Assessing the construction of Innovation Capabilities -
Influences at the individual, organizational, and structural levels

ABSTRACT

Nowadays competing in unforgiving and dynamic markets requires fostering innovative cultures that continuously update the fit between the changing requirements of demanding customers and organizations' offering and capabilities.

In a clear move towards this direction, many large companies have started implementing programs aimed at building innovation as a broad and sustainable capability installed in their DNA. Given that incorporating innovation into organizational cultures involves all organizational members, a shared challenge of many innovation initiatives is reaching and including people at every corner of the organization.

This exploratory study aims to contribute to a better understanding of how factors at the individual, organizational, and environmental levels influence the way employees evaluate innovation initiatives. Results from the analysis of a sizable database show that the factors examined in this study explain a large proportion of the variability found, that there are relevant differences among both functional areas and hierarchical levels, and also suggest that there are both synergetic and moderating interactions between factors.

The results reported here add to the increasing literature on innovation management and provide insights into the design and implementation of Innovation Management Systems that take into account factors that influence the way in which organizational members perceive and respond to innovation initiatives.

Keywords:
Innovation Management Systems; organizational change; expectation-disconfirmation theory

I. INTRODUCTION

The current business environment has become increasingly competitive and dynamic, and organizations are making considerable efforts to increase long-term firm performance through innovation (Allen, Adomdza, & Meyer, 2015). This is not surprising as innovation is widely regarded as crucial to create competitive advantage, particularly for firms in changing environments (D'Aveni, Dagnino, & Smith, 2010; Denton, 1999; Porter, 1998; Tushman & O'Reilly III, 2006). Indeed, some scholars argue that the extent to which firms can innovate is the most important determinant of firm performance (e.g. Mone, McKinley, & Barker, 1998).

But innovation is characterized for having a non-linear dynamic nature with cycles of divergent and convergent activities, whose boundaries are drawn by both external environmental and institutional forces and by top management vision, and characterized by learning processes that occur through the innovation journey (Van de Ven, Andrew H, Polley, Garud, & Venkataraman, 2008). Therefore collecting the benefits of innovation is far from easy. In addition, to improve a firm's innovativeness top management needs to address the multiple dimensions of innovation, relating diverse resources and capabilities (Damanpour, 1991; Edquist & Hommen, 1999). As a result, the rate of innovations that are successfully introduced to the market is strikingly low with failure rates between 40 and 55 percent (Castellion & Markham, 2013), therefore consuming valuable and scarce organizational resources, and even possibly endangering organizational survival in the long run (Bayus, Erickson, & Jacobson, 2003).

The evident difficulties of making innovation happen, and its´ not-so-uncommon discouraging results underscored the need for a more systemic vision of innovation: one that recognizes innovation as a process of adaptation and change that - to be successful - requires developing innovation capabilities for designing and managing the several interacting components that contribute to a more innovative organization. Thus innovation is a process to be managed, and for doing so, Innovation Management Systems are needed (Davila, Epstein, & Shelton, 2012; Lawson & Samson, 2001; Tidd & Bessant, 2013).

But, even though the notions of Innovation Management Systems and Innovation Capabilities are not new (e.g. Damanpour, 1991; Lawson & Samson, 2001), and that the growing interest in managing innovation has motivated the development of new management tools such as the European standard for innovation management (CEN Technical Committee 389, 2013), the current state of development of innovation management capabilities across organizations seems to have not improved much since these ideas were first presented, as suggested by a recent survey applied to top managers in almost 700 Swedish organizations showing that more than half of them think their organization's innovation efforts suffer from management problems (Larsson, Magnusson, & Karlsson, 2015).

Current conceptualization of Innovation Management Systems comprises several interrelated components, being consistent with Van de Ven's (1986) argument that the management of innovation requires integrating essential functions, organizational units, and resources throughout the entire value chain. While at first sight the innovation management models proposed by different authors might look diverse, a second look shows that there are important similarities and most of the variation has to do with wording differences or with the grouping of concepts. Crossan

and Apaydin's (2010) systematic review of literature on innovation over 27 years strongly suggest this to be the case. They synthesized diverse perspective into a comprehensive multi-dimensional framework of innovation at the organizational level. The central dimensions of this framework, namely leadership, strategy, organizational structure, knowledge management, resource management, organizational culture, and process management are also present in Lawson and Samson's (2001) framework on innovation capabilities; Davila, Epstein, and Shelton's (2006) model for making innovation work; Adams, Bessant, and Phelps' (2006) ideas on the innovation management process, and Tidd and Bessant's framework (2009) for managing innovation[1]. Not surprisingly, those dimensions are consistent with the principles and concepts of the Criteria for Performance Excellence (CPE) of the Malcolm Baldrige National Quality Award (NIST, 2011).
What is even more important than these similarities is the increasing empirical evidence of the positive effects of Innovation Management Systems as described above, on organizational processes and outcomes. One example is the study by Ferreira and colleagues (2015) that tests Tidd and Bessant's model and finds it appropriate in explaining firm's differences in innovative capacity and innovation performance. Similarly, Thai Hoang et al. (2006) find that components such as leadership, people management, process, and strategic management enhance firm innovativeness and have a positive impact on firms' innovation performance. In turn, Satish and Srinivasan (2010) find that strategic planning, customer and market focus, human resource focus, process management, and business results have a strong and significant impact on the innovation performance of organizations. Finally, the study by Prajogo and Sohal's (2006) suggest that the combination of several components has a higher explanatory power for innovation performance, and that there is cross fertilization between product quality and process innovation and between product innovation and process innovation.

One clear challenge in the creation of innovation capabilities is that innovation is not an individual activity but rather a collective achievement. Even the ideas of most brilliant minds will fail without the skills, resources, and support from other organizational members (Van de Ven, Andrew H, 1986). In addition, when employees interact with other employees, both the number of high-quality ideas and the diffusion of these ideas increase (Basoglu, Daim, Dogan, Taskin, & Gomez, 2013). Prior research has found that the discovery and development of entrepreneurial opportunities is dependent on the willingness of individuals to go beyond their contractual tasks and operate outside normal functions and processes (Lumpkin, Cogliser, & Schneider, 2009). While this commitment and motivation could be argued to be important in all business contexts, they are particularly relevant in innovation efforts where the ambiguity of the situation requires employees to be more proactive in applying their skills, knowledge and resources of every type, in contrast with stable environments that are not as demanding (Keil, McGrath, & Tukiainen, 2009; Schuler & Jackson, 1987). Along these lines, a recent study shows that one practice with very strong impact on innovation performance across industries was mobilizing the whole organization (Thuriaux-Alemán, Johansson, & Eagar, 2013).

[1] For more details see Appendix 1 – Components of Innovation Management Frameworks.

So, in spite of the fact that the successful development of innovation capabilities requires the backbone of a supportive personnel, the factors that influence the way in which employees perceive and evaluate organizational innovation initiatives have received scant attention in the literature. Increasing our understanding about this relevant aspect is important as perceptions influence attitudes, and attitudes influence behaviors (e.g. Chang, 2004; Lankton & McKnight, 2012), which are likely to have a strong impact in organizational efforts aimed at building innovation capabilities.

This article empirically explores this gap using insights from the change management and consumer behavior literatures, taking advantage of the privileged access to an archival dataset originally intended at creating a ranking of innovative companies.

II. THEORETHICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Innovation programs and evidence of innovation results

When it comes to establishing an innovation culture and developing innovation capabilities, a common approach is communicating the initiative to employees through newsletters, speeches, meetings, and other channels. These communication efforts aimed at clarifying a vision and the direction in which the organization needs to move, have also the effect of creating expectations among employees. Expectancy – Disconfirmation theory (Oliver, 1980) holds that when evaluating something, people contrast actual results with prior expectations that function as a standard of comparison. The concept of expectations refers both to the anticipation of future consequences based on prior experience, current circumstances, or other sources of information (Tryon, 1994), and to the standard of comparison used to determine performance (Yi & La, 2003).

So, organizational communications create expectations, but organizational changes such as building innovation capabilities take time. Consequently innovation initiatives risk losing credibility and the commitment of organizational members when compelling evidence showing progress is lacking (Gupta, 2011; Kotter, 1995). In contrast, visible results testify that organizational efforts are progressing reasonably well and momentum is being built or maintained.

> *Hypothesis 1: awareness of actual innovation results will positively affect evaluations of organizational innovation efforts.*

Innovation programs and environmental dynamism

Organizational innovation initiatives don't just happen in a vacuum, but rather are embedded in a competitive and institutional context (Jansen, Van Den Bosch, Frans AJ, & Volberda, 2006; Levinthal & March, 1993). Changes in the environment can seriously jeopardize a firm's capacity to create and capture value. Alternatively, they can provide windows of opportunity for strengthening the firms positioning and long term viability. In any case, the more challenging and demanding the environment, the less appealing and the more dangerous the status quo will look, creating a sense of urgency to act (Kotter, 1995). Increased environmental dynamism puts pressure on firms to be more innovative (Miller & Friesen, 1983), for instance bringing new

products to the market faster (Calantone, Garcia, & Dröge, 2003; Olavarrieta & Friedmann, 2008), as a result of firms' effort to better match the demands of the environment. In consequence, organizational innovation efforts are likely to be better appreciated when the organization faces a more turbulent and dynamic environment. Therefore the following hypothesis is proposed:

> *Hypothesis 2: the more challenging and demanding the environment, the better evaluated organizational innovation efforts will be.*

Innovation programs and cynicism

Cynicism is a negative attitude that has cognitive, affective, and behavioral components (Andersson, 1996; Dean, Brandes, & Dharwadkar, 1998); negative attitudinal effects, for instance lower intentions to help others at work (Roberts & Zigarmi, 2014); and less willingness to participate in organizational change efforts (Reichers, Wanous, & Austin, 1997). Prior research suggests that cynicism is quite prevalent in organizations, with Kanter and Mirvis (1989) reporting that 43 percent of the U.S. workforce is cynic, while Reichers and colleagues (1997) classify 48 per cent of their sample as high in cynicism. The literature provides several definitions of cynicism, with a shared core essence as the disbelief of another's stated or implied motives for a decision or action (Stanley, Meyer, & Topolnytsky, 2005). Stanley and colleagues (2005) explored the behavioral consequences of change-specific cynicism and has found that it predicts intentions to resist change.

Building innovation capabilities is a relevant organizational change that requires widespread support from organizational members, so it is not surprising if it suffers from cynicism-related issues, similar to those that affect other organizational changes. In particular, given that cynicism acts as a perceptual screen to interpret organizational events in such a manner as to maintain consistency between beliefs and reality (Abraham, 2000), cynics would perceive organizational innovation efforts through negatively biased lenses. In addition, cynicism becomes a self-fulfilling prophecy as it prevents employees from wholeheartedly participating in change efforts, thereby assuring their failure because innovation depends upon employee discretionary commitment (Wanous, Reichers, & Austin, 1994). These ideas are represented in the following hypothesis.

> *Hypothesis 3: cynicism negatively affects evaluations of* organizational innovation efforts.

Innovation programs and skepticism

The dynamism and turbulence of modern business environments have lead many companies to engage in innovation initiatives in aspects as varied as production quality, customer service, reengineering, right-sizing, culture, and teamwork. According to Reichers and colleagues (1997), many of these initiatives follow the predictable sequence of *"introductory fanfare, followed by tough times of implementation, ending with something less than complete success, just in time for the next major change to begin"*. In consequence, innovation initiatives within the firm may be viewed with skepticism and perceived as just another "management fashion". Initiatives seen as a fad without business relevance imply the danger of negative perceptions (Raub & Von Wittich, 2004).

In a change context, skeptics have been described as those individuals who doubt the likelihood of change success (Reichers et al., 1997). So change-related skepticism is likely to manifest itself in doubts about the viability of a change and whether it will attain its stated objectives. Prior research has found that skepticism is negatively correlated with perceptions of the managerial and organizational skills and competences required given the nature of change. Also skepticism predicts intentions to resist change (Stanley et al., 2005).

Following this discussion, skepticism is likely to affect how organizational members perceive innovation initiatives. Likely impact could range from increased disbelief regarding organizational communications on the topic to refusing to support and even opposing innovation-related change. This account suggests the following hypothesis:

> *Hypothesis 4: skepticism negatively affects evaluations of* organizational innovation efforts.

Innovation programs and communications

The literature on organizational change stresses the role of communication as a key factor in the effective implementation of change initiatives (Conner, 2006; Hultman, 1998; Kotter, 1995). Effective communication, measured as the extent to which employees get the message, requires the avoidance of too complicated or too vague visions or ideas in the first place (Kotter & Cohen, 2002; Kotter, 1995). Innovation-related changes should not be much different from other types of change regarding awareness level of programs and initiatives aimed at building innovation capabilities. While informed employees will be attentive to clues regarding whether innovation efforts are progressing, the uninformed ones will not be able to recognize progress and, missing available information. Therefore the following hypothesis is proposed.

> *Hypothesis 5: innovation effort obliviousness negatively affects evaluations of* organizational innovation efforts.

Innovation programs and functional differences

Due to bounded rationality (March, Simon, & Guetzkow, 1993; March, 1978), individuals cannot take into consideration every possible aspect in an evaluation process. Individuals' field of vision considers just a subset of all possible aspects, of which they selectively pay attention to just a few. When individuals process the selected pieces of information, their worldviews act as a filter that attaches meaning to the information and results in the final interpretation and evaluation (Hambrick & Mason, 1984). So it is argued that worldviews are probably related to individuals' background, education, and experience, all of which would affect the information people pay attention to and how it is processed (Pfeffer, 1997). Common worldviews or subcultures tend to develop within functional areas in large organizations reflecting common problems, situations and experiences faced by employees performing a similar function (Martins & Von der Ohe, 2006). In addition, individuals from different functional areas often differ in training and background (Deal & Kennedy, 2000).

In consequence, one should expect differences across functional areas in the perception and evaluation of organizational innovation efforts. The difference between the corporate function and others should be larger, particularly since prior research has concluded that the extent to which individuals form reasonable expectations influences the degree of alignment between expectations and actual results, having a positive effect on evaluations (e.g. Turel & Serenko, 2006). The fact that individuals at the corporate function - which is where organizational innovation programs are designed and approved – are better positioned to form realistic expectations regarding the scope, implications, and likely results of innovation efforts, suggests that when comparing actual results with expectations, people at the corporate function will suffer less from the issue of negative disconfirmation. Based on these ideas, the following hypothesis is offered.

> *Hypothesis 6: organizational members at the corporate level will have more positive evaluations of* organizational innovation efforts*.*

Potential interactive effects

Some of the factors described above are likely to have not only direct effects, but also interactive effects as they work in conjunction. Those interactions might be synergetic, substitutive, or have a moderating effect. Hypotheses 7a, 7b, and 7c detailed below describe some of the probable interactions that result from pondering several of the arguments from which a number of the prior hypotheses were derived.

> *Hypothesis 7a: cynics lacking awareness of organizational innovation efforts are likely to be even more negative regarding organizational innovation efforts.*

> *Hypothesis 7b: cynicism and skepticism are likely to have interactive effect.*

> *Hypothesis 7c: actual evidence of innovation efforts results will reduce the negative effects of skepticism.*

III. Methods

3.1 Research Process and Data Collection

This article takes advantage of a database collected by ESE Business School for the study "*Examination of the State of Innovation in Large Chilean Firms 2013*"[2], which produces a ranking of Chilean innovative companies. The database consists of questionnaire responses to the MIC instrument[3] from almost 5700 individuals from 28 different firms collected during year 2012. Some of the industries covered by MIC are Food Processing, Mining, Education, Financial Services, Baking, Utilities, Energy, Pharmaceutical, Communications, Entertainment, and Transportation,

[2] Radiografía de la Innovación en Grandes Empresas Chile 2013.
[3] "The Most Innovative Companies" questionnaire, available in Appendix 2.

among others. The companies were large corporations with more than $50 mm dollars in billing, more than 200 employees, and leaders in their field. All firms participating in the ranking were interested to some extension in pursuing innovative activities and at various advancement levels. Most of the firms were in the process of implementing innovation management models and a few were at a stage were value creation was becoming apparent. The majority of the firms were focused on incremental or semi-radical innovation.

The MIC instrument asks respondents to assess their organizations' systems to manage innovation according to several dimensions: leadership, strategy, human resources, organization, key assets management, product and service innovation processes, and results.

3.2 Measurement of Constructs

This section describes dependent, independent, and control variables. All variables are measured using 5-point Likert-scale survey questions, except when indicated. Descriptive statistics of the constructs and correlation matrix are presented in Table 1.

Insert Table 1 about here

3.2.1 Dependent variables

Evaluation of the Innovation Management System

The MIC instrument measures eight components of the innovation management system using 5-point Likert-scale items. The components, argued to support the creation of innovation capabilities, are (a) Leadership, (b) Strategy, (c) HR policies, (d) Organizational structure, (e) Value chain management, (f) Knowledge management, (g) Innovation management process, (h) New services and product development process, and (i) Orientation to results. Table 1 describes the results of principal component factor analysis. It also shows the variance explained, the first eigenvalue, as well as the Cronbach alpha measure of reliability (Cronbach, 1951). The results suggest that constructs are appropriate, with variance explained between 67% and 82%, and Cronbach's Alpha between 0.79 and 0.92. Descriptive statistics of the constructs and correlation matrix are presented in Table 2.

Insert Table 2 about here

3.2.2 Independent variables

Innovation results awareness

The MIC instrument includes one open-ended question asking respondent to provide an example of innovation developed by their firm.

A dummy-coded variable was included that takes the value of "1" if an example of innovation was provided and "0" otherwise.

Skepticism and Cynicism

This study employs archival data that lacks direct measures of skepticism and cynicism. Prior research has related skepticism with education, as the latter creates the conditions for individuals to use critical thinking to address eventual discrepancies between claims and evidence (e.g. An, Jin, & Park, 2014; DeLorme, Huh, & Reid, 2009). So a measure of education level is used as a proxy of skepticism, consisting in a 4-point item: 1.High School, 2.Technical Training, 3. Undergraduate studies, and 4. Graduate studies.

In turn, prior studies argue that people's initial idealism and optimism is replaced with cynicism over time as a result of the inconsistencies they find at work. For instance, initiatives and change programs introduced as centered on topics such as TQM or team work, but finally result in downsizing. Then, it is not surprising that cynicism is strongly related to organizational tenure (e.g. Niederhoffer, 1967). In consequence a measure of organizational tenure is used as a proxy. Given that the data is highly skewed, a logarithmic transformation is applied.

Innovation effort obliviousness

To measure ignorance regarding organizational innovation efforts, a variable was created that counts the number of missing answers per respondent. Given that the data is highly skewed, a logarithmic transformation is applied.

Functional areas

The data set allows classifying organizational members into four different functional areas: Corporate, Sales, Operations, and Administrative. Dummy variables were created to identify each function.

Environmental dynamics

The MIC instrument includes seven 5-point Likert-scale items to measure the environmental dynamism face by firms. The items are the following: (i) "Our customers know what they want and are increasingly demanding", (ii)" Competition has augmented and has become increasingly tough", (iii)"This firm has no choice but reducing its costs", (iv)"This firm increasingly requires more specialized personnel with technical knowledge", (v)"Our industry is affected by frequent technological changes", (vi)"Organizational performance is affected by the economy and by socio-political issues", and (vii)"This firm has to comply with environmental regulations that are increasingly stringent". Factor analysis with varimax rotation revealed two dimensions that explain 51% of data variation. Items (i), (ii), and (v) loaded on the first factor, which was labeled "Competitive pressures", while items (iii), (vi) and (vii) loaded on the second factor, which was labeled "Cost pressures". Item (iv) had cross-loadings over the recommended threshold of 0.32, thus it cannot be fully assigned to any single factor. These two factors were extracted and used as independent variables representing two dimensions of environmental dynamics.

3.2.3 Control variables

Some variables were included to control for variance in evaluations due to characteristics at the organizational and individual level.

First, regression models are fit using fixed-effects that allow exploring the relationship between predictor and outcome variables within an entity (i.e. firms). Each entity has its own individual characteristics that may or may not influence the predictor variables, for example, the current resource base of a firm may influence the extent to which it is successful in building innovation capabilities. When using fixed-effects the assumption is that something within the entity may impact or bias the predictor or outcome variables so it needs to be controlled for. Fixed-effects regression removes the influence of those entity-invariant characteristics so the net effect of the predictors on the outcome variable can be assessed.

In addition to controlling for variance due to differences among firms, two dummy-coded variables were included to control for variance in evaluations due to respondents' characteristics. Firstly, gender was coded using "1" for females, and "0" for males. And given that employees' hierarchical level might influence their evaluation of initiatives aimed at building innovation capabilities, a dummy variable was included that takes a value of "1" for employees at the lower hierarchical level, and "0" for those with managerial responsibilities.

IV. ANALISYS AND RESULTS

The hypotheses were tested with multivariate regression models using White's correction, which solves some heteroskedasticity problems (White, 1980). In order to test for multicollinearity. Two approaches were followed as suggested by Chatterjee et al.'s (2000) – the condition number and the sum of the reciprocals of the eigenvalues - which indicate that results are unlikely to be affected by this problem. Hypotheses H1 to H6 are tested using the following specification with fixed-effects:

$$\text{Innovation Management System factor}_{(k)} = \beta_0 + \beta_1 \text{Innovation Result Awareness} + \beta_2 \text{Environmental dimension}_{(m)} + \beta_3 \text{Cynicism} + \beta_4 \text{Skepticism} + \beta_5 \text{Innovation Effort Obliviousness} + \beta_6 \text{Functional area}_{(n)} + \Sigma\, \beta_i \text{ other covariates} + \epsilon$$

Table 3 below presents the results for hypothesis H1 to H6. Before going into the analysis of the hypotheses, one relevant comment has to do with the appropriateness of using specifications with fixed effects. Table 3 shows the results of an F-test designed to test the joint statistical significant of all "u_i", namely the joint significance of all the dummy variables used to control for effects at the firm level. In all models the test is highly significant, meaning that there are meaningful differences across firms. These significant differences at the organization level are also evident when looking at the "Adjusted R-squared" and at the "within R-squared". While the former includes the explanatory effect of firms' dummies, the latter does not and focuses just on the other explanatory variables. Notice that fixed effects "u_i" have two general features. First, they are invariant within firms, meaning that they represent a characteristic that is common to all observations that belong to the same company. And second, they have an effect on the dependent variable. So, differences in both observable and non-observable variables that are

likely to affect the dependent variable - for instance firms' resource endowments and culture respectively – will be reflected in the coefficients of the fixed-effect dummies. A second comment has to do with Rho - the intra-class correlation index – that represents the share of the estimated variance of the overall error accounted for by the fixed-effects "u_i". Let's use the model for HR policies in Table 3 to illustrate its meaning. In that model, explanatory variables explain 38% of variance, meaning that 62% of the variance is explained by factors not included in the model. Given that Rho has a value of 11% that means that idiosyncratic factors should explain 89% of the non-explained variance, suggesting that those non-included idiosyncratic factors represent 55% of total variance. These results appear meaningful given the highly diverse degrees of involvement with innovation initiatives and the different realities that personnel experience within firms. So, while those employee members of the team responsible of the innovation initiative will have full information and awareness of the degree of progress and the challenges involved, for others their only connection with the initiative will be the company's newsletter. At the same time, others will have partial involvement, perhaps contributing a little and waiting for the improvements that the innovation initiative was assumed to bring.

Continuing with the analysis, hypothesis H1 predicts that actual innovation results will affect positively evaluations of organizational innovation efforts, namely the components of the Innovation Management System. Models 1.1 to 1.9 provide strong support for this claim. The coefficient of Innovation Results Awareness is positive and significant at the 1% level for all components of the Innovation Management System.

Hypothesis H2 predicts that organizational members' awareness of increasing environmental demands will have positive effects on evaluations of organizational innovation efforts. Models 1.1 to 1.9 provide strong support for this claim. The coefficients of both Competitive Pressures and Cost Pressures are positive and significant at the 1% level for all components of the Innovation Management System.

Hypothesis H3 and H4 predict that Cynicism and Skepticism respectively will have negative effects on evaluations of organizational innovation efforts. Eight of the nine models provide support for H3. The coefficient of Cynicism is negative and significant for the following components of the Innovation Management System: Strategy, HR policies, Organizational structure, Value Chain management, Knowledge management, Innovation management process, New Services and Product development process, and Orientation to results. Regarding H4, all the models strongly support it. The coefficient of Skepticism is negative and significant at the 1% level for all components of the Innovation Management System.

Hypothesis H5 indicates that ignorance regarding organizational innovation efforts will negatively affect how they are evaluated. Models 1.1 to 1.9 provide strong support for this claim. The coefficient of Innovation Effort Obliviousness is negative and significant at the 1% level for all components of the Innovation Management System.

Hypothesis H6 states that there will be an evaluation gap due to functional differences. Specifically, it predicts that those individuals belonging to the Corporate function will have a more positive evaluation than those in other functions. The data set allows classifying organizational members into four functional areas: Corporate, Sales, Operations, and Administrative. The

Corporate function was defined as the zero group, and three dummy variables were created to identify the other functions, so that their coefficients represent the mean differences between each group and the zero group. The general pattern shown in Table 3 provides support for H6. There are 27 coefficients to test H6 (nine models x three dummies per model). All the coefficients are negative, and 23 of them are significant: eleven at the 1% level, eight at the 5% level, and four at the 10% level. Particularly, models 1.2 and 1.3, for the Strategy and HR policies components respectively, provide strong support as the coefficients for the Sales, Operations, and Administrative functions are all negative and significant at the 1% level.

Insert Table 3 about here

Table 4 below presents the results for hypothesis H7, which explores the extent to which there are interactive effects between some independent variables, and whether those interactions are complementary, substitutive, or moderating. When the effects of two independent variables goes in the same direction, their interaction is complementary if the coefficient of the product term is significant and of the same sign that those of the two independent variables, meaning that the antecedents are synergetic when they work together. In turn, if the coefficient of the product term is significant and its sign is different from those of the two independent variables, it means that they are substitutes, namely that the impact of one of them is higher when the other's value is smaller. Finally there is the case when the effects of two antecedents go in different directions. Here, a significant coefficient for the product terms can be interpreted as one antecedent moderating the effect of the other, specifically the antecedent whose sign is the same as that of the interaction term would be the moderating one. The specification used to test these interactive effects is the following:

$$\text{Innovation Management System factor}_{(k)} = \beta_0 + \beta_1 \text{Antecedent(A)} + \beta_2 \text{Antecedent(B)} + \beta_3 \text{ Antecedent(A)*Antecedent(B)} + \Sigma \beta_i \text{ other covariates} + \epsilon$$

The results of the analysis are summarized in Table 4 that shows the interactive effects of four independent variables, two at the individual level – Cynicism and Skepticism – and other two that depend on the way in which top management designs and implements intra-organizational communications regarding the organizational innovation efforts: Innovation Effort Obliviousness and Innovation Result Awareness.

Results are organized as follows. Each column shows the results of all possible combinations of these four variables for one of the nine components of the Innovation Management System. The upper part of each column shows two measures of goodness-of-fit for the base model, that is, the one without the interaction term. For instance, for model 2.1 in Table 4 the two measures shown are those of model 1.1 in Table 3. One measure of fit is the Adjusted R-squared and the other is the Akaike Information Criterion (AIC). The AIC takes into account both the complexity of a model – number of free parameters – and how well that model fits the data. For this index smaller values

indicate better fit. In addition, for each one of the pairs of interacting variable, Table 4 shows the coefficient of the product term, its p-value, and significance level. It also shows the Adjusted R-squared and the difference between the AIC of the base model and the one of the model including the interaction term – Delta AIC. A negative delta indicates that the model including the interaction terms has a smaller AIC, and consequently it provides a better fit of the data. Notice that two conditions are relevant for evaluating models that include an interaction term: (a) whether the interaction term's coefficient is significant, and (b) the extent to which including the interaction terms improves the overall fit of the data.

Results provide strong support for the interaction between Cynicism and Innovation Effort Obliviousness, suggesting they are complements. Coefficients for all models are negative, with eight of them being significant at the 1% level, and the remaining one being significant at the 5% level. All Delta AICs indicate a better fit.

In turn, the results provide some support for a complementary relationship between Cynicism and Skepticism. Models 2.3 and 2.4, on HR policies and Organizational Structure respectively, show a negative coefficient, significant at the 1% level. In addition, models 2.5 and 2.8 on Value Chain management and New Services and Product Development respectively, have a negative coefficient significant at the 10% level. Delta AICs for these four models indicate a better fit.

Concerning the interaction between Innovation Results Awareness and Skepticism, results for models 2.1, 2.1, 2.3, 2.5 and 2.8 provide partial support to a moderating role of Innovation Results Awareness on the effects of Skepticism. That is, actual awareness of Innovation Results reduces the negative effects of Skepticism. While the coefficient of the product term is positive for all models, it is significant at the 5% level just for models 2.2 (Strategy) and 2.8 (New services and product development), and significant at the 10% level for models 2.1 (Leadership), 2.3 (HR policies), and 2.5 (Value Chain management). Delta AICs for these five models indicate a better fit.

As a final comment regarding the analysis of interactive effects, the results shown in Table 4 are particularly interesting taking into account that regressions including product terms suffer from low statistical power, and thus Type II errors are likely in this type of analysis (Aguinis & Gottfredson, 2010).

Insert Table 4 about here

V. DISCUSSION AND CONCLUSIONS

In this article we explored how factors at the individual, organizational, and environmental level influence the way in which organizational members perceive and evaluate efforts aimed at building innovation capabilities.

At the individual level, skepticism and cynicism negatively affect evaluations of organizational innovation efforts. At the organizational level, functional differences explain significant variation in evaluations of organizational innovation efforts, with organizational members at the corporate level having a more positive view and assessment of their degree of progress. In addition,

organizational communications regarding innovation have positive effects. Both, those organizational members aware of innovation results and those more fully informed about innovation efforts have better evaluation of them. Finally, at the environmental level, increased awareness of a turbulent and demanding environment causes a more positive assessment of organizational innovation efforts.

In addition, it was found that some of these variables have interactive effects. While cynicism and skepticism have synergetic interactive effects, reinforcing one another, communication about innovation effects counteracts their negative effects. Consistent with Expectancy–Disconfirmation theory, awareness of innovation results reduces the negative effects of skepticism. In addition, increased levels of knowledge reduce the negative effects of cynicism. These results are a valuable step forward in better understanding the factors that influence the way in which employees perceive and evaluate organizational innovation initiatives and have clear implications for practice and research. Moreover, the strong support found for the hypothesized effects across all the dimensions of the Innovation Management Systems makes these findings worthy of attention by both scholars and practitioners.

Implications for Practice

Building innovation capabilities in existing organization faces significant challenges, namely designing the proper policies, processes and procedures; obtaining and aligning key assets; and fostering the required exploratory innovation culture while at the same time taking care of and sustaining the regular exploitation culture (Davila et al., 2012).

Concerning the “people dimension”, building innovation capabilities is not different from other organizational change initiatives and, as Kotter (1995) argues, just getting the transformation program started requires the decisive support and cooperation of many individuals. Given that innovation efforts are likely to take the organization out of its comfort zone, engagement from all members of the company is required as without their support the innovation initiative will likely fail. The results reported in this article show that skepticism and cynicism have negative consequences on organizational innovation efforts and that the way in which communications are managed can counteract their negative effects. For instance, this article’s findings suggest that the effort to orchestrate employee engagement and complicity will benefit from sharing early success stories, and that the extent to which people get the message contributes to overcome cynic attitudes. As far as we know, this is the first study providing empirical evidence of the effects that characteristics at the individual level such as skepticism and cynicism have on organizational innovation efforts, unveiling the mechanisms through which communications contribute to the creation of innovation capabilities. These results are consistent with those of the change management literature, for instance the idea that firms should “communicate for buy-in” taking into account that when employees first hear about new initiatives, their responses often reflect fear, cynicism and anxiety, and thus communication that ignores these feelings becomes propaganda(e.g. Kotter & Cohen, 2002). Moreover, this study provides empirical evidence about the applicability in the field of innovation, of strategies proposed by change management scholars for dealing with cynicism about organizational change (e.g. Kotter & Cohen, 2002; Reichers et al., 1997). For instance, the suggestion of keeping people informed of ongoing changes, and that of publicizing successful results. Additional analysis, not reported, suggest that innovation related communications face different challenges that vary depending on firm size. For instance, 36 percent of employees in large firms are aware of innovation results, while in medium-sized firms the percentage raises to almost 55, more than 1.5 times that of large firms. This difference is particularly striking given that all firms participating in the innovation ranking from which the

database was obtained had actually produced innovation results at the time the survey was applied. Another difference has to do with the degree of ignorance regarding the innovation initiative. In this case, the measure for innovation effort obliviousness in medium-sized firms is 14 percent larger than that of large firms. So the general picture is that, in spite of better communications in large firms with respect to medium-sized firms, people are more aware in the latter of compelling evidence showing that innovation efforts are providing results.

A second relevant implication for practice refers to environmental dynamics. It is not uncommon that efforts to build innovation capabilities are an organizational response to increasingly demanding environments. While recent research has found that there is a positive correlation between innovation performance and employee awareness of innovation's importance to firm competitiveness (Ferreira et al., 2015), to the best of our knowledge this is the first study that - using multivariate regression models - has found that employees' perception of the environment have an impact on the development of innovation capabilities. This finding suggests that in addition to having candid and fluid conversation with employees regarding the progress of innovation initiatives, top leadership should foster increasing transparency regarding environmental turbulence. This approach will lbe a strong motivating factor for gaining support from employees, particularly on the early stages of the implementation efforts, while results are not available.

A third implication that seems important has to do with the significant differences found across functional areas, in particular the fact that organizational members at the corporate level have a more positive view and assessment of the degree of progress of innovation efforts.
The development of innovation capabilities is an organizational change effort usually lead by top management, and without fluid and candid interaction with other organizational members, top management could be at risk of developing a rosy and excessively optimistic view of the process. This problem could be particularly important in firms lacking a social capital that provides the psychological safety required for speaking up observations, concerns, and questions (Carmeli & Gittell, 2009; A. Edmondson, 1999; A. C. Edmondson, 2003), as nobody would want to be the messenger of bad news. As a departing point for gaining a more realistic view of the process, it may be useful to consider the suggestion from the organizational change literature of using two-way communications in order to see change from the employees' perspective (Reichers et al., 1997)

Implications for Research

From their very beginning, innovation management models have been centered on the innovation process, from the idea generation to the commercialization phases (Rothwell, 1994). So it is not surprising that current conceptualizations continue to consider the process of innovation as cornerstone, with other elements such as leadership, knowledge management, and culture, among others, performing the relevant function of antecedents or facilitators (e.g. Crossan & Apaydin, 2010). Even though the role of organizational members different from organizational leadership has received increasing attention, in most models their role is that of valuable resources: bearers of knowledge and skills that are essential to innovation, whose contributions are better obtained when using the appropriate motivating mechanisms.
This perspective misses the fact that people attach meaning to information through perceptual processes (Kahneman, 2011), so that the way in which they perceive the world around them influences their attitudes and behaviors. So the innovation management literature is likely to benefit from more cognitive approaches such as the expectancy-disconfirmation theory (Oliver,

1980), among others. In addition, given that the creation of innovation capabilities is a relevant organizational change, there is a promising cross-fertilization between the innovation management and the change management literature. This paper aims to contribute in that direction.

Limitations and Future Research

Although in this study we take advantage of privileged access to unique data, there are some limitations. The first limitation is that regression analyses are based on cross-sectional data. Future work should attempt to expand the sample to include more periods and perform analysis over longitudinal data already.

Another limitation is that, due to the archival nature of our dataset, we are using demographic indicators as proxies of skepticism and cynicism, and these proxy measures may contain more noise than purer psychological measures. For example, in addition of being and indicator of skepticism, education may serve as an indicator of motivation, risk propensity, and other underlying traits. Indeed, some studies suggest that there is a positive correlation between education and risk propensity, an effect that goes in the opposite direction[4] of the hypothesized in this study (e.g. Doğan & Özdemirci, 2012; Smith & Friedland, 1998). Given this weakness, if demographic data yield significant findings, then the hypotheses explored in this article will have been put to a relatively stringent test. Future research should include psychological measures to further explore and validate this paper's findings.

Finally, this study was designed to be exploratory and, as such, the findings and conclusions are tentative and require further research.

[4] If education is a proxy of both skepticism and risk propensity, the resulting effect of these antagonist forces will be that the statistical significance of the coefficient will suffer. Thus, the extent to which the coefficient is significant and goes into the hypothesized direction is considered a more stringent test.

Table 1 – Descriptive Statistics of Constructs and Correlation Matrix

Variable	Mean	StdDv	Max	Min	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Innovation results awareness	0,43	0,50	1,00	0,00	1																				
(2) Cynicism	1,80	1,02	3,93	0,00	0,09	1																			
(3) Skepticism	2,82	0,78	4,00	1,00	0,11	-0,11	1																		
(4) Innovation effort obliviousness	0,95	1,04	3,83	0,00	-0,08	-0,11	-0,02	1																	
(5) Lower hierarchical level	0,70	0,46	1,00	0,00	-0,15	-0,16	-0,30	0,13	1																
(6) Functional area: Sales	0,25	0,43	1,00	0,00	0,02	-0,01	-0,03	0,01	0,00	1															
(7) Functional area: Operations	0,40	0,49	1,00	0,00	-0,05	0,07	-0,06	0,01	0,02	-0,47	1														
(8) Functional area: Administrative	0,33	0,47	1,00	0,00	0,02	-0,08	0,07	-0,02	-0,01	-0,40	-0,58	1													
(9) Functional area: Corporate	0,02	0,13	1,00	0,00	0,04	0,05	0,04	0,01	-0,04	-0,07	-0,11	-0,09	1												
(10) Env. dynamics: competitive pressures	0,00	1,00	2,34	-4,93	-0,03	0,06	-0,10	-0,02	0,09	0,01	-0,01	0,01	-0,04	1											
(11) Env. dynamics: cost pressures	0,00	1,00	2,63	-4,51	0,07	0,11	0,05	-0,10	-0,06	-0,08	0,02	0,04	0,03	0,00	1										
(12) Female	0,30	0,46	1,00	0,00	-0,06	-0,13	-0,06	0,07	0,15	0,14	-0,12	0,00	0,01	0,08	-0,07	1									
(13) Leadership	3,89	0,97	5,00	1,00	0,09	0,06	-0,13	-0,22	0,02	-0,01	-0,02	0,03	0,01	0,42	0,27	0,04	1								
(14) Strategy	3,85	0,88	5,00	1,00	0,08	0,04	-0,14	-0,22	0,05	0,00	-0,03	0,03	0,02	0,43	0,25	0,05	0,80	1							
(15) HR policies	3,55	0,97	5,00	1,00	0,07	-0,02	-0,17	-0,26	0,08	-0,02	-0,01	0,02	0,02	0,40	0,26	0,07	0,76	0,81	1						
(16) Organizational structure	3,54	1,04	5,00	1,00	0,06	0,03	-0,13	-0,20	0,06	0,02	-0,05	0,04	0,00	0,37	0,18	0,06	0,64	0,68	0,70	1					
(17) Value chain management	3,90	0,89	5,00	1,00	0,11	0,01	-0,08	-0,17	0,02	0,01	-0,06	0,05	0,01	0,41	0,23	0,08	0,69	0,73	0,73	0,68	1				
(18) Knowledge management	3,49	1,04	5,00	1,00	0,05	0,02	-0,17	-0,19	0,10	0,00	-0,01	0,01	0,00	0,39	0,20	0,08	0,68	0,73	0,79	0,69	0,74	1			
(19) Innovation management process	3,63	1,05	5,00	1,00	0,06	0,04	-0,13	-0,20	0,09	0,01	-0,02	0,01	0,01	0,37	0,23	0,07	0,68	0,71	0,73	0,69	0,70	0,78	1		
(20) New serv. & prod. development	3,75	0,97	5,00	1,00	0,08	0,02	-0,12	-0,19	0,07	0,01	-0,05	0,03	0,02	0,39	0,22	0,08	0,70	0,74	0,74	0,68	0,76	0,78	0,76	1	
(21) Orientation to results	4,02	0,88	5,00	1,00	0,09	0,02	-0,09	-0,09	0,05	0,01	-0,03	0,02	0,02	0,37	0,25	0,06	0,62	0,67	0,67	0,60	0,69	0,67	0,73	0,75	1

Table 2. Principal factor analysis for the components of the Innovation Management System

Variable	Items	Lading on First Factor	Variance Explained	Eigenvalue	Cronbach alpha
Leadership	lid1	0,91	0,82	3,29	0,92
	lid2	0,92			
	lid3	0,90			
	lid4	0,90			
Strategy	stra1	0,86	0,73	2,91	0,87
	stra2	0,86			
	stra3	0,84			
	stra4	0,85			
HR policies	hrp1	0,77	0,70	4,93	0,92
	hrp2	0,87			
	hrp3	0,84			
	hrp4	0,84			
	hrp5	0,79			
	hrp6	0,87			
	hrp7	0,88			
Organizational structure	org1	0,83	0,67	3,34	0,85
	org2	0,77			
	org3	0,88			
	org4	0,88			
	org5	0,71			
Value chain management	vcm1	0,88	0,75	2,99	0,88
	vcm2	0,89			
	vcm3	0,79			
	vcm4	0,89			
Knowledge management	knw1	0,84	0,75	3,01	0,88
	knw2	0,91			
	knw3	0,89			
	knw4	0,82			
Innovation management process	inm1	0,82	0,79	2,36	0,86
	inm2	0,92			
	inm3	0,92			
New services and product development process	dev1	0,88	0,76	3,03	0,88
	dev2	0,88			
	dev3	0,86			
	dev4	0,86			
Orientation to results	res1	0,87	0,71	2,14	0,79
	res2	0,83			
	res3	0,85			

Table 3 – Effects of Antecedents on Components of the Innovation Management System

	Leadership		Strategy		HR policies		Organizational Structure		Value chain management		Knowledge management		Innovation mgmt. process		New serv.& prod. develop.		Orientation to results	
	(model 1.1)		(model 1.2)		(model 1.3)		(model 1.4)		(model 1.5)		(model 1.6)		(model 1.7)		(model 1.8)		(model 1.9)	
Variables	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.
Innovation results awareness	0,17 **	0,00	0,15 **	0,00	0,15 **	0,00	0,15 **	0,00	0,21 **	0,00	0,15 **	0,00	0,16 **	0,00	0,15 **	0,00	0,15 **	0,00
Cynicism	-0,01 .	0,74	-0,03 *	0,05	-0,09 **	0,00	-0,04 *	0,03	-0,05 **	0,01	-0,05 **	0,00	-0,03 *	0,03	-0,04 **	0,00	-0,04 *	0,02
Skepticism	-0,12 **	0,00	-0,11 **	0,00	-0,18 **	0,00	-0,11 **	0,00	-0,08 **	0,00	-0,18 **	0,00	-0,11 **	0,00	-0,11 **	0,00	-0,10 **	0,00
Innovation effort obliviousness	-0,15 **	0,00	-0,14 **	0,00	-0,20 **	0,00	-0,17 **	0,00	-0,11 **	0,00	-0,15 **	0,00	-0,16 **	0,00	-0,15 **	0,00	-0,03 *	0,03
Lower hierarchical level	-0,02 .	0,46	0,01 .	0,73	0,04 .	0,12	0,03 .	0,32	-0,03 .	0,20	0,10 **	0,00	0,11 **	0,00	0,08 *	0,02	0,03 .	0,15
Functional area: Sales	-0,16 +	0,06	-0,21 **	0,00	-0,26 **	0,00	-0,16 +	0,08	-0,15 *	0,05	-0,09 .	0,31	-0,16 *	0,03	-0,27 **	0,01	-0,18 *	0,04
Functional area: Operations	-0,13 .	0,18	-0,20 **	0,01	-0,25 **	0,01	-0,19 *	0,05	-0,19 **	0,01	-0,11 .	0,22	-0,21 **	0,01	-0,27 **	0,01	-0,21 *	0,02
Functional area: Administrative	-0,16 +	0,07	-0,21 **	0,00	-0,26 **	0,00	-0,15 .	0,12	-0,14 *	0,04	-0,13 +	0,08	-0,22 **	0,00	-0,25 *	0,02	-0,19 *	0,02
Female	0,00 .	0,97	0,01 .	0,41	0,05 **	0,01	0,01 .	0,61	0,07 *	0,02	0,05 *	0,05	0,05 +	0,06	0,04 *	0,04	0,02 .	0,40
Env. dynamics: competitive pressures	0,37 **	0,00	0,33 **	0,00	0,35 **	0,00	0,32 **	0,00	0,32 **	0,00	0,35 **	0,00	0,32 **	0,00	0,33 **	0,00	0,30 **	0,00
Env. dynamics: cost pressures	0,25 **	0,00	0,22 **	0,00	0,24 **	0,00	0,20 **	0,00	0,22 **	0,00	0,21 **	0,00	0,23 **	0,00	0,22 **	0,00	0,20 **	0,00
Intercept	4,46 **	0,00	4,49 **	0,00	4,55 **	0,00	4,15 **	0,00	4,38 **	0,00	4,18 **	0,00	4,19 **	0,00	4,39 **	0,00	4,50 **	0,00
Adjusted R-Sq	37,0%		36,5%		38,2%		30,0%		30,8%		32,7%		32,1%		31,4%		28,5%	
within R-Sq	28,3%		27,4%		29,6%		19,5%		24,3%		23,0%		21,5%		22,6%		20,0%	
F test that all u_i=0	0,0%		0,0%		0,0%		0,0%		0,0%		0,0%		0,0%		0,0%		0,0%	
Number of observations	5033		5043		5052		5023		5026		5005		4982		4983		5020	
Rho - intraclass correlation	15,3%		11,6%		11,1%		17,4%		8,4%		13,6%		16,4%		10,8%		10,6%	

** indicates significance at the 1% level, * at the 5% level, and + at the 10% level.

This table shows the results of multivariate analysis to test hypotheses H1 and H2. Nine models are shown, one for each component of the Innovation Management system. Group dummies are not reported for clarity.

Table 4 – Interactive Effects of Antecedents on Components of the Innovation Management System

	Leadership		Strategy		HR policies		Organizational Structure		Value chain management		Knowledge management		Innovation mgmt. process		New serv.& prod. develop.		Orientation to results	
	(model 2.1)		(model 2.2)		(model 2.3)		(model 2.4)		(model 2.5)		(model 2.6)		(model 2.7)		(model 2.8)		(model 2.9)	
Variables	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.
Adjusted R-Sq (Base model)	37,0%		36,5%		38,2%		30,0%		30,8%		32,7%		32,1%		31,4%		28,5%	
Akaike Information Criterion (AIC)	11.944,4		11.199,7		11.944,4		11.944,4		11.210,9		11.944,4		12.605,9		11.944,4		11.199,7	
Cynicism x Inn.Eff.Obliviousness	-0,02	* 0,03	-0,02	** 0,01	-0,05	** 0,00	-0,04	** 0,00	-0,03	** 0,00	-0,04	** 0,00	-0,04	** 0,00	-0,04	** 0,00	-0,03	** 0,00
Adjusted R-Sq	37,0%		36,6%		38,4%		30,1%		30,9%		32,8%		32,3%		31,5%		28,6%	
Delta AIC [(-) improves ; (+) worsens]	-0,9		-3,7		-17,4		-8,0		-5,6		-7,3		-11,0		-11,0		-7,2	
Cynicism x Skepticism	-0,02	. 0,15	-0,01	. 0,31	-0,03	** 0,01	-0,03	** 0,00	-0,03	+ 0,07	-0,02	. 0,12	0,00	. 0,82	-0,03	+ 0,06	-0,01	. 0,34
Adjusted R-Sq	37,0%		36,5%		38,2%		30,1%		30,9%		32,7%		32,1%		31,4%		28,5%	
Delta AIC [(-) improves ; (+) worsens]	-0,5		1,2		-3,5		-2,6		-1,6		0,3		1,9		-2,9		1,1	
Inn.Res.Awareness x Skepticism	0,06	+ 0,06	0,07	* 0,04	0,06	+ 0,08	0,05	. 0,17	0,04	+ 0,06	0,05	. 0,19	0,05	. 0,15	0,06	* 0,05	0,03	. 0,26
Adjusted R-Sq	37,0%		36,6%		38,2%		30,0%		30,8%		32,7%		32,2%		31,4%		28,5%	
Delta AIC [(-) improves ; (+) worsens]	-2,2		-4,5		-3,2		-0,9		-0,5		-0,6		-0,3		-2,4		0,7	

** indicates significance at the 1% level, * at the 5% level, and + at the 10% level.

This table shows the results of multivariate analysis to test interaction effects.Twenty sevenr models are shown, three for each component of the Innovation Management system. Group dummies are not reported

Appendix 1 – Components of Innovation Management Frameworks

Lawson & Samson 2001	Adams et al 2006	Davila, Epstein, and Shelton 2006	Tidd & Bessant 2009	Crossan & Apaydin 2010	CPE - MBNQA	MIC Instrument
Vision and strategy	Strategic orientation	Innovation Model	Strategy	Leadership	Leadership	Leadership
Harnessing the competence base	Strategic leadership	Strategy	Organization	Structure	Strategic Planning	Strategy
Organizational intelligence	Culture	Organization	Learning	Mission, goals, and strategy	Customer focus	HR Policies
Creativity and idea management	Structure	Processes	Processes	Structure and Systems	Workforces focus	Organizational structure
Organizational structures and systems	Knowledge management	Metrics	Networking	Resource Allocation	Process management	Value chain management
Culture and climate	People	Rewards		Org. Learning & knowledge management	Measurement, analysis, and knowledge management	Knowledge management
Management of technology	Resources	Learning		Organizational culture	Results	Innovation process management
	Innovation process management	People & culture		Business processes		New product and service development
				Innovation (process & outcome)		Results

Appendix 2 – Measures of the MIC instrument

Dimension	Code	Item
Environmental dynamics	env1	Our customers know what they need and are more demanding.
	env2	Competition has increased and is more and more tough
	env3	This Company is forced to keep its costs low-
	env4	This Company requires more specialized personnel and technical knowledge.
	env5	Our industry is subject to frequent technological changes.
	env6	The net income of the Company is affected by economic, political and social factors.
	env7	The Company has to comply with more stringent environmental regulation.
Leadership	lid1	The C-Suite and the Board include the innovation concept in all the company's processes.
	lid2	The C-Suite and the Board are committed to innovation: They secure availability of resources, and encourage personal initiative, etc.
	lid3	The C-Suite and the Board have included innovation as one of the core values of the company.
	lid4	The C-Suite and the Board are committed to the permanent review of the way we innovate, implementing improvement whenever is necessary.
Strategy	stra1	The Company has a clear and defined way to develop and implement its strategy.
	stra2	The Company is willing to include innovative ideas (from internal personnel or external organizations or individuals) in the development of its strategy.
	stra3	The Company has a working plan, financial resources and sufficient personnel to fulfill the innovation objectives.
	stra4	The gap between the ideal and actual scenarios is analyzed to set new objectives and periodic improvements.
HR policies	hrp1	Personnel selection aims at recruiting individuals with knowledge and experience different than those of the company.
	hrp2	Our personnel development policies promote technical knowledge, creativity and team work in support of innovation.
	hrp3	Personnel performance review favor initiative and the contribution from workers.
	hrp4	Incentive policies (economic and non-economic) contribute to the innovation (reward original ideas, entrepreneurial spirit, information sharing, etc.).
	hrp5	The Company possesses communication systems to share new ideas and innovations.
	hrp6	The Company encourages workers to know other experiences to support the innovation effort.
	hrp7	The Company constantly review that the personnel policies and processes favor innovation.
Organizational structure	org1	There are one or more areas with innovation responsibility within my company.
	org2	The individual in charge of innovation in my Company reports to the General Manager.
	org3	There is a specific Budget in my Company for innovation projects, separate from the main budget.
	org4	There are multidisciplinary teams in my company with innovation responsibility.
	org5	Daily work and pressure for results ARE NOT obstacles to innovation.

Assessing the construction of Innovation Capabilities - Influences at the individual, organizational, and structural levels

Dimension	Code	Item
Value chain management	vcm1	My Company identifies and evaluates new technologies that could have an impact on its products, processes and results.
	vcm2	My Company actively promotes cooperation among suppliers, clients and other external agents.
	vcm3	My Company is committed to having long and stable relationships with its suppliers and customers.
	vcm4	My Company seeks ventures and external cooperation that enhance new technology's evaluations.
Knowledge management	knw1	There is a "library" with experiences, projects, ideas, etc., available for consultation by anybody within the company.
	knw2	There is a systematic process to decide knowledge the Company should acquire or develop.
	knw3	The Company promotes the usage of the acquired knowledge.
	knw4	The Company is always seeking new innovation opportunities, observing the competition and its environment.
Innovation management process	inm1	There is a strict management control at use in my Company.
	inm2	There is a formal innovation process in my Company (with activities, responsible parties and decision points), with high visibility.
	inm3	There are permanent improvement reviews to the innovation process.
New services and product development process	dev1	The Company plans the development of new products and services, clearly defining the goals, budgets and responsibilities.
	dev2	New products or services development starts with a specific requirement and it is conducted by multidisciplinary groups.
	dev3	Testing of new products or services is always by means of prototyping or piloting.
	dev4	The C-Suite and the Board care about the continuous redesign and improvement of organizational processes
Orientation to results	res1	Processes are controlled with specific tools like software, follow-up systems, etc.
	res2	Meeting goals and objectives is always under review in my Company.
	res3	Formal specific innovation goals have been established in my Company (i.e. percentage of sales coming from new products).

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