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PERSPECTIVES ON INNOVATION MANAGEMENT OF ECUADORIAN COMPANIES: EMPIRICAL EVIDENCE

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This paper examines the relationship of 40 practices of innovation management lifted from Tidd *et al.* (2013, p. 634) in 477 Ecuadorian companies. The sample is from the period 2013–2014 and are divided into micro, small, medium and large enterprises. The management practices are divided a priori into 5 constructs (strategy, processes, organisation, relationships and learning). We then carry out a descriptive analysis, where the degree of the implementation of practices in the entirety of the businesses are stipulated. Later, we test a model with inferential analysis (multiple regression analysis) where the degrees of significance of the practices are determined within each construct and their relation to the size of the companies. The innovation management potential in the Ecuadorian business environment is also discussed. The results show, that companies are far from displaying

constant management practices in innovation, as such, general recommendations for companies in the study are given.

Keywords: Innovation; strategy; management.

Introduction

The competitiveness of a nation depends on the ability of its industries to innovate and improve their activities (Porter, 1998). In the same vein, Scott and Lodge (1995) reason that competitiveness is increasingly a matter of structures and strategies, and the reverse is increasingly a consequence of the natural resource endowment of a country. Meanwhile, Ezeala-Harrison (1999) shows that competitiveness in international terms could be defined as the relative ability of companies from one country to produce and market products of superior quality at lower prices.

As such, nations seek competitive advantages that differentiate and empower their business in international markets as this produces the expected benefits for the population (Porter, 1998). At the same time, each organisation knows *a priori* that innovation is an important part of the industrial engine of an economy. Heunks (1998) reinforces this fact by noting that innovation tends to increase growth and business efficiency due to the investment incurred. Therefore, the extent to which knowledge and financial resources are effectively managed is linked to the advantages obtained from innovation (Darroch, 2005). In this sense, we see that companies have had to reallocate their factors of production — as demonstrated by a study with Asian companies (van der Zee, 2006) — to build a competitive advantage through the discovery, access, mobilisation and utilisation of knowledge worldwide (Doz *et al.*, 2001). Innovative practices should be an integral part of everyday operations for organisations as they generate potential economic and social changes for maintaining high levels of profitability (Drucker, 1998; Christensen, 1997). In itself, innovation becomes the expression of the dynamic capabilities of organisations (Teece *et al.*, 1997). In this regard, it is important to mention the Competitiveness Index measured by the The Global Competitiveness Report 2011–2012, which stresses Ecuador as one of the countries with progress on the issue of competitiveness (compared to the previous year). In fact, Ecuador jumped four places from 105 to 101. In terms of innovation, Ecuador is ranked 103rd with a score of 3.76 with 5.79 (Switzerland) scoring highest. Furthermore, the progress of Ecuador in the general index of basic citizen requirements in 82nd position, highlights progress in macroeconomic policies (40th position), health and primary education (70th position) followed by rates in infrastructure and institutional development (94th and 125th positions, respectively). The report highlights Ecuador as one of the three Latin American countries that have experienced sustained growth in the competitive factors and environmental indicators.

This overall increase in productivity for Ecuador is due to trade liberalisation which has had a positive and significant effect on various economic agents which have focused mainly on industrial manufacturing exports in recent years (Wong, 2009). This helped with the commercial liberalisation of production factors, aimed at developing the country, theoretically helping the country's poorest (Winters *et al.*, 2004).

As such, the aim of this paper is to analyse the context of innovation management in Ecuadorian companies based on questionnaire proposed by Tidd *et al.* (2005). The paper is structured as follows: in the next section we present the theoretical framework of innovation. The methodology employed follows by proposing a basic multi-variable regression model. Finally, we present the discussion and conclusions sections.

Theoretical Framework

The search for the "creative destruction" of Schumpeter (1950) directs us towards a constant exploration to create something new, which simultaneously destroys the old rules and sets new ones, altering the economic balance of a given market and generating extraordinary profits above the market average. This is what we call *innovation*. Innovation is divided into radical and/or incremental innovation, which generates something new for the world in the first case and one that generates continuous changes in processes in the incremental case, with both mechanisms having positive effects on organisational performance (Ettlie, 1999: Lin and Chen, 2007; Bhaskaran, 2006; Auken *et al.*, 2008). The above guides the organisation to stay in the market depending on the spaces and navigating between the different types of innovation known as the four Ps. (Process, Paradigm, Product, Position) (Francis and Bessant, 2005).

In the same vein, we know that manufacturing sectors maintain high levels of organisational practices and management for new product development (Miles, 2000; Tidd *et al.*, 2005). We also note that innovation in products/processes depend on the volumes of resources (internal and/or external) that an organisation can acquire, as such to be able to stay in the market in which it operates (Oerlemans *et al.*, 2001b; Freel, 2005). It can be also seen that the service sector makes a contribution to the development of management practices in terms of Organisation, Processes, Tools, Technologies and Systems (OPTS) analysed in Tidd and Hull (2006). Likewise, we understand that there are dynamic innovation models and not all companies have equal capacities for innovation in their branches as is the case of multi-nationals (Richardson and Khan, 2002). This perspective goes along with the complexity of acquiring and developing new technologies for

human and business networks and capabilities to maintain high levels of continuous training of their professional staff (Tidd, 1997).

The organisations take information from the competitive environment in which they are involved in order to develop new values (technological solutions) to maintain or expand their market position. From this, we understand that innovation is based on knowledge as an ongoing process that has a pattern to follow (routines and/or organisational practices) to thus reduce the uncertainty or lack of resources required to maintain continuous growth and/or strategic maintenance, generating competitive advantages that position us in the market (Porter, 1980).

Continuous innovation, as an incremental strategy, very often occurs *a priori* within a set of rules and/or established relationships, where actors (entrepreneurs of all sizes) tend to play an active role in the search for greater productivity, efficiency and market dominance. Discontinuous innovation, as a management strategy, aims to achieve a radical innovation in products and/or processes, which requires a huge effort for any organisation, as it will need large investments in R&D. This would practically make normal development go awry which should be organised (a lack of rules of the game), leaving much of the decision making to chance (random), without guaranteeing a product and/or process being truly radical (Tidd *et al.*, 2005).

Based on the above, it can be argued that innovation depends not only on a strategy, but on several components that generate a knowledge-based architecture with different mechanisms in different types of innovation (Tidd *et al.*, 2005). Therefore, is difficult to associate innovation to a particular type of technology or market as such (Henderson and Clark, 1990).

Our research argues that the evaluation of innovation management is not such an easy task, and there have been several attempts to generate kits, models and tools to measure innovation management (Ayhan and Oztemel, 2014; Francis, 2001; Utterback and Abernathy 1975; By, 2005; By *et al.*, 2011; Bessant and Caffyn, 1997; Didonet and Díaz, 2012). Our particular study focuses on evaluating five important areas in innovation management suggested by Tidd *et al.* (2005): organisation; processes; strategy; relationship; learning. We specified these areas in the questionnaire that has been applied to the studied sample of Ecuadorian firms.

According to Tidd *et al.* (2005), "organisation" allows us to know whether an organisation has adequate methods of developing new technological processes, if there is the flexibility to implement new practices that lead us to develop new products/processes, and to see if the organisation generates spaces to develop new ideas in the workers, etc. "Processes" indicate how to generate radical innovation in business, to see if we allocate specific resources for the exploitation of innovative options, and analyse if we are afraid to change everything we do, etc. "Strategy" indicates whether we employ approaches to research and learning in order to explore new directions in technology and markets, where we see if we

work as peripheral users to develop new products and services, etc. "Relationships" allow us to see whether we focus on innovative practices and improve practices, to see if we practice open innovation, networking outside our company from which we get a constant stream of challenging ideas, etc. Finally, "learning" lets us know whether we use formal techniques to manage and learn from outside of our industry, we use technology that helps us to be more agile and quick in awareness and response to emerging threats and peripheral opportunities etc.

The above leads us to ask whether there are institutionalised practices that lead to sustained growth of the innovation variable within a scheme of "innovation management" within productive organisations in Ecuador. Otherwise, everything could be random, and down to the circumstances of an organisation (of its own struggle to survive). In this regard, we discuss the following hypothesis:

H_1: Ecuadorian firms emphasize different practices of innovation management according to their size.

To discuss this proposition, we reviewed the literature and found that the measurement model of innovation management presented by Tidd *et al.* (2005) is a suitable model and has been tested by the authors in various countries with different types of organisations. The measurement model proposed by the authors contains 40 questions that refer to management practices regarding continuous and/or incremental innovation pattern, and discontinuous innovation patterns. The practices are enclosed in five constructs: strategy, processes, organization, relationships and learning.

Methodology and Model

The research is descriptive with a quantitative emphasis. In this regard, our work is based on the implementation of the questionnaire proposed by Tidd *et al.* (2005) and consisted of 40 questions divided into the 5 factors: strategy, processes, organisation, relationships and learning. The questionnaire was translated into Spanish for application in Ecuador.

The questionnaire was designed to answer the question "How well do we manage innovation?" The survey was a self-assessment tool that consists of assertions and denials, and was measured via the Likert Scale (1932) in which 1 is "not true at all" and 7 is "Very true" (see the questionnaire in Appendix A). The results helped us see if there was a behavioural pattern of the organisations when approaching the subject of continuous and discontinuous innovation in different time periods.

In order to classify the micro, small, medium and large enterprises of Ecuador, we have taken as reference the company size by the number of employees, as set forth in Resolution 1260 issued by the Secretariat of the Andean Community,

Lima (Peru). This resolution has been accepted by the Organic Code of Production, Trade and Investment of Ecuador. In this regard, we considered micro enterprises as having between 1 to 9 employees, small enterprises as having 10 to 49 employees, medium enterprises as having 50 to 199 employees, and large enterprises as having 200 or more employees. According to the National Economic Census of 2010, there are 496.708 SMEs exist in Ecuador. For our study we split the companies according to their most profitable activity, dividing them into production companies, services and trade.

The first stage of the study was to apply the questionnaire outlined above adding to it basic data of the companies surveyed (company name, number of workers, educational level manager or senior person, indicate whether the company's R + D and how much percentage spent on R&D) and then generate a descriptive and inferential analysis using a second step of the basic econometric model of multiple linear regression. As such, we can consider that and y^*_{it} represents a censored sample (see Novales, 1993, p. 552) in a linear function of K explanatory variables (x_k where $k = 1, 2, 3, \ldots, k$):

$$y^*_{it} = \beta_0 + \beta_1 x_{1it} + \beta_2 x_{2it} + \cdots + \beta_k x_{kit} + u_{it} \tag{3.1}$$

simpler:

$$y^*_{it} = \beta_0 + \sum_{k=1}^{k} \beta_k x_{kit} + u_{it}, \tag{3.2}$$

where $i = 1, \ldots, N$ units and $t = 1, \ldots, T$ observations in the period; in matrix notation would be our econometric model:

$$y^*_{it} = \beta'_k x_{kit} + u_{it}. \tag{3.3}$$

Furthermore, u_{it} is also the error term that represents the effects of all other variables omitted from the model. That is, it is the observed variation of the dependent variable, and cannot get explained by the variation observed in the k independent variables. Expressions (3.1)–(3.3) are identical. The letters $\beta_0\, \beta_1\, \beta_2, \ldots,$ β_k are the parameters that need to be measured. β_0 is the intercept, the constant term; while the other parameters are the slopes of y^*_{it} with respect to each of K independent variables.

For the purpose of this investigation, the formulation (3.3) was used to test the 40 questions within each construct (see Appendix 1) and its relation to the size of the company (see Table 3) in this way we can determine the significance of each question with your construct.

To do this, we generated four separate databases by company size (with information from the 477 surveys and 40 practices evaluated in two years) and generate a

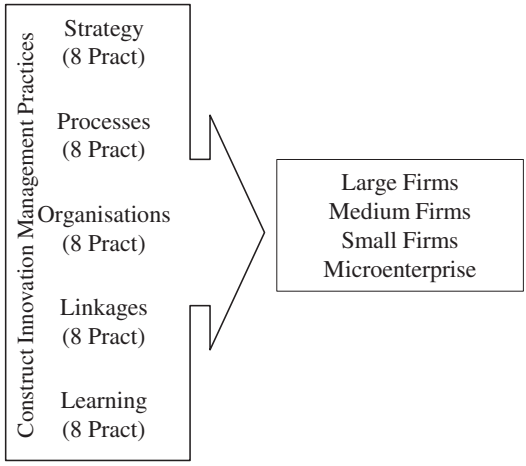

Fig. 1. Conceptual model.

regression for each construct (Strategy, Processes, Organisation, Relationships and Learning). In this regard, 24 models that validate practices regarding its construct and firm size were performed. The conceptual model is shown in Fig. 1.

Data Sampling

The sample consists of 477 micro, small, medium and large companies surveyed in Ecuador. The questionnaire was answered in two periods: second half of 2013 and first half 2014. The survey was administered by students of the Master of Business Administration, The Technical University of Loja, Ecuador, as part of the module of Research, Development and Business Innovation. The students themselves selected the companies surveyed, as they were generally companies in which they worked.

Results

Descriptive analysis of the sample

The scope of the sample reaches 477 companies, with 46.8% surveyed in 2013 and 53.2% companies in 2014. The division based on Ecuadorian law resulted in over the two years the following groups of enterprises in terms of size: 3.4% of microenterprises, 40.7% of small businesses with fewer than 50 employees, 23.9% of companies having between 50 and 199 employees (medium) and 32.1% are considered "large Ecuadorian companies" as can be observed in Table 1.

The sectors of production and services bring together 82.3% of the sample, with 17.6% in the commercial sector.

Table 1. Sample size.

Sample size (%)	
Micro	3.4
Small	40.6
Medium	23.9
Large	32.1
Total	100

We sampled a large number of professionals across all business levels (63.7% of the total), concentrating mostly on small business, and draw attention to the low number of technicians across the board in all categories of business (3.1%). Similarly, a sharp increase in the number of graduates according to company size can be observed. As the company grows the number of professionals with post graduate qualifications grows too, with it being evident the number of post graduate in large companies.

Regarding R&D for just 2014, when the questions of investment in R&D and the use of a R&D department are included, the data shows clearly that there are low levels of investment in R&D by the 254 companies surveyed in 2014. A fewer than 80% of companies state that they invest less than 1% in R&D, whereas only 42.9% of companies have a R&D department. Also, we can see that only the small, medium and large companies feel as though they are capable of generating some sort of real long-term innovations. What is remarkable is that, as the firm size increases, so too does the creation of R&D departments, with one being able to assume that there is greater awareness for the need to have a department of R&D.

Descriptive analysis of the survey

The questionnaire titled "How well do we manage innovation?" was applied in consecutive years in 2013 and 2014.

The strongest reply for the 2013 questionnaire was in relation to the section concerning strategy. This returned results demonstrating a mean high of 5.5, slightly higher than learning and organisation. With a mean of 5.9, Question 26 was the most strongly answered, claiming, that there is the support and agreement from higher levels of management for innovation within the company.

Three questions (1, 6 and 32) tied with a mean low of just 5.3 for year 2013 in strategy variable, including, that the employees have a clear understanding of how innovation can make a company more competitive, that the goals and strategy of innovation are clearly explained to the staff so that they know what it is they are looking to improve and that they have processes to examine new technological or market developments and determine what they mean to their business strategy.

The results of "strategy" construct demonstrate that the interviewees claim for to be support for innovation from higher management, however this support is not transmitted to the workers via explanations of innovation nor do they have processes to examine new technological and market developments and the outcomes of these for their business strategy.

Moving on to the results of "learning", the overall findings for the topic retrieved a mean of 5.4. Tellingly, the strongest answered question (number 15), yielding a mean of 5.9 was that the companies studied innovated most frequently when learning from their mistakes. The weakest answered question returned with a mean of just 4.5 was concerning whether companies innovate when meeting and discussing issues with other firms as a method of learning through others (question number 25).

In relation to "organisation", we were returned results with an overall mean of 5.4, a similar level to learning. A lofty 5.8 was found in reply to Question 38 showing that the companies work well in internal teams. However, the companies did not appear to agree that their reward and recognition system supported innovation, with a mean of 4.9 for question number 28 for the 224 firms researched and interviewed. These results appear to show that whilst the companies work well together in search of learning and innovation, they do not have a system of reward or recognition when this is achieved.

"Processes" was the next topic analysed in questionnaire one, having an overall mean of 5.3 for the 224 firms in the eight questions aimed at processes. The interviewees answered strongly (with a mean of 5.6) that the companies had in place appropriate processes that help the management develop new products in an effective way, from the start of the process to the product launch (Question 2). However, they did not agree so strongly with the statement that they had a clear structure for choosing innovation, with a mean of just 4.9 returned for question number 32. This is a similar sort of result that we found for organisation — with the company's management appearing to be very hierarchical in that the management is in place to decide what is done and where with little incentive for the workers in general — but without definite structures in place for the choosing of their innovations.

Finally, we arrive at "relationship" construct with a mean of 5.2. This is the most curious of the results because we actually have not only the lowest averaged answered question but also the highest. With a mean of 6.0, in question number 5, the interviewees stated that the companies have good relationships with the suppliers in which both parties are winning. However, with a mean of 4.3, in question number 14, the companies do not appear to have good ties with the universities or other centres of research to help develop understanding of innovation. This is interesting because it begs the question as to why, if they have good relationships with their suppliers, do they not work with them to discuss innovations (as shown previously with the results of learning). Perhaps it is an innate protection from the

companies in wanting to internalise procedures and not use outside sources such as other companies, universities, or research institutions to consult in methods of innovation or change.

In regards to the 2014 questionnaire it is shown that there has been a decrease in all five dimensions (Strategy, Processes, Organisation, Relationships and Learning) as opposed to the results from the 2013 questionnaire.

The strongest reply for the 2014 questionnaire (similarly to 2013) was in relation to the sections concerning strategy and learning. These returned results demonstrating a mean high of 5.3, slightly higher than organisation. With a mean of 6, question 5 was the most strongly answered, claiming, that the company has good relations with the suppliers, in which both companies come out winning.

The weakest reply for the 2014 questionnaire was in regards to relationships (the same as the 2013 questionnaire). However, the results of this construct revealed a lower mean of 4.9 as opposed to 5.2 a year earlier. Question 14 (belonging to the relationships section) had the lowest score with a mean of just 3.8, suggesting that the companies do not have good contacts with universities or research institutions helping them to work together and improve knowledge and understanding.

It can be observed in Table 2, that the mean of each dimension and its relation with size differs in all types of companies which lead us to accept H_1. The dimension *organisation* is the one with the highest average for the years (2013, 2014) with 5.7 and 5.6, respectively in microenterprises. The lowest average is from the year 2013 in the relationships dimension with 4.7, increasing in the year 2014 to 5.4 points for microenterprises.

These results showed quite a dip in regards to the results from 2013. Figure 2 (radar graph) shows these findings in graph form. Strategy, learning and organisation are the strongest ways of demonstrating how the companies manage innovation, whilst processes and relationships are the weakest.

Table 2. Relationship size/years and constructs of innovation.

	2013				2014			
	Micro	Small	Medium	Large	Micro	Small	Medium	Large
Strategy	5.3	5.5	5.5	5.5	5.4	5.2	5.3	5.4
Processes	5.3	5.3	5.2	5.4	5.2	5	5.1	5.2
Organisation	5.7	5.4	5.5	5.3	5.6	5.3	5.3	5.1
Linkages	4.7	5.3	5.2	5.3	5.4	4.9	5	5.1
Learning	5	5	5	5	5	5	5	5

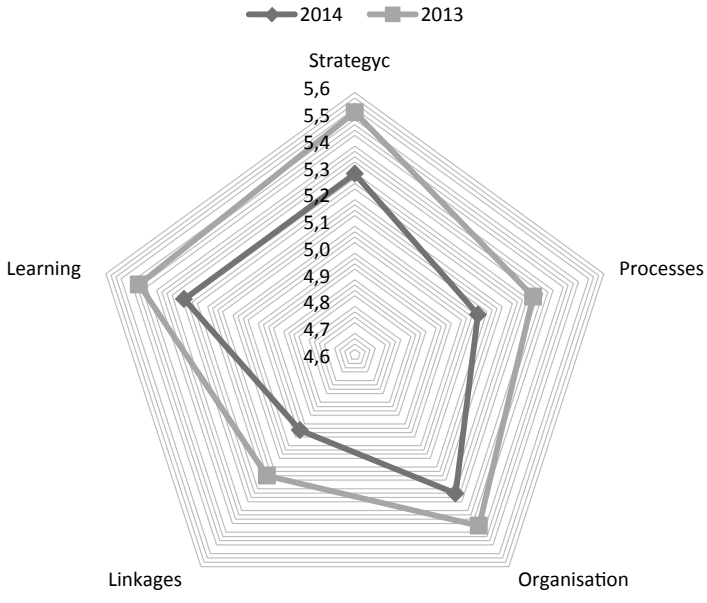

Fig. 2. Radar graph.

Table 3. Result of linear regression model: including questions of each construct given (dependent variables) and firm size (independent variables).

Companies	Strateg*		Proces*		Organ*		Linkag.*		Learn.*	
	Quet.	Sig.	Quet.	Sig.	Quet.	Sig.	Quet.	Sig.	Quet.	Sig.
**Large	Q6	0.018	Q7	0.001	Q13	0.031	Q19	0.018	Q30	0.05
					Q38	0.001				
**Medium	Q1	0.007	Q7	0.005	Q3	0.018			Q25	0.043
	Q16	0.008					No Sig.		Q15	0.047
	Q21	0.035								
**Small	Q31	0.016	Q2	0.001	Q33	0.001	Q9	0.034	Q15	0.028
			Q27	0.043	Q38	0.022	Q14	0.026	Q20	0.000
							Q24	0.002	Q25	0.000
							Q34	0.007		
							Q39	0.000		
***Micro	No Sig.		No Sig.		No Sig.		No Sig.		No Sig.	

*$N = 477$ (2013–2014).

** Lineal regression models $p < 0.05$.

***Lineal regression models $p > 0.05$.

Inferential analysis of the survey

For the inferential analysis, we have generated a Pearson correlation analysis with 40 variables. Only two variables can be observed with a relatively high level of correlation (0.70). More, the results of the Pearson correlation for the independent variables did not show problems of multicollinearity once the highest was 0.70, which did not represent a problem for subsequent analysis that implies a relationship of dependence (Lin and Chen, 2005). Following the methodology of Tidd *et al.* (2005), there are eight questions related to each construct studied.

Generating a detail of the questions that were significant in the sample we note that, in the construct *strategy*, results of Question 6 of the questionnaire reveals that all employees of large companies have clarity on the innovation goals of the company, i.e., there would be a reinforcement of teamwork and a vertical communication theme of innovation.

Regarding the segment of medium companies Questions 1, 16 and 21, that relate to the knowledge of employees in general terms are significant. This idea is reinforced by the fact of using tools and forecasting techniques to overcome the threats and enhance opportunities (Question 16 of the questionnaire).

For the construct *process*, the results of Question 7 are repeated in the large and medium enterprises of the sample, hinting to an internal order of organisations regarding deadlines and operating costs of innovation projects. This would lead us to think that there is a good drive between both companies (large and medium enterprises), given that there is a more structured relationship between the two groups. In the case of small businesses, the results of Question 2 indicates that the organisations have adequate processes that help them manage or develop new products (from idea to launch) and results of Question 27 indicates that companies have adequate mechanisms to ensure the involvement of all departments of the company in developing new products/processes.

In the construct *organisation*, the results of Question 38 revealed greater significance in large and small businesses. We argue, therefore, that organisations teamwork is essential for Ecuadorian large and small companies. In the case of the large firms, the results of Question 13 reinforce the fact that in a high level business, the company staff suggests ideas to improve products and processes, which can also denote the fact that much R&D departments is concentrated in large firms. In the case of medium-sized enterprises, the results of Question 3 indicate that organisational structure does not stifle innovation, in fact, it helps generate innovation.

The construct *relationships* becomes the most dispersed variable from the sample, since it only has significant questions for the large and small enterprises. The questions associated with analysis revealed that have no business relationship

between the two groups (not significant between groups were repeated questions). In large companies, only Question 19 is significant and indicates the importance of working close to customers in developing new concepts in products and processes. These levels of work close by and for customers in large companies is something that we could call normal, which in the case of Ecuador, would reflect an accommodation of business universal ideals. For small businesses and their level of relationship, we can see that are in line with all matters relating to generate actions that positioned at a place in the market because. In this case, the results of Question 9 indicates that small enterprises revise their projects to improve future performance. The results of Question 14 showed that working with universities and research centres to develop new knowledge is a practice in small firms. The results of Question 24 indicate the effort to collaborate with other companies to develop new processes and products. The results of Question 34 exhibit the fact of being close to the formal education systems to communicate their training needs and/or training.

It can be seen for the construct *learning*, that Questions 15 and 25 are repeated with a higher level of significance. In the sample, large and small businesses have an important significance for Question 15, which makes it clear that learning from mistakes in each organisation (beyond size) is something that generates significant thought and attention to the particular. The Question 25 is repeated in medium and small enterprises, indicating a strong interest in generating ties with other companies to learn. Both questions 15 and 25 show us that Ecuadorian companies are willing to learn as much from their mistakes and finding new ways to make them grow with their peers, which would mean a clear focus on the business associativeness.

Conclusion and Recommendations

Although, we know that companies do not need to be highly innovative in order to have good results (Yamin *et al.*, 1999), we cannot stop thinking about the results of global innovation index (Global Competitiveness Report-GCR 2011–2012) of Ecuador. In that sense, perhaps the increased rate is improved by 12 pillars of global competitiveness which measures the GCR (mainly macroeconomic pillars) and not for a strong change within Ecuadorian companies. In this respect, the results of our study point out that any micro manages to have significant responses to the regressioned variables. If so, the issue of the management of innovative practices in Ecuador, will be presented only in small, medium and large enterprises with mixed results.

Having implemented Tidd and Bessant's (2013) survey in 477 Ecuadorian companies it can be argued that only 22 of the 40 practices (55%) were significant in relation to the proposed econometric model, which revealed that the number of responses is low, since we must consider that of the 22 variables 4 are repeated in different econometric models. This shows a concentration of responses in different business levels except for microenterprises, which could be interpreted as a repetition of practices in specific topics depending on the size and activities of the company. For example, Question 25 has the same significance for small and medium enterprises (sharing experiences with other companies). This shows that they are making efforts together (without discrimination even if they are private sector efforts as such or the same economic sector) through the support of business associations or government support (through special public policy).

Out of the five constructs studied, the strategy construct was the highest rated by respondents, with 5.4 points on average, followed by learning (5.35), organisation (5.30), processes (5.3) and linkages (5.0). This shows that the Ecuadorian companies have a strong focus on teamwork, demonstrating clarity on issues of vision, mission and values that surround an organisation. Worth noting that this symmetry is found strongly marked in medium and large enterprises.

Finally, our study has generated a basic radiography of innovation management in Ecuador. Overall, companies present different emphasis on innovation management practices depending on their size. Therefore, our study hypothesis (H_1) was accepted. The businesses are still far from generating sustained innovation practices. There are no indications that companies maintain a register of ongoing and/or incremental innovation or maintain a pattern of discontinuous innovation.

In this regard, we generally recommend that the Ecuadorian companies generate incentive programs for the management of innovation and next to it, exploit synergies that could be achieved with strategic agreements with universities and research centres, eliminating the academic distance today clearly reflects an organisational disadvantage. At the same time, we suggest to companies to maximise the good relationships they have with suppliers and customers in order to strengthen the internal supply chain. This could help enterprises to expand the search for open innovation as a way to grow in the various sectors of international markets (Chesbrough, 2005) and achieve a level of performance with multinational companies as evidenced by the study of Williams and Vossen (2014).

We recommend that companies generate programs and practices of teamwork oriented to the management of innovative practices that enhance the participation of employees at all levels. From the above, companies must generate effective communication systems (from top to bottom and from bottom to top) and generate economic and social incentives to support innovation and/or form specialised teams in the field, stimulating a project-based organisation, bringing together

different elements into an integrated whole. This usually includes several companies, long periods and high levels of technological hazards that may help in the long term (Gann and Salter, 2000).

Regarding business relationships, it is observed that most of the practices are exercised, but more concentrated in small businesses, especially those related to improving systems training and staff development, this helps to strengthen networking with other firms and markets. Therefore, it should be recommended that companies should strengthen relations with its suppliers, better understand the needs of their customers (through market surveys and other means of approachment), learn from the experience of competition organisations, and constantly evaluating the innovation management of the organisation.

Lines of future research should focus on the similarities and differences between business sizes, to explore whether there is a universal model for innovation as noted by Mazzarol *et al.* (2014) in a study of OECD countries, more approaching the concepts and comparisons within the Ecuadorian context.

Appendix A. Questionnaire

How Well Do We Manage Innovation?

This simple self-assessment tool focuses attention on some of the important areas of innovation management. Below you will find statements which describe 'the way we do things around here' — the pattern of behaviour which describes how the organization handles the question of innovation. For each statement simply put a score between 1 (= not true at all) to 7 (= very true).

	Statement	Score 1 = Not true at all to 7 = Very true
1	People have a clear idea of how innovation can help us compete	
2	We have processes in place to help us manage new product development effectively from idea to launch	
3	Our organization structure does not stifle innovation but helps it to happen	
4	There is a strong commitment to training and development of people	
5	We have good 'win-win' relationships with our suppliers	

Appendix A. (*Continued*)

	Statement	Score 1 = Not true at all to 7 = Very true
6	Our innovation strategy is clearly communicated so everyone knows the targets for improvement	
7	Our innovation projects are usually completed on time and within budget	
8	People work well together across departmental boundaries	
9	We take time to review our projects to improve our projects to improve our performance next time	
10	We are good at understanding the needs of our customers/end-users	
11	People know what our distinctive competence is — what gives us a competitive edge	
12	We have effective mechanisms to make sure everyone (not just marketing) understands customer needs	
13	People are involved in suggesting ideas for improvements to products or processes	
14	We work well with universities and other research centres to help us develop our knowledge	
15	We learn from our mistakes	
16	We look ahead in a structured way (using forecasting tools and techniques) to try and imagine future threats and opportunities	
17	We have effective mechanisms for managing process change from idea through to successful implementation	
18	Our structure helps us to take decisions rapidly	
19	We work closely with our customers in exploring and developing new concepts	
20	We systematically compare our products and processes with other firms	
21	Our top team have a shared vision of how the company will develop through innovation	
22	We systematically search for new product ideas	

Appendix A. (*Continued*)

	Statement	Score 1 = Not true at all to 7 = Very true
23	Communication is effective and works top-down, bottom-up and across the organization	
24	We collaborate with other firms to develop new products or processes	
25	We meet and share experiences with other firms to help us learn	
26	There is top management commitment and support for innovation	
27	We have mechanisms in place to ensure early involvement of all departments in developing new products/processes	
28	Our reward and recognition system supports innovation	
29	We try to develop external networks of people who can help us — for example, with specialist knowledge	
30	We are good at capturing what we have learned so that others in the organization can make use of it	
31	We have processes in place to review new technological or market developments and what they mean for our firm's strategy	
32	We have a clear system for choosing innovation projects	
33	We have a supportive climate for new ideas — people don't have to leave the organization to make them happen	
34	We work closely with the local and national education system to communicate our needs for skills	
35	We are good at learning from other organizations	
36	There is a clear link between the innovation projects we carry out and the overall strategy of the business	
37	There is sufficient flexibility in our system for product development to allow small 'fast-track' projects to happen	

Appendix A. (*Continued*)

	Statement	Score 1 = Not true at all to 7 = Very true
38	We work well in teams	
39	We work closely with 'lead users' develop innovative new products and services	
40	We use measurements to help identify where and when we can improve our innovation management	

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