



Managing the “Intangibles”: Business and Entrepreneurship Perspectives in a Global Context

Coordinators

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Analysis of operations in the context of manufacturing, and its impact on the competitiveness of SMEs in Guadalajara, Mexico

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Abstract

This research is motivated by the importance of SMEs in the current work of the world and our country in particular. It is appropriate to understand the important social role played by SMEs to be an instrument of social cohesion and stability, creating employment opportunities for people with no professional education (Enríquez, Adame, Camacho, 2012). The analysis was done to manufacturing SMEs in Guadalajara, analyzing the mechanisms that SMEs become increasingly competitive, globalized, entrepreneurial vision with entities that have the resources to acquire the technology they will streamline processes.

We propose an approach where competitiveness is the dependent variable and independent variable operations, each variable is related to certain factors such as financial performance, technology and costs of the dependent variable as well as other factors by the independent variable, such as: reliability, administrative control, staff development and automation.

The results relates the operations (manufacturing), with competitiveness using Structural equations.

Keywords: Competitiveness, Operation, Business vision, technology

Manufacturing in Mexico 2013

Currently, the monthly reports from the National Institute for Geography and Statistics (INEGI) indicate that industrial activity in Mexico decreased (-) 1.67% in the fourth month of 2013 compared to last March based on seasonally adjusted figures. Manufacturing decreased (-) 1.16% during the month of April. But compared to the annual rate, manufacturing increased 5.6%. (INEGI, 2013)

The manufacturing industry in Jalisco

In June 2011 the production of the domestic manufacturing industry recorded an increase of 0.8% over the same month in 2010. The level of manufacturing output grew 1.7% in Jalisco during June 2011 at an annual rate. In the accumulated January-June 2011 grew 4.9% the manufacturing industry at national level for the month of September 2010, while in the state of Jalisco was growth of 7.7%.

Manufacturing SMEs in Jalisco

According to SEIJAL, (2012) Jalisco is the fourth at national level economy contributing 6.6% to the PIB in 2010. The main economic activities are manufacturing 42%, further highlighting the electronic industry

The metropolitan area of Guadalajara (ZMG) is one of the main tourist destinations in the country, out in Puerto Vallarta beach centers, strengthening the service sector. This has allowed it to stand out in the international arena both foreign trade and investment, contributing to the development of the entity (SEIJAL, 2012).

TABLE 1: EXPORTS AND IMPORTS OF MANUFACTURING ZMG

Manufacturing Industry	Exports Jan-Mar 2013	Imports Jan-Mar 2013 (USD)
Food industry	\$624,298,670.94	\$756,898,225.75
Textile industry	\$64,139,268.82	\$273,633,584.05
Footwear industry	\$11,104,970.00	\$53,776,079.83
Manufacture of rubber and plastic	\$194,404,329.31	\$624,325,828.51
Metal mechanical industry	\$433,536,079.39	\$686,404,676.84
Chemical industry	\$472,211,539.83	\$1,214,136,594.01
Furniture industry	\$67,859,260.24	\$75,256,617.43
Jewelry industry	\$133,099,360.67	\$18,049,896.21

Operations

Within operations, one of the factors that highlight most is the research on the human resources of the company. The knowledge, skills and attitudes of workers and how they are working, are increasingly important issues for companies, because traditional sources of success, as the technology and products, markets, financial resources and economies of scale are increasingly less relevant.

Although in the modern age the industry organization does not rely only on the organization of human labor but also on various factors that affect their operations, such as technology, capital, access, knowledge, proximity to logistics / market, etc., creating more competition. Therefore, industries are increasingly flexible in their manufacturing operations and their supply chains / distribution. However, industrial operations are inevitably exposed to a variety of risks arising from market conditions, technological changes and the disappearance of the benefits over a period of time. This makes industrial operations, obsolete or reduce the period of time with good benefits. Moreover, economic and financial factors and government policies play an important role in the prosperity of the industries and their disappearance (Nallathiga, 2010).

Therefore, for the development of operations personnel, we suggest considering the following skills in production, divided into two categories: intellectual control capability (to memorize the order of placement of parts or work procedure correctly) and skills motor and sensory (being the visual, auditory, tactile sense, and limbs) (Mori and Kikuchi, 1995). The latter being difficult to remove through interviews (Doyo, D., Ohara, A., Shida, K., Matsumoto, T., & Otomo, K., 2009).

It is important that the level of competition that a company projected, as there are several industries that are engaged in the same thing and sometimes that makes it more outstanding than the other is the performance and development of all staff it works. For that reason an institution or company should be able to compete with both domestic enterprises and global, whatever its rotation and size, but the best competition is with herself, as to be better every day is a goal that all industry should be set, as it is important to improve oneself to be better than the thousands of skills that surely exist in the market.

An important point for such purposes is industrial automation, serving much within a firm, as it is a primary tool for efficient management in enterprises, it can reduce time and increase productivity.

It should be noted that automation is not only the fact be changing machines and tools but is an entire project to be carried out to verify that it is profitable to automate the whole plant or part of it, this is based on painstaking research taking into account the history of the industry to subsequently reach the best conclusion (Téllez, 2008).

The automation process has now been successfully impact the software development, as these may become, in many cases, cheaper than conventional machines, one can speak of those programmable (PLC programmable logic controller) that sometimes you only ever need one operator, which reduces costs in payment for labor that is directly related to the process (Téllez, 2008).

Problematization

At present the issue of competitiveness for SMEs has expanded significantly in any business environment where these businesses are operating, leading to the conclusion that the economies of the regions where these organizations operate are constantly growing and important indices of competitiveness (Gardiner et al., 2004 Strambach, 2002)

Small and medium-sized enterprises in countries with a low industrial development have serious limitations, such as inadequate infrastructure and limited government support, hindering the implementation of innovation and the lack of financial resources in small and medium enterprises as essential for the development and growth because, due to deficiencies in the marketing and no specialization of human resources, as well as design and implement appropriate for new market development strategies, they impede the performance and implementation of the innovation. Similarly, several studies establish that barriers to innovation among business organizations are usually associated with the strategies, costs, human resources, organizational culture, information flow, and government policies (Baldwin & Lin, 2002; Mohen & Roller, 2005). In this sense, the barriers to innovation SMEs directly affect the limited resources they have (Hadjimanolis , 1999, Hewitt -Dundas, 2006).

The current situation presents small and medium enterprises in Mexico is the result of a gradual deterioration and results in the loss of competitiveness due to the lack of support to maintain growth and development; this has resulted in job losses and the closure of companies in this sector, due to international competition and globalization of markets (INEGI, 2004). The importance of SMEs in the environment, both for their contributions to the creation of jobs and wealth in the country, covering 95.5% of the total national companies, and generate 45% of GDP.

The fundamental problem with the Mexican manufacturing industry is the low labor productivity growth, due in part to the low investment in training, research and technological development "budget cuts in research and education that violate our future".

Given the current state of manufacturing in Mexico urges a new industrial strategy that is inclusive, sustainable, long-term, so far away, and with a free market that has not yielded the expected positive results.

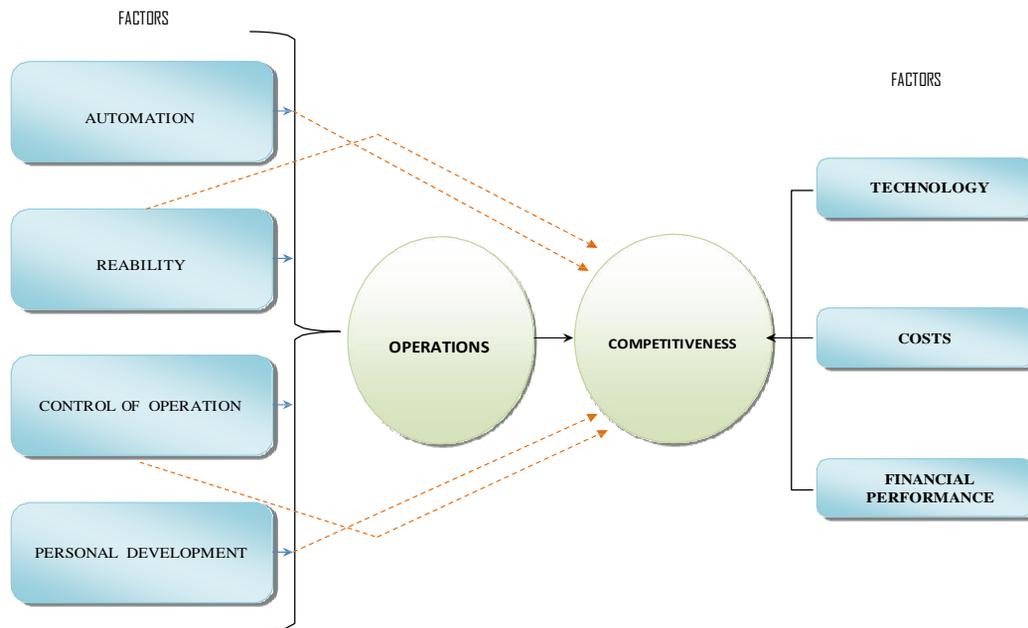
A strategy for the development of industry, value-added services and innovation, required to incorporate emerging issues in the new industrial policies on education and training, enhancing productivity, competition in domestic markets, internationalization of companies, research and technological development, energy efficiency, sustainable development and use of the purchasing power of government and big business to the development of suppliers of domestic goods and services.

Urges also define policies for industries and products that are facing new global competition or technological paradigms that detonate faster growth and more balanced regional development with significant impacts on employment, sectorial coordination and production chains.

Methodology

Research model of competitiveness with respect to operations of manufacturing SMEs in the ZMG.

Spatial and temporal delimitation



The delimitation of this study was done for manufacturing SMEs in the Guadalajara metropolitan area consists of the municipalities of Guadalajara, El Salto, Tlaquepaque, Tlajomulco de Zuñiga, Tonalá and Zapopan, in the period 2012-2013 being the cross questionnaire and this phenomenon was studied in a specific period (Münch & Angeles, 2009).

TABLE 2: NUMBER OF MANUFACTURING SMES IN THE METROPOLITAN AREA OF GUADALAJARA

Township	Manufacturing SMEs
1. Guadalajara	1, 417
2. El Salto	114
3. Tlajomulco	112
4. Tlaquepaque	317
5. Tonalá	155
6. Zapopan	732
TOTAL	2, 842

Source: INEGI (2013).

The sample

$$n = \frac{N \cdot i}{i(N - 1) + 1} = \frac{2842 \cdot 0.04}{0.04(2842 - 1) + 1} = 114$$

TABLE 3: TECHNICAL DETAILS OF THE RESEARCH SAMPLE

features	survey
¹ universe	2 847 SMEs in the manufacturing industry.
Scope of Study	regional
Sampling Unit	Manufacturing SMEs with 11 to 250 workers
Method of data collection	survey staff
Sample Type	Simple random
Sample Size	400 companies
Margin of sampling error	± 4% at a global level, to a confidence level of 97% (p = q = 0.5)
Date of fieldwork	September 2012 to February 2013

Source: Authors' calculations based on data from INEGI (2013)

General purpose

To analyze the relationship between operations management and Competitiveness of SMEs in the manufacturing industry in the metropolitan area of Guadalajara.

Specific objectives

- To present the most relevant aspects of operations management and the importance of competitiveness as key to higher profitability in market share relative to its competitors.
- Identify the factors involved in the management of operations within the SMEs.
- Identify and relate aspects of operations management to competitiveness in organizations.

Hypotheses

- H1: A greater automation, lower production costs.
- H2: A greater control of operations, the greater the financial performance.
- H3: A better management of operations improves the competitiveness of the organization

Research question

What are the elements of the correlation between variables and Operations Management Competitiveness of SMEs in the manufacturing industry in the metropolitan area of Guadalajara?

Additional questions

What factors intervene in the management of operations in manufacturing SMEs in the central-western part of Mexico?

Is it possible to identify key processes for optimal management operations in the organization and deal with the changing environment to be competitive?

TABLE 4: INTERNAL CONSISTENCY AND CONVERGENT VALIDITY OF THE THEORETICAL MODEL

Variable	indicator	factor loadings	t-Robust value	A de Cronbach	IFC	IVE
Automation	PA1	0.776***	1.000*	0.807	0.808	0.583
	PA2	0.776***	18.768			
	PA3	0.739***	15.472			
Reliability	PCI_A	0.639***	1.000*	0.818	0.820	0.604
	PC2_A	0.839***	15.179			
	PC3_A	0.792***	14.951			
Control of Operations	PO1	0.749***	1.000*	0.877	0.876	0.542
	PO2	0.796***	18.707			
	PO3	0.648***	12.958			
	PO4	0.797***	17.911			
	PO5	0.748***	15.777			
	PO6	0.667***	13.527			
Personal Development	PD1	0.709***	1.000*	0.887	0.897	0.688
	PD2	0.832***	17.305			
	PD3	0.933***	19.612			
	PD4	0.828***	14.626			
Financial Performance	FP1	0.782***	1.000*	0.914	0.915	0.729
	FP2	0.895***	19.825			
	FP3	0.883***	20.492			
	FP4	0.851***	18.844			
Costs	PC2	0.747***	1.000*	0.843	0.845	0.580
	PC3	0.793***	13.501			
	PC4	0.847***	17.925			
	PC5	0.644***	12.192			
Technology	TE1	0.775***	1.000*	0.913	0.914	0.638
	TE2	0.817***	22.461			
	TE3	0.817***	18.706			
	TE4	0.826***	18.905			
	TE5	0.746***	15.540			
	TE6	0.809***	18.157			
S-BX ² (df373=894.9570 (p < 0.000), NFI= .888; NNFI= .919; CFI= .931; RMSEA= .059						

Parameter constrained to this value in the validation process*** = p < 0.001

Therefore, the results of applying the AFC are presented in Table 4.4 and show that the model provides a good fit of the data (S-BX²= 894.9750; df = 1321; (p < 0.0000); NFI = .888; NNFI = .919; CFI = .931; RMSEA = .059). Also, Cronbach's alpha and IFC exceed the value 0.70 recommended by Nunally and Bernstein (1994), which

refers to the rate of the extracted variance (IVE) was calculated for each pair of constructs, resulting in a higher than 0.50 IVE (Fornell & Larcker, 1981). And for evidence of convergent validity, the results indicate that the AFC all items related factors are significant ($p < 0.001$) and the size of all standardized factor loadings are greater than 0.60 (Bagozzi & Yi, 1988).

Regarding the indicators most relevant factor or more we have to load into the variable indicators include automation as automation (PA1) has automated production processes (PA2), has machinery that uses some software, which infer that the fact of having an automated process directly impacts the cost, increasing the reliability of the product as well as adhere to the planning in the preparation thereof.

Related to other indicators, administrative control of operations, note that the factor loading more records are: (PO1) has a statistical process control of production; (PO2) has a letter of process control; (PO3) has a plan for maintenance of machinery and equipment, we infer that directly affect respect to financial performance, once the projected financial statements have reliable support, whether it is possible to fulfill commitments with customers and deal with the volumes of production, both in quality and delivery times. For as regards the maintenance, it will not become a cause for backwardness.

TABLE 5: DISCRIMINANT VALIDITY OF THE MEASUREMENT OF THE THEORETICAL MODEL

Variables	Automation	Reliability	Control of operations	Personal development	Financial performance
Automatización	0.583	0.671	0.777	0.640	0.210
Reliability	0.501,0.841	0.604	0.851	0.751	0.2610
C. Operations	0.593,0.961	0.665,1.037	0.542	0.9140	0.3360
P. development	0.466,0.814	0.573,0.929	0.716,1.112	0.688	0.3060
Financial P.	0.096,0.324	0.157,0.365	0.222,0.45	0.194,0.418	0.729
Costs	-0.053,0.171	0.059,0.259	0.018,0.23	0.018,0.23	0.172,0.356
Technology	0.382,0.682	0.346,0.618	0.446,0.746	0.391,0.683	0.193,0.401

Regarding the evidence of discriminant validity, the measurement is provided in two forms that can be seen in Table 5. Since, with a confidence interval of 90% of confidentiality, none of the individual elements of the underlying factors of the correlation matrix contains the 1.0 (Anderson & Gerbing, 1988). Another point to note is extracted variance between the two constructs is greater than 0.50, taken from Table 4 that references the index variance extracted (IVE) (Fornell & Larcker, 1981). And based on these criteria it is concluded that the different measurements to model demonstrate sufficient evidence of reliability and convergent validity

Results

Finally to obtain the results statistics research hypotheses, a structural equation model (MEC) was performed using the same variables to check the model structure and get the results that allowed contrasting hypotheses, using for this the software and above EQS 6.1 (Bentler, 2005, Byrne, 2006; Brown, 2006).

As well as, the nomological validity of the theoretical method was analyzed by the Chi square test is the fundamental measure, where the final value of the adjustment function or minimization measure is the chi-square (Lévy et al . 2005); whereby the theoretical model was compared with the adjusted model. And the results indicate that no significant differences are good theoretical model in explaining the relationships observed between the latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). These results of the application of MEC are presented in Table 6.

TABLE 6: RESULTS USING STRUCTURAL EQUATIONS

Hypotheses	Estructural relationship	Factors loadings	T-robust value	Measure of the FITs
H1: A greater automation lower production costs	Automation → Competitiveness	.288***	.1711	S-BX ² ₍₃₇₃₎ = 894.757 P=0.000 NFI=.888
H2: A greater control of operations increased financial performance	Control → Financial development	.279***	.1577	
H3: A greater management operations increased competitiveness	Management → Competitiveness	0.736***	.3288	NNFI=.919 CFI=.931 RMSEA= 059

In the results table of the application of MEC appreciate where we refer to the hypothesis H1 regarding the results ($\beta = 0.288$, $p < 0.001$) indicates that automation has significant positive effects on competitiveness. Assuming H2 results ($\beta = 0.279$, $p < 0.001$) indicate that control of operations have significant positive effects on competitiveness. And finally with the latter hypothesis H3 results indicate ($\beta = 0.736$, $p < 0.001$) than the management of operations have significant positive effects on competitiveness. In the above table the results of the application of MEC appreciate where we refer to the hypothesis H1 regarding the results ($\beta = 0.288$, $p < 0.001$) indicates that automation has significant positive effects on competitiveness. Assuming H2 results ($\beta = 0.279$, $p < 0.001$) indicate that control of operations have significant positive effects on competitiveness. And finally with the latter hypothesis H3 results indicate ($\beta = 0.736$, $p < 0.001$) than the management of operations have significant positive effects on competitiveness.

Analysis and discussion

Automation currently plays an important role in business, because, once the processes are automated or support in software support activities, the goals can be met with regard to: quality, on-time delivery and the quality of the finished product, which directly impacts costs.

Since, compared to the results obtained in the statistical and factor analysis corroborated the views expressed by the various authors in the theory experts in the variables investigated; where manufacturing SMEs in the Metropolitan Zone of Guadalajara, consider that automation has significant effects on the implementation of cost reduction. With this budgeted reaffirms H1: a greater automation lower production costs.

In regards to the administrative control of operations, all attributes of this variable were accepted by the interviewees as elements to consider that the product met in terms of contributing to increase the profit margin. Identified as key elements were: statistical process control, have a preventive maintenance program, as well as exceed the expectations of customers in terms of quality. A further important point is the fact of working with suppliers to meet the input requirements of quality. With the above complies with H2: a greater administrative control of operations increased financial performance.

H3: the higher management operations increased competitiveness. If by definition, operations management refers to the control of resources flowing into a process properly structured, with the idea of adding value to fulfill the goals of the organization and make it happen in an environment that generates higher profits competition, this study reveals that, at least in manufacturing SMEs in the Guadalajara metropolitan area itself is true.

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