

Strategic archetypes in Mexican metalworking SMEs: differences in innovation and absorptive capacity over performance

Arquetipos estratégicos en PYMES metalmeccánicas mexicanas: diferencias en innovación y capacidad de absorción sobre su desempeño

Archétypes stratégiques dans les PME mexicaines de métal-mécanique : différences d'innovation et capacité d'absorption par rapport à leur performance

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Abstract

After several years of booming, today the Mexican metalworking industry faces a complex environment largely due to foreign policy changes. Nevertheless, most small-and-medium-sized entrepreneurs do not perceive what is to come because they are busy attending the demands of the present market, which has allowed them to obtain a stable performance in the short term. This research analyzes the explanatory value of innovation and potential absorption capacity, which was conducted on the performance of different strategic archetypes in small-and-medium-sized entrepreneurs of the Mexican metalworking industry, based on the typology proposed by Miles and Snow (1978). With

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data from surveys applied to 197 SMEs in three regions of Mexico, a non-experimental transactional quantitative-correlational type of research was developed. Half of the interviewees were found to be analysts, for whom innovation and potential absorptive capacity have an explanatory value of 32.3% on performance. The rest of the interviewees feature defender archetypes, in which innovation has an explanatory value of 56.8%. According to Chow's Test, these differences are not significant in the final performance result. It is concluded that small-and-medium-sized business analysts and advocates develop capacities that allow them to make the necessary adjustments that the environment dictates along the way, generating different competitive advantages that help them achieve similar results in the short term.

Keywords: Strategic Archetypes, Absorption Capacity, Innovation, Performance.

Resumen

Después de varios años de auge, hoy la industria metal-mecánica mexicana se enfrenta a un entorno complejo derivado en gran parte, de los cambios de la política exterior. Sin embargo, la mayoría de los pequeños y medianos empresarios no perciben lo que está por venir porque están ocupados en satisfacer las demandas del mercado presente, que les ha permitido obtener un estable desempeño en el corto plazo. Esta investigación analiza el valor explicativo de la innovación y capacidad de absorción potencial y realizada sobre el desempeño de los distintos arquetipos estratégicos en pequeños y medianos empresarios de la industria metalmeccánica mexicana, a partir de la tipología propuesta por Miles y Snow (1978). Con datos de 197 encuestas levantadas a PYMES de tres regiones de México, se desarrolló una investigación no experimental transaccional de tipo cuantitativa correlacional. Se encontró que la mitad de los entrevistados son analistas, en quienes la innovación y la capacidad de absorción potencial tienen un valor explicativo sobre el desempeño del 32.3%. El resto de los entrevistados tienen rasgos de arquetipos defensores, en quienes la innovación tiene un valor explicativo sobre el desempeño del 56.8%. De acuerdo al Test de Chow, estas diferencias no son significativas en el resultado final del desempeño. Se concluye que los pequeños y medianos empresarios analistas y defensores desarrollan capacidades que les permiten realizar los ajustes necesarios que el entorno va dictando, generando distintas ventajas competitivas que les ayudan a conseguir resultados similares en el corto plazo.

Palabras clave: Arquetipos estratégicos, Capacidad de absorción, Innovación, Desempeño.

Résumé

Après plusieurs années d'essor, l'industrie métallurgique mexicaine est aujourd'hui confrontée à un environnement complexe dû en grande partie aux changements de la politique extérieure. Cependant, la plupart des petits et moyens entrepreneurs ne perçoivent pas ce qui est à venir car ils sont occupés à satisfaire les demandes

du marché actuel, ce qui leur a permis d'obtenir une performance stable à court terme. Cette recherche analyse la valeur explicative de l'innovation et de la capacité d'absorption potentielle et porte sur la performance des différents archétypes stratégiques chez les petits et moyens entrepreneurs de l'industrie métallurgique mexicaine, à partir de la typologie proposée par Miles et Snow (1978). À partir des données de 197 enquêtes menées auprès de PME dans trois régions du Mexique, une recherche transactionnelle non expérimentale de type corrélationnel quantitatif a été élaborée. On a constaté que la moitié des personnes interrogées sont des analystes, pour lesquels l'innovation et la capacité d'absorption potentielle ont une valeur explicative sur la performance de 32,3 %. Les autres personnes interrogées présentent des caractéristiques de défense des archétypes, où l'innovation a une valeur explicative de 56,8%. Selon le test de Chow, ces différences ne sont pas significatives dans le résultat final de performance. Il est conclu que les analystes et les défenseurs des petites et moyennes entreprises développent des capacités qui leur permettent de faire les ajustements nécessaires que l'environnement leur dicte, produisant différents avantages concurrentiels qui les aident à atteindre des résultats similaires à court terme.

Mots-clés: Archétypes stratégiques, Capacité d'absorption, Innovation, Performance.

1. Introduction

For some decades, the development of the automotive industry in Mexico has increased exponentially, as most of the world's largest automobile corporations have envisioned great opportunities thanks to the abundant resources available, skilled labor and of course, its geographical location (Vicencio Miranda, 2007).

This is why today this industry leads the investments that foreign companies make in the field of Mexican manufacturing. According to data from the Instituto Nacional de Estadística y Geografía (INEGI)- the National Institute of Statistics and Geography- and the Mexican Association of Automotive Industry (AMIA)-Asociación Mexicana de la Industria Automotriz (AMIA)- (2016), the manufacturing industry contributes 3.5% of the national GDP and 16.9% to the manufacturing GDP, reaching eighth place as a producer of vehicles in the world and fourth as a global exporter.

Despite these advantages, the automotive industry faces a complex environment, derived from foreign policy changes that the current president of the United States is promoting

(Estañol, Lara, Rodríguez, Sánchez, Sigler, Torres and Valle, 2016). In addition, in the last decade, the automotive industry in Latin America has been overshadowed because Asian automakers have increased their exports to the United States (Álvarez Medina, 2007; Avendano, Melguizo, and Miner, 2017). This situation has mostly affected small-and-medium-enterprises (SMEs) that are immersed in this industry, who constitute the majority of the national suppliers within the Tier 1, 2 and 3¹ echelons of the productive chain (Bautista and Peralta, 2017).

This sector has committed to developing new technological and organizational skills (Álvarez Medina, 2007), largely due to the fact that they are constantly subject to different evaluation systems (Fonseca, 2015, Velosa García, and Sánchez Ayala, 2012) due to the demands of the large automobile companies, which have opened up entry to these SMEs thanks to the outsourcing of some manufacturing activities at the lowest echelons of the production chain.

Some estimates account for over 550 national Tier 1-suppliers who in turn purchase production supplies from smaller companies (Tier 2 and Tier 3), estimated at around 400. The latter group imports around 71% of the materials used to manufacture components because an incipient integration of companies persists (Covarrubias Valdenebro, 2014).

Faced with the challenges ahead, second-and-third-tier SMEs must not only comply with the parameters already mentioned, but they must also face a more complex environment than they did in the past, because they must rethink about tackling other markets, have other customers and have a wider range of products that can support them in surviving the times ahead (González and Luna, 2016). This means that SMEs require greater absorptive and innovative capacities to cope with the complex (Cohen and Levinthal, 1990) environment to come.

Nonetheless, according to Mintzberg (1994), the environment currently experienced by small-and-medium-sized Mexican metal-working companies presents somewhat

stable characteristics, and since the market demands few changes, most of the knowledge required is simple and although the birth of new companies of the same nature is present, an integrated market in which there are few products and few-but-loyal customers still persists. However, the medium-term foresees an unstable and turbulent environment ahead (Rivera Rodríguez, Calderón, and Cabezas, 2011), as there is an upward trend of great demand for technological innovations in the automotive industry, especially in terms of sustainable fuels usage (Álvarez Medina, 2007). Moreover, this industry demands to satisfy a wide range of market niches' demand with very particular characteristics, which causes the existence of a wide range of products (Vicencio Miranda, 2007).

Faced with the complex environments that lie ahead, companies can either exit the market or generate positive actions that favor the development of innovative practices for better organizational performance (Damanpour and Schneider, 2006). For most small-sized entrepreneurs the challenge is greater since they do not have enough time and resources to face up the changes that are coming because they are occupied with their short-term performance (Baptista Nunes, Annansingh, Eaglestone, and Wakefield, 2006).

In this sense, there are several studies that explain the close relationship between the use of environmental knowledge (through absorption capacity) and innovation in products, markets and processes (Becker and Peters, 2000; Cockburn and Henderson, 1998; Cohen and Levinthal, 1990; Nieto and Quevedo, 2005; Veugelers, 1997) for better organizational performance (Mowery, Oxley, and Silverman, 1996; Negassi, 2004) in the short and long term. However, most of these studies have been carried out on large companies, whose strategies are better outlined than those of SMEs. In the latter, the owners or general managers determine the strategy and structure (Apak and Atay, 2014; Bagnoli and Vedovato, 2012), making the necessary adjustments when the environment so requires (Oyedijo, Olateju, Okunnu, and

¹ Within the automotive industry, first level suppliers (Tier 1) have been developed, these are in charge of serving the automotive plant; second level suppliers (Tier 2), deliver parts to the first level and third level suppliers (Tier 3) supply raw materials (Ramírez, 2011).

Adeyemi, 2010). Therefore, they are the ones who also define the strategies for the development of absorption and innovation capacity, in pursuing a better performance (Broersma, Van Gils, and De Grip, 2016).

With the objective of analyzing the explanatory value of innovation and potential absorption capacity, which carried out on the performance of the different strategic archetypes, 197 small-and-medium-sized entrepreneurs of the metalworking industry were interviewed in three regions of the country, finding significant differences in the predictive variables, but not in the final result of the organizational performance.

The structure of this paper is divided into four parts: the first part deals with the theoretical bases that sustained this research, the second part describes the methodology followed to obtain the empirical evidence hereof; the third part analyzes the results and a discussion is carried out with respect to other studies. Lastly, the conclusions are put forward, describing the limitations of the work and the lines of research that originate from it.

2. Theoretical Framework

Scholars in the administrative areas have taken on the task of characterizing different profiles in entrepreneurs in order to explain their current behavior and predict their future behavior. Perhaps the most influential work is that of Miles and Snow (1978), who define four strategic archetypes based on their position on innovation, market monitoring, organizational structure and the skills they have developed to face changes in the environment. On the original work of Miles and Snow (1978), DeSarbo, Di Benedetto, Song, and Sinha (2005), determined that current circumstances modify the strategic archetype as part of the constant and necessary adaptation process that they must undertake to continue to stay in the market (Romanelli and Tushman, 1994). Table 1 shows the main characteristics of each strategic archetype.

The strategic archetypes identified by Miles and Snow (1978) and complemented by DeSarbo, *et al.* (2005), are defined by the way they act based on the activities they carry

out on a permanent basis. All of them have different strategies that they develop with the aim of maximizing profits.

According to Berger and Udell (2006) and Broersma, *et al.* (2016), SMEs are more exposed to the environment's circumstances when compared to large companies. As a result, small-and-medium-sized entrepreneurs are forced to make changes in strategies (Mintzberg, Quinn, and Voyer, 1997), although quite generally (Schindehutte and Morris, 2001), and they also partially modify the structure (Claver-Cortés, Pertusa-Ortega, and Molina-Azorín, 2011; Faust, 2006; Pertusa-Ortega, Molina-Azorín, and Claver-Cortés, 2007) to adapt to the environment (Kets De Vries, 1977; van den Hooff and Huysman, 2009).

One key point for any organization is innovation, where the strategic thinking of the small-and-medium-sized entrepreneur has a direct effect (Del Giudice, Khan, De Silva, Scuotto, Caputo, and Carayannis, 2017), deciding on new products or improvements to existing ones and on engaging in new processes and markets (Marcati, Guido, and Peluso, 2008).

For the purposes of this paper, innovation is a means to generate change as a response to the evolution of the external environment, or as a preventive action influenced by the environment. Innovation can also be seen in new technological processes, new organizational structures or management systems and new plans or programmes (Damanpour, 1996, p. 694), which aim to develop new markets. Strategic flexibility is required to allow the organization to evolve, according to the new uses that can be given to the resources it already has and other new resources it acquires or develops (Subramaniam and Youndt, 2005). For SMEs, most of their innovations are reflected in the reconfiguration of products, services and sales channels (Lee, Park, Yoon, and Park, 2010).

Innovation does not always have a positive short-term effect on SMEs' performance. It depends on other contextual factors, the life cycle of the product and the ultimate purpose for innovating (Rosenbusch, Brinckmann, and Bausch, 2011), as well as on its way of using the information of the environment,

Table 1. Strategic archetypes and their characteristics

Strategic archetype	Type of products	Innovation in products	Current markets	Entrance into new markets	Market monitoring	Strategies	Resources	Organizational structure	Procedures	Skills
Prospector	Last generation	Constant	With novelty products	Constant	Constant	Aggressive	Optimum conditions	Flexible	Decentralized	Diverse and flexible
Defender	Select and high quality	According to the demand	Greater concentration	If it represents opportunities for growth	Frequent	Defensive	Good conditions	Functional with sub-structures	Concentrated by department	To meet the demand
Analyst	Stable	After careful monitoring	Greater concentration	After a careful monitoring	With a certain periodicity	Control of costs and income	Careful control of resources	Structure by product or market	Rigid in product and flexible in innovation	Analysis
Reactor	What the market asks for	According to market forecasts.	Greater concentration	Only in case of threats	Sporadic	What the market dictates	Focused on solving daily problems	Rigid functional structure	Traditional	Specialized

Source: Authors' own elaboration based on DeSarbo et al. (2005).

for which knowledge is used within the organization in process innovation, while it is a combination of internal and mainly-from-the-outside knowledge when it comes to product innovation (Flor Peris, Oltra Mestre, and García Palao, 2011).

According to the Brunswicker and Vanhaverbeke study (2015) the SME owner determines the innovation strategy influenced to a large extent by the external knowledge he obtains from his network of business partners, one of the resources making up his absorptive capacity (AC). In this sense, Wales, Paride and Patel (2013) explain that the owner of the SME has the ability to slow down or accelerate the AC that the organization acquires, according to its entrepreneurial orientation.

Absorption capacity (AC) is the ability of an organization to recognize and identify the value of new external information and then assimilate it, exploit it and apply it in improving or developing new products, services, markets or processes (Cohen and Levinthal, 1990). According to Zahra and George (2002), AC can be potential and realized. Potential AC refers to the concern to acquire and assimilate external knowledge, whether it is used to produce innovations or not. Realized AC refers to the ability to transform and exploit knowledge for development or improvement. Both potential and realized AC are necessary for upper organizational performance (Jansen, Van Den Bosch, and Volberda, 2005).

AC and innovation contribute to the development and operation of competitive strategies that seek to improve organizational performance (Edelman, Brush, and Manolova, 2005). In this vein, several studies have found the joint influence of AC and innovation on performance. One of the most recognized is that of Tsai (2001), who acknowledges the joint effect of Social Capital and AC on innovation and performance. Wang and Wang, for their part, (2012) found that innovation acts as a mediating variable between absorption capacity (encompassing the concept in the shared knowledge variable) and the performance of the organization. Forés and Camisón (2016) found that the size of the organization does not have an effect on the AC it can develop. However, they found that AC in SMEs has a direct effect on radical

innovations that take place more frequently than in large companies. In particular, Fosfuri and Tribó (2008) determined that potential AC has a significant impact on innovation development and performance. Gray's (2006) study also shows that the profile of small-and-medium-sized entrepreneurs plays as a moderating variable between absorption capacity, innovation and organizational performance.

Also named business output, organizational performance has been widely analyzed as a variable resulting from combining numerous factors. Nevertheless, recent studies have bestowed a preponderant role AC and innovation (Ali, Kan, and Sarstedt, 2016; Ferreras-Méndez, Newell, Fernández-Mesa, and Alegre, 2015), but the effect of the strategic archetype of the small-and-medium-sized entrepreneur on these variables has not yet been clarified.

3. Methodology

The Mexican metalworking industry faces a complex environment brought about by several factors; the most important is perhaps the shaky continuity of the Free Trade Agreement with the United States. This situation mainly affects small businessmen making up the supply chain, since much of their strategies are aimed at that of their largest customers in the automotive industry (INEGI and AMIA, 2016).

The objective of this research was to analyze the explanatory value of innovation and potential and realized AC on the performance of the various strategic archetypes of small-and-medium-sized entrepreneurs in the Mexican metalworking industry. The specific objectives were:

- Determining the strategic archetype with which small-and-medium-sized entrepreneurs of the Mexican metalworking industry behave.
- Determining the significant differences that exist between innovations, potential and realized AC and the performance of strategic archetypes groups found.

Small-and-medium-sized businessmen

Table 2. Cronbach's alpha for study variables

Variable	Questions on the original scale	Cronbach's Alpha	Questions on the modified scale	Final Cronbach's Alpha
Potential AC	9	0.636	7	0.700
Realized AC	12	0.705	12	0.705
Innovation	6	0.872	6	.0872
Performance	4	0.856	4	0.856

Source: Authors' Own elaboration.

groups in the metalworking sector were surveyed (INEGI and AMIA, 2016), 76 in the State of Mexico, 40 in Ciudad Juárez and 81 in Aguascalientes, using as data collection instrument an original translation by Desarbo *et al.* (2005) to classify strategic archetypes, from Jansen *et al.* (2005) to measure absorption capacity, from Subramaniam and Youndt (2005) for the innovation scale and from Schreiner, Kale and Corsten (2009) to measure perceived performance. A Likert scale was used to measure the three study variables. In the section on innovation and performance, the perception of the actions carried out and the results those achieved were rated in comparison with their competitors, wherein 1 meant "much worse than the competition" and 7 "much better than the competition". The section on absorptive capacity rated the perception of the interviewees with respect to the actions undertaken, wherein 1 was "very much in disagreement" and 5 "very much in agreement".

To verify the reliability of the instrument, Cronbach's Alpha was calculated (Table 2), establishing an acceptable parameter on all scales, except for that of potential absorption capacity, in which two questions were eliminated. With this, an internal consistency of 0.700 was achieved, the reasonable minimum for this type of studies (Hair, Prentice and Cano, 1999).

This was a correlational and applied type of research: based on prior research on the subject, a quantitative research was developed, carrying out statistical calculations that worked as a basis for the discussion of the results.

The hypothesis on which this work was based is that there are differences in innovation, absorption capacity and performance among the different strategic archetypes located in Mexican metalworking SMEs.

The following statistical hypotheses were derived therefrom:

H_1 = There is a significant difference in the explanatory value of innovation and the potential and realized absorption capacity over performance in the strategic archetypes of the metalworking SMEs.

H_0 = There is no significant difference in the explanatory value of innovation and the potential and realized absorption capacity over performance in the strategic archetypes of the metalworking SMEs.

The research design was cross-sectional non-experimental, gathering the data in February 2017 from the subjects, without any manipulation on the variables, limited to the observing the phenomena for the description and ensuing analysis of the findings (Kerlinger, Lee, Pineda and Mora Magaña, 2002).

For data analysis and calculation of step-by-step linear regression, statistical calculations were performed with the support of the SPSS Statics 23.0 software, regarding the strategic archetype as a differentiating value. Calculations were made in Excel for Chow's test.

The normality of the data was calculated through the Kolmogorov-Smirnov (K-S) test for the dependent variable (performance) and the independent variables (innovation,

Table 3. Significance level for the Kolmogorov-Smirnov normality test

Variable	Analyst	Defender
Innovation	0.052	0.046
Potential AC	0.012*	0.005*
Realized AC	0.012*	0.012*
Performance	0.056*	0.001*

Source: Authors' Own elaboration.
* Lilliefors's Correction of significance.

Table 4. Classification of entrepreneurs by strategic archetype

Archetype	Frequency	Percentage
Analyst	98	49.7%
Defender	99	50.3%
Total	197	100.0%

Source: Authors' Own elaboration.

Table 5. Descriptive statistics by group

	Mean value of the scale	General		Analyst		Defender	
		Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Innovation	3.5	4.6641	1.0594	4.4949	0.9298	4.8317	1.1541
Potential AC	2.5	3.4344	0.7484	3.3294	0.8301	3.5382	0.6453
Realized AC	2.5	3.4040	0.6379	3.3401	0.6577	3.4672	0.6144
Performance	3.5	5.0000	1.1415	4.8699	1.0842	5.1288	1.1869

Source: Authors' Own elaboration

potential absorptive capacity and realized absorptive capacity), setting the level of significance at =0.05. Table 3 describes the parameters found.

All variables met the normality parameter for both groups, although the innovation and performance variables yielded parameters slightly higher than 0.05 in the analyst group. However, it can be inferred that the population of both groups has a normal distribution.

4. Results and discussion

The instrument yielded results, which determined that the small-sized businessmen from the metalworking industry interviewed in three regions of the country, behave with a strategic-analyst or defender archetype (Table 4). From the two groups of strategic archetypes found and the calculation of the composite variables, averages and standard deviations were obtained per group.

The 98 small-and-medium-sized entrepreneurs with a strategic-analyst archetype (representing 49.7% of the population), claimed to have few products and making few innovations after a careful risk analysis,

concentrating their efforts in satisfying the demand of their scarce but select recurrent customers.

As for the 99 entrepreneurs with a defender archetype (50.3% of the population), they perceive their products as stable because the market has defined them. They offer few products, yet select and high quality. They attested to frequently monitor the market looking for new growth and innovation opportunities, but they are more engaged in markets they already cover. In addition, they are prepared for threats that may arise against the business.

Table 5 shows the descriptions for each group, showing that both consider themselves to be above the mean value of the innovation scales, potential and realized absorptive capacity and performance. A slightly higher value is observed in the defenders' group over the analysts in all variables; however, there is a greater dispersion of the data on innovation in the defenders' group compared to the analysts.

Upon verifying that the data have a normal distribution through the statistical tests performed, significant differences were calculated between the means using

Table 6. Student t-test for independent samples

Variable	P-Value (bilateral sig)	Acceptance or rejection of H ₁ at a significance level =0.05
Innovation	0.025	There is a significant difference between the average innovation of analysts and defenders.
Potential AC	0.050	There is a significant difference between the average potential absorptive capacity of analysts and defenders.
Realized AC	0.163	There is no significant difference between the average absorption capacity of analysts and defenders.
Performance	0.112	There is no significant difference between the average performance of analysts and defenders.

Source: Authors' Own elaboration.

Table 7. Pearson correlation for study variables

Variable	Realized AC	Innovation	Performance
Potential AC	0.315**	0.146*	0.664**
Realized AC	1	0.576**	0.330**
Innovation		1	0.209**

Source: Authors' Own elaboration.

Table 8. Predictive Variables in Analyst and Defenders Performance

Strategic archetype	Dependent variable	Predictive variable	Non-standardized coefficients	Standardized Coefficient	R ²
Analyst	Analyst Performance	Innovation	0.534	0.458	0.322
		Potential AC	0.279	0.214	
		Realized AC			
		Constant	1.54		
Defender	Defenders' Performance	Innovation	0.775	0.754	0.568
		Potential ac			
		Realized AC			
		Constant	1.383		

Source: Authors' Own elaboration.

the student t test (Table 6). This proves that there is a significant difference in innovation and potential absorptive capacity between the analyst and defender groups, but there are no differences in realized absorptive capacity and performance.

The next step was to test the statistical hypothesis regarding the existence of significant differences in the explanatory value of innovation and potential and realized absorptive capacity on performance

in analysts and defenders' group. For this purpose, the bivariate correlation between the study variables was analyzed through the Pearson correlation (Table 7). Significant correlations were found between innovation and potential and realized AC. Furthermore, significant correlations were found between potential AC and performance and realized AC with performance. Due to the high correlations obtained, it was decided to use the regression method by successive steps to determine the coefficients of both groups

with the greatest explanatory value on performance, as shown in Table 8.

According to the calculations, two of the study variables (innovation and potential CA) are determined to have an important explanatory value on the performance of the general equation ($R^2=0.457$) and on that of analysts ($R^2=0.322$). However, in the defenders, only innovation explains performance to a greater extent ($R^2=0.568$).

The co-linearity indicators were acceptable, considering that the VIF (Variance Inflation Factor) is less than 10; however, the tolerance index was greater than 0.800 in all cases, which means that potential AC and innovation have a high correlation (García, Chagolla, and Noriega, 2015).

The Chow test was used to determine if the regression coefficients between the two groups can be regarded as different according to the following parameters:

$$DS_G = \beta_0_G + \beta_{INN_G} INN_G + \beta_{CA_G} CAP_G + CAR_G + U_G$$

$$DS_A = \beta_0_A + \beta_{INN_A} INN_A + \beta_{CA_A} CAP_A + CAR_A + U_A$$

$$DS_D = \beta_0_D + \beta_{INN_D} INN_D + \beta_{CA_D} CAP_D + CAR_D + U_D$$

Where:

DS= Performance

β_0 = constant's coefficient of variation

β = coefficient of variation

INN= Innovation

CAP= Potential absorption capacity

CAR= Realized Absorption capacity

U= variation by variables foreign to the model

G= general

A= analysts

D= defenders

In terms significance levels, all cases were acceptable, as it yielded large values and the significance indicators (Sig) were small.

With the regression and sub-regression calculations, the significant difference between the coefficients was determined through the following formula:

$$F = \frac{(RSS_R - RSS_{UR})/K}{(RSS_{UR})/(n_1 + n_2 - 2K)} \sim F[K, (n_1 + n_2 - 2K)]$$

Where:

F= Chow's F Statistician

RSS_R = Restricted sum of the residue's squares

RSS_{UR} = Unrestricted sum of the residue's squares

K= number of variables in the model

n_1 = Number of observations from the first group

n_2 = Number of observations of the second group

Substituting the data, the value $F=1.2552$ was determined. As it is less than 4, no structural change is determined between the two groups (Wooldridge, 2013). Therefore, the null hypothesis is accepted: there is no significant difference in the explanatory value of innovation and potential absorptive capacity over performance in analysts and defenders' groups in metalworking SMEs. Table 9 summarizes the results obtained.

The small-and-medium-sized entrepreneurs of the metalworking sector in the Mexican automotive industry are more vulnerable than their larger fellows because they invest most of their time in the daily operation of the company (Baptista Nunes *et al.*, 2006) to meet the demand and changes requested by large customers in the short term. The synergy given in recent years within the automotive industry (Vicencio Miranda, 2007) has caused small-and-medium-sized entrepreneurs in that sector to engage more in the daily rhythm of activities, leaving aside the information from abroad that points to the complex environment to come, which could explain the strategic archetypes obtained (DeSarbo *et al.*, 2005). The strategy that most of them have followed is to specialize in products required by a small group of large companies, i.e., large

Table 9. Linear regression indicators for the general equation and sub-regressions per group

Equation	Predictive Variables	R ²	Sum of the residue's squares	F	Sig	Non-standardized coefficients			Standardized coefficient	Collinearity statistics	
						K	Innovation	Potential AC		Tolerance	VIF
General	Innovation and potential AC	0.457	138,71	81.58	0.000	1.174	0.670	0.204	0.662 0.134	0.901	1.110
Analyst	Innovation and potential AC	0.322	77.346	22.527	0.000	1.540	0.534	0.279	0.458 0.214	0.886	1.129
Defender	Innovation	0.568	59.602	127,66	0.000	1.383	0.775		0.754	1.000	1.000
Sum of the squares of the analyst and defender residues			136,95								
Source: Authors' Own elaboration.											

automakers and those classified in TIER1. This has caused them to work in a rigid structure, concentrating on the markets they already cover; these are features of the defender and analyst strategic archetypes, according to Miles and Snow (1978).

The studies on AC and innovation in SMEs analyzed, state that most of the latter are focused on serving a market that they already dominate (Velosa García *et al.*, 2012) and that they spend most of their time in boosting their short-term performance (Baptista Nunes *et al.*, 2006): both of those are features shared by the strategic archetypes defender and analyst by Miles and Snow (1978). Oyedijo, Olateju, Okunnu, and Adeyemi (2010) state in a general manner that small-and-medium-sized entrepreneurs make adjustments only when the environment demands them. However, according to Miles and Snow (1978) this characteristic is more noticeable in the analysts.

Half of those interviewed said they were constantly preparing to defend themselves against market threats by developing skills to cope with demand. These characteristics correspond to the strategic archetype called "defenders," who are more open to innovation, according to DeSarbo *et al.* (2005), compared to analysts. This could be verified through empirical evidence since a significant difference in innovation between defenders and analysts was established.

The other half of the interviewees were classified within the analyst category, who stated that they moderately developed some innovations after performing a careful analysis of the market (DeSarbo *et al.*, 2005). This position is evidenced in the results obtained herein upon seeing a greater involvement of their potential AC combined with innovation on organizational performance.

Both groups revealed a realized AC similar to its potential AC; however, neither in the analyst group nor in the defenders' group is there a variable that contributes to explaining organizational performance. According to Flor Peris *et al.* (2011), in general, manufacturing SMEs have limitedly flexible structures and strategies, which means that the knowledge acquired takes longer than large companies to transform and then be exploited for development or improvement of products, processes or markets. Consequently, the SMEs' realized AC could manifest itself over a longer period outside the scope of this research.

On the other hand, the innovations materialized in products are few and isolated because they are subject to the specific demands of customers, thus generating more innovations in time and resource efficiency, which require more wit and knowledge towards within the organization and little information about the environment

(Rosenbusch *et al.*, 2011). Therefore, potential AC played a more important role than realized AC in the evidence herein obtained, both in the general regression equation and in the analysts' sub-regression.

Notwithstanding, the defenders' group's potential AC did not play a preponderant role in the variance of performance, perhaps because defenders innovate not as a reactive consequence to market monitoring, but as part of a process in which they assimilate, exploit and apply knowledge (Cohen and Levinthal, 1990) to the improvement or innovation of a product or process, which is why potential AC is already immersed in innovation.

Although significant differences in innovation and potential absorptive capacity were found among the group of analysts and defenders, no significant difference was found in their explanatory value on performance. This finding is consistent with the position of DeSarbo *et al.* (2005) on the typifications of strategic archetypes, moulded under a contingent perspective of the organization-environment adjustment perspective, that is, with a mindset that there is no global superiority of a strategic archetype, because each of them develops different competitive advantages that translate into a similar performance (Camisón Zornoza, Garrigós Simón, and Palacios Marqués, 2007).

Therefore, there are other variables that explain to a greater extent the performance of analysts, whereas, for defenders, the innovation variable alone explains 56.8% of their performance. It can then be inferred that each strategic archetype uses different resources to arrive at similar results (Desarbo *et al.*, 2005).

When valuable information that affects the organization is recognized, innovations that enable upper business performance can be generated (Pertusa-Ortega *et al.*, 2007; Rosenbusch *et al.*, 2011). However, in manufacturing SMEs, the effect of innovation on performance could be observed over a longer term than in large companies, because it proportionally implies more onerous investments that entail a slower return on investment, which has a greater effect when considering that SMEs are more exposed to the circumstances of the environment

(Berger and Udell, 2006), in addition to other factors such as the age of the product itself, according to its life cycle (Rosenbusch *et al.*, 2011).

5. Conclusions

Small-and-medium-sized entrepreneurs in the metalworking industry face a relatively stable environment, which will become complex in the coming years. However, most of them have not yet glimpsed the consequences of the major shifts in foreign policy regarding the automotive industry, because they are immersed in meeting the current demands of their largest customers, which has brought about satisfactory results in the short term, showing a similar performance between those seeking new opportunities for growth and innovation and those who constantly monitor and analyze market changes and trends to develop moderate innovations.

The strategic archetypes that predominate in small-and-medium-sized entrepreneurs are the analyst and the defender. This profile outlines the position of the organization regarding the development of absorption and innovation capabilities on its performance. However, in a stable environment, the analyst and the defender attain a similar performance, as the market does not require breakthrough innovations that can jeopardize its stability.

For the owners of the SMEs, innovations entail an investment proportionally greater than what a large company would need to disburse materially, in terms of resources and time, wherefore the return that they could obtain on the investment made in innovations is longer. Coupled with this, small-and-medium-sized entrepreneurs should be considered accustomed to obtaining short-term results, so they are more likely to be willing to make innovations as long as they are certain that they will make profits almost immediately. In addition, not having a client to ensure the placement of their products is a risk that not all entrepreneurs are willing to take on, so they would rather maintain a defensive or analytical position.

On the other hand, small-and-medium-sized entrepreneurs have partially developed their potential and realized absorptive capacity, given the limited time they have

to monitor the market. Furthermore, the resource they use most to gather valuable information is their network of commercial partners, leaving aside the knowledge they can obtain from researchers in public institutions because Latin American countries have weak ties between productive sector and academia.

In the coming years the changes in the Mexican automotive industry will be noticeable because the international trade game rules are constantly evolving, wherefore small-and-medium-sized entrepreneurs in this sector will be forced to develop their absorption and innovation capacities forthwith since surviving in the uncertain and turbulent environment that lies ahead depends on this.

A limiting factor to this research was the moment in which the data were collected since the exit of Canada from the Free Trade Agreement was not yet seen as a threat, nor the new rules of the game set up in the trade agreements between Mexico and the United States.

New lines of research are opened to define whether potential AC acts as a mediating or moderating variable in realized AC and innovation on SMEs' performance. Other research is suggested to determine if the strategic archetypes that predominate in small-and-medium-sized entrepreneurs, in general, are defenders and analysts, thus entering other sectors and other regions even. To complement the results hereto, it would be advisable to carry out a longitudinal study to observe the evolution of the SMEs' capacities given their adaptation to the environment. These studies may strengthen the knowledge on strategic archetypes, absorption capacity and innovation, to develop relevant research that will allow scholars in administrative and economic fields to approach and support small-and-medium-sized enterprises, which are the highest-contributing economic units to the world's economy.

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