

# **Analysing innovation's impact on operational effectiveness: The case of Colombian companies in the Valle del Cauca area**

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## **Abstract**

Organizations are spending substantial resources in the implementation of innovations. Therefore, it is important to evaluate if the management of those innovations has positive results on the effectiveness of the operations. Quantitative data from 155 questionnaires were analyzed using structural equation modeling. Respondents were selected from several industries in the area of Valle del Cauca in Colombia. Initial findings suggest strategies have an indirect impact on operational effectiveness through the achievement of the learning process in the studied organizations.

**Keywords:** Innovation strategy, organizational learning, operational effectiveness.

## **Introduction**

Organizations are faced with competitive pressures to improve efficiency and productivity. They need to respond to market changes through the continual improvement of their paradigms, products, practices, processes, systems, and services, since improvement in performance derives in large measure from innovation (Ifandoudas & Chapman, 2006; J. Tidd & Bessant, 2009). Accordingly, many organizations are investing substantial resources in innovation initiatives to re-engineer their processes or come up with new product, paradigm or position innovations (J. Tidd & Bessant, 2009), but the extent to which these innovations assist organizations to improve the effectiveness of the operations still needs to be explored (Armbruster, Bikfalvi, Kinkel, & Gunter, 2008; Mabert, Soni, & Venkataramanan, 2003). Therefore, being aware of the importance of innovation and subsequently dedicating substantial resources to the innovation task might not be sufficient, as the operational effectiveness might not meet the expected outcomes (Olson, Slater, & Hult, 2005).

The purpose of this research is to get an insight into how innovative practices influence the effectiveness of operations in organizations in Colombia and particularly in the area

of Valle del Cauca. The questionnaire was designed based on Tidd and Bessant's (2013) Innovation Self-assessment Tool and the operational effectiveness model developed by Santa et al. (2013). A survey was taken among different employees from various sectors in the Colombian industry in the Valle del Cauca region. The data collected was analyzed using structural equation modeling (SEM). Therefore, this research seeks to answer the research question, "What are the main factors in innovation that positively impact operational effectiveness?"

### **Literature review**

Innovation is one of the factors that deserves more attention from academics, practitioners, and entrepreneurs, along with the entrepreneurial spirit itself. The correct application of innovative practices could open doors to new markets, making possible greater efficiency in business and economic growth (Sarkar, 2010). There are, however, numerous definitions of innovation that indicate several points of view from various authors at different times, influenced by political, economic, social, and cultural factors among others. Therefore, it is important to get an insight as to what innovation is and what are its implications.

#### *The innovation-self assessment tool*

Tidd, Bessant and Pavitt (2013) defined innovation as a process of transforming an opportunity into fresh ideas and being widely used in practice. However, it is essential for organizations to be able to measure how well placed they are to deal with the challenges of managing innovation. For organizations, it is also important to better understand how they handle the challenges of building linkages into innovation space and reframing the approaches which they take to innovation. Additionally, organizations need to know the kind of organizational structure they have, and if this structure supports an innovative behavior and allows the development of novel ideas. In addition, it is important to know whether they can learn and build capability for the future.

The self-assessment innovation tool was one of the methods that Tidd, Bessant and Pavitt (2013) designed and used to analyze organizations and let them score themselves. According to John Bessant and Joe Tidd (2013), the innovation auditing tool has one main principle which is that using past knowledge the organization can raise many questions about how innovation has been managed. Thus, the organizations that respond are given a performance score compared to the initial model and this allows aspects to be identified with possible improvements. This model essentially creates a profile of innovation performance. Organizations that operate in an innovative organizational climate have a higher probability of succeeding if they have clear strategic goals, long-term links supporting the technological areas, and steady project management processes closely supervised by senior management.

In the global market, innovation performances are applied in specific organizations contrasting them highly with those who have no clear innovation strategy, limited technological activity, and no plan to acquire more. Additionally, organizations that show unclear management, weak external links, and a poor organization in terms of supporting ideas by others are unlikely to achieve a high operational effectiveness or attain a higher competitive advantage that comes from a competitive environment. This should lead the organizations' management to question their capability, learn from their mistakes and transmit this through organizational learning, and create some patterns for future references. The way they question these aspects is by considering what they need to do more of and what they need to strengthen, what they need to do less of and what they

need to stop, and what new routines should be developed in order to make certain behaviors work (J. Tidd et al., 2013).

### *Strategy*

In an increasingly competitive environment, innovation is a key factor in enabling a company to achieve a dominant market position and increase its profitability (Ratten, Ferreira, & Fernandes, 2017). All of the drivers considered in the self-assessment tool have a unique combination when applied to each organization; therefore, the results can be similar but different. Because firms make decisions in rapidly growing and changing competitive environments, formal strategies must be seen as part of a wider process of continuous learning from experience and from others to cope with complexity and change (J. Tidd et al., 2013).

Strategy includes defining the long-term objectives, the methods to achieve them, and ensuring the necessary resources. Furthermore, it is suggested that the way goals will be achieved is not specified by the strategy. In this sense, the planning and strategy are different concepts. One of the greatest limitations to strategic change is the considerable number of things successful incumbents know about their industry that, unfortunately, are no longer true. That is why industries need innovation, to create different strategies that will make a difference in each market (Hendela, Turoff, Hiltz, & Fjermestad, 2017). As a consequence, operational efficiency and strategic flexibility combined are the requirements for such innovation skills (Boer, Kuhn, & Gertsen, 2006).

Innovative strategies create competitive advantages by the appropriate management of core competencies in the value chain. This means transforming high-level technologies and production skills help individual businesses grow and adapt to the forever changing environment, as it is also competitive. Applying this method of strategic management can also be reviewed as resource-based or capabilities-based. There is a process to achieve strategies. First, it is necessary to recognize and develop all the fields that can be joined into a similar or same functioning process, product, or service. The next step is to identify and investigate which new competencies must be aggregated so that the process, product, or service will be innovative and therefore not become obsolete. Hence, a definition based on measuring competencies' combinations in diverse disciplines is highly useful to help formulate and develop innovation strategy (J. Tidd, 2012).

### *Processes*

The initiators of the model, Tidd and Bessant (2013), have organized and managed the questions to answer the way which the organization searches for opportunities, how they manage their selection process, how they manage the implementation of innovation projects from the idea right up to the launch and further, and the way which the employees perceive the organization supporting innovation via ideas and models. Also, the process model searches for answers that make the audit tool reflect if there is a clear and communicative innovation strategy, the way which external linkages are maintained and also how the innovation process transforms into organizational learning. Process innovation is a demonstration and a powerful source of advantage by being able to make something never made before or in a new and different way, using innovative methods. This type of innovation can be seen in the way things are created but also in the way which the products or services are delivered to the clients or the next in line in the supply chain (J. Tidd et al., 2013).

When an organization attempts to achieve new benefits, they require internal and external integration of various sectors and combine simultaneous mechanisms to obtain the goal of increasing their profit (Ettlie & Reza, 1992). The role that information

technology plays is essential since it helps to transform information into organizational knowledge. Moreover, innovation is a social process that embraces various variables and factors. Support of new knowledge that is relevant to the organization creates a place for the creation of new knowledge. This knowledge is key for the innovation in the processes of the firm to be efficient and, in turn, develop new products (Brown & Eisenhardt, 1995), enhancing their processes and management of new technology, building a totally visible improvement in its efficiency and effectiveness (Zhang & Lado, 2001).

#### *Organizational learning.*

The term organizational learning became popular in the 1990s and has been widely defined and discussed in the extant literature since then (Senge, 2006). The base of the concept has expanded in all three dimensions: conceptual, theoretical, and empirical (Rahman, Rahman, Ali, & Khan, 2016). Organizational learning is defined by Dodgson (1993), as the way firms enhance their knowledge and ability by aligning knowledge around the organizational culture as well as adapting it within the organization to increase the efficiency of the workforce. Organizational learning includes R&D, training, and formal education of employees. It also involves the means that the organization uses to disseminate information throughout its employees and how this information is processed and stored.

However, firms need to attain a certain level of learning ability or absorptive capacity in order to reap the benefits from organizational learning (Zahra & George, 2002), which in turn enables firms to meet current needs of technology and market. Such collaborations facilitate the learning and acquisition of new knowledge either through internal development of new products, services, or external technology acquisition (Schoenmakers & Duysters, 2006). Conversely, firms with low or stagnant organizational learning face challenges adjusting to environmental changes and ultimately their ability to reduce costs or to change product lines (Kloot, 1996). Hence, the need for overcoming obstacles and learning from experiences as an organization.

Organizations need to avoid routine behavior; although learning is difficult, its application can lead to preventing waste of time and money, and avoiding repeated confusion and mistakes during the firm's production. Learning can affect the initial arrangements established, and show requirements for a new set of skills that are needed, along with much-needed effort. Therefore, it is not surprising that many companies decide to use the strategy of borrowing ideas from textbooks or other firms' experiences so as to cut the process. This generally does not end well, because copying ideas and applying them without much thought will not generate positive achievements in the long term; the key is to use the potential in learning from others' and the firm's own errors, and creating routines and strategies that generate organizational learning accompanied by innovation. There is no substitute for the long and experience-based process of learning, for which it is advised to take organizational learning as one of the main pillars towards innovative and thriving companies that reflect this in their operational effectiveness (Santa et al., 2013).

#### **Operational effectiveness**

Operational effectiveness refers to the ability to establish processes, based on core capabilities within the organizations, that encourage them to exceed customers' expectations (Santa et al., 2013). A firm's performance is based on its strategy and operational effectiveness, as they operate concurrently (Tutorea & Rotaru, 2012). In this vein, it is argued that although operational effectiveness can be the key to the competitiveness of companies, this will only be possible if companies operate better and

faster than the competition (Bigelow, 2002). Otherwise, organizations can fall into a dispute, thus losing any possibility of competitive advantage (Tutorea & Rotaru, 2012).

Gaining a competitive advantage and improving operational performance is not a short-term task. Consequently, excelling in some of the objectives and being competitive in each of the others, gives an organization an edge in the market (Wheelwright & Bowen, 1996). Operational effectiveness is generally achieved by emphasizing five dimensions: 1) cost; 2) quality, 3) reliability, 4) flexibility, and 5) speed. A cost advantage can only be achieved when the company carries out activities more efficiently, including the elimination of waste. Quality is achieved when products or services meet customer demands and meet the manufacturing specifications of the product or service delivery. Reliability is achieved when the products maintain their condition or services and meet agreed conditions. Flexibility is acquired when the organization is able to adjust what it does, how it does it, and when it does it, in response to customer demands. And finally, speed is obtained when organizations can offer new products or services in a timely manner and are able to shorten the time between application for a product or service and delivery of it, as often, and when it is required (Santa et al., 2013).

In view of the above review of the literature, organizations should measure how well they are placed to deal with the challenges of managing innovation and how this endeavor helps them to achieve the effectiveness of operations. Accordingly, it is important to link the operational performance objectives with the dimensions selected from the innovation self-assessment tool, strategies, process, and organizational learning. Thus, the main purpose of this research is to build on and extend the existing literature and to put forward a theoretical framework that examines the following propositions (see figure 1):

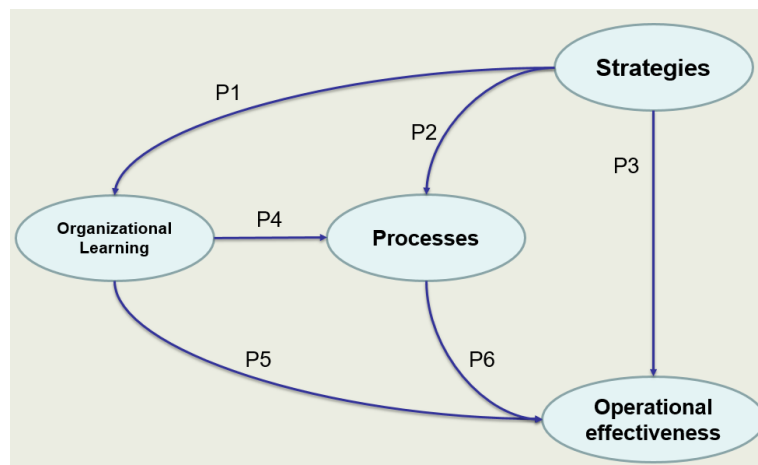


Figure 1. Theoretical Framework and Propositions.

**Proposition 1.** There is a predictive influence of Strategies on Organizational Learning;

**Proposition 2.** There is a predictive influence of Strategies on Processes;

**Proposition 3.** There is a predictive influence of Strategies on Operational Effectiveness;

**Proposition 4.** There is a predictive influence of Organizational Learning on Processes;

**Proposition 5.** There is a predictive influence of Organizational Learning on Operational Effectiveness;

**Proposition 6.** There is a predictive influence of Processes on Operational Effectiveness.

## Methodology

This research was undertaken with an exploratory purpose, as there is no evidence of research on the impact of strategies, processes, and organizational learning on operational effectiveness in Colombia and in the Valle del Cauca region. An exploratory study is undertaken when there is a lack of understanding of the problem, which leads to an unstructured problem design. (J. F. Hair, Black, & Babin, 2010)

This research addresses issues that are currently problems in many organizations in the area where this research was conducted. For this purpose, quantitative data was gathered through a self-administered online questionnaire directed to organizations in the manufacturing sector that were implementing innovations at the time of the survey. Of the 500 surveys distributed among the organizations that had implemented innovation initiatives recently, 170 were returned (34% response). Each returned questionnaire was reviewed for completeness and, of the 170, only 155 were considered usable and therefore practical due to large amounts of missing data, lack of involvement of the respondent in the use of innovation, or the impossibility of identifying the role of the respondent (manager, engineer or operator-user).

Confirmatory factor analysis (CFA) was used to study the relationships between observed and continuous latent variables, and to determine the measurement model's overall fit (Cooksey, 2007; J. Hair, Black, Babin, & Anderson, 2010). Factor loadings were estimated, items loaded on only one construct (i.e. no cross loading) and latent constructs were correlated (equivalent to oblique rotation in exploratory factor analysis). Internal consistency was assessed using Cronbach's alpha coefficient and the items-to-total correlation. Table 1 summarizes the constructs' coefficient values. All constructs have values greater than 0.7 of the cut-off level set for basic research (Nunnally, 1978). Additionally, confirmatory factor analysis (CFA) was conducted to test construct validity.

*Table 1- Cronbach's alpha*

<b>Variable</b>	<b>Number of Items</b>	<b>Alpha (<math>\alpha</math>)</b>
<b>Strategies</b>	4	9.07
<b>Processes</b>	4	8.68
<b>Organizational Learning</b>	3	8.21
<b>Operational Effectiveness</b>	4	9.07

To support the model goodness-of-fit indices (GFI) were utilized: the model shows 120 distinct sample moments, with 37 distinct parameters to be estimated. The Chi-square equals 298,104 with 83 degrees of freedom, with a CMIN/DF of 3,592 and a 0.000 probability level. Note that Wheaton et al. (1977) suggested a ratio of approximately five or less as a reasonable criterion, Marsh and Hocevar (1985) recommended using ratios as low as two or as high as five, and Carmines and McIver (1981) suggested ratios in the range of 2:1 or 3:1 as indicatives of an acceptable fit between the hypothetical model and the sample data. The CFI value above 0.9 supports the model, with a result of 0.929 (Bentler, 1990). In addition, the reliability of each of the constructs in the model was evaluated using several fit statistics, the root mean square error of approximation (RMSEA) was acceptable as the model had a value of 0.079 and the maximum is considered to be 0.08 (Bentler, 1990; Jöreskog & Sörbom, 1982).

The baseline comparisons fit indices suggest that the hypothesized model fits the observed variance-covariance matrix well relative to the null or independence model (see Table 2).

*Table 2- Baseline Comparisons*

<b>Model</b>	<b>NFI Delta1</b>	<b>RFI Rho1</b>	<b>IFI Delta2</b>	<b>TLI Rho2</b>	<b>CFI</b>
<b>Default model</b>	.892	.805	.930	.897	.929
<b>Saturated model</b>	1.000		1.000		
<b>Independence model</b>	.000	.000	.000	.000	

### **Results**

The findings from SEM (Table 3 and Figure 3) show a strong and positive relationship between strategies and organizational learning ( $\beta=0.75$ ,  $p < 0.001$ ); strategies and processes ( $\beta = 0.35$ ,  $p < 0.001$ ); organizational learning and processes ( $\beta=0.35$ ,  $p < 0.001$ ) and organizational learning and operational effectiveness ( $\beta=0.84$ ,  $p < 0.001$ ), thereby confirming propositions P1, P2, P4 and P5 respectively. These four propositions endorse the importance of strategies as a key element in the direction that learning and process innovation need to take. Additionally, the importance of the role that organizational learning has when leading the innovation in processes and the operational effectiveness of the organizations studied in this research.

*Table 3- Regression Weights: (Group number 1 - Default model)*

			<b>Estimate</b>	<b>S.E.</b>	<b>C.R.</b>	<b>P</b>
<b>OrgLearn</b>	<---	Strategies	,669	,076	8,794	***
<b>Processes</b>	<---	Strategies	,344	,092	3,747	***
<b>Processes</b>	<---	OrgLearn	,659	,116	5,686	***
<b>OE</b>	<---	Strategies	,064	,082	,785	,432
<b>OE</b>	<---	OrgLearn	,580	,143	4,065	***
<b>OE</b>	<---	Processes	-,141	,118	-1,192	,233

The results of the study show that there is no impact of strategies on operational effectiveness ( $\beta=0.10$ , not significant). Additionally, there is no impact of processes on operational effectiveness ( $\beta=-.25$ , not significant).

The structural model clearly supports the theory about the importance of strategies having a positive impact on organizational learning and innovation in processes. Additionally, the fact that organizational learning has a positive impact on processes and operational effectiveness, demonstrates its importance to innovation.

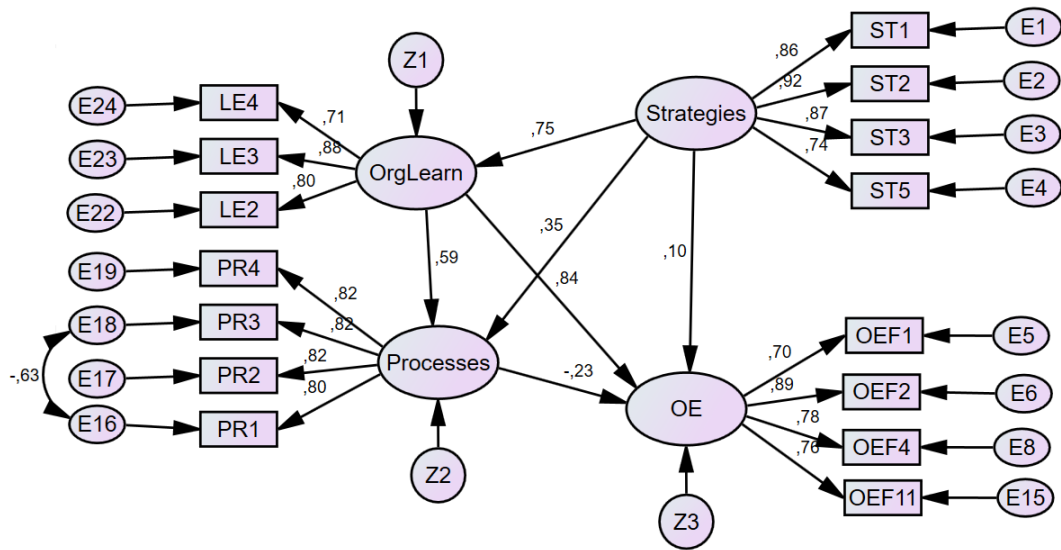


Figure 3 - Structural model results

## Conclusion

We set out to answer, “What are the main factors in innovation that positively impact operational effectiveness?” Results suggest that only organizational learning has a positive and strong predictive power on operational effectiveness. This fact supports the view of Dodgson (1993), who stated that organizational learning is the way firms enhance their knowledge and ability by aligning knowledge around the organizational culture as well as adapting it within the organization to increase the efficiency of the workforce. Therefore, efficiency and effectiveness can only be achieved through the implementation of appropriate learning cultures across the organization. Additionally, as organizational learning includes R&D, training, and formal education of employees, it should be used as a powerful strategic tool to disseminate knowledge and information throughout the organization. Additionally, the organizations in the studied region should be concerned about the way they are disseminating their strategic view and the way they are setting up their innovation in processes, as these two dimensions show an insignificant predictive power on operational effectiveness.

Another important finding from this study is that strategies have a significant and positive predictive power on organizational learning and processes. This finding confirms the importance of strategies for learning and innovation in processes that the organizations must achieve when they are searching for a competitive advantage or gaining a higher market share. As Tidd & Bessant (2013) pointed out, strategies must be seen as part of a wider process of continuous learning from experience and from others to cope with complexity and change.

Finally, the impact of strategies on operational effectiveness is indirect throughout the learning of the organization. When organizations in the selected sample search for opportunities, when they are managing their selection process, and when they are attempting to implement and manage innovation projects from the idea right up to the launch and further, they must create outstanding learning processes so the strategies can have an impact on the effectiveness of the operations. Not being able to accomplish an appropriate learning process indicates that the strategies in the organization will fail in their main objective to improve the effectiveness and efficiency of the operations of the organization, and to gain and sustain a competitive advantage.



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