accompanied by the commitment of the company to improve permanently, in order to maintain quality service and a commitment to the client and the employee, thereby contributing to the adoption of a culture of quality.

The proposed model considers the dimension of routines and processes, as well as continuous improvement. Likewise, the model considers to be relevant the attitude or behavior of the businessperson who declares his or her business one of tourism. (This is the dimension of characteristics and touristic vocation). This means that the majority of clients are tourists, and therefore, the service providers are willing to meet them and provide them with a unique experience. In this way the providers look to have satisfied clients and will therefore have a greater profitability, assuring their place in the market (Gonzalez, & Ruiz 2014).

METHODOLOGY

This proposal consists of using the Exploratory Factor Analysis (EFA) and the Confirmatory Factor Analysis (CFA) which allow for the identification of the constructs of interest, starting from the proposed theoretical model and thus obtaining the factor scores of the competitiveness index. To do this, we first explain what the EFA and the CFA are, and then use the pilot sample and generate the index.

The Factorial Model

The EFA is a statistical method that explores the dimensionality of the variables and expresses the variation and covariation of a set of variables $x_j, j = 1 \dots p$ dependent upon factors $F_k, k = 1, \dots, m$, also called latent variables. This analysis, as its name indicates, is exploratory because it iteratively searches for the best representation of the original variables in the least number of dimensions (or factors) from the covariance matrix.ⁱⁱ

Once we are familiar with the variables that identify a specific factor (or as we called it in the model, a dimension which is a latent variable obtained in the EFA), then we use the CFA to prove the formation of the proposed hypothetical factors, for which restrictions are imposed. For example, to eliminate one of the p variables in a specific factor, a restriction is introduced in which its weight is equal to zero (Bollen & Lennox, 1991 pp.226). It is common practice to use the EFA results to identify some factors and then introduce the restrictions observed using the CFA approach to confirm the results of the exploratory analysis (Brown, 2006).

The distinction between EFA and CFA is diffuse, in the sense that the restrictions that are imposed in the CFA may be exploratory in a certain manner, and therefore it should be considered that the EFA and the CFA are, rather, the extremes of a continuum; since it is enough to introduce restrictions to the EFA to be modeled as CFA (Cortes & Vargas, 2011 p.370).ⁱⁱⁱ

An advantage of the CFA is that the indices obtained for each enterprise, in each dimension, preserve their original scale and can be used for longitudinal analyses.^{iv} In addition, a second order CFA is presented to generate the general competitiveness index (Brown, 2006), which is explained next.

For practical purposes the first order CFA identifies six factors that correspond to the dimensions of competitiveness, denoted as F_1, F_2, F_3, F_4, F_5 and F_6 where factor F_i measures the business Tourist Vocation through 20 manifest variables^v x_1, \dots, x_{20} , the load associated with this factor denotes the importance they have in explaining the factor, and they are denoted by $\lambda_1, \dots, \lambda_{20}$. This same factor has a measurement error associated with it for each manifest variable, which is denoted by $\varepsilon_1, \dots, \varepsilon_{20}$; these measurement errors must be “small”^{vi} in order to guarantee the identified factor as unidimensional. Analogously for factor F_2 , the Management of Routines and Processes is measured with 9 manifest variables x_{21}, \dots, x_{29} and has a weight of $\lambda_{21}, \dots, \lambda_{29}$, which also has corresponding measurement errors associated of $\varepsilon_{21} \dots, \varepsilon_{29}$. The rest of the factors correspond to the dimensions F_3 , the Management of Continuous Improvement is measured with 10 manifest variables, F_4 , the Management of Human Capital with 18 manifest variables, F_5 , the Market-Client Management with 18 manifest variables and F_6 , the Evaluation of Benefits with 18 manifest variables (Graph 2).

The second order CFA has two levels of factor formation. The first identifies the latent variables F_1, \dots, F_6 already defined, in which the weights λ_i are estimated for these factors. On the second level these factors shape a second order latent factor G, and the weights γ_i are estimated to generate the competitiveness index.

Note that the factorial model contains reflective indicators^{vii} for each factor since the set of indicators are one-dimensional to the construct in question, and therefore they are expected to have a high correlation with each other.

So we can estimate the factorial scores of F_1, \dots, F_6 , as well as of G, which are useful for future analyses. There are several advantages to using this approach. One of them is that the calculation of the scores is done in one step, and it does not need to be recalculated in two steps. The other advantage is that we can calculate both first and second order of the CFA, and these can be used for longitudinal comparison purposes since the scores are not standardized.^{viii}

Some authors argue that the construction of models will allow identifying those factors influencing the competitive position and will contribute to increasing the competitiveness of tourism business in the countries (Mykolaychuk & Savina, 2017). Relevant efforts have been done about performance measurement in tourism firms, such as Sainaghi's et al. (2017) meta analysis, in which authors declare as a finding that it has been a determined effort to tie metrics more closely to tourism long-term strategy.

The Measurement Instrument

The questionnaire that is developed and applied to validate the theoretical model, is called “Measurement of Competitiveness Instrument” and the process that is followed to guarantee its validity and reliability is described and can be seen graphically in Figure 2.

The specification of the domain of the tourism competitiveness construct was made based on the theoretical model developed in this project that establishes that competitiveness is composed of six dimensions or factors that include: (F₁) Characteristics and tourism vocation, (F₂) Management of routines and processes, (F₃) Management of continuous improvement, (F₄) Management of human capital, (F₅) Market-client management and (F₆) Evaluation of benefits.

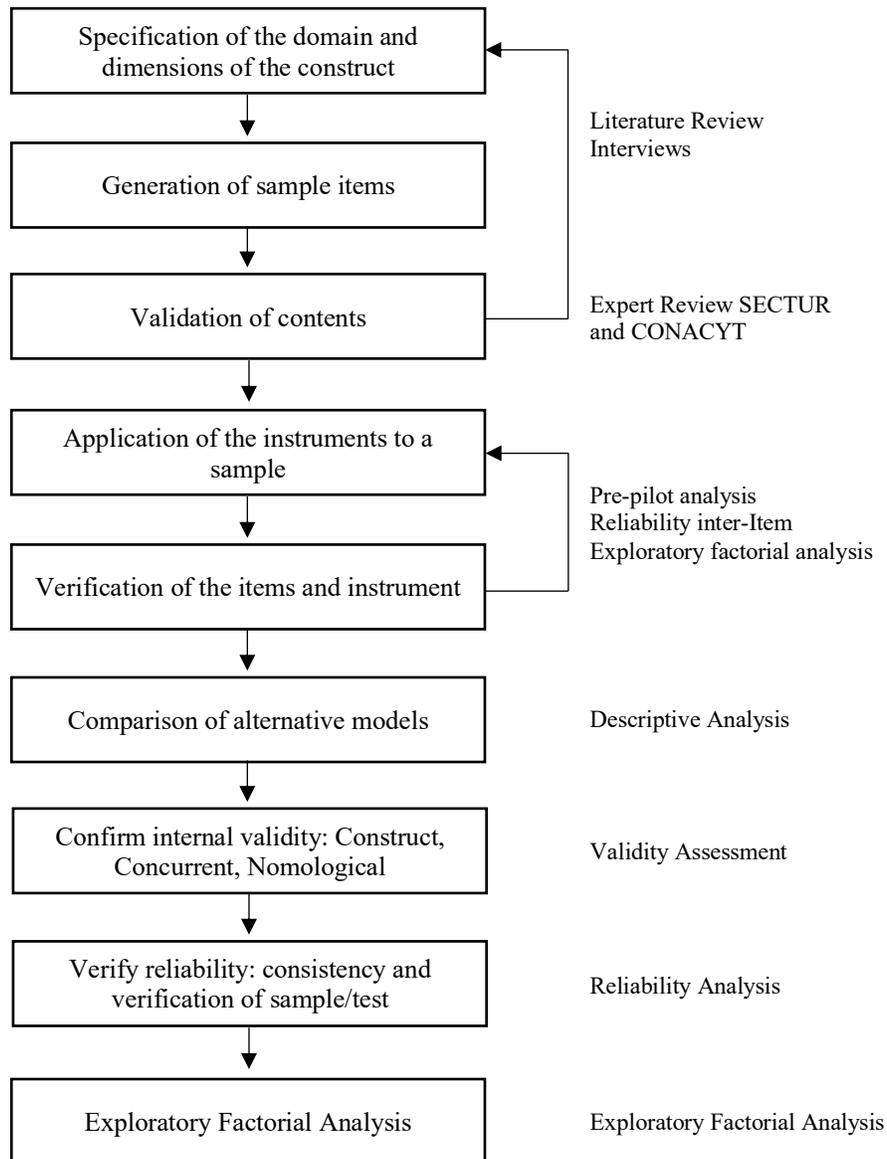
The generation of items or questions that refer to the six dimensions mentioned included four processes such as: a) literature review (including other scales of total quality in tourism such as quality seals of the Federal Ministry of Tourism), b) interviews with experts such as businessmen and public servants of the Federal Ministry of Tourism as well as evaluations by groups of academic researchers, c) Further refinement of the proposed scales by reviewing the tourism sector, both government and private, d) pre-pilot test on a sample of 6 (six) enterprises aimed at perfecting the instrument through the elimination of confusing questions or those that represented a high index of complexity for the interviewees, at the same time the Likert scale of answer was extended from 5 to 7 options as suggested by Alwin (1992), in addition to measuring the response times of the participants in this phase.

Given that competitiveness measurements are subject to measurement error because they are latent (unobservable) variables, one of the fundamental requirements is to evaluate the psychometric properties of the scales that are included in the measurement of competitiveness instrument. Therefore, it is critical to develop said tests that can allow us to evaluate the validity and reliability of the scales that make up that measurement instrument. Validity can be defined as the degree to which the differences in scores of scale observed reflect the true differences between objects (in this case, tourism companies) on the characteristic being measured (in this case, tourism characteristics and vocation, management of if repeated measurements are done (Sampieri, 2018).

The subsequent analyses aim to ensure the validity and reliability of the scales that make up the instrument for measuring the competitiveness of tourism service providers in Mexico. Finally, it is important to underline that the instrument is characterized for being valid from an outside point of view, which implies that it can be applied in a generalized form, meaning, to the majority of tourism enterprises in Mexico. The advantage of this characteristic is that the questions (mostly) apply to the different types of tourism service providers (if their vocation is tourism).

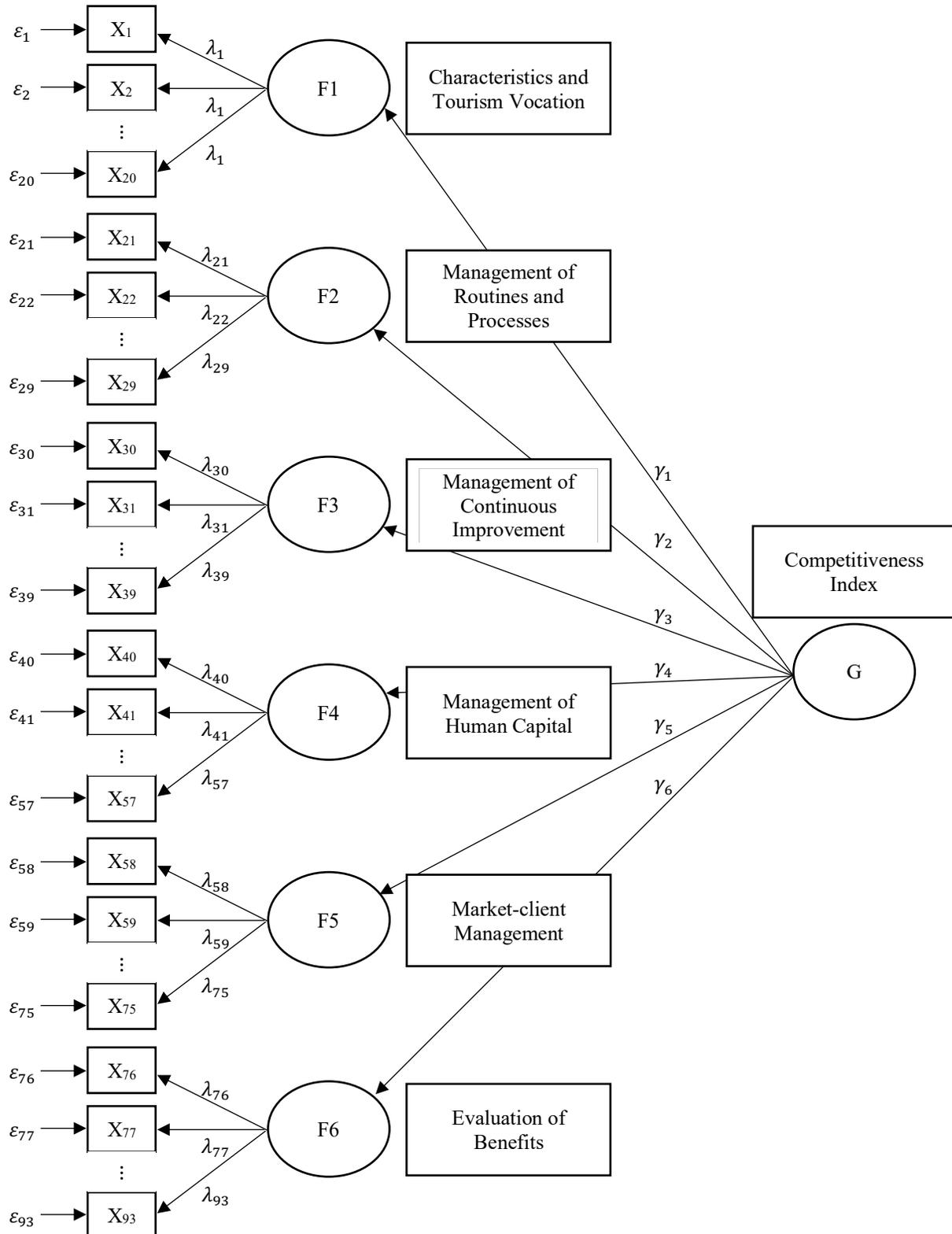
This characteristic will allow us to build a single instrument that applies to the different areas of the enterprises.

Figure 2. Methodology to develop the Competitiveness Measurement Questionnaire



Source: Author's elaboration based on Gonzalez and Ruiz (2014).

Figure 3. Representation of Second Order Confirmatory Factor Analysis



Source: Author's elaboration based on Gonzalez and Ruiz (2014)

The Pilot Sample Data

In order to validate the competitiveness model for the service companies of the proposed tourism sector and its measuring instrument, a pilot test is carried out in 2013 to 116 tourism companies; a second measurement will take place at the end of 2020. The companies that make up the sample are providers of tourist services that hold the quality seal of the Federal Ministry of Tourism in the following states: State of Mexico, Hidalgo, Nuevo Leon, Quintana Roo, Veracruz and the Mexico City.

The sample of the participating companies represents a variety of actions, years of experience in the sector, operational activities, tourist areas and types of certifications. The sample size is n = 116.

A probabilistic sampling was not carried out because the objective of the study is to validate the instrument, based on a theoretical model, as well as the theoretic model, but not to obtain inferences from the studied population. Since the objective of the study, the results are evaluated according to the proposed model and not its inference capability.

Table 1. Size of the company

	Frequency	Percentage	Valid percentage	Cumulative percentage
From 0 to 5 workers	36	31.0	31.0	31.0
From 6 to 10 workers	20	17.2	17.2	48.3
From 11 to 50 workers	37	31.9	31.9	80.2
From 51 to 100 workers	12	10.3	10.3	90.5
From 101 forward	11	9.5	9.5	100.0
Total	116	100.0	100.0	

Source: Author elaboration

As it can be observed in table 1, the sample for the initial survey is subdivided in five categories of companies by size which is measured by the number of workers. Although the questionnaire was applied to companies of all sizes, it can be identified in the cumulative percentage that the largest size was micro and medium companies.

Regarding the type of business of the participating tourist companies, the most important percentage of the sample (44.8%) corresponds to restaurants, hotel activities represent 18.1%, travel agencies (retail and wholesale) represent 12.1% of the companies, cultural and leisure services are 4.3%, while the remaining 18.1% is from other activities.

The analysis procedure includes the completion of three stages:

Stage 1. Exploratory Factorial Analysis, aimed to achieve two objectives: 1) reducing the number of indicators of the instrument and 2) increasing reliability of the competitiveness dimensions.

Stage 2. Confirmatory Factorial Analysis of First and Second Order, with the objective of verifying if the theoretical model proposed, is observed effectively in reality, that is, verifying if the hypothetical factors (dimensions) form these latent variables. In this stage, the proposed model is adjusted as a result of the theoretical framework of the present project. The objective in this phase is to estimate the factorial charges of both the factorial analysis of the first-order and the factorial of the second order. Likewise, the factorial scores are calculated, which constitute the basis for obtaining a ranking of the tourism companies.

Stage 3. Ranking Identification. Once you have the factorial scores calculated in Stage 2, a table is built associating the competitiveness scores with characteristics in the companies (size, tourism sector of activity, types of certification). As a result, a general competitiveness ranking is presented.

The objective of applying the instrument to a sample of tourism companies allows for validation and reliability in subsequent studies. This instrument was elaborated through several consultations with the support of the theoretical framework (details in Gonzalez & Ruiz, 2014 p.145-171).

In this sense, the construction of the model to continue measuring the competitiveness of tourism companies over time, is a contribution without a defined period of validity since it is useful to continue measuring systematically and over time the competitiveness of companies without limitation for having made the instrument, the theoretical model and the survey in 2013.

There are other validated theoretical models such as Flak & Glód, (2015) which main differentiation with this research is they use correlation and we use a multivariate technique.

RESULTS

The methodological proposal consists of operationalizing the dimensions of competitiveness suggested in Graph 1, besides showing validity and reliability. The validity of the construct rises from the idea that the dimensions of the model must be supported by the research, as well as linked to the substantive theory (Hernandez Sampieri, Fernandez Collado & Baptista Lucio, 2008). In our study the dimensions of competitiveness are explained in the parts of the theoretical framework and the model itself. Therefore, what remains to be proven is that these dimensions be identified by the EFA and CFA and have the desired reliability.^{ix} To exemplify the application of the EFA, the analysis of only one of the dimensions is shown, since the procedure repeats for the rest.

EFA: Dimension Characteristics and Tourism Vocation

The EFA is used for the dimension of Characteristics and Touristic Vocation. To capture this dimension, 24 questions or manifest variables are proposed in the questionnaire. The EFA establishes that only 20 variables are enough to satisfactorily build this factor.^x The first question is how many factors should be retained. The likelihood ratio test in Table 2 concludes that the number of factors to be extracted is 5.^{xi} Likewise the sedimentation plot suggests the same solution, as shown in Table 2 and Graph 1, respectively.

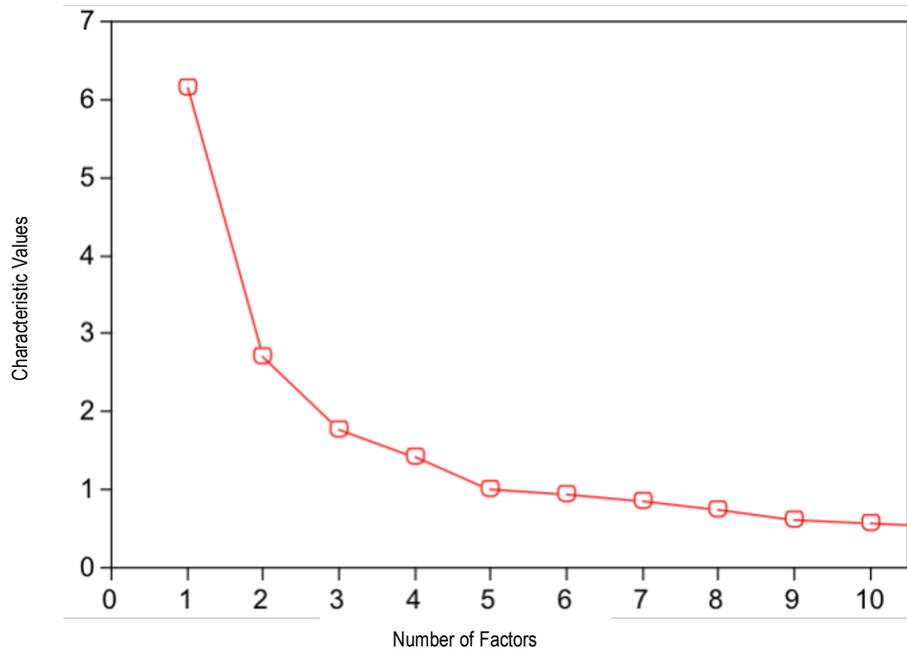
Table 2. Summary of the Information of the Adjustment of the EFA Characteristics and Tourism Vocation

Model	Chi- squared	Degrees of Freedom	Value of P
1-factor	601.626	170	<0.001
2-factor	353.51	151	<0.001
3-factor	257.054	133	<0.001
4-factor	207.789	116	<0.001
5-factor	146.6	100	0.0017

Source: Author’s elaboration based on the Ministry of Tourism’s Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

In the sedimentation plot, you can visually determine the inflection point of the curve, in which the slope of this polygonal line drastically decreases, and the eigenvalue is greater than the unit,^{xii} since this criterion indicates the number of factors to be withheld. In this case, the change that defines an inflection point occurs between the fourth and fifth factor, as shown in Graph 1.

Graph 1. Sedimentation Plot for the Extraction of Factors



In Characteristics and Tourism Vocation

The manifest variables that shape the Characteristics and Tourism Vocation Dimension are shown in Table A1, in Appendix. The EFA can obtain rotated factors using the VARIMAX method (Kaiser, 1960),^{xiii} the weights that appear in bold type indicate those that are higher for each one of the factors.^{xiv} Most of the variables were unequivocally related to a single factor, except question B15 regarding the degree to which the company encourages employees to assume responsibilities, which presented similar correlations for factors A and C.

However, for variables B6 (Decisions take into account financial structure), B9 (Degree in which it has equipment maintenance programs), B21 (Organization of activities for customer entertainment) and B23 (Use in the last five years of support from the public sector), no remarkable correlations were presented with any of the 5 factors, so they were excluded from the analysis.

In summary the extracted factors or groups of variables could be interpreted in the following way: A: Clearly defined and transmitted Business Management Systems; B: Business Plan that guides the strategy of the company; C: Infrastructure, Technology and Security Systems; D: Company responsibility; E: Design of differentiated products and services. These factors are part of the Characteristics and Tourism Vocation Dimension. Cronbach's alpha, which measures the internal consistency of the 20 variables included in this dimension, is 0.878, and reaches a very satisfactory level in terms of reliability.^{xv} In this way we fulfill the condition of identifying the first dimension.

CFA: Dimension: Characteristics and Tourism Vocation

The CFA is carried out for the selected variables in the previous section. In Appendix, Table A1 the results of the factor weights for Characteristics and Tourism Vocation are shown as a result of the CFA. The weights indicate that all the variables have been identified; we can observe in this table that the B5, B8 and B11 variables have relatively low weights compared with the rest. However, we decided to retain them because they are based on the theoretical framework. These variables, like the rest, contribute to an adequate foundation to the construct (intangible concept) of Characteristics and Tourism Vocation. It should be noted that the same procedure is followed with the rest of the

factors and the scores for each are obtained in the same way. The second column of this table contains the averages of each variable and a third called product, which is the result of multiplying the average by the weight of each variable, the purpose is to calculate the weighted average as indicated in the following formula,

$$\bar{f}_1 = \frac{\sum_{i=1}^{20} \lambda_i \bar{x}}{\sum_{i=1}^{20} \lambda_i}$$

where \bar{x} is the average of the manifest variable x and λ_i is the weight estimated through CFA (as shown in Table A1). For example, the weighted average for the construct F_1 (Tourism Vocation), is equal to $\bar{f}_1 = 57.641/13.227 = 4.358$ on a scale of seven points, where the minimum value is 0 and the maximum value is 6. The individual F_{1j} scores of each SME for this factor are calculated with

$$F_{1j} = f_{1j} + \bar{f}_1, \quad j = 1, \dots, 116$$

where f_{1j} is the estimated score from the CFA and \bar{f}_1 is the weighted average. As long as the score is closer to six, the SME achieves a better rating.

This procedure is done for the other dimensions (F_2, F_3, F_4, F_5 y F_6), but due to space constraints, we will not show the results. (details in Gonzalez & Ruiz, 2014).

We proceeded analogously to identify the rest of the dimensions of competitiveness, but because of space constraints, we'll only show the Cronbach's alpha and the composite reliability of Dillon-Goldstein¹, as shown in Table 2 which also shows alphas with satisfactory levels of reliability. For this first phase, the methodological proposal consists of identifying (validity and reliability) the six dimensions of the Competitiveness Model that include: (F_1) Characteristics and Tourism Vocation, (F_2) Management of Routines and Processes, (F_3) Management of Continuous Improvement, (F_4) Management of Human Capital, (F_5) Market-Client Management, (F_6) Evaluation of Benefits.

Table 3. Reliability of the Dimensions of Competitiveness

Dimensions	Number of items ¹	α -Cronbach	ρ -Dillon-Goldstein
Characteristics and Tourism Vocation	20	0.88	0.87
Management of Routines and Processes	9	0.84	0.83
Management of Continuous Improvement	10	0.82	0.82
Management of Human Capital	18	0.87	0.87
Market-Client Management	18	0.93	0.92
Evaluation of Benefits	18	0.82	0.82

The number of items is in accordance with Graph 2.

Source: Author's elaboration based on the Department of Tourism's Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

Typically, the results of an EFA are considered as such, exploratory. Consequently, this solution should be read as an initial proposal, often this exploratory phase is not very clear because on some occasions the factorial weights are ambiguous (they load two or more factors simultaneously) as is the case of B3 and B15. The second phase consists of applying the second order CFA model that is defined in Graph 2 and has the objective of confirming the inter-item (between variables) correlation structure that allows us to determine the questions of the survey that are identified with the constructs or latent variables previously explored. In this stage we confirmed which variables truly integrate the previously explored factors.

The Global Index of Competitiveness in Tourism

Once the factorial scores of F_1, \dots, F_6 have been obtained, the second order factorial model proposed in Graph 2, which constitutes the index of competitiveness in tourism, is adjusted. The objective of the first stage consists of estimating

¹ Dillon-Goldstein's composite reliability formula is calculated with the following expression $\rho = (\sum_i \lambda_i) / [(\sum_i \lambda_i) + \sum_i Var(e_i)]$ where λ_i are standard factor weights and the standardized residual variances $Var(e_i) = 1 - \lambda_i^2$.

the factorial weights $\lambda_1, \lambda_2, \dots, \lambda_{93}$ from the first order factors, while the second stage is oriented toward the estimation of the second order factorial weights $\gamma_1, \gamma_2, \dots, \gamma_6$. In reality this step can be done all in one, as shown in this study.^{xvi}

In this stage the factorial scores obtained from the first order CFA are used to estimate the second order CFA model. Table 3 shows the factorial weights to obtain the global competitiveness score. The higher weights indicate that all of the dimensions are determinant for achieving a competitive position in the tourism industry. However, the dimensions that the analysis identifies as the most important are: i) Market-Client Management and ii) Management of Human Capital. It's worrisome to note that these two dimensions of competitiveness are those that obtain the lowest measurements in performance (specifically Human Capital, since Market-Client is in fourth place in performance). This finding diagnoses important areas of opportunity to improve competitiveness in the field of tourism in the surveyed companies.

In synthesis, by using the factorial scores F_1, \dots, F_6 the global index of competitiveness is generated. Table 4 shows the factorial weights of each of the dimensions. The average calculated from this index is 4.138. It can be noticed that Human Capital Management dimension is the one with most influence in the touristic business competitiveness, while routines and processes is the second one.

Table 4. Results of the Confirmatory Factor Analysis for Global Score

Variables	Weights
F1. Characteristics and Tourism Vocation	0.700
F2. Management of Routines and Processes	0.768
F3. Management of Continuous Improvement	0.651
F4. Management of Human Capital	0.939
F5. Market-Client Management	1.000
F6. Evaluation of Benefits	0.746

Source: Author's elaboration based on the Department of Tourism's Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

Table A2 in Anexx, shows the basic descriptive statistics of the global scores of competitiveness. The percentile threshold $0.75 (Q_{0.75})$ is equal to 5.104 and therefore, Table 5 shows the order of the companies with scores greater than $Q_{0.75}$. In the category of scores greater than $Q_{0.75}$ we mainly find hotels and restaurants with more than 11 employees, with at least 5 years of experience in the area and well-developed infrastructure for the tourist industry.

Table 5. Order of the Companies with Scores in the Percentile greater than 0.75 as a Global Competitiveness Score

FOLIO	Number of Employees	Area	Years in Business	Entity	Factorial Score
58	51 to 100	Hotel	Less than 5	Metropolitan Area	6.511
8	Upwards of 101	Hotel	5 to 10	Quintana Roo	6.236
3	Upwards of 101	Restaurant	15 to 20	Quintana Roo	6.221
62	11 to 50	Hotel	5 to 10	Metropolitan Area	6.183
5	11 to 50	Hotel	Less than 5	Quintana Roo	6.084
93	0 to 5	Other	Less than 5	Metropolitan Area	6.028
95	11 to 50	Hotel	5 to 10	Metropolitan Area	5.994
60	Upwards of 101	Hotel	More than 20	Metropolitan Area	5.969
1	Upwards of 101	Hotel	5 to 10	Quintana Roo	5.966
28	51 to 100	Hotel	11 to 15	Veracruz	5.963
7	Upwards of 101	Hotel	More than 20	Quintana Roo	5.946
82	51 to 100	Hotel	More than 20	Metropolitan Area	5.877
94	11 to 50	Restaurant	11 to 15	Metropolitan Area	5.816
91	11 to 50	Restaurant	5 to 10	Metropolitan Area	5.809
50	6 to 10	Restaurant	More than 20	Metropolitan Area	5.734

Note: Only the 15 highest scores are shown

Source: Author's elaboration based on the Department of Tourism's Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

Similarly, in the category of scores less than $Q_{0.25}$ (the lowest scores), we mainly find restaurants with less than 50 employees and a deficient infrastructure (see Table A3 in Appendix).

CONCLUSIONS

Based on the outcomes from this study, we have validated both the theoretical model of competitiveness in the tourism industry, as well as the instrument of measurement that operationalizes the proposed constructs. The competitiveness model of a Mexican tourist company is based on the review of literature on this topic, the experience of the researchers, politicians and participating businesses. Consequently, we developed a model based on a value chain of a tourism-service company, which has six dimensions: Characteristics and Tourism Vocation, Management of Routines and Processes, Management of Continuous Improvement, Management of Human Capital, Market-Client Management and Evaluation of Benefits. These dimensions make up a set of variables that measure the internal capabilities of each company, and therefore its competitiveness as a business.

On the other hand, the method of measurement applied here has desirable properties from an index to measure the competitiveness of tourist SMEs, transversally, as well as longitudinally, given that the scores are not standardized and can be compared over time. This property is useful because it allows for the elaboration of public policies to improve competitiveness in Mexican tourism companies. The measurement obtained contains perceptions and quantitative elements, aspects that come together in one model. This is the origin of the measurement of competitiveness.

To achieve this objective, we've proposed the use of factor analysis as a tool. This has several advantages: 1) the factorial weights of the indices are estimated from the data obtained from the survey, using second order factor analysis, which reflects the covariance structure of its variables; 2) the indices obtained this way are able to be utilized over time, allowing for the longitudinal comparison of the units (businesses), without the scores being relativized a year after the study; 3) the longitudinal invariance can be studied which guarantees that the index measures the same aspects each time it is applied.

As a particular contribution of this study, we'd like to point out the construction of the theoretical model of competitiveness of the tourism-service company, the validation and application of the instrument of measurement — based on the proposed model — and the application of the factor analysis method.

The factor analysis allows us to obtain a score of each dimension of the proposed model, with which each business can identify its areas of improvement or strengths. Also, the analysis allows us to define a global index to measure the competitiveness of the business that is useful in ranking businesses and comparing them over time.

Lastly, we recommend that future research use this instrument of measurement to generate a foundation of longitudinal data, which would allow us to study the path of competitiveness of tourism companies. This longitudinal vision would allow us to shape adequate public policies to improve the performance of tourism businesses. Nowadays, competitiveness is more than performance and it copes with transcendental issues such as sustainability which is being studied from the enterprise and performance point of view (Alonso-Almeida et al., 2015) and even upon a destination point of view (Cárdenas, 2018).

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REFERENCES

- Aktouf, O. (2005). The False Expectations of Michael Porter's Strategic Management Framework. *Gestao e Planejamento*, 11, 75-94.
- Alonso-Almeida, M., Bagur-Femenias, L., Llach, J., & Perramon, J. (2015). Sustainability in small tourist businesses: the link between initiatives and performance. (T. & Francis, Ed.) *Current Issues in Tourism*, 1-22. doi:10.1080/13683500.2015.1066764
- Alwin, D.F. (1992). Information transmission in the survey interview: Number of response categories and the reliability of attitude measurement. En P. V. Marsden (Ed.), *Sociological Methodology* 22, 83-118). Washington DC: American Sociological Association.
- Bianco, C. (2007). ¿De qué hablamos cuando hablamos de competitividad. Documento de trabajo, 31. Bollen, K. A. & Lennox, R. (1991). Conventional wisdom on measurement: A structural perspective. *Psychological Bulletin*, 110(2), 305-314.
- Brown, T. A. (2006). *Confirmatory Factor Analysis for Applied Research*: The Guilford Press.
- Caird, S. (1992). What support is needed by innovative small business? *London Journal of General Management*, 45, 45-68.
- Cardenas, E. (2018). Demographic and urban impacts of tourism policies in Puerto Vallarta, Mexico. *e-Review of Tourism Research*, 15(2-3), 92-113. Obtenido de <http://ertr.tamu.edu>
- Cetindamar, D., & Kilitcioglu, H. (2013). Measuring the competitiveness of a firm for an award system. *Competitiveness Review*, 23(1), 7-22. doi: 10.1108/10595421311296597
- Contreras Cueva, A. B., Macías Álvarez, P., & González Morales, O. (2018). Incidencia de la certificación "Tesoros de México" sobre la ventaja competitiva de los hoteles. *Economía Teoría & Práctica*(49). doi: 10.24275/ETYP/AM/NE/492018/Contreras
- Cortés, F. & Vargas, D. (2011). Marginación a través del tiempo: A propósito del Índice de CONAPO. *Revista Estudios Sociológicos, Publicada por El Colegio de México*, XXIX(86), 361-387.
- Dwyer, L., Forsyth, P. & Rao, P. (2000). Destination Price Competitiveness of Travel and Tourism: A Comparison of 19 Destinations. In G. Crouch & B. Ritchie (Eds.), *Competitiveness and Tourism* (2012 ed., Vol. I & II). MA, USA: Edward Elgar Publishing Limited.
- Evans, N., Campbell, D. & Stonehouse, G. (2006). *Strategic Management for Travel and Tourism*. Oxford: Elsevier.
- Evans, N. G. (2016). Sustainable competitive advantage in tourism organizations: A strategic model applying service dominant logic and tourism's defining characteristics. *Tourism Management Perspectives*, 18, 14-25. doi: 10.1016/j.tmp.2015.12.015
- Flak, O., & Glód, G. (2015). Verification of the Relationships between the Elements of an Integrated Model of Competitiveness of the Company. *Procedia - Social and Behavioral Sciences*, 207, 608-631. doi: 10.1016/j.sbspro.2015.10.132
- Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J. & Bryant, B. E. (1996). The American Customer Satisfaction Index: Nature, purpose and findings. *Journal of Marketing*, 60(4), 7-18.
- González, J. C., Ruiz, L. (Coords). (2014). *Metodología para la medición de la competitividad de los prestadores de servicios turísticos inscritos en las certificaciones y los sellos de calidad de la Secretaría de Turismo (SECTUR)*. México, D.F.: LID Editorial Mexicana.
- Goranov, Z. (2014). Information Security of the Enterprise-Key Factor for Increasing its Competitiveness. In Proceedings of International Conference on Application of Information and Communication Technology and Statistics in Economy and Education (ICAICTSEE) (p. 612). International Conference on Application of Information and Communication Technology and Statistics in Economy and Education (ICAICTSEE).
- Guarda, M. E., Rapiman, S., Rebién, R. & Solís, S. (2006). *Competitividad en las Empresas Turísticas de la Ciudad de Valdivia*. Region de los Lagos. Valdivia: Universidad Austral de Chile.
- Hernandez Sampieri, R., Fernandez Collado, C., & Baptista Lucio, P. (2008). *Metodología de la investigación*. México, D.F.: Mc Graw Hill.
- Hill, C. W., Jones, G. R., & Schilling, M. A. (2014). *Strategic management: Theory & cases: An integrated approach*. Cengage Learning.
- Heskett, J., Sasser, W. E. & Schlesinger, L. A. (1997). *The Service Profit Chain: How leading companies link profit and loyalty, satisfaction, and value*. New York, NY: The Free Press.
- Heskett, J. L., Sasser Jr, W. E., & Schlesinger, L. A. (2015). *What great service leaders know and do: creating breakthroughs in service firms*. Berrett-Koehler Publishers.
- Heskett, James L. (2014). Notes from the search for deep indicators in services. *Journal of Service Management*, 25(3), 298-309.
- Ibarra, M., González, L., & Demuner, M. d. R. (2017). Competitividad empresarial de las pequeñas y medianas empresas manufactureras de Baja California. *Estudios Fronterizos*, 18(35), 107-130. doi: 10.21670/ref.2017.35.a06
- Kožená, M., & Chládek, T. (2012). Company Competitiveness Measurement Depending on its Size and Field of Activities. *Procedia - Social and Behavioral Sciences*, 58, 1085-1090. doi: 10.1016/j.sbspro.2012.09.1089
- Jarvis, C. B., Mackenzie, S. B. & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, 30, 199-218.
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*,

- 20, 141-151.
- Molina Germán, J., Pérez Melo, A., Lizárraga Salazar, G., & Larrañaga Núñez, A. (Mayo de 2018). Análisis de calidad de vida laboral y competitividad en empresas de servicios turísticos. *3C Empresa Investigación y Pensamiento Crítico*, 7(2), 44-67. doi:<http://dx.doi.org/10.17993/3cemp.2018.070234.44-67/>
- Mykolaychuk, K., & Savina, G. (2017). Features Of Evaluation Of The Competitive Status. *Baltic Journal of Economic Studies*, 3(4), 179-184.
- Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York: McGraw Hill.
- Olaf, F., & Grzegorz, G. (2015). Verification of the relationships between the elements of an integrated model of competitiveness of the company. 11th International Strategic Management Conference 2015. *Procedia - Social and Behavioral Sciences*, 207, 608-631. doi: 10.1016/j.sbspro.2015.10.132
- Palacios, J. L. & Vargas, D. (2009). *Medición efectiva de la calidad. Innovaciones en México*. Mexico D.F.: Trillas.
- Porter, M. (1987). *Ventaja Competitiva*. México: CECSA.
- Ritchie, J. B., & Crouch, G. I. (2003). The competitive destination: A sustainable tourism perspective. *Cabi*.
- Rubio A. & Aragón A. (2002). Factores explicativos del éxito competitivo. Un estudio empírico en la pyme. *Cuadernos de Gestión* 2(1), 49-63.
- Sampieri, R. H. (2018). Metodología de la investigación: las rutas cuantitativa, cualitativa y mixta. McGraw Hill México.
- Sánchez, A. A., Bañón, A. R., Jiménez, A. M. S., & Sangedo, J. J. C. (2010). Estrategia y competitividad empresarial: un estudio en las mipymes de Tabasco. *Investigación y Ciencia*, 18(47), 4-12.
- Sainaghi, R., Phillips, P., & Zavarrone, E. (2017). Performance measurement in tourism firms: A content analytical meta-approach. *Tourism Management*, 59, 36-56. doi: 10.1016/j.tourman.2016.07.002
- Zhong, J., Chen, X. & Xie, L. (2010). China Hotel Quality Competitiveness Assessment: A Quality Competition Index Approach. *Journal of China Tourism Research*, 6, 145-163.

APPENDIX

Table A1. Results of the Confirmatory Factor Analysis for Characteristics and Tourism Vocation

Variables	Description	Weights	Means	Product
B1	Basic policies established and shared with the entire organization	0.684	4.991	3.414
B2	The company has a business plan	1.000	4.342	4.342
B3	The company has a system of management	0.925	4.784	4.425
B4	The company carries out SWOT analysis (or other)	0.937	4.332	4.059
B5	Financial analysis done to support decision making	0.365	5.105	1.863
B7	Clearly defined organizational culture	0.650	5.106	3.319
B8	Degree of compliance requirements	0.266	5.531	1.471
B10	Degree to which the company has implemented a program to reduce energy consumption	0.655	4.314	2.826
B11	Degree to which it has the required infrastructure	0.335	5.244	1.757
B12	Specific procedures to select & evaluate suppliers	0.581	4.855	2.821
B13	Degree to which it has security systems for client protection	0.844	4.666	3.938
B14	Degree of use of technologies to offer services vs direct competition	0.584	4.714	2.753
B15	Degree to encourage employees to assume responsibilities	0.665	4.962	3.300
B16	Degree to which it develops products and services based on available resources	0.879	3.181	2.796
B17	Sale of products & services oriented specifically to the tourist market	0.643	3.500	2.251
B18	Degree to which it has services designed considering geographical location	0.507	3.509	1.779
B19	Degree to which it designs products with differentiated experience vs. competition	0.541	4.500	2.435
B20	Current organization chart	0.770	4.578	3.525
B22	Strategic alliances increase tourism clients and complement services	0.811	3.736	3.030
B24	Social responsibility activities	0.585	2.629	1.538
	Sum		13.227	57.641

Source: Author’s elaboration based on the Department of Tourism’s Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

Table A2. Descriptive Statistics of Factorial Scores for a Global Competitiveness Score (n=116)

Percentile	Threshold	Statistic	Value
25%	3.121	Average	4.138
50%	4.246	Variance	1.783
75%	5.104	Asymmetry	-0.453
		Kurtosis	2.467

Source: Author’s elaboration based on the Department of Tourism’s Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

Table A3. Order of Companies with Scores in the Percentile Lower than 0.25 as a Global Score

FOLIO	Number of employees	Area	Years in business	Entity	Factorial Score
64	0 to 5	Restaurant	11 to 15	Metropolitan Area	0.882
17	6 to 10	Restaurant	More than 20	Nuevo Leon	0.908
75	11 to 50	Other	Less than 5	Metropolitan Area	0.986
100	6 to 10	Other	5 to 10	Metropolitan Area	1.595
112	11 to 50	Restaurant	11 to 15	Hidalgo	1.653
110	6 to 10	Restaurant	15 to 20	Hidalgo	1.746
10	6 to 10	Restaurant	15 to 20	Quintana Roo	1.799
14	0 to 5	Restaurant	11 to 15	Nuevo Leon	1.854
13	0 to 5	Other	Less than 5	Nuevo Leon	1.899
88	0 to 5	Restaurant	11 to 15	Metropolitan Area	1.953
44	0 to 5	Restaurant	Less than 5	Metropolitan Area	2.026
22	0 to 5	Travel Agency	Less than 5	Nuevo Leon	2.135
85	0 to 5	Travel Agency	Less than 5	Metropolitan Area	2.330
63	0 to 5	Other	More than 20	Metropolitan Area	2.426
65	0 to 5	Restaurant	More than f20	Metropolitan Area	2.434

Note: Only the 15 lowest scores are shown

Source: Author’s elaboration based on the Department of Tourism’s Pilot Survey of Competitiveness (Gonzalez & Ruiz, 2014)

ENDNOTES

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- i This definition is the result of the collective work done in Project 189029 financed by CONACYT-SECTUR.
- ii The matrix of covariance measures the structure of covariation of the variables measured. The covariance is a measurement of the lineal association between two variables.
- iii There is another way to obtain indices through Principal Component Analysis (PCA). However, the objective of the PCA is to obtain components (linear combinations of the manifest variables) that maximize the variance. These components are orthogonal and each of them explains a certain percentage of the total variance. They generate standardized scores from the observations. The EFA, for its part, seeks the construction of latent (unobservable) variables with a high degree of commonality that allows incorporating the covariance structure of the indicator variables.
- iv In CFA, the scores obtained are not standardized and therefore, can be used longitudinally to measure the tendency over time. The opposite occurs with the scores from the Analysis of Principle Components, where the scores are standardized and can't be utilized for longitudinal analyses.
- v The manifest variables are measured through questions on the survey.
- vi If λ_{ij} is linked to factor F_j then the residual error is $\varepsilon_{ij} = 1 - \lambda_{ij}^2$ whereas if the weight is λ_{ij} it's close to the unit (a value that is considered satisfactory), so the residual error ε_{ij} is "small."
- vii The reflective indicators are those that are highly correlated and one-dimensionally measure the construct for high reliability and validity; the lineal combinations determined by factorial weights define the construct. The formative indicators are those that are not correlated and explain the construct. If one of these indicators is omitted, the meaning of the construct can change (Jarvis, Mackenzie & Podsakoff, 2003). For this paper we have selected reflective indicators because the indicative variables of each construct have a high correlation and each one is part of the global index of competitiveness.
- viii Upon standardizing the scores, the tendency is eliminated, and therefore, it is difficult to analyze the data longitudinally. If we observe variable x_i , the average and standard deviance of this variable are \bar{x} and s , respectively, so the standardized variable of x_i is defined as $z_i = (x_i - \bar{x})/s$.
- ix Reliability is defined as the degree of convergence that the manifest variables have, which shape a construct. Reliability is evaluated with Cronbach's Alpha, a desirable value would be equal to or greater than 0.70 (Bollen & Lennox, 1991; Nunnally & Bernstein, 1994).
- x Various exploratory analyses were done which helped identify the reported variables. For a tighter study, we are only reporting the final result.
- xi The solution with six factors does not converge. This indicates that only solutions with 2 to 5 factors should be reviewed.
- xii The eigenvalue reflects the magnitude of the variance explained by each factor, typically we use Kaiser's (1960) criterion which suggests retaining the number of factors whose eigenvalue is greater than the unit or that the percentage of variance explained be greater than 60%. Nonetheless, we used the likelihood ratio test, shown in Table 1.
- xiii The VARIMAX method carries out an orthogonal rotation of the original factors with the purpose of obtaining a clearer interpretation of the factorial weights.
- xiv Typically, the weights greater than 0.4 are marked in bold type in the matrix of rotated factors.
- xv The criterion used is to use the threshold of reliability of Cronbach greater than 0.7 to assure the index is satisfactory (Nunnally & Bernstein, 1994).
- xvi Keep in mind that the objective of this proposal is to show the methodology using a pilot sample of 116. Therefore, the analysis must be divided into two phases, the first and second order CFA.