Competitiveness in Manufacturing SMEs: A Perspective of México

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Abstract:
In the literature on enterprise management, Small and Medium Enterprises (SMEs) are considered the sector with significant contribution to the economical growth of both developed countries and emergent countries. However, SMEs have fewer opportunities to be integrated with bigger companies in current market globalization and uncertainty in businesses, mainly because they have not taken advantage of those market opportunities and have not improved their competitiveness level. They have only dedicated to certain functional aspects of their business but have not collaborated with their suppliers to achieve it. This investigation has focused on 125 SMEs from the manufacturing sector in Aguascalientes State, México, with the main objective is

to identify their competitiveness level. Results have shown that the financial performance, costs reduction and use of technology are good variables to measure the competitiveness level of manufacturing SMEs.

Keywords: Competitiveness, Financial performance, Cost reduction, Technology

1. INTRODUCTION

In the literature, Small and Medium Enterprises (SMEs) are generally considered as the enterprise sector that generates major contributions to the economical growth of any country; its participation is essentially orientated to offering job opportunities, goods and services to bigger enterprises (Singh *et al.*, 2008). Similarly, SMEs definition is based on its location, size, background, structure, organisation, employees´ number, sales volume, actives value and enterprise property (Rahman, 2001). In the manufacturing sector, SMEs commonly act as suppliers of parts, components and sub assemblers of products to bigger companies; this is because SMEs are capable to produce such raw material at a lower cost than bigger companies (Singh *et al.*, 2008).

Most of the SMEs have simple systems and procedures to enhance flexibility, decisions making in short times, greater understanding and quick response to consumers needs. Although, SMEs have more pressure to keep their competitiveness level, both in the national and international market (Singh *et al.*, 2008). However, according to Chiarvesio *et al.* (2004), SMEs are characterized by a dynamic behaviour in terms of innovation, relationships management with market and suppliers, internationalization processes and their ability to organize and manage business agreements; which means better performance and competitiveness level (Leachman *et a.*, 2005), if this is considered a synonym of productivity, assuming quality and efficiency in these variables (Porter, 1998).

External factors of SMEs are important to create competitive advantages (Porter, 1990; Krugman, 1991; Saxenian, 1994; Enright, 1998; Gordon & McCann, 2000), this is because according to Enright (1990), Porter (1990), Krugman (1991, 1997), Anderson (1994), Omahe (1995), Lloyed and Dicken (1977), Coyle (1997, 2001), Scott (1998), Fujita *et al.* (2000) and Norton (2000) enterprises alone cannot create competitive advantages, instead they require application of various market modes, for instance, active participation of customers and suppliers, which can benefit SMEs through a major level of innovation, productivity and competitiveness (Martin & Sunley, 1998).

Alike, most of the studies published in the current literature about the measurement of competitiveness in organisations present financial parameters (Singh *et al.*, 2008). Man *et al.* (2002) Vargas and Rangel (2007) define in their investigations that financial performance in SMEs has a significant positive relation with the internal development of their capabilities, such as, use of information technology and communication (methods and processes that support enterprises), the use of technology in production processes (equipment acquired or developed by the enterprise), development and implementation of a continuous improvement strategy, innovation and change management.

Therefore, it is necessary to investigate, analyze and discuss about the SMEs competitiveness in emergent countries (Singh *et al.*, 2008; Singh *et al.*, 2010) because from few investigations published on the literature concerning SMEs competitiveness were studied in developed countries (e.g. Wincent, 2005; Ritchie &

Brindley, 2005; Henchion & McIntyre, 2005; Elango, 2008; Oksanen & Rilla, 2009; Parhizkar *et al.*, 2009; Di Gregorio *et al.*, 2009; Crick, 2009). But only few were focused on SMEs in emergent countries (e.g. Venkataramanaiah & Parashar, 2007; Xia *et al.*, 2007; Islam, 2008; Singh *et al.*, 2008; Singh *et al.*, 2010; Najib *et al.*, 2011).

In this context, the main contribution of the present empirical study is an analysis of SMEs competitiveness in an emergent country, in this case, Mexico. Another contribution is the methodology employed, because structural equations were used to test the second-order model representing competitiveness level.

The investigation process is presented organized as follows. On the second section, the literature review describes previous empirical studies and hypotheses. On the third section, the methodology is explained, which details the sample and variables used. Fourth section includes data analysis and results. Finally, on the fifth section, the main conclusions and discussion are presented.

2. LITERATURE REVIEW

Recently, in the literature, a strong competition both in national and international market is shown, which urges enterprises, mainly SMEs, to excel its practices, such as, innovation and customer responsibility (Singh *et al.*, 2008). Therefore, most of the needs of SMEs are concentrated on product quality, for instance, zero defects, competitive price and major financial performance (Corbett & Campbell-Hunt, 2002), because SME´s capability to continuously maintain and improve their business performance and manufacturing processes, seems to be an essential condition to increase their competitiveness level (Lagace & Bourgault, 2003).

Nevertheless, other changes that impact SMEs include their usage and development of technology (Kleindl, 2000), human resources development (Hudson *et al.*, 2001), new products development (Sonia & Francisca, 2005) and supply chain management, through collaboration and participation with their clients, suppliers, distributors, competition and other organisations, such as, consulting organisations and research centres (Soh & Roberts, 2005; Bennett & O´Kane, 2006). Consequently, SMEs' adapting capability as quick as possible to business changes is imperative to SMEs in order to survive in market and to maintain sustainability in the long term (Denis & Bourgault, 2003).

Besides, Vos (2005) defines that SMEs have fewer abilities, which can impede implementation of enterprise strategies; this is because SMEs are in general orientated to local markets, or market niche, demanding a product with a relative low specialization development (Urbonavicius, 2005). At the same time, SMEs have different barriers that inhibite competitiveness growth, for example, among others barriers, resources scarcity, flat organisational structure, few technical experts, low innovation level, poor knowledge management (Singh *et al.*, 2008). A flat organisational structure can generate higher levels of workers and employees frustration as they commonly feel without growth expectancies in the company. SMEs have serious difficulties to hire highly qualified personnel and to keep those workers and employees of high levels of abilities and experience (Ghobadian & Gallear, 1996). Therefore, the most important barriers impeding SMEs competitiveness, mentioned in the literature, include: use of inadequate technology and other resources (Gunasekaran *et al.*, 2001; Hashim & Wafa, 2002); excessive costs in products development (Chorda *et al.*, 2002); lack of effective sales techniques and markets research (Hashim & Wafa, 2002); inefficacy to respond demand of technological

competencies (Muscatello *et al.*, 2003; Narula, 2004); and lack of coordination between marketing, production and economic resources to use software, like Enterprise Resource Planning (ERP)(Xiong *et al.*, 2006).

Competitiveness priorities represent essential elements to be developed by SMEs, because it is precisely through them how enterprise strategies can be supported and enterprise performance can be improved (Kim & Arnold, 1996). For that reason, the competitiveness level of SMEs depends mostly on its ability to perform practices like costing, quality, requests response, products delivery, innovation and its flexibility to adapt themselves to possible variations on demand and market (Carpinetti *et al.*, 2000).

SMEs have to properly align the production area with competitiveness priorities; which is an imperative to competitiveness enhancement. Singh *et al.* (2008) defines that if this type of enterprises achieves a continuous process of improvement of the production area, it will facilitate long term growth of competitiveness level (Singh *et al.*, 2008). In the same manner, competitiveness priorities can be used as a measurement of competitiveness level (external) and competencies (internal) of SMEs, this is because according to Fleury and Fleury (2003) enterprises can optimize the relation of quality and price in order to improve operation performance.

In parallel, Lau (2002) considers that both quality and cost reductions are essential elements to obtain a major level of competitiveness in SMEs, in the electronic and computer industry, in United States. In addition, Dangayach and Deshmukh (2005) concluded in their research that SMEs first have to give high priority to quality products and then to work on flexibility of their processes. Whereas, Lagace and Bourgault (2003) focused on analyzing the relationship between programs and practices of production and competitiveness priorities of SMEs, concluding that the later have to be carefully designed, because through these the CEO has to adopt different management processes or practices to significantly improve the organisation.

On the other hand, SMEs have to measure their financial performance in order to obtain a sustainable growth in a competitive and globalized market. Such type of measurement is essential in the adoption and implementation of enterprise strategies, as systems to measure performance are fundamental to an organisation management system (Garengo *et al.*, 2005). In the literature, performance is commonly defined as the process to quantify efficiency of production systems. For that reason, an enterprise performance can be measured by the relation of incomes and outputs (Singh *et al.*, 2008). In this sense, outputs are products created by organisations and outputs are resources used by organisations (Choudhary, 2001). These are basic for tangible and intangible assets in businesses in the analysis of the enterprise performance.

Moreover, enterprise performance has been traditionally measured through financial indicators, for example, profit margin, market share, sales and level of growth. However, financial indicators only measure past performance. Thus, Garg *et al.* (2003) considered it impossible for SMEs to carry out this type of measurement, because managers do not have detailed information of the enterprise. Therefore, researchers suggested the use of subjective and objective measurements in order to measure performance, mainly because, in this context, performance, which is relative to its industry or sector, represents an indicator of their competitiveness level.

Vastag and Montabon (2001) suggested a scale to measure competitiveness advantages in organisations. This scale compares manufacturing unit costs and delivery speed against their main competitors. Whereas, Ribeiro and Cabral (2006) developed a methodology for the metal mechanic industry, it is a measurement model that considers some areas of production, customers and business results. Also, St-Pierre and Delisle (2006) developed a scale to measure SMEs performance through a diagnostic expert system, identifying it as a provider of better operational and financial performances in companies.

Similarly, in the literature there are models considering the integration of qualitative and quantitative information to measure enterprise performance, such as, the balance scorecard (Kaplan & Norton, 1992). Other models include a presentation of processes, results and performance (Momaya, 2000), the business scorecard (Kenji & Sá, 2002), the performance prism (Neely *et al.*, 2002); the performance and strategy (Frigo, 2002) and a model based on knowledge (Denkena *et al.,* 2006). Hence, following recommendations by Hudson *et al.* (2001) about the use of quantitative and qualitative data to measure performance as an indicator of the level of competitiveness in enterprises, from which it is possible to establish the following hypothesis:

H1: Financial performance is a good measure of the SMEs competitiveness level

On the other hand, most of SMEs work with long cycle times and poor systems to forecast and plan production; consequently, there are serious problems in inventory control systems and high costs that impede growth of competitiveness levels (Singh *et al.*, 2008). This is because of the excess of inventories in warehouses, that became obsolete, and of the poor customer service offered (Gunasekaran *et al.*, 2000). Then, manufacturing SMEs have to improve their production and materials management systems (Ulusoy, 2003) in order to increase their competitiveness level. In order to achieve that, suppliers development is implicit, which helps to reduce purchasing costs (Humphreys *et al.*, 2004), mainly because companies supporting their suppliers in terms of capabilities and performance, generate cost reduction and competitiveness improvements (Park *et al.*, 2001).

Trent andMonczka (1999) define that fewer suppliers can provide products with better quality level and major competitiveness level in SMEs, this is through an increased compromise to improve designs and quality of their products. Therefore, a good alternative to improve competitiveness is to maintain a long term relationship with suppliers, because direct, purchase and operation cost can be reduced in SMEs and supplier can be integrated to the operations (Canon & Homburg, 2001). Hence, it is now possible to define the following second hypothesis:

H2: Cost reduction is a good measure of the SMEs competitiveness level

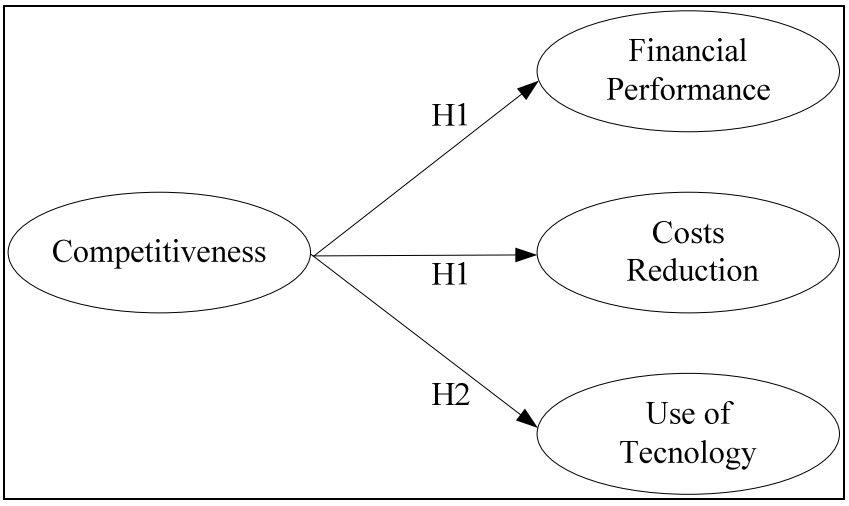
Besides, a great deal of SMEs trust on technology even though in many cases it is inefficient and inappropriate, for the reason that these are used to carry out intensive activities and traditional management practices (Hashim & Wafa, 2002). However, SMEs are urged to increment their competitiveness level, due to uncertain markets and businesses, according to Raymond (2005) this can be achieved by the use and application of advance technology in production systems. Besides, Mosey (2005) defines that SMEs can compete both against its principal competitors and big companies by developing new products generated with new technology.

Similarly, Chanaron and Jolly (1999) suggest from their research project that higher levels of technologies are necessary in order to improve competence strategies in industries; this because there is a clear relation between technology capabilities and competitive production priorities in industries (Gupta, 1996). However, if technology commonly used by their competitors is superior and considered as standard in industry, then it can be a threat in a competitiveness level as in SMEs survival (Narula, 2004).

In current literature, it is defined that the use of technology impacts competitiveness levels of SMEs in two ways (Singh *et al.*, 2008). The first one is due to changes in prices of the structure by developing more efficient and flexible processes. The second one is caused by developing new products and higher quality level, better design, post sale services and shorter delivery (Vinas *et al.*, 2001). Therefore, new technologies apart from offering SMEs wider possibilities to increment market sharing, additionally, increments competitiveness level and introduction of new products for these markets (Aspelund & Moen, 2004). Gunasekaran *et al.* (2001) have considered that introducing technology into production processes helps SMEs to reduce production time, to increment flexibility levels, reliability, to improve customer service and to enhance development of competitive advantages. Therefore, it is possible to propose the following hypothesis:

H3: The use of technology is a good measure of the SMEs competitiveness level

Figure 1 Theoretical Model



3. METHODOLOGY

The methodology of this research includes an empirical study in manufacturing SMEs of Aguascalientes state, México, in order to resolve these three hypotheses proposed in the theoretical model of competitiveness, based on the Enterprise Information System of Mexico (SIEM from its acronym in Spanish) directory, which on July 30th, 2009, had 130 enterprises registered, mainly with 20 to 250 employees. Because the number of SMEs was small it was considered appropriate to survey all them, having a reliability level of 99% and ±1% of error. At the same time, such survey as data collection was designed to be answered by managers or owners of SMEs. Data collection was carried out by individual interviews, from which 125 were validated, having 96% response rate. **Error! Reference source not found.** shows the main characteristics of this research.

Table 1 Research Design

Characteristics	Research
Population	130 SMEs
Geographic Area	Aguascalientes State (México)
Sample	SMEs (20 to 250 employees)
Data Collection Method	Individual Interviews to Managers
Sampling Method	Simple Random Sampling
Sample Size	125 SMEs
Sampling Error	+/- 1% error, reliability level 99% (p=q=0.5)
Field Work	September to December 2010

On the other hand, according to Buckley *et al.* (1988) in order to measure the competitiveness level in SMEs three factors have to be considered; *1) financial performance,* measured with a 6 items scale*; 2) costs reduction*, measured with a 6 items scale; and*3) use of technology*, measured with a 6 items scale. All items from these three factors were measured using a Likert scale of 5 points, where 1= total disagreement to 5=total agreement.

A Confirmatory Factorial Analysis (AFC from its acronym in Spanish) was employed in order to evaluate reliability and validity of the used scale to measure competitiveness level in manufacturing SMEs, for that the method of maximum likelihood with EQS 6.1 (Bentler, 2005; Brown, 2006; Byrne, 2006). Hence, reliability of these three competitiveness factors was evaluated by the Cronbach's Alpha Coefficient and Composite Reliability Index (IFC) (Bagozzi & Yi, 1988). Chou, Bentler andSatorra (1991) and de Hu, Bentler and Kano (1992) suggest to correct statistics of the theoretical model of competitiveness when considered normal, using robust statistics in order to provide a better statistical fit of data (Satorra & Bentler, 1988).

Besides, fit indexes considered in this research work were the normalized fit index (NFI), the not normalized fit index (NNFI), the comparative fit index (IFI) and the root mean square error approximation (RMSEA) (Bentler & Bonnet, 1980; Byrne, 1989; Bentler, 1990; Hair *et al.*, 1995; Chau, 1997; Heck, 1998). Authors like Segars and Grover (1993) proposed that if the first three indexes have values from 0.80 to 0.89 the theoretical model has an appropriate fit, on the contrary if indexes value is higher to 0.90 there is evidence of an excellent theoretical model fit (Jöreskog & Sörbom, 1986; Byrne, 1989; Papke-Shields *et al.*, 2002). Also, if RMSEA value if minor to 0.080 model fit is considered acceptable (Jöreskog & Sörbom, 1986, Hair *et al.*, 1995).

Error! Reference source not found. presents the AFC results showing that the theoretical model of competitiveness has an appropriate fit ($S\text{-}BX^2 = 225.765$; $df = 116$; $p = 0.000$; $NFI = 0.881$; $NNFI = 0.927$; $CFI = 0.938$; and $RMSEA = 0.077$), items from the three factors related are significant ($p < 0.01$), the size of all standardized factorial weights are higher than 0.60 (Bagozzi & Yi, 1988), the Cronbach´s Alpha and the IFC are higher than 0.70, and the extracted variance index (EVI) has a value higher than 0.50 (Fornell & Larcker, 1981). These values show sufficient evidence of convergent validity and reliability, which justifies internal reliability of the used scales (Nunally & Bernstein, 1994; Hair *et al.*, 1995).

Table 2 Internal consistency and convergent validity of the theoretical model

Variable	Indicator	Factorial Weight	Robust t value	Cronbach´s Alpha	IFC	IVE
Financial Performance	RF1	0.857***	1.000[a]	0.921	0.926	0.679
	RF2	0.861***	12.718			
	RF3	0.937***	18.867			
	RF4	0.876***	14.362			
	RF5	0.715***	10.098			
	RF6	0.663***	8.443			
Costs Reduction	RC1	0.912***	1.000[a]	0.931	0.931	0.729
	RC2	0.934***	17.528			
	RC3	0.800***	14.246			
	RC4	0.820***	15.949			
	RC5	0.793***	12.045			
Use of Technology	UT1	0.820***	1.000[a]	0.928	0.927	0.682
	UT2	0.834***	14.485			
	UT3	0.932***	18.314			
	UT4	0.865***	13.870			
	UT5	0.739***	9.363			
	UT6	0.748***	9.524			
$S\text{-}BX^2$ (df = 116) = 225.765; p < 0.000; NFI = 0.881; NNFI = 0.927; CFI = 0.938; RMSEA = 0.077						

[a] = Parameters constrained to that value in the identification process

*** = p < 0.01

In terms of discriminated validity, evidence is presented in two ways as shown in **Error! Reference source not found.**. Firstly, the confidence interval test proposed by Anderson and Gerbing (1988), which defines that with an interval of 95% confidence none of the individual elements from the correlation factors matrix, which establishes that with a 95% confidence interval none of the individual elements from the latent factors of the correlation matrix has the value of 1.0. Besides, the current extracted variance test proposed by Fornell and Larcker (1981) corroborate that the extracted variance in very pair of constructs is bigger to its corresponding EVI. Therefore, according to results from both tests, measurements show sufficient evidence of discriminated evidence of the theoretical model.

Table 3 Discriminated validity of the theoretical model

Variables	Financial Performance	Costs Reduction	Use of Technology
Financial Performance	**0.679**	0.480	0.245
Costs Reduction	0.455 - 0.931	**0.729**	0.176
Use of Technology	0.255 - 0.735	0.176 - 0.664	**0.682**

The diagonal represents the Extract Variance Index (EVI), above the diagonal shows the variance, below the diagonal shows the correlation factors with a reliability interval of 95%.

4. RESULTS

The structural equations model was used in order to respond the proposed hypotheses of the theoretical model of competitiveness, this using the EQS software, version 6.1 (Bentler, 2005; Byrne, 2006; Brown, 2006). At the same time, the nomological validity of the model was examined with a Chi square test, which compares obtained results between the theoretical model and the measurement model, demonstrating no significant differences between the models; this allows explaining the observed relationships among latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). **Error! Reference source not found.** shows more details about results.

Table 4 Results from the structural equations model

Hypotheses	Structural Relation	Standardized Coefficient	Robust t Value
H1: The level of financial performance is a good measure of competitiveness level	Financial P. ⟶ Competitiveness	0.360***	13.452
H2: The reduction costs is a good measure of competitiveness level	Costs Red. ⟶ Competitiveness	0.394***	19.689
H3: The use of technology is a good measure of competitiveness level	Technology ⟶ Competitiveness	0.401***	22.608
$S\text{-}BX^2$ (df = 112) = 217.980; p < 0.000; NFI = 0.885; NNFI = 0.927; CFI = 0.940; RMSEA = 0.077			

*** = P < 0.01

Error! Reference source not found. presents results from applying the structural equations model. In terms of H1 hypothesis the obtained results are $\beta = 0.360$, $p < 0.01$, indicating that financial performance is a good measure of competitiveness in manufacturing SMEs. For hypothesis H2, $\beta = 0.394$, $p < 0.01$, demonstrate that cost reduction is also a good measure of competitiveness level in manufacturing SMEs. For hypothesis H3, $\beta = 0.401$, $p < 0.01$, indicate that the use of technology is also a good measure of competitiveness level in manufacturing SMEs. Therefore, it was possible to prove that competitiveness level in manufacturing SMEs can be measured by three factors or dimensions: financial performance, costs reduction and use of technology.

5. CONCLUSIONS AND DISCUSSION

This empirical study about manufacturing SMEs in the Aguascalientes state, Mexico, helps to demonstrate that financial performance, costs reduction and use of technology are good indicators to measure the competitiveness level in these organisations. Such conclusion can be summarized into two ways. Firstly, SMEs have the objective of incrementing and maintaining its competitiveness level, therefore it is necessary to improve their financial performance, costs reduction and to efficiently use its prevailing technology, so SMEs have the appropriate conditions to achieve such objectives.

Secondly, financial performance, costs reduction and use of technology do not have the same impact on measuring the competitiveness level. On the contrary, according to this research results, the use of technology is the variable with more impact, followed by costs reduction and financial performance. In consequence, the use of technology should be maximized in SMEs by managers; they should invest on more economical resources to acquire modern technology similar or superior to that used in the SMEs sector, because through this it can be significant reduce both production and products costs, which at the same time can improve the company financial performance.

In a globalized market and progressive competitive levels, where not only Mexican enterprises but from other countries, SMEs managers and owners have to collectively work with their customers and suppliers in order to obtain, increment and maintain their competitiveness level, which impact tangible actions, such as, surviving in local and regional markets, reaching major participation in the current market, expanding its participation in national market or even in an international market.

SMEs managers have to design and to implement enterprise strategies that are focused on widely reduce costs; this provides them higher levels of competitiveness. Therefore, it is essential to work with customers and suppliers to collectively make agreements that allow cost reductions in production and services offered by the company, along with, distribution and logistics costs. This reduction allows SMEs to offer goods and services with a better Price in its market, which can displace products made by its main competitors or implement better promotional strategies than its competitors.

Furthermore, SMEs managers or owners are obliged to efficiently use their technology or even renew it, because it can offer them a higher level of competitiveness. Hence, organisations managers have to design and implement such strategies focused on collaboratively work with customers and suppliers, in order to identify support mechanisms that allow development and acquisition of technology; which allows them not only to reduce costs of production, distribution and logistics, but also to create necessary conditions to design and

implement innovation activities in participating enterprises, hence, development of new products or improvement of existing products, and generate a better financial performance.

Additionally, managers from manufacturing SMEs need to implement a training program to workers and employees in the use of information technologies, because it allow them an efficient use of technology and major competitive advantages than its main competitors. Also, it is essential to have a working environment in manufacturing SMEs where workers and employees are willing to share knowledge, skills, and experience in the use of technology with new employees. This can generate not only costs reduction to the company, but only to substantially improve its financial performance and therefore its competitiveness level.

Finally, this empirical study has limitations. First of all, the scale used to measure the competitiveness level of manufacturing SMEs, considers only three factors or dimensions, future work should integrate more factors in order to evaluate results. Another limitation of this research is its data collection because only one part of information has been considered of the financial performance, costs reduction and use of technology with qualitative variables, therefore, in future work it would be necessary to integrate quantitative variables in order to determine same results. At the same time, it is important to define that the majority of enterprises from the sample considered the requested information as highly confidential and private, for that reason collected data may not reflect enterprises reality.

A third limitation is about the variables measurement because of the 6 items scale used for each of the three dimensions. Therefore, future research should implement more comprehensive measurements incrementing the number of items. Another limitation is that surveys were directed only to managers and owners of manufacturing SMEs, as a consequence results can significantly differ if population changes. For that reason it is necessary to replicate and extend research with customers and suppliers in order to obtain a better definition of the used scale. One last limitation is that this study includes only manufacturing SMEs with 20 to 250 employees, future studies should also consider enterprises with less than 20 employees, which represent more than half of the enterprises to validate the obtained results.

Finally, a wider discussion, going further obtained technical results, ¿what effects SMEs should have by using a quantitative scale to measure its competitiveness level? ¿ what specific activities of financial performance, costs reduction and use of technology impact competitiveness level in manufacturing SMEs? Questions like these can raise and be answered in future research.

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