

# IMPACT OF TECHNOLOGICAL INNOVATION STRATEGIES IN EXPORT PERFORMANCE OF EXPORTING SMES IN AGUASCALIENTES, MEXICO

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## Abstract

The objective of this study is to analyze the impact that technological innovation strategies have on the export performance of exporting SMEs in the State of Aguascalientes, Mexico. To do this, an empirical study was carried out based on a sample of 116 export companies from the State of Aguascalientes, Mexico. The results obtained show that when companies carry out a strategy of technological innovation, they obtain greater export performance. However, SMEs must carry out an in-depth analysis of the innovation strategy to be adopted depending on their financial and human capabilities to obtain the most favorable result for their company in national and foreign markets.

**Keywords:** innovation, technology, export.

## **1. INTRODUCTION**

The high global competitiveness, accelerated technological changes and the increase in international business have led companies to innovate in their products to achieve survival, improve their production quality, enter new markets, react to competitive invasion (Oropeza, Guzman and Saavedra, 2015), create value, achieve renewal and success of organizations (Rodriguez, Shaadi and Shaadi, 2015). However, it is important to mention that, in the current global scenario, companies must be able to bring these new products to new international markets.

According to the World Trade Organization (2019) trade tensions that have arisen between nations, global economic uncertainty and the economic downturn at a general level, have generated global trade momentum lost and it is expected that by 2020 merchandise trade continues to decline, achieving growth of only 2.7%, when in previous years was 3.0%.

In Mexico, exports have not been very stable in recent years, experiencing a decline in total exports of 1.8% in 2017, an increase of 10.1% in 2018 and an increase of 2.3% in 2019 (INEGI, 2020), however, the Mexican Business Council for Foreign Trade predicts that by 2020 exports to grow 2.0% (Bancomext, 2020). That is why SMEs should create innovative strategies to access international markets.

The importance of SMEs is widely recognized worldwide. In Mexico, they represent 99.8% of economic units, contributing 34.7% of Total Gross Production (PRODEINN 2013-2018). In recent years, there has been a growing interest in the export performance of SMEs, because their behavior is very heterogeneous as it depends heavily on the size of the company, the type of sector of the country and the year (Park, Urmeneta, and Mulder, 2019). The literature mentions the influence of technological innovation in the export performance of SMEs is the result of the competitive advantages derived by companies through new technologies and more efficient production techniques; resulting in new products and processes (Azar and Ciabuschi, 2017), in addition to allowing them to react more quickly to changes in technologies in global markets (Gunday, Ulusoy, Kilic and Alpan, 2011).

Also, empirical evidence has been found that links the innovative activity of companies with their internationalization, showing that exporters are often characterized by a higher level of innovation (Martins, Gomez, and Vaillant, 2015; Palacios and Saavedra, 2016; Diaz, Zamora and Mora, 2019; Bıçakcıoğlu, Hizarci-Payne, and Özgen, 2019). In the same way, it has been observed that technological innovation makes it more likely that companies enter the international market, thus demonstrating the existence of a positive relationship between innovation and export performance (Escandon-Barbosa and Hurtado Ayala, 2014).

It is widely mentioned in the literature, that exports are concentrated in a few products and few companies. That is why the research that analyzes the situation of exporting SMEs has increased, since, although they represent a low percentage of total exports, they play a very important role in terms of product diversification and innovations (Park, et al., 2019).

## **2. REVIEW OF THE LITERATURE**

### **2.1 Technological Innovation Strategies**

Regardless of the size of the organization, innovation is an essential strategic tool for competitive advantage in today's highly globalized and changing environment. This vision has existed since the early forties of the twentieth century when Joseph Schumpeter concluded that innovation was a feature of the capitalist system and all the old products should be replaced by new products that will better meet the needs of consumers (Pinzon, Maldonado and Martinez, 2015).

Similarly, it is considered that innovation is a necessity to achieve long-term success, growth, sustainable performance and to survive in the market (Tohidi and Jabbari, 2012). That is why innovation must be considered a strategic necessity rather than as a strategic choice (Nijssen and Frambach, 2000) in any organization.

There is no consensus on definitions in the literature on the concept of innovation. The differences between each other are mainly based on their understanding as a result or as a process and in considering whether or not marketing (Delgado-Verde, Martin-de-Castro, Navas-Lopez, and Cruz-González, 2011), however, innovation is seen as a key for achieving growth and corporate welfare (Oropeza, et al., 2015), adopting new to the company.

Innovation and technology have been a combination studied in the last decade (Delgado-Verde, et al, 2011; Filipescu, Prashantham, Rialp, and Rialp, 2013; Camisón and Villar-Lopez, 2014; Azar and Ciabuschi, 2017; Ming, et al, 2018. Bagheri, Mitchelmore, Bamiatzi and Nikolopoulos, 2019) because it has found a consensus in the literature that innovations incorporating a complementary function such as R & D have more likely to respond quickly to changes in the market, creating advances to be the first to develop new products and dominate the market (Damanpour and Gopalakrishnan, 2001).

OECD in the Frascati Manual (2013) defines technological innovation activities as all stages scientific, technological, organizational, financial and commercial, including investments in new knowledge, carrying or trying to bring to the implementation of new products and or improved processes.

Concerning SMEs, studies indicate that small organizations are often more innovative than large, although the implementation of their innovations is slower due to lack of resources. This is because it can be faster, more flexible and more responsive to the dynamics of the environment in which they operate thanks to its simple organizational structure (Zatezalo and Gray, 2000), which is why various studies have focused on analyze innovation in SMEs (Van Auken, Madrid-Guijarro and García-Pérez-de-Lema, 2008; Aranda, Solleiro, Castanon and Henneberry, 2008; D'Angelo, 2012; Martinez, Maldonado and Pinzón, 2013; Ribau, Moreira and Raposo, 2017).

Usually, the empirical evidence highlights the benefits of SMEs to adopt technological innovations, however, companies must choose the innovation strategy to be implemented to succeed in the market, or simply, to survive (Kotler, Bowen and Makens, 2010). In the literature was found, although strategies may vary depending on the researcher, a common factor is that they focus on actions taken by the company to obtain a favorable outcome regarding the possibility of creating new and successful products in the market.

According to the literature, the main innovation strategies that can adopt a company is the innovation strategy and the strategy of imitation. This is why a company that follows the innovation strategy will try to be the first to develop new products and introduce them into the market, meanwhile, a company that adopts a strategy of imitation will try to launch similar products more or lesser extent from those introduced by the pioneers. It can say that both strategies represent an innovation for the company, as there are products that are new to the firm but not new to the market; while there are other products that are new to the company and also for the market.

The advantages of the innovation strategy lie in a greater positioning of the brand in the minds of consumers, generating scale economics and experience, etc., however this kind of strategy requires major investments to be pioneers in the market. On the other hand, the advantages of imitation strategy are based on cost savings and risk reduction, these companies have less potential market, have slower growth and lower the effectiveness of their marketing activities (Jimenez and Sanz, 2012).

Both strategies have advantages and disadvantages for SMEs so they should adopt the strategy that best suits their objectives and capacities for investment to develop technological capabilities and to develop them in national and international markets. At this point it is necessary to recognize the barriers for SMEs to access financial and human resources (Wadhwa, McCormick and Musteen, 2017). That is why innovation strategies developed to access international markets will be essential for export success (Freixanet, 2014).

## **2.2 Export Performance**

According to the Profile Manufacturing Companies Export (PMCE), provided by INEGI (2016), the term export can be defined as the total of goods expressed in terms of volume, weight or monetary value leaving the national territory permanently or temporarily, through a customs petition and complying with the requirements of the Law and Customs Regulations in force.

In the context of international business, the internationalization of one company is known as the process of increasing its international operations and the transfer of products to other countries (Welch and Luostarinen, 1988). It is considered that the most practical way a company is internationalized is through exports (Villena and Souto, 2015). Export allows companies to use their idle operational capacity, increase production efficiency, increase profits and ensure survival in a highly globalized market (Azar and Ciabuschi, 2017); it is considered that these activities are crucial to enhance national prosperity (Pla-Barber and Alegre, 2007).

That is why, in recent decades, the interest of SMEs to enter foreign markets has increased. However, not all companies succeed with the same results. It is considered that external conditions in international markets are the same for all SMEs, however, internal or controllable factors by the company could be associated with the different export levels that companies have (Villena and Souto, 2015).

Export Performance has been defined in the literature in different ways. Cavusgil and Zou (1994) define it as far as the objectives of a company regarding export a product to a foreign market, they are achieved planning and implementing export marketing strategies. The objectives of business in an

international context can vary widely among companies, industries, national contexts and time horizons (Beleska, 2014), however, generally export companies seeking greater participation of the market, the satisfaction of the customer, sales revenue and profitability (O'Cass and Weerawardena, 2009).

### **2.3 Relationship of Technological Innovation Strategies and Export Performance**

The relationship between technological innovation strategies and export performance is widely recognized in the international literature. Globally, it is considered that countries with greater investment in R & D that are classified as technology leaders achieve greater positive effect on the level of its exports to countries that do less investment in this area, and besides, this effect is magnified with the technological improvements that they achieve (Marquez-Ramos, Martinez-Zarzoso, and Suárez-Burguet, 2011).

At the company level, external conditions for export are the same for all SMEs, however, the internal factors of the companies are what lead them to achieve different export results. One of these factors is technological innovation strategies. It can be said that technological innovation represents one of the most important and sustainable sources of competitive advantage for an SME to internationalize (Madrid-Guijarro, Garcia and Van-Auken, 2009). Even it has come to consider that very low levels of technological innovation are not enough to prepare SMEs for the requirements of the market and competitive conditions (Landau, Karna, and Sailer, 2016) in international markets.

Empirical evidence has been found that states that companies that develop technological innovation strategies have greater export performance (Eusebius, Rialp-Criado and Llonch, 2004; King, 2016; Azar and Ciabuschi, 2017; Polo, Ramos, Arrieta and Ramirez, 2018; Bagheri, et al 2019). One is made by Bagheri, et al., (2019), who, in an investigation to 116 SMEs in the UK, found that there is an inverted relationship U-shaped between technological innovation and export performance. This result suggests that export performance may improve the strategies to adopt technological innovation in strategic decisions of SMEs. Another recent study similar to the research context is by Polo, et al., (2018) in Colombia, which derives from the Annual Manufacturing Survey (AMS) and in which the results showed that technological innovation strategies exert a positive influence on the export possibilities of companies.

These results are consistent with the international literature, which generally affirms the positive impact of technological innovation strategies on export performance. Therefore, taking into account the above, it is proposed that:

H1: In the SME's, the greater are the technological innovation strategies, the greater the export performance.

### **3. METHODOLOGY**

To answer the hypothesis in the research, a structured questionnaire was conducted addressed to the exporting SMEs of the State of Aguascalientes (Mexico), through the census sampling rate. Managed to get a total of 116 valid questionnaires given to owners, general managers or managers export through a personal interview. The survey data was conducted between August 2018 and June 2019. It

was sought that exporting companies had continuous export activities and had at least one year of operating, in order to ensure that these companies were considered as exporters and not only that they had carried out an isolated export activity.

For the measurement of the Technological Innovation Strategies construct, the scale given by Jimenez and Sanz (2012) which consists of 5 items, measured through a Likert 5-point scale, in a continuous comprising from imitation of a product was used for the measurement of the Strategies construct Technological Innovation that is new to the company but not for the market to create entirely new products for the company and for the market. Regarding the measurement of the Export Performance construct, the EXPERF three-dimensional scale, created by Zou, Taylor, and Osland (1998), which focuses on financial, strategic and satisfaction of the performance dimensions we were used. This concept may have different determinants between a study and another, depending on the export targets each company pursues, however, the EXPERF scale is generally accepted because it closes the gap between objective and subjective measures of export performance (Beleska, 2014), this scale is composed of 9 items, which measure the three dimensions assessed.

#### 4. ANALYSIS

One Confirmatory Factor Analysis (CFA) was performed using the robust maximum likelihood method in the software EQS 6.1 (Bentler, 2005; Brown, 2006; Byrne, 2006). To study the proper fit of the data, the Normed Fit Index (NFI), the Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA) was used and the value of chi-square Satorra-Bentler between its degrees of freedom (S-BX2/DF). The results (Table 1) suggest that the model fits to the data (NFI = 0.912; NNFI = 0.958; CFI = 0.967; RMSEA = 0.069; S-BX2 / DF = 1.54) using traditional adjustment indicators suggest that, for NFI, NNFI and CFI above 0.90 values indicate proper fit and values above 0.95 indicate a good fit. As for the values of RMSEA, values between 0.05 and 0.08 indicate an appropriate adjustment (Byrne, 2006; Hu and Bentler, 1999). And S-BX2/DF adjustment is considered acceptable if the index is less than 3 (Schermelleh-Engel, Moosbrugger and Müller, 2003).

For reliability analysis (Table 1), the Alpha Cronbach was used as well as the Composite Reliability Index (CRI) by Bagozzi and Yi (1998) and Average Variance Extracted (AVE) by Fornell and Larcker (1981). For the first, the values were higher than 0.70 recommended by Nunnally and Bernstein (1994), for the second, the values were higher than 0.6 and for the third, the values were higher than 0.5 as recommended Bagozzi and Yi (1998) showing convergent validity.

**Table 1. Validity and internal consistency indicators of the theoretical model.**

Variable	Indicator	Factorial load	Robust t value	Cronbach's alpha	CRI	AVE
Technological Innovation Strategies	IPE1	0.746	10,237	0.904	0.902	0.651
	IPE2	0.665	7,093			
	IPE3	0.791	9,110			
	IPE4	0.946	12,450			
	IPE5	0.859	1000			
Export Financial Performance	EXF1	0.842	1000	0.930	0.935	0.829
	EXF2	0.951	13,953			
	EXF3	0.934	12,876			
Strategic Export Performance	EXE1	0.936	1000	0.916	0.924	0.801
	EXE2	0.891	22,015			
	EXE3	0.857	17,332			
Export satisfaction	EXS1	0.820	1000	0.927	0.932	0.821
	EXS2	0.955	17,216			
	EXS3	0.937	17,441			
NFI = 0.912; NNFI = 0.958; CFI = 0.967; RMSEA = 0.069; S-BX2 / GL = 1.54						

Source: Own elaboration based on research findings.

All measurements of the factor loadings are above 0.6, as recommended by Bagozzi and Yi (1988), demonstrating that there is construct validity. For discriminant validity (Table 2) the test of the extracted variance test was performed in which the square root of the average extracted variance of a construct was compared with its correlation with another construct (Fornell and Larcker, 1981) and it was found that, in all cases, the index of variance extracted was greater than the variances of each of the pairs of constructions.

**Table 2. Discriminant validity of the theoretical model.**

Variables	Technological Innovation Strategies	Export Financial Performance	Strategic Export Performance	Export satisfaction
Technological Innovation Strategies (TIS)	0.651			
Export Financial Performance (EFP)	0.152	0.829		
Strategic Export Performance (SEP)	0.210	0.744	0.801	
Satisfactory Performance Export (SPE)	0.129	0.469	0.662	0.821

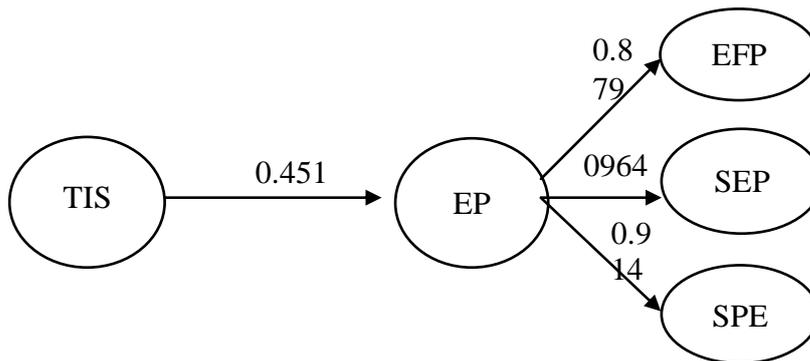
Source: Own elaboration based on research findings.

According to the results of the confirmatory factor analysis, it can be said that the theoretical model has analyzed the reliability and validity sufficient to test the hypothesis proposed investigation.

**5. RESULTS**

Once the confirmatory factor analysis was carried out, for which the software used was EQS 6.1 (Bentler, 2005; Brown, 2006; Byrne, 2006) and the method robust maximum likelihood, setting the theoretical model was tested and the supposed validity and reliability of the structural model analyzed (Figure 1).

**Figure 1. Structural model analyzed. The values show the standardized coefficients of each relationship.**



TIS = Technological Innovation Strategies; EP = Export Performance; EFP = Export Financial Performance; SEP = Strategic Export Performance; SPE = Satisfactory Performance Export.

Source: Own elaboration based on research findings.

Subsequently, the analysis of the structural model of the model to be evaluated with the study hypotheses was carried out, as established by the theory, the adjustment of the model was verified, finding a good adjustment with the following indices: NFI = 0.912; NNFI = 0.958; CFI = 0.967; RMSEA = 0.069; S-BX2 / DF = 1.54, same as found above 0.9 and RMSEA recommended allowable range between 0.05 and 0.08. After this, the result of the hypothesis in the model (Table 3) was recognized, and a standardized 0.451 coefficient and robust t value 4.359, which confirms that there is a positive influence of innovation strategies were obtained export performance. That is why SME exporters should further develop their innovation strategies to achieve better export performance.

**Table 3. Results of the structural model.**

Hypothesis	Structural relationship	Standardized coefficient	Robust value T
H1: In SMEs, the larger the technological innovation strategies, the greater the export performance.	TIS → EP	0.451 ***	4,359
NFI = 0.912; NNFI = 0.958; CFI = 0.967; RMSEA = 0.069; S-BX2 / GL = 1.54 *** = p <0.01			

Source: Own elaboration based on research findings.

## 6. CONCLUSIONS AND DISCUSSION

At present, SMEs face a scenario of global economic uncertainty that forces them to seek competitive advantage nationally and internationally. The theory of Resources and Capabilities argues that companies must identify, develop and maintain their assets and competencies that differentiate it from its competitors and to allow him to gain a competitive advantage (Barney, 1991), at the same time it must be constantly renewing their skills and adapting to rapidly changing environments (Teece, Pisano and Shuen, 1997).

In the literature review, it was found that companies that carry out technological innovation strategies are more likely to dominate the market. However, SMEs must carry out an in-depth analysis of the innovation strategy to be adopted depending on their financial and human capabilities, to thereby obtain the most favorable outcome for your company regarding the possibility of creating innovative and successful products in domestic and foreign markets.

The hypothesis raised in this research mentions that technological innovation strategies have a positive impact on the export performance of SMEs exporting from Aguascalientes, Mexico. With the results obtained from a sample of 116 census export SMEs, it can be said that the hypothesis was accepted. This result adds to other empirical studies that support this relationship. Therefore, executives, managers and export managers of SMEs should lead to strategies out innovation, to have greater capacities technologies that can adapt them more quickly to changes and demands of the domestic market and international.

The limitation of this study is based on the fact that the study was carried out only in one State of Mexico, and with a limited number for the few exporting companies that exist in the entity. It is therefore suggested that a larger sample size in most regions of Mexico, will help compare the results obtained in this research study could explain the relationship better.

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