ORGANIZATIONAL STRUCTURE AND INNOVATION: ANALYSIS FROM THE STRATEGIC CO-ALIGNMENT

Introduction

The researchers have been interested in understanding the variables that foster innovation within organizations and they have found, in their studies, that innovation has a positive influence on performance (Damanpour, Walker, and Avellaneda, 2009; Hee-Jae and Pucik, 2005; Jiménez-Jiménez and Sanz-Valle, 2011; Stock and Zacharias, 2011; Terziovski, 2010; Walker, Damanpour, and Devece, 2011) and on a company's organizational structure (Dalton et al., 1980; Fegh-hi, 2010; Menguc and Auh, 2010; Pleshko and Nickerson, 2008; Santra and Giri, 2008). Similarly, other authors too have presented evidence of the relationship between innovation and organizational structure (Aiken, Bacharach, and French, 1980; Menguc and Auh, 2010; Sahay and Gupta, 2011). Despite the extensive review, we found that the influence that structural variables have on innovation is yet an incipient field of study (especially in Colombia and in SMEs). In Latin America, there is barely any research linking organizational structure to innovation and very few studies that evaluate innovative development in the region (Ketelhöhn and Ogliastri, 2013). In Colombia, there is also no evidence of the existence of any works on this particular topic, except for some limited studies on organizational structure (Marín-Idárraga, 2012; Marín-Idárraga and Cuartas-Marín, 2013; Marín-Idárraga and Losada Campos, 2015). Despite ample references in other contexts, the influence of structural variables on innovation is still a field of study that has not progressed, especially when dealing with SMEs.

While some previous studies reveal the interactions between structure and innovation, there are still possible lines of research that may establish the joint and mediating relationships in strategic co-alignment constructs. In fact, some studies propose the realization of analyses that integrate multiple variables and in different contexts (Liao et al., 2011; Menguc and Auh, 2010). It is for this reason that this research, whose goal is to determine the co-varied effects of structural

variables on organizational innovation through the application of a structural equation methodology, was put together.

Given that an organizational structure is an endogenous factor that favours innovation—one which is essential for a company's competitive supply—the urgency of its consolidation and its advancement in SMEs is made evident. As such, the following research question was formulated: How does organizational structure influence innovation under strategic co-alignment conditions in Bogotá-based SMEs?

The importance of this study is justified by i) its novelty: strategic co-alignment is an understudied theoretical field with scant empirical production, especially in Colombia; ii) its appropriateness: SMEs require references in order to understand their operation and to serve as a guide in their strategic management, in this case, by observing the influence that strategic co-alignment of structural variables has on innovation; and iii) its relevance: since the verification of the hypothesis will lead to theoretical progress in unchartered territories.

This paper is divided into 4 sections: the first section contains the theoretical framework and hypothesis formulation; the applied methodology is detailed in the second; the results and analysis are presented in the third; while the conclusions, limitations, and future research possibilities are indicated in the last.

Theoretical framework

The strategic co-alignment theory

The Strategic Co-alignment Theory goes beyond the Structural Contingency Theory to indicate that performance does not appear by the mere inclusion of structural variables induced into the organizational design by the environment, but that these variables must be subject to a strategic fit to enhance organizational performance (Ensign, 2001).

The origins of this theory go back to the initial works of Drazin and Van de Ven (1985), Donaldson (1987) and Fry and Smith (1987) in the organizational field, and of Venkatraman and Camillus (1984) and Venkatraman (1989) in the field of strategic management. The common features of the different approximations are the consideration of a necessary coherence, referred to as fit which has been assumed as a linguistic symbol to explain the synchrony, consistency or coherence required between situational factors, endogenous structural variables, and organizational performance, from an integrated holistic perspective. That is, something which some authors such as Nadler and Tushman (1999) have chosen to call congruence.

Notwithstanding the criticisms for the Structural Contingency Theory, particularly for its lack of clarity on how the organizational structure is adjusted to contingent factors to secure better performance (Fry, 1982; Schoonhoven, 1981), various authors have been interested in filling these voids and have thereby presented theoretical models supporting subsequent studies (Donaldson, 1987; Drazin and Van de Ven, 1985; Venkatraman and Camillus, 1984; Venkatraman, 1989). These authors agree that organizations make two basic decisions: i) they define organizational conditions that allow the company to best align with external contingency factors (exogenous fit), and ii) they assemble internal variables through strategies and processes that allow structural congruence (endogenous fit).

Lee, Park, and Kwon (2015) supported these ideas explaining: “when fit is improved due to consistency among the elements of business, firm performance also improves” (p. 332). Therefore, the central thesis of Strategic Co-alignment Theory is that superior performance is achieved when an organization is able to integrate both external and internal fit conditions. This thesis was validated in recent studies, which have demonstrated the synergistic effect of co-alignment on performance (Chatzoglou, Diamantidis, Vraimaki, Vranakis, and Kourtidis, 2011; Fuentes-Fuentes, Lloréns-Montes, Molina-Fernández, and Albacete-Sáez, 2011; Jouirou and Kalika, 2004).

Hypothesis formulation

Even though innovation has been subject to different taxonomies (Damanpour and Gopalakrishnan, 1999), for the purposes of this study, we will focus on innovation originating from a technological core, which is also known as technical innovation, something which refers to novelty in products and processes (Daft, 1978). The analysis of this innovative typology was assumed since it is what recurs most in SMEs, according to the information obtained from a technological innovation and development survey.[1]

Various studies have involved the analysis of the relationships between organizational structure and innovation (Atuahene-Gima, 2005; Chang and Hughes, 2012; Fernhaber and Patel, 2012; Jansen, Van, and Volberda, 2005; Zhang, Linderman, and Schroeder, 2012) but yielded dissimilar results of the effect and direction of the influences. The research carried out by Aiken et al. (1980), Menguc and Auh (2010) and Sahay and Gupta (2011) shed light on the impact of organizational structure on innovation. Sahay and Gupta (2011), in particular, showed that functional differentiation is positively linked to innovation, suggesting that greater formalization and centralization means lower propensity to innovate. De Pablos (1999) found that innovation is negatively linked to innovation and that it even extends the time of its adoption, while Jansen, Van, and Volberda (2006) empirically showed different influences between formalization and centralization and exploratory and exploitative innovation. Additionally, Damanpour and Gopalakrishnan (1998) made a series of theoretical approaches to propose the diverse effects that complexity and bureaucratic control have on the production of various types of innovation while Sarkees, Hulland, and Prescott (2010) found that functional differentiation exerts a moderating effect between innovation and performance. It is hereby proposed that Bogotá-based SMEs promote innovation through vertical differentiation and formalization, given that, due to their

[1] http://www.dane.gov.co/index.php/tecnologia-e-innovacion-alias/encuesta-de-desarrollo-e-innovacion-tecnologica-edit

size, they require clear parameters to guide their strategic implementation. Meanwhile, decentralization favours innovative actions by promoting ideas in the operating core.

As such, the hierarchical division of labour, standardization, and decentralization are established as major alternatives in guiding innovative behaviour. Accordingly, the following hypotheses are proposed:

H1: Differentiation positively and significantly influences innovation.

H2: Decentralization positively and significantly influences innovation.

H3: Formalization positively and significantly influences innovation.

For its part, the Strategic Co-alignment Theory suggests that the fit of endogenous structural factors is a significant determinant of superior organizational performance (Donaldson, 1987; Drazin and Van de Ven, 1985; Ensign, 2001; Venkatraman and Camillus, 1984; Venkatraman, 1990). Lee et al. (2015) held that when the environment and industrial capabilities are co-aligned, innovation increases with positive impacts on performance. Although Menguc and Auh (2010) showed that innovation acts as a mediator between organizational structure and performance, the effects under the conditions of co-alignment have not yet been studied. In view of this fact, differentiation, decentralization, and formalization of structural variables have been considered to exert a synergistic effect on innovation in Bogotá-based SMEs under greater co-alignment conditions than when taken separately. Hence, the following hypotheses was formulated:

H4: The co-alignment between structural variables has a positive and significantly greater effect on innovation.

Figure 1 summarizes the schematic reference that guides the formulation of the study hypothesis.

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Methodology

Type of study, sample and data

The exercise corresponded to a descriptive research and was carried out through an explicative and cross-sectional study (Babbie, 2010; Malhotra, 1999) to characterise the population and identify the existing effects between strategic co-alignment of the structural variables and innovation.

This research has developed a structural equation model to confirm the formulated hypotheses (Bentler and Weeks, 1980; Jöreskog, 1978). SEM (Structural Equation Modelling) models, as they are known in the field of research, are a type of multivariate technique that enables the simultaneous examination of a series of dependent relationships, in which a dependent variable can also turn into an independent one in subsequent relationships (Hair, Black, Babin, and Anderson, 2009).

According to Anderson and Gerbing (1988), a two-phase process was conducted. In the first phase, the measurement model was obtained and was then used to perform a confirmatory factor analysis on the scales used. In the second phase, the first order co-aligned structural model was obtained and was used to confirm the hypothesis.[2] Both the measurement and structural model obtained positive values in terms of degrees of freedom, determining the condition of over-identification.

In this study, the company was considered the unit of analysis while methodological issues in similar studies were taken into account (i.e., Lee and Grover, 1999; Liao et al., 2011). The characteristics of the target population are described in Table 1.

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Insert Table 1 here

[2] Data processing was performed using the EQS 6.1 software, a programme specializing in structural equations (Bentler, 2006).

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To obtain the sample from the industrial, commercial and services sectors, the probability method of simple random sampling was used, applying the formula to a finite population (Malhotra, 1999). The Benchmark database was used as a sampling framework. Following the indications of Babbie (2010) and Malhotra (1999), the companies considered for the study were reduced to those located in Bogota, and only those belonging to the commercial, service, and manufacturing sectors. These companies also belong to the SME category (in terms of number of employees) and only those existing and in operation, with available contact details and emails to send the questionnaires to, were included. The results produced 157,864 units that were available for evaluation, for which a sampling formula for finite populations was used, with an estimation error of 5%. Once the calculation was applied, a final sample with 383 companies was obtained, with a confidence level of 95%.

This data was collected in 2014, through a self-administered survey based on a structured questionnaire targeting strategic apex directors and middle management because, in accordance with (Mintzberg, 1979), they are responsible for the direction and implementation of organizational strategies, as they participate in the decision-making processes. The data was obtained by sending the questionnaires by e-mail, following the recommendations of (Dillman, 2000).

There were 284 completed questionnaires obtained at the end of the fieldwork. From this total, seven returned questionnaires had too many missing values and were thus discarded (Malhotra, 1999). This yielded a final sample of 277 valid cases, representing a response rate of 72.3% (277/383), which is considered acceptable for this type of study (Baruch, 1999) and quite high when compared to similar research previously conducted (i.e., Lee and Yang, 2011; Liao et al., 2011; Menguc and Auh, 2010). In terms of composition, come 53% (147) of the respondents were strategic apex directors, and 47% (130) were midline managers.

To verify whether there were differences between the obtained responses (in relation to the three evaluated sectors), a Kruskal-Wallis test was applied. In all cases, $p > .05$ values were obtained, indicating that there were no differences between the responses provided by directors and managers that belong to the industrial, commercial, and service sectors, respectively. Additionally, to verify whether there were any differences between the obtained responses from the two organizational levels, a Mann-Whitney *U* test was applied. In all cases, $p > .05$ values were obtained, indicating that there were no differences between the responses provided by the strategic apex directors and midline managers.

Considering that the responses were not obtained from the entire initial sample (383 companies), the non-response bias was verified using the data relating to the entire population, such as size and annual sales volume (Armstrong and Overton, 1977). The Student's *t*-test indicated that there were no significant differences between respondents and non-respondents ($p > .05$).

Measurements

The organizational structure

Generally, measurements of organizational structure are made in terms of the variables comprising the organisation (Liao et al., 2011; Menguc and Auh, 2010), all in consonance with the initial studies carried out by Pugh et al. (1968) and Hage (1965). These commonly accepted variables consider differentiation, formalization, and decentralization as major determinants of organizational structure (Dalton et al., 1980; Damanpour and Gopalakrishnan, 1998; Lee and Grover, 1999).

Differentiation refers to the division of labour within the organization, consisting of functional differentiation, or the creation of areas of functional responsibility, leading to task specialization (Kilduff, 1993) and employees' professionalization (Burton and Obel, 2014); and vertical differentiation, or the establishment of control spans, which give rise to the hierarchical chain

(Damanpour and Gopalakrishnan, 1998). In the present study, vertical differentiation was assumed and measured using three items adapted from Lee and Yang, 2011 and Lenz (1980).

Formalization comprises a control mechanism for organizational work, through the definition of labour standards and protocols that are generally documented to regulate employee behaviour (Caruana, Morris, and Vella, 1998; Mintzberg, 1979). The measurement of the variable followed a common pattern and considered the pioneering works of Hage (1965) and Pugh, et al. (1968). It is for this reason that three items based on these were adapted.

Centralization corresponds to a *locus* of decision rights within the organization (Caruana, et al., 1998; Hage, 1965) that are normally concentrated at the strategic apex (Mintzberg, 1979). The delegation of decision-making to other organizational levels corresponds to decentralization. In this study, the alternative of measuring decentralization with three adapted items from Lee and Yang (2011) was assumed.

Innovation

The analysis of innovation and its influence on organizational performance is a relevant research topic (Jansen et al., 2006; Jiménez-Jiménez and Sanz-Valle, 2011; Walker et al., 2011; Yalcinkaya, Calantone, and Griffith, 2007). Although one can say, from an intuitive perspective, that innovation has a positive impact on performance (Hee-Jae and Pucik, 2005), its direction and magnitude may not be as evident a fact that has given rise to extensive literature concerning its measurement (Walker et al., 2011).

While there exist various innovation taxonomies (Damanpour and Gopalakrishnan, 1999), the focus of this study is on technological innovation, for, in accordance with the research of Damanpour (1987), it is the one best associated with some organizational structure variables. The measurement of technological innovation is performed according to improvements or novelties in processes and products (Gopalakrishnan, Kessler, and Scillitoe, 2010). Based on this parameter,

four items were added to observe the conceptual elaborations of different authors (Damanpour, 1987; Dewar and Dutton, 1986; Gopalakrishnan et al., 2010).

Strategic co-alignment

Venkatraman (1990) defines co-alignment as a metaphor to represent the fit between different theoretical dimensions. The author, however, believes that this conception leads to a complication in measuring, given the complexity of the constructs that are sought to be empirically tested. In lieu of this, he proposes three methodological alternatives: i) an interactionist approach, based on a moderator analysis between the variables; ii) a profile deviation approach, which evaluates the congruence between variables according to their adherence to a profile, previously and externally specified by the researcher; and iii) a co-variation approach, which evaluates the internal consistency of the variables through a structural model.

Since this research makes use of a structural equation model (previously described), a co-variation perspective for measuring structural co-alignment was used.

Validity of scales

From the total number of questions that samples had to answer (277*21=5817), a minimum quantity was left unfilled (32 items). In order to maintain data completeness, the missing values were substituted based on a mean substitution imputation method (Hair et al., 2009).

In virtue of the fact that the scales used corresponded to adaptations from previous studies, the methodological literature recommends the development of corresponding validity tests (Babbie, 2010; Malhotra, 1999). Accordingly, convergent and discriminant validity tests were applied.

As stated by Hair et al. (2009), content validity is an evaluation of the level of correspondence between the selected articles, to constitute an additive scale and its conceptual definition. To achieve this validity, a pre-test was conducted wherein four expert academic judges evaluated the

questionnaire. To determine the validity of each item and their viability in the scale, the content validity index is obtained (I_{VC}). Values above 0.7 guarantee that the indicator is good and that the item is appropriate for the scale, thereby confirming its validity. In this study, all questions obtained a score of above 0.7 concluding that the scales possess content validity and require no modifications. Furthermore, a pilot test was applied to three companies selected from the sample. No critical issues were detected in their completion of the questionnaire.

Internal consistency establishes the reliability of a scale, regulating the errors of respondents as it confirms that the scales are measuring the same construct. This consistency is obtained by using Cronbach's Alpha (α) in the exploratory factor analysis, (Nunnally, 1978), and through the Scale Composite Reliability (SCR) indicator (Bagozzi and Yi, 1988) as well as the Average Variance Extracted (AVE) (Fornell and Larcker, 1981) in the confirmatory factor analysis. According to Hair et al. (2009), the consensus on the lower limit of Cronbach's Alpha and the SCR is 0.70 (although it could decrease to 0.60 in the exploratory investigation). As for the AVE, the lower limit is 0.5.

The results are presented in Table 2, from which the following can be observed: For differentiation α = 0.81, *SCR* = 0.81*, AVE* = 0.59; for decentralization *α* = 0.68, *SCR* = 0.69*, AVE* = 0.43; for formalization α = 0.79, *SCR* = 0.79*, AVE* = 0.56; and for innovation *α* = 0.84, *SCR* = 0.84*, AVE* = 0.57. According to the results, all dimensions present values above 0.7 for *α* and SCR and values above 0.5 for the AVE. The closest value to the lower limit was the one corresponding to the dimension of decentralization. This does not show, however, that the results were affected, especially when taking into consideration the appreciation of Chin (1998) for whom the SEM model rules should not be too inflexible when there are no significant deviations. Consequently, the internal consistency of the scales is confirmed.

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Construct validity

The construct validity of a scale is the degree to which certain concepts precisely represent the concept of interest (Hair et al., 2009). In general, this is carried out by calculating the convergent validity and discriminant validity, based on the construction of a measurement model (Byrne, 2006).

Convergent validity

Convergent validity estimates the degree to which attempts to measure the same concept are concordant with each other (Hair et al., 2009). To establish convergent validity, a confirmatory factor analysis was performed, applying the maximum likelihood procedure based on the covariance matrix, using the *EQS 6.1* software (Bentler, 2006). Higher scores are being sought to measure the convergent condition in one-dimensional factors, specifically with values of above 0.5 as being acceptable (Anderson and Gerbing, 1988; Fornell and Larcker, 1981).

In evaluating the goodness of fit, the measurement model was consequently obtained and various indicators suggested by available literature were used (Byrne, 2006; Hair et al., 2009).[3]

The results registered in Table 2 (previously presented) show that, although Chi squared $X^2_{(59)}$= 118.56, $p < .05$, did not provide a significant result, something which is common when samples of more than 150 units are processed (Martínez-López, Gázquez-Abad, and Sousa, 2013), the maximum likelihood method indicators CFI = 0.96, IFI = 0.96, NNFI = 0.94, RMSEA = 0.06 [0.04 – 0.08], show that the model has an acceptable fit (Bagozzi and Yi, 1988; Hooper et al., 2008). The standardized solution provided scored greater than 0.5 in all dimensions and the maximum likelihood values *t* were significant ($p < .05$), confirming convergent validity.

[3] In this sense, the following indicators were calculated a) the Chi squared based on the maximum likelihood method $-X^2/df \geq 2$ is considered acceptable (Bagozzi and Yi, 1988); b) the relative fit indices that can be used to compare the model result with another model with a worse fit—values above 0.9 are acceptable (Bagozzi and Yi, 1988; Hooper, Coughlan, and Mullen, 2008)—in this case, the comparative fit index (CFI), the non-normed fit index and the incremental fit index; and c) the root square error of approximation (RMSEA), which evaluates how close the fit is to the null hypothesis, where values lower than 0.08 are deemed acceptable (Hooper et al., 2008).

Discriminant validity

Discriminant validity indicates that each factor corresponds to a different dimension as it represents the degree to which theoretically similar concepts differ from each other (Hair et al., 2009). Discriminant validity occurs when the Average Variance Extracted is greater than the correlation squared between the constructs (Anderson and Gerbing, 1988).

In Table 3, the inter-correlations and square root of the *AVE* are given in the main diagonal, verifying that the square root of the *AVE* is greater in each case, confirming discriminant validity.[4]

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Results

Descriptive results

Table 3 (above) presents some descriptive statistics. As can be observed, mean values are closer to the high range according to the applied questionnaire (approximate values are between 4.0 and 7.0). As such, one can conclude that companies are characterized by having mechanistic organizational structures (Burns and Stalker, 1961) for they present high levels of vertical differentiation and formalization.

As regards the variable correlations, it is observed that they are significantly correlated (values lower than 0.52 indicate absence of multicollinearity). In particular, we can see that hierarchical division, the decentralization of decisions and standardization of labour facilitate innovation in

[4] To avoid squaring all correlations, the square root of the AVE is generally obtained as an equivalent value (Cegarra-Navarro, Sánchez-Vidal, and Cegarra-Leiva, 2011).

the organization. This first analysis generally indicates that organizational structure has a significant association with innovation.[5]

As for the effective sample of the study, it comprised 277 Bogotá-based SMEs, belonging to the industrial (152), commercial (58) and services (67) sectors. Most of these companies were characterized by having between 1 and 50 employees (62.8%) that have spent between 1 and 10 years on the job (45.1%) (See Table 4).

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Structural model and hypothesis confirmation

The structural model was evaluated by examining the dependence coefficients of the variables and the latent factors. The first order model was initially run to evaluate the hypothesis concerning the influences of organizational structure on innovation. An acceptable fit was obtained, according to the goodness of fit indicators.

The results presented in Table 5 indicate that differentiation has a positive but not significant influence on innovation (0.12; $t = 1.37$, $p > .05$) and, as such, Hypothesis 1 is not supported. There is a positive and significant influence between decentralization and innovation (0.29; $t = 3.12$, $p < .05$) supporting Hypothesis 2, and there is a positive and significant influence between formalization and innovation (0.40; $t = 4.20$, $p < .05$) supporting Hypothesis 3.

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Insert Table 5 here
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Finally, the structural model was run under covariation conditions (Venkatraman, 1990), whose relationships between factors and obtained results are shown in Table 6. These results indicate that the co-alignment of differentiation, decentralization, and formalization positively and

[5] All correlations present a low linear association, which means that there will be no multicollinearity issues in performing subsequent calculations.

significantly influence innovation (0.77; t = 5.35, p < .05), with a substantial increase in all factor loadings, supporting Hypothesis 4.

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Discussion

Within the framework of organizational structure, the significant correlation between its three central variables (Hage, 1965; Pugh et al., 1968) confirms that they continue to be the principal imperatives to be considered in organizational design (Aiken et al., 1980; Dalton et al., 1980; Mintzberg, 1979). Thus, the association of formalization with decentralization ($r = 0.38$; $p < .01$) and with differentiation ($r = 0.48$; $p < .01$) indicates that directors compensate the delegation of authority and assignation of rights with standards enabling them to maintain behaviour control. It is therefore confirmed that in the context of Bogotá-based SMEs, greater levels of decentralization also indicate greater levels of formalization (Burton and Obel, 2004; Hage, 1965).

Previous research has shown positive effects between organizational structure and innovation that correspond with the obtained findings (Damanpour and Gopalakrishnan, 1998; Tushman and Nadler, 1986). With regard to vertical differentiation, a greater value of positive but not significant influence on innovation was found (H1). Although some authors have already shown that differentiation favours the innovative process (Sahay and Gupta, 2011), this was not verified in this study and this is consistent with the study by Naranjo-Valencia, Jiménez Jiménez, and Sanz-Valle (2012) that showed that hierarchical culture negatively affects innovation. One possible explanation for this is that the mere creation of a span of control does not guarantee the encouragement of innovation. Presumably, in line with Hull and Hage (1982), the establishment of hierarchies in the SMEs studied yielded to a lack of clear assignment of functions enough to promote innovation, constraining the flow of creative ideas. It is also possible that this can be

attributed to different environmental and organizational conditions that mediate or moderate the influence of organizational structure on innovation, examples of which include: environmental dynamism, competitive intensity, technology, size, age and management style, among others (Lavie, Stettner, and Tushman, 2010).

From the conducted analysis, one can deduce that decentralization positively affects innovation (H2), in a way that a greater assignation of decision rights is synonymous to a greater chance of promoting innovative processes (Sahay and Gupta, 2011). This is because this innovative typology originates in the organization's technical core and flows from the bottom up; making decentralization a potentiating condition (Daft, 1978).

The findings show that formalization positively influences innovation in Bogotá-based SMEs (H3). Although these results are different from those found in other studies (Lewis, Welsh, Dehler and Green, 2002; Sahay and Gupta, 2011), they correspond to the theoretical approach of Daft (1978), in which structural variables have different influences depending on the type of innovation (administrative or technological). Thus, administrative innovation is facilitated by low formalization, whereas the reverse enables technical innovation (corresponding with the findings of this study).

Lastly, it is confirmed that in Bogotá-based SMEs, the co-alignment of structural variables is a relevant strategic alternative to potentiate innovation (H4), confirming organizational congruence theories (Ensign, 2001; Fry and Smith, 1987; Venkatraman and Camillus, 1984; Venkatraman, 1989; Venkatraman, 1990). These theories establish that better organizational results are obtained when the company reaches a fit of its structural factors to work against the exogenous forces affecting it. This study found that individual differentiation has no significant effect on innovation — rather, the co-alignment of differentiation with formalization and decentralization plays an important influence on innovation.

Conclusions and implications

Although there exists an important spectrum of research concerning organizational structure and its effects on innovation (Fegh-hi, 2010; Lee and Yang, 2011; Lee and Grover, 1999; Lenz, 1980; Menguc and Auh, 2010; Sahay and Gupta, 2011), very few studies have integrated those different variables into one single construct in the framework of strategic co-alignment, especially in the case of Colombia and SMEs, where there is still much work to be done.

In this study, it was observed that hierarchical division does not influence innovation, whereas decentralization and formalization do. However, when these structural variables were jointly evaluated (in strategic co-alignment), an increased and significant effect on innovation was observed.

This study provides two important contributions:

i) Although the main variables of the organizational structure are well identified and defined in the pioneering studies of the Aston group (Donaldson and Luo, 2014), its conjoint analysis has provided little empirical evidence to advance the development of the theory. This work contributes in this direction by confirming that the co-alignment of structural variables possesses a greater capacity to influence innovation than when evaluated separately. It specifically shows that innovation is favoured when the organizational structure is decentralized, through the allocation of decision rights guided by control systems (formalization). This study, therefore, displays synergy and goodness of fit (Plugge, Bouwman, and Molina-Castillo, 2013) as conditions to consider in the research of strategic streams. In addition, a co-variation method that can be replicated in checking theoretical models of fit is herewith introduced, in line with Venkatraman (1990).

ii) For strategic management, this study provides elements of understanding in terms of organizational performance. It shows managers that innovation improves when the

organizational structure is formalized and decentralized. It also shows that the synergistic property of the organizational systems is verified (Kast and Rosenzweig, 1972) if formalization, decentralization, and differentiation are co-aligned. Although the topic of innovation has become a central issue in the processes of contemporary management and is considered as one of the most decisive factors in competitiveness (Huang, 2011), practitioners and managers require clear guidance on organizational conditions and facilitators to encourage innovative processes (Ariss and Deilami, 2012, Urgal, Quintás, and Tomé, 2011). In terms of organizational structure, this work shows SMEs that hierarchies themselves do not affect innovation and that is why vertical differentiation must be simultaneously accompanied by formalized processes and the allocation of decision rights. This work also shows those responsible for the design and implementation of development policies in organizations that innovation can arise when the empowerment necessary to promote innovative ideas among employees—especially those in the organisations' operative levels—is present.

To end with, it is important to point out that this study develops a theoretical framework and methodology that can be considered a substantial contribution to knowledge, given that it exposes the absence of studies incorporating the theory of strategic co-alignment in the Latin American context, particularly in Colombia.

Limitations and future research lines

This study was subject to a number of limitations worth mentioning. Structural Contingency Theory establishes various situational factors that influence the organizational structure such as environment, strategy, technology, institutional power and task uncertainty, among others (Donaldson, 1987). Furthermore, it has been shown that the environment presents diverse typologies such as uncertainty, dynamism, complexity, hostility and munificence, among those deemed most important (Burton and Obel, 2004; Mintzberg, 1979). In this study, considering its condition as unpredictable, the influence of the environment was not evaluated and, as such,

strategic co-alignment can change given different conceptual perspectives. Further studies could test organizational congruence hypotheses under different environmental assumptions and including other situational factors such as strategy and technology.

Although hypothesized that it is logical for differentiation to influence innovation, this study did not support this idea perhaps for the reasons explained in the discussion section. Even though it was shown that the separate analysis of this variable did not produce the effect that it had under co-alignment conditions, it would be worth examining whether there is any mediator o moderator effect, which could be the subject of future research.

Finally, the results obtained came from a cross-sectional study applied to just one sample of Bogotá-based SMEs. Although they could contribute to a particular characterization of the population, the results for this sample segment are probably not suitable for extrapolation or generalization to all SMEs. Future research could conduct longitudinal studies, and in other regions as well, to establish comparative parameters and reach more definite conclusions.

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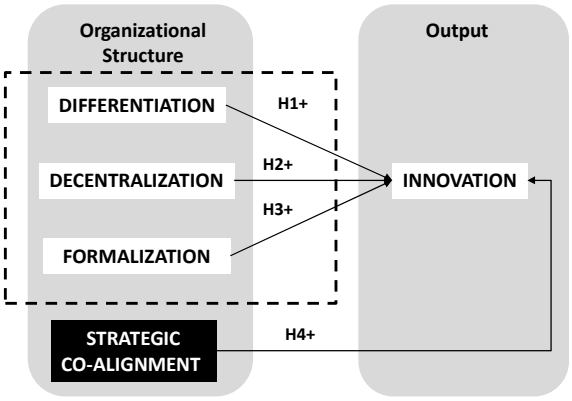
Figure 1.
Conceptual model and hypotheses



Source: Own elaboration

Table 1.
Technical details of study

Scope:	Bogotá D.C.
Duration:	12 months.
Elements:	Bogota SMEs[1].
Sampling units:	ISIC Rev. 3.1, 2 digits[2] (Adapted Colombia).
Sampling frame:	BPR Benchmark Database™.
Respondents:	Managers of the strategic apex and midline.

[1] The classification was based on law 905 of 2004 (Colombia), in terms of number of employees, ranging between 11 and 200.
[2] Process of adapting international standard industrial classification proposed by the United Nations.

Table 2.
Evaluation of measurement model

	Standardized load	*t-value*	Reliability
			$\alpha = 0.81$
Differentiation			*SCR* = 0.81
			AVE = 0.59
How is the level of hierarchy of the company?	0.76	-[a]	
How is the amount of operative positions versus directive positions in the company (administrative intensity)?	0.74	11.15*	
How is the magnitude of regular channel in the company (levels from operative core to general manager)?	0.81	11.80*	
			$\alpha = 0.68$
Decentralization			*SCR* = 0.69
			AVE = 0.43
To what extent is allowed decision-making at intermediate and/or under level of the company?	0.48	-[a]	
How is the degree of autonomy that has the directors of subunits to determine how your unit will be evaluated?	0.78	6.65*	
How is the degree of autonomy that has the directors of subunits for budget allocation?	0.69	6.54*	
			$\alpha = 0.79$
Formalization			*SCR* = 0.79
			AVE = 0.56
To what extent the company defines policies and/or norms on how the tasks should be performed?	0.76	-[a]	
To what extent are documented and/or digitized the operative processes of the company?	0.78	11.29*	
The extent to which employee tasks are monitored, registered and/or evaluated?	0.71	10.58*	
			$\alpha = 0.84$
Innovation			*SCR* = 0.84
			AVE = 0.57
To what extent the company makes improvements to existing products?	0.71	-[a]	
To what extent the company develops new products?	0.71	10.74*	
To what extent the company makes improvements to existing production processes?	0.83	12.15*	
To what extent the company develops new processes?	0.77	11.57*	

-[a] Fixed parameter
* $p < .05$
$X^2_{(59)} = 118.56$, $p < .05$; CFI = 0.96; IFI = 0.96; NNFI = 0.94; RMSEA = 0.06 [0.04 – 0.08].

Table 3.
Means, standard deviations and correlations

	Mean	SD	1	2	3	4
1. Differentiation	4,00	1,30	*0.77*			
2. Decentralization	3,94	1,14	0.39*	*0.66*		
3. Formalization	4,92	1,29	0.48*	0.38*	*0.75*	
4. Innovation	4.67	1,22	0.41*	0.45*	0.52**	*0.75*

N = 277
* $p < .01$. The italic numbers on the diagonal are the square root of *AVE*.

Table 4.
Sector, size and age of sample

	%
Sector	
Industrial (152)	55
Commercial (58)	21
Services (67)	24
Size	
(No. of employees)	
1 to 50	62.8
51 to 100	18,4
101 to 150	8,7
151 to 200	10,1
Age	
(Years of operation)	
Between 1 and 10	45,1
Between 11 and 20	25,3
Between 21 and 30	17,0
More than 31	12,6

Table 5.
First-order structural model

	Path	Load Factorial	*t value*	Hipo-tesis	Verified
First-order model					
a	Differentiation → Innovation	0.12	1.37	*H1*	No
b	Decentralization → Innovation	0.29	3.12*	*H2*	Yes
c	Formalization → Innovation	0.40	4.20*	*H3*	Yes

* $p < .05$
$X^2_{(59)} = 118.56$, $p < .05$; CFI = 0.96; IFI = 0.96; NNFI = 0.94; RMSEA = 0.06 [0.04 – 0.08].

Table 6.
Structural model in co-alignment

	Path	Load Factorial	*t value*	Hipo-tesis	Verified
Second-order model					
	Differentiation → Co-alignment	0.70	5.28*		
	Decentralization → Co-alignment	0.71	5.00*		
	Formalization → Co-alignment	0.82	5.46*		
d	Co-alignment→ Innovation	0.77	5.35*	*H4*	Yes

* $p < .05$
$X^2_{(60)} = 120.74$, $p < .05$; CFI = 0.96; IFI = 0.96; NNFI = 0.94; RMSEA = 0.06 [0.05 – 0.08].