

Los flujos de conocimiento de las empresas de exportación de fabricación de calzado en México. Caso de estudio de su productividad y competitividad

The Knowledge Flows of Footwear Manufacturing Exportation Companies in Mexico. Study Case of Their Productivity and Competitiveness

CONTRERAS - David^{1*}, SOCORRO – Elia², GORDILLO – José¹

¹Universidad Tecnológica del Suroeste de Guanajuato, Carr. Valle huanímaro Km 1.2, 38400 Valle de Santiago Guanajuato, México, dicontreras@utsoe.edu.mx

²Universidad Autónoma de Querétero, Cerro de las Campanas s/n, 76010, Santiago de Querétero, Querétero, México, eldiaz90@hotmail.com.

Recibido Septiembre 05, 2015; Aceptado Diciembre 07, 2013

Resumen

Este estudio de caso trata de exponer los flujos de conocimiento y su relación con la competitividad de la industria manufacturera de exportación del calzado en México a través del modelo teórico y prueba de hipótesis aplicada (coeficiente de determinación R^2 y X^2 chi cuadrado). La investigación se llevó a cabo empleando un método cuantitativo basado en 3 etapas: 1) datos de recaudación de exportaciones de 120 meses (2003-2012); 2) la aplicación del modelo y 3) análisis de correlación entre el conocimiento y la competitividad. La investigación demuestra que el flujo de conocimiento en las necesidades mexicanas de exportación de la industria del calzado apoyo porque todavía es, en muchos casos, muy pobre, por otro lado, revela algunas mediciones de conocimiento positivos, simplemente en algunos casos en diferentes años.

Palabras Clave

Conocimiento. Competitividad. Productividad.

Abstract

This study case tries to expose the Knowledge flows and its relationship with the competitiveness of the footwear manufacturing exportation industry in Mexico through a theoretical model and applied hypothesis test (determination coefficient R^2 and chi square X^2). The research was conducted employing a quantitative method based in 3 stages: 1) Collection data from exportations of 120 months (2003-2012); 2) Model application, and 3) analysis of correlation between knowledge and competitiveness. The research corroborates that the knowledge flow in the Mexican footwear industry exportation needs support because still is, in many cases, very poor, on the other, reveals some hard positive knowledge measurements, just in some cases through different years.

Keywords

Knowledge. Competitiveness. Productivity.

Citación: Contreras D, Socorro E, Gordillo J. The knowledge flows of footwear manufacturing exportation companies in Mexico. Study case of their productivity and competitiveness. Revista Ciencia, Tecnología e Innovación 2015, 11-12: 697-708

*Corresponde al Autor (Correo electrónico: dicontreras@utsoe.edu.mx)

*Investigador primer autor.

Introduction

To an important number of organizations, the creating, managing and transferring knowledge is at the top of agenda. Futurist, economist and academics have recognized for many years that the world is moving towards a global 'Knowledge economy' (Chase, 1997).

The knowledge, it can find in all kind of organizations. The different forms of management, including measurement, creating or transferring it are being utilized by organizations toward getting competitive advantages. Since Knowledge Management KM represents one of the most critical variables to get an organizational success (Argyris and Schon, 1978; Nonaka, 1991; Kogut and Zander, 1992), an increasing number of companies have launched KM initiatives (Mu-Yen and An-Pin, 2006).

Organizations like Hughes Space & Communications Co. and Ford Motor Company utilized the KM to minimize the costs and production cycle keeping on an innovative ability (Ward and Leo 1996). Research of Business Intelligence, Ernst & Young Center for Business Innovation of 431 U.S. and European organizations reported that 87% of people describe their corporations as knowledge-intensive, indicating that knowledge and its manipulation is critical to their competitiveness (Holsapple and Singh, 2001).

Additionally, a survey conducted by Journal of Knowledge Management with the assistance of Best Practice Club and the Benchmarking Exchange in 1997 reveals that over 90% of respondents perceive their organizations being knowledge-intensive but only a 6% were characterized as very effective to achieve better performance (Chase, 1997).

The KM is becoming a relevant practice inside the organizations not only for their success, but also for the development of societies (Ragab and Arisha, 2013). In this sense the benefit most expected from KM has been improve decision making with 89% (Chase, 1997).

In this sense, their measure is until recent years, conformed as the basis of continual improvements for organizational performance and one of the most difficult activities (Chen et al., 2009). Metrics definition inside organizations is, at the same time, one of the most important principles (Besic and Djordjevic, 2007), and its importance is very significant (Velimirović et al., 2011); an example of this, is the relevance of KM evaluation to managers from Asia, United States and United Kingdom (Mu-Yen and An-Pin, 2006). For this reason, several models have been created and used for measure, create, manage or transfer knowledge at different levels, considering many factors with the sole purpose to obtaining organizational performance.

One of the proposed models focused on trait is Trumbo's (1961); the spiral knowledge model, from Nonaka and Takeuchi (1991) is focused on the conversion of tacit knowledge to explicit knowledge for properly exposing inside the company. This model has been precursor from many concepts and further research (Lloria, 2000). Another way of achieving this was developed by a prominent international panel of practitioners and academics of KM known as the Knowledge Chain model (Holsapple and Singh, 2001). This model helps to measure the learning level of organizations considering the creation of new knowledge, identifying some activities focused on knowledge acquisition, identification, selection, generation, internalization and externalization included in primary activities and measure, control, coordination and leadership corresponding to secondary activities.

Besides, we have the Manufacturing Small and Medium Enterprises SMEs Knowledge Management model from Alfaro (2008). This model exposes the relationship between culture, direction style, structural and relational capital trying to achieve a systemic approach and knowledge.

By the application of the previous models at different level, a visible increment on the competitiveness index can be obtained; however, the high overall inherent costs involving resources such as time application, have derived on a low success of this scheme.

Other model is the Return Of Investment (ROI) that was utilized by Laitamaki and Kordupleski (1997) to evaluate the KM projects and performance of Customer Value Added CVA; the knowledge-based-system model from Stein et al., (2001) was designed to automate task and capture knowledge; however, according with Holt et al., (2007) the models that assess KM were focused for the individual attributes; the organizational culture and climate and the specific change or the process.

For these reasons, measure, create, manage or transfer knowledge is at the top of organizational agenda. Most of KM models are focus on measure and evaluation Knowledge through different paradigms. So, to get a SMEs measure knowledge is advisable utilize a simple method and less demanding in time and financial resources (Kozena and Chládek, 2012).

In spite of the creation of the latest models, actually the evidence indicates that KM still intimidates to managers and their companies (O'Dell and Hubert, 2011). So, how do most firms that have initiated a new way to measure, create, manage or transfer knowledge develop appropriate metrics to gauge the effectiveness of their initiative?

There is a need for a model to measure Knowledge initiatives from the companies (Mu-Yen and An-Pin, 2006) and be comprehensive yet straightforward enough to be understood by all those who will apply them (Ragab and Arisha, 2013) and improve their decision making and get their competitiveness.

In many studies, the correlation of Knowledge with another paradigms is positive, like marketing of Griffin and Hauser (1996); the research of Henard and Szymanski (2001) with new product performance or the relation with organizational climate like antecedent of KM from Jaworski and Kohli (1993), or the research from Darroch (2005) applied in New Zealand organizations with 50 or more employees. In this study the KM is how it through three components (knowledge acquisition, dissemination and responsiveness) and all of them have a direct effect on innovation, just there are very few studies between Knowledge and competitiveness like the research from Liu, Chen and Tsai (2004) considering four main functions, knowledge obtaining, knowledge refining, knowledge storing and knowledge sharing over Taiwan's industries.

The result reveals that Knowledge capability has a tremendous effect on competitiveness. In the same sense, Liu, Chen and Tsai (2005) exhibit the positive effect between the KM and a new product development strategy in high-tech industries. The results indicate that KM practices are positively associated with organizational performance in qualitative and quantitative method (Davenport and Prusak, 1998; Massey et al., 2002; Nonaka, 1994; Choi and Lee, 2003; Darroch and McNaughton, 2003; Lee and Choi, 2003; Schulz and Jobe, 2001; Simonin, 1997; Tanriverdi, 2005) but most of them are descriptive (Chauvel and Dupres, 2002).

There exists another model called Comparative Advantage Revealed Index CARI model development by United Nations for the Industrial Development Organizations UNIDO in 1985. The CARI model considers exportations level against importations encompassing the heterogeneity of all product prices from supply chain resulting in a positive (comparative advantage) or negative (comparative disadvantage) according the mathematical equation. In this sense, the purpose is measure the Knowledge level of footwear industry exporting in Mexico through CARI model application trying to encompass others factors that could influence in the organizational competitiveness and purpose another form to evaluate the Knowledge showing comparative advantage or disadvantage of footwear industry from Mexico.

In Mexico, there are companies that contribute in an important way to the economic development of the country (organizations and society) that's the case of the footwear industry.

The footwear industry in Mexico during four decades were considered one of the most important industries in Mexico, producing 217 million of footwear shoe pair utilizing 168 thousand workers (Hernández, 2007), having 8008 economic units and increasing its exportations to 3.6 million in the first semester of 2012, which is an upward growth of 21.8% in comparison with the same period of last year (Canaical, 2012). This information reflects an increase of the industry boosting interaction between science and technology through knowledge (Imco, 2013). So, the footwear industry continues being, in Mexico, the most important industry in production, exportations and employment (Gracia Hernández, 2009), that is to say getting the right knowledge to the right people at the right time to improve the organizational performance (O'Dell et al., 1998).

The objective for this research was to conduct an exploratory quantitative study to create a broader set of evidence regarding of the Knowledge flow and its relationship with competitiveness of manufacturing industry exporting from Mexico through of straightforward and comprehensive called CARI model that try to support and improve in the future, the decision making of the industry and increase the competitiveness.

Research method

Due to, the knowledge's concept is extremely complex and is not easily defined as one concise definition, the first concept was based on Laal's contribution like "know-how" (Laal, 2011). The second concept, competitiveness, was based on the World Economic Forum WEF and defined as a "series of factors, politics and institutions that determinate a productivity level of a country" (Sala-I-Martin et al., 2007).

The research design utilized was quantitative, exploratory and not-experimental, with three objectives:

1. Evaluate the Knowledge level of the footwear industry exporting of Mexico.
2. Measure the correlation between Knowledge and their competitiveness level of the footwear industry of Mexico.
3. Identify the dependence or independence correlation of Knowledge and competitiveness of the footwear industry exporting of Mexico.

The research was based in six hypotheses:

H0: The Knowledge average flow of the footwear industry exporting in Mexico is negative.

H0-1: The Knowledge and competitiveness correlation of the footwear industry exporting in Mexico are less of 0.5.

H0-2: The Knowledge and competitiveness correlation average is independent.

H1: The Knowledge average flow of the footwear industry exporting in Mexico is positive.

H1-1: The correlation level between Knowledge and competitiveness of the footwear industry exporting in Mexico, is greater than 0.5.

H1-2: The Knowledge and competitiveness correlation average of the footwear industry exporting in Mexico are dependent.

To delimitate the study according with Knowledge's concept, were considered the balance of tradedimension, theexportations and importations and the result of CARI model application in order to express the operativity of KM. To properly measure competitiveness concept, the productiveness dimension was considered troughthe exportations measure by shoe pair.

Concept	Dimension	Indicator	Operativity
Knowledge	Balance of trade	Exportations and importations	Level expressing on the result of CARI model application
Competitiveness	Productiveness	Exportatios	Volume of exportations per shoe pair of footwear

Table 1. Operativity of concepts adapted from Laal (2011) and Sala-I-Martin et al.(2007).

The analysis of the variables was developed through identification of the Knowledge level and competitiveness as follows: Knowledge as independent variable and competitiveness as dependent.

For this study, an analysis tool of 16 questions considering likert scale, with a reliability of 0.712, measured through the Cronbachcoefficient α , was applied, based on Nunnally (1978) the reliability level was acceptable if the value was at least 0.7 for the exploratory research.

Besides that, the correlation level was verified through determination coefficient R^2 supported with hypothesis test with chi-square application χ^2 to probe dependence or independence.

The methodological research contains 3 stages. Stage 1 requests the exportation and importation data; stage 2 shows the CARI model application and stage 3 analyzes the correlation between Knowledge and competitiveness according R^2 and χ^2 .

Development

Stage 1: The data of the comparative advantages revealed that index CARI was obtained of exportation and importation levels of the footwear industry in Mexico in different sections. The information, of shoe pair data recollected, was conformed from 2003 to November 2012 according to the chapter number 64 of SIAVI (Internet Tariff Information System): footwear, leggings, booties and articles. A database was built containing the information of the current situation of the footwear industry in Mexico, related with both exportations and importations considering six sub items having 59 fractions.

6401 Waterproof footwear with sole and rubber on top. The top can't get joined to the sole by seam or by rivets, nails, screws, spikes or similar devices, or be formed with different unit parts in the same way.

6402 Footwear with sole and rubber or plastic top.

6403 Footwear with rubber, plastic, natural leather or regenerated sole and natural leather top.

6404 Footwear with rubber, plastic, natural leather or regenerate sole and textile top.

6405 Other footwear styles.

6406 Parts of footwear.

Stage 2: To estimate the CARI model equation it was necessary to conform the whole set of exportations and importations classified by pair shoe. The estimation of the average flux was evaluated and balance trade was obtained. After this, the mathematical model was applied: the result of the commercial balance of the country against the average of the worldwide commercial flux multiplied by the division of the average of the worldwide commercial flux.

CARI model equation

$$V_i = \frac{(x-m)_i}{\left[\frac{X+M}{2} \right]_i \left[\frac{x+m}{2} \right]_{iw} \left[\frac{X+M}{2} \right]_w} \quad (1)$$

- x Exportations per item, sub item and fractions of the footwear sector.
- m Importations per item, sub item and fractions of the footwear sector.
- X Total exportations of the footwear sector.
- M Total importations of the footwear sector.
- i Represents a branch of the footwear per item.
- j Denotes the country were the research was made.
- w Denotes the total of items of the manufacturing sector of footwear.

Stage 3: To prove the correlation between Knowledge and competitiveness the operativity of concepts per item was analyzed. Firstly, the competitiveness trough exportations level was included in the CARI model results. After this, the method of coefficient determination was adopted for measuring both concepts R^2 .

Supporting this there was applied a chi square X^2 to make sure the dependence or independence between variables.

Results

The application of CARI model, showed in table 2, revealed, on few years, some positive balances in the Knowledgeflow and, on the other hand, some negative. According the results, all the items have negative score in any given year. The highest measured negative level was -2.000 in 2010, corresponding to the item 6406. On the other hand, the highest positive level was localized in 2005 for item 6405 reaching 1.773, but, in spite of this, the average for the 6402, 6403, 6404, 6405, 6406 items was negative.

Year/Items	6401	6402	6403	6404	6405	6406
2003	1.136	-1.784	-0.238	0.530	0.883	-0.464
2004	0.999	-1.878	-0.088	-0.166	0.071	-0.835
2005	0.861	-1.780	0.009	-1.522	1.773	-0.802
2006	0.739	-1.465	-0.006	-1.822	-0.262	-0.801
2007	0.737	-1.309	-0.035	-1.879	-0.112	-0.661
2008	0.562	-1.513	-0.345	-1.844	0.423	-0.750
2009	0.409	-1.099	-0.104	-1.824	-0.677	-0.933
2010	-0.269	-0.994	-0.342	-1.718	-1.049	-2.000
2011	0.007	-0.996	-0.364	-1.654	-1.433	-0.902
2012	-0.113	-1.179	-0.153	-1.662	-1.205	-1.141
CARI average	0.507	-1.399	-0.166	-1.356	-0.158	-0.928

Table 2. Results for the CARI model application.

In the other hand, based on the CARI model, the Knowledgeflow in the footwear industry exporting in Mexico, from 2003 to 2012, has shown a variable average. Just in 6401 item a positive index was yielded.

Besides, the results of correlation level of Knowledge and competitiveness measure by pair shoe for every year, were over 0.5 in tree items while in others were below.

According to the graphics for 6401 the KM doesn't reflect the highest competitiveness level, but CARI result average is positive; to 6402, 6404 and 6406 items the Knowledge increase reflects a high competitiveness level of the industry.

For 6403 item, even though the Knowledge level doesn't show an increase of competitiveness so there's no relation; and to 6405 it could perceive a medium relation.

Results / Items	CARI	Determination coefficient R ²
6406	-0.928	0.191
6405	-0.158	0.441
6404	-1.356	0.929
6403	-0.166	0.039
6402	-1.399	0.915
6401	0.507	0.689

Table 4. CARI and determination coefficient results.

The correlation level between Knowledge and competitiveness for all items was supporting with chi square application. The average of R² supporting with X² considering 9 liberty grades and 0.10 of significance were 0.5344 and 17.289. In this sense, it could support the correlation of Knowledge and competitiveness in footwear manufacturing industry exporting from Mexico.

Level correlation	Knowledge & Competitiveness
R ²	0.5344
X ²	17.289

Table 5. Correlation average R² and X²

Keeping in mind all the items, the results show an average above 0.5, so the variation of the independent variable Knowledge explains the 53.44% of the variation in the dependent variable in the footwear industry (competitiveness).

Conclusions

- From the results obtained in the present research, the Knowledge flow it looks like, for the most of items, and decrease. It is concluded that in a global level the footwear industry exporting in Mexico hasn't registered an optimum Knowledgeflow because its average was registered in -0.5838, so the H0 is accepted and H1 is rejected.

- According with the correlation level between the Knowledge and the competitiveness of the footwear industry exporting in Mexico is higher or less to 0.5 in a general level, and according to R², registering an average value of 0.5344 so H1-1 is accepted and H0-1 is rejected.

- To probe the dependence or independence was obtained chi square result of 17.289 so the H1-2 is accepted; and H0-2 is rejected. With this result it can be concluded that there is a general relation between Knowledge and competitiveness in the manufacturing industry of footwear exporting in Mexico. Finally, the construct validity between theory, hypothesis and results was approved through the overall results obtained.

- Since it presented an average value of 0.507 during the analyzed years of 6401 item so, this measurement can be considered as an indicator of an optimum Knowledge level. The correlation between Knowledge and competitiveness was of 0.6893, but, since the latter value represents an inverse relationship, it is advisable to consider another's elements in order to leverage this result.

- The above reflects the Knowledge flow in the manufacturing industry of footwear in Mexico, full of ups and downs.

- It is not enough with market aperture, an inside overlook to the manufacturing footwear is needed, and, on this basis, decide on another kind of strategy, like Zundel (2012) quotes: “our ability for reflection has to be understood from inside our enmeshing with space and time”.

- The footwear industry production in Mexico is growing up, this could reflect a positive perception by the entrepreneurs, their costumers and government but, once the CARI model was applied, the industry reflects opposite results: in accordance with H1, where it is assumed that the average Knowledge of the footwear industry in Mexico is positive. A future study will be aimed at other types of industries. By consulting this research, all industries exporting can adapt themselves to determine their Knowledge and its management and could measure their competitiveness.

Acknowledgments

This research was supported by Technological University of the Southwest of Guanajuato trough business development department and Autonomous University of Queretaro by Administration Doctorate Program.

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