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# **Determinants of Innovation Culture**: a Study of Textile Industry in Santa Catarina

**Giancarlo Gomes**[†]
*Blumenau Regional University*

**Denise Del Prá Netto Machado**[Ω]
*Fundação Getulio Vargas*

**Joaquin Alegre**[¥]
*Universidad Jaume I*

## ABSTRACT

The Brazilian textile industry has suffered the impact of products from Asian countries, mainly because of low prices. Seeking to determine the differential of the textile industry of the state of Santa Catarina, the objective of this study is to analyze the determinants of organizational culture – strategy, structure, support mechanisms, stimulus to innovation and communication – that influence innovation in textile companies in the state, based on a survey among 441 respondents from 16 firms. Data were analyzed using structural equation modeling. We conclude that organizational structure was the dimension that had the strongest influence in shaping the culture of innovation. Flexibility and the presence of multifunctional teams are indicators that show that organizations are working to develop a culture of innovation.

**Keywords**: Organizational culture. Innovation. Textile industry of Santa Catarina.

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***Author for correspondence:***

[†]. PhD in Accounting and Administration from Blumenau Regional University (FURB)
Institution: Professor at Blumenau Regional University
Address: Rua Antônio da Veiga, 140 Campus 1 - Sala D-102 - PPGAD - Programa de Pós-Graduação em Administração
Bairro Victor Konder. Blumenau – SC - Brazil
E-mail: giancarlo@pzo.com.br
Telephone: (47) 3321-0285

[Ω] PhD in Business Administration from Fundação Getulio Vargas - SP (FGV-SP)
Institution: Professor at from Blumenau Regional University
Address: Rua Antônio da Veiga, 140 Câmpus 1 - Sala D-102 - PPGAD - Programa de Pós-Graduação em Administração
Bairro Victor Konder. Blumenau – SC - Brazil
E-mail: profadenisedelpra@gmail.com
Telephone: (47) 3321-0285

[¥] PhD in Business Administration and Management with mention of European Doctorate from Universidad Jaume I
Institution: 'Juan José Renau Piqueras' Department of Business Administration, Universidad de Valencia
Address: Universidad de Valencia. Av. de los Naranjos, s/n. 46022 Valencia, España
E-mail: joaquin.alegre@uv.es
Telephone: ++34 963828877

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## 1 INTRODUCTION

One of the factors that can stimulate innovation is organizational culture. This is due to the fact that by influencing employees' behavior, organizational culture can affect their acceptance of innovation as a fundamental factor for the organization's success, strengthening their commitment to innovation (HARTMANN, 2006; NARANJO-VALENCIA; JIMÉNEZ; SANZ-VALLE, 2012). Organizational culture can thus be seen as one of the determinants of innovation, since it can promote or hamper it. And a culture of innovation needs to be accompanied by a suitable organizational context (AHMED, 1998).

Therefore, the sustentation of an innovative company comes mainly from its organizational culture, since the ability to innovate rests in the skills and attitudes of the workers (KNOX, 2002). For innovation to happen, it is essential to have a culture that facilitates the processes as a strategic factor for the company to attain its objectives (JAMROG; OVERHOLT, 2004). Culture is thus one of the factors that influence innovation in an organization, by stimulating or discouraging behaviors that unleash processes leading to innovation (JASKYTE, 2004; OBENCHAIN; JOHNSON, 2004; JASKYTE; KISIELIENE, 2006; NARANJO-VALENCIA, JIMÉNEZ; SANZ-VALLE, 2012).

Even with the growth of global consumption of textiles and clothing in recent years, Brazil's share in this global trade has diminished. The main reason is heightened competition, mainly caused by the explosive growth of products from Asia (COSTA; ROCHA, 2009). On the national stage, the state of Santa Catarina stands out as one of the main producers of textiles. As such, the state's textile industry has been suffering severe market pressures, mainly from Asian countries (MENDES, 2003).

Against this backdrop, to survive it has become fundamental for textile companies to develop differentiated strategies, based on the use of innovation as a relevant instrument for insertion in the international market (COSTA; ROCHA, 2009). For this to occur, firms need to invest in changing people's outlook, and in this way to modify the organization's culture (MARTINS; MARTINS, 2002). This article analyzes the determinants of organizational culture – strategy, structure, support mechanisms, stimulus to innovation and communication – that influence innovation in textile and clothing companies in Santa Catarina.

The article is organized in six sections including this introduction. The next section presents the theoretical framework on innovation culture, and based on the literature,

describes the hypotheses. The third part sets out the survey method and procedures applied, and the fourth details the exploratory and confirmatory factor analyses of the data, followed by analysis of the determinants of innovation in the firms studied. The sixth section summarizes the contributions of the study.

## 2 THEORETICAL FOUNDATIONS AND HYPOTHESES

Organizational culture is a complex and multifaceted phenomenon, hard to define precisely. "Culture of innovation", or "innovation/innovative culture", is part of this complexity, with a transversal aspect by which the theme "innovation" is established and permeates all areas of the organization. Therefore, although innovation may be desired by the company, this might not be possible if the values, norms and practices stress the status quo. Some determinants of innovation are basic to achieve successful innovation.

The article of Martins & Terblanche (2003) provides a starting point for a better understanding of the variables that influence innovation. The model with five determinants, proposed initially by these authors, has been used by other researchers – Martins, Martins & Terblanche (2004), Nkosi & Roodt (2004) and Zdunczyk & Blenkinsopp (2007) – but we did not find any Brazilian studies applying this model. Based on these determinants – Strategy, Structure, Support Mechanisms, Stimulus to Innovation and Communication – we developed 15 variables to be measured (Figure 1).

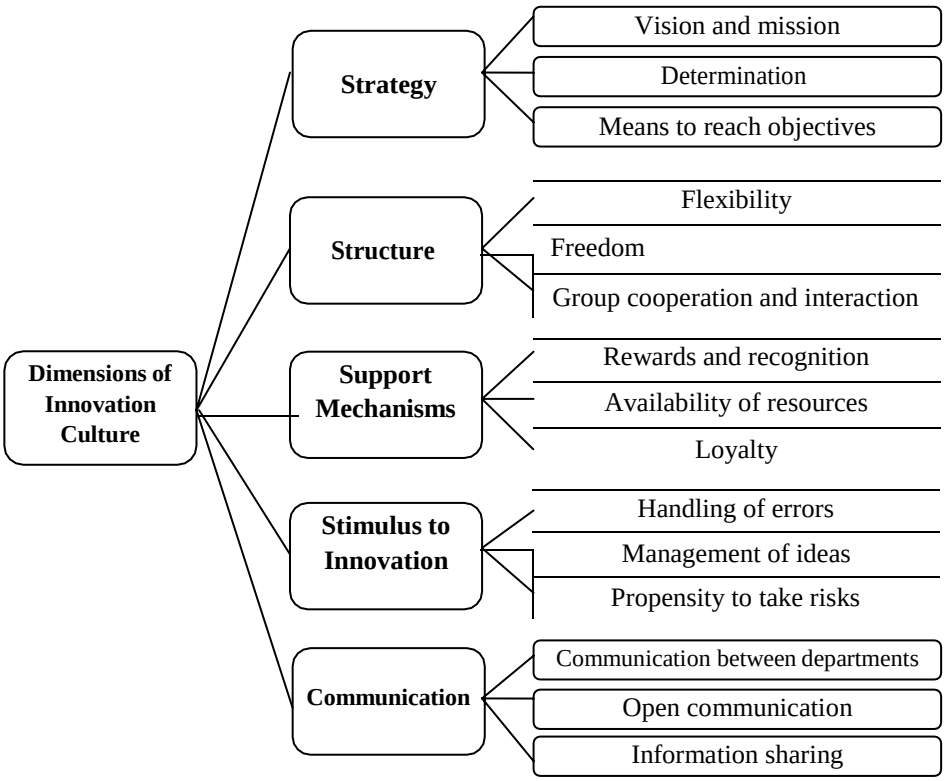


Figure 1 – Variables of innovation culture analyzed in this article
Source: Adapted from Martins & Terblanche (2003).

Costa, Monteiro Filha & Guidolin (2011) argue that companies in the textile sector need to adopt strategies that lead to innovation and allow sustaining a competitive position in the domestic and global market. Companies more willing to make innovation happen are those that have a clear vision of the future. A strategy of innovation is a strategy that promotes the development and implementation of new products and services (MARTINS; MARTINS, 2002).

One of the effects of organizations' mission and vision declarations is their influence on the creation of a strong culture, able to adequately guide behaviors and actions (AHMED, 1998). According to Adams, Bessant & Phelps (2006) and Crossan & Apaydin (2010), the successful implementation of innovative ideas occurs through the collaboration among the different parts of an organization. The mission, objectives and strategies establish the direction the company will follow. For Dombrowski et al. (2007), the mission and vision declaration helps focus an organization's energy, serving as guidelines that unite the employees, their working practices and entire organizational being. The lack of a common goal can generate factions (like the marketing faction, human resources faction, etc.) that put their own interests in first place, undermining the overall goals of the organization.

The organizational targets and objectives reflect its priorities and values, and can promote or hamper innovation (Arad, Hanson & Schneider, 1997). Creativity and innovation should be part of the vision and mission of forward-looking companies. Besides this, the vision and mission of creative and innovative organizations also need to be oriented to customers and the market (MARTINS; TERBLANCHE, 2003; DOMBROWSKI et al., 2007). Hence, we formulated the following hypothesis: ***Hypothesis 1:*** *Organizational strategy is one of the components having a positive effect on the formation of an innovative culture.*

Culture influences the structure and operational systems of a firm (ARMSTRONG, 1995). The structure relies on some values that influence the development or restriction of creativity and innovation (MARTINS; TERBLANCHE, 2003). Organizations with flexible structures propitiate the development and implementation of new ideas, and are more innovative than companies with rigid structures (UTTERBACK, 1979).

In the case of the textile sector, one of the challenges is to achieve productive flexibility, with gains in efficiency and productivity, since the life cycle of products tends to be very short due to fashion trends and seasonal changes (RECH, 2006). The organizational structure also has a direct influence on innovation. It can be said that innovation is strengthened by organic structures, as opposed to mechanistic structures (AHMED, 1998).

In the textile sector, one of the ways to achieve flexibility is the use of overtime, flextime arrangements, outsourcing and temporary workers. Outsourcing in the sector is used both for non-core activities and for production. Among the main non-core activities that are typically outsourced are maintenance and other technical services, due to the type of machines used, which are complex and need regular maintenance (BERMAN; COSTA; HABIB, 2000; PICCININI; OLIVEIRA; FONTOURA, 2006).

Factors associated with greater flexibility to achieve innovation – such as creativity and propensity to take risks – are hard to maximize when the company places emphasis on stability and control. A culture that fosters flexibility favors the development of innovation (DOMBROWSKI et al., 2007; NARANJO-VALENCIA; JIMÉNEZ; SANZ-VALLE, 2012). In light of these observations, the following hypothesis is put forward: ***Hypothesis 2:*** *A flexible organizational structure is one of the components having a positive effect on the formation of an innovative culture.*

Support mechanisms should be present in an organization's culture to create a climate that promotes creativity and innovation. Rewards and recognition, as well as availability of

resources like time, information technology, training and creative people, are mechanisms that support creativity and innovation (MARTINS; TERBLANCHE, 2003). According to Amabile et al. (1996), intrinsic motivation is the form of motivation most closely associated with creativity. When intrinsic motivation is high, the members of the organization become more involved and seek more information about the activity, allowing them to break away from traditional styles of generating ideas (AMABILE et al., 2005).

Information technology is a fundamental support mechanism for the success of innovation (SHATTOW, 1996). In the textile and clothing sector, the improvements attained with use of CAD/CAM systems and numeric control devices include reduced production time and less wastage of fabric, besides more agility of the creative and productive process, and consequently lower costs (RECH, 2006).

Recruitment, selection and maintenance of employees are ways to promote a culture aimed at creativity and innovation. Besides prizing personality traits such as intelligence, knowledge, risk-taking, curiosity and energy, establishing an explicit value calling for diversity in the formation of working groups is very important to attract creative and innovative people (BRESNAHAN, 1997; GARDENSWARTZ; ROWE, 1998).

Training of workers should not be a vague or unpretentious process. In the textile sector there are implicit and explicit objectives involved in the process, ranging from greater preparation to deal with more advanced machinery and equipment to subtle subjection to the qualification strategies that the organization considers best suited for each type of function (SARAIVA; PIMENTA; CORRÊA, 2005; FIRJAM; FERRAZ, 2011). This leads to ***Hypothesis 3:*** *The existence of good support mechanisms is one of the components having a positive effect on the formation of an innovative culture.*

The way that errors are handled will determine whether people feel free to act creatively and innovatively. Errors can be ignored, covered up, punished or perceived as an opportunity for learning (BRODTRICK, 1997). For Martins & Terblanche (2003), tolerance of mistakes is a fundamental condition in cultures that support creativity and innovation.

Without knowing that tolerance for risk exists within the company, employees are hesitant to innovate or become involved in activities that diverge from traditional patterns (AHMED, 1998). Tolerance of mistakes is an essential element for development of a culture that promotes creativity and innovation. Successful organizations reward success but also

recognize and even commemorate failures, as opportunities to discuss and learn from them (RYAN, 1996; TUSHMAN; O'REILLY, 1997).

Leaders play a key role in stimulating innovation, since they are among those responsible for motivation. A leader can create or destroy a culture of innovation. To favor innovation, leaders should be open and flexible. Leadership in innovation implies openness to risk, persistence and an enterprising spirit, but also requires tolerance of failure (CORNEJO; MUÑOZ, 2010). These observations lead to the fourth hypothesis: ***Hypothesis 4:*** *Stimulus to innovation is one of the components having a positive effect on the formation of an innovative culture.*

Schein (1993) stresses the contributions of dialog to build trust within groups, the recognition by groups of the existence of different ideas and forms of communication, and equalization of the roles of each individual in the process of acquiring group knowledge (BARRET, 1997). Damanpour (1991), in a study of the antecedents of organizational innovation, found that the attitude toward change and external and internal communication were positively related with innovation. The critical multifunctional aspects of internal communications were studied by Dougherty (1990), whose research indicated that individuals from different departments understand the development of products in different ways.

Communication among team members, like communication with external agents, helps improve the results of development teams, i.e., the better the internal and external communication is, the better the result of the product development process will be (ALLEN, 1971; DOUGHERTY, 1990; BROWN; EISENHARDT, 1995). In general, it is important for organizations to nurture democratic lateral communication without hierarchical chains, for the purpose of attracting and retaining the talented people necessary for experimentation and innovation (DOMBROWSKI et al., 2007). The final hypothesis is therefore: ***Hypothesis 5:*** *Communication is one of the components having a positive effect on the formation of an innovative culture.*

## 3 RESEARCH METHODS AND PROCEDURES

The state of Santa Catarina – the geographic area chosen for this study – stands out for its textile sector. According to data from the Santa Catarina State Federation of Industries (FIESC), in 2011 the textile and clothing sector employed over 169 thousand workers in 9,702 establishments. A traditional exporter, the textile and clothing industry in the state sold products worth US$ 176 million to foreign customers in 2011, corresponding to 5.9% by value of total Brazilian exports. Santa Catarina is the second leading producing state of

textiles and wearing apparel in Brazil, and is the leading producer of knitting yarn and elastic thread in Latin America. It also stands out as a producer of bed, bath and table linen (FIESC, 2012).

The sample of companies was defined by accessibility or suitability, based on our research objectives. We sought to select firms that could in some way present characteristics to help elucidate the hypotheses. In this way, we chose companies representing distinct links in the textile production chain in Santa Catarina. The choice of the respondents from each company was also not random. Instead, this choice was made by the companies themselves, so that the sample in this respect also was intentionally non-probabilistic.

The data collection process began with a previous meeting with managers of each firm selected, where we delivered a presentation letter describing the study and its aims. This preliminary contact allowed selecting the participants in the survey. After this, we scheduled the dates and times for collecting the data. The questionnaire was printed and provided to the companies according to the number of respondents.

We asked for a sample of people from all organizational levels. Therefore, the population covered all the employees of the organizations studied, from senior executives to mid-level managers down to shop-floor workers. The time frame for return of the questionnaires was 15 days, to assure a high response rate. The data were gathered between April and December 2012.

Of the total of 467 questionnaires collected, 26 were not fully filled out and were excluded from the sample, leaving 441 valid questionnaires. According to Schumacker & Lomax (1996), a sample of 100 to 150 cases is the minimum for structural equation modeling (SEM). In turn, Hair Junior et al. (2005) suggest a sample size of 200 cases. With respect to the proportion of cases, this should be at least five times the number of variables to be analyzed, and the most appropriate ratio is ten to one. Since the questionnaire contained 39 items (assertions), the sample size was adequate according to the parameters suggested by the above-mentioned authors.

Table 1 presents the characteristics of the sample: number of employees, location and area of action and the size of the sample from each company. To assure anonymity, the firms are identified only by letters, from “A” to “P”.

**Table 1 – Sample of the Firms Surveyed**

| Company | Business Area | Location | Headcount | Sample |
|---|---|---|---|---|
| A | Women's clothing | North | 200 | 29 |
| B | Men's and women's clothing | West | 130 | 35 |
| C | Men's clothing | Vale do Itajaí | 800 | 11 |
| D | Men's and women's clothing | Vale do Itajaí | 4,032 | 33 |
| E | Men's and women's clothing | Vale do Itajaí | 80 | 16 |
| F | Men's and women's clothing | Vale do Itajaí | 450 | 39 |
| G | Men's and women's clothing | Vale do Itajaí | 1,700 | 16 |
| H | Medical-hospital products | Vale do Itajaí | 3,300 | 25 |
| I | Bed, table and bath linen | Vale do Itajaí | 2,640 | 36 |
| J | Men's and women's clothing | West | 120 | 30 |
| K | Clothing labels | Vale do Itajaí | 163 | 27 |
| L | Sportswear | West | 700 | 21 |
| M | Sportswear | North | 145 | 65 |
| N | Men's and women's clothing | North | 65 | 18 |
| O | Children's clothing | Vale do Itajaí | 1,450 | 21 |
| P | Men's and women's clothing | North | 145 | 19 |
| **Total** | | | 16,120 | **441** |

Source: Research data.

As can be seen in the table, the sample consisted of 441 respondents from 16 textile companies. Most of them produce clothing (for men, women or children), with one company being specialized in bed, table and bath linen and one in making clothing labels. A characteristic of the clothing segment is that it demands productive flexibility to adjust to style trends and seasonal variations in product mixes.

The data were first analyzed by exploratory factor analysis (EFA), from which we identified the variables that best explain the constructs. Then we performed confirmatory factor analysis (CFA) to test the reliability and validity of the constructs, followed by SEM to test the hypotheses.

## 4 EXPLORATORY FACTOR ANALYSIS – CULTURE OF INNOVATION

The validation of the scales of the innovation culture construct followed the recommendations in the literature, including previous empirical studies. This analysis allowed us to discern whether each variable of the constructs was related to only one factor, and if these were strongly correlated with each other, indicating a single factor, as well as to evaluate the unidimensionality of the constructs. The dimensions referring to culture of innovation were based on the model proposed by Martins & Terblanche (2003) and Martins, Martins & Terblanche (2004), while the indicators were adapted from other works, since this construct has not yet been considered in studies using SEM.

With respect to the Strategy dimension, we removed the variable Strategy5, since it was not correlated with any of the other variables of the construct and the factor loading was lower than 0.50. Besides this, in the factorial solution this variable was a separate factor from the others. This was a variable with reverse scale, which can cause dubious interpretation by the respondents. Therefore, we opted not to include this indicator in the CFA and in the test of the structural model, so the Strategy dimension was composed of nine variables.

We did not exclude indicators of the Structure dimension, since all presented significant results in terms of reliability, correlation matrix, factor loading and commonalities. Therefore, this dimension was composed of eight indicators for the CFA. In the Support Mechanisms dimension, we eliminated the Support5 indicator, also for not being positively correlated with the other variables. We also removed Support3, since this variable had a standardized factor loading of 0.497, lower than the recommended minimum of 0.60. The value of the variable for commonalties also was below 0.5, so the dimension was composed of seven indicators for the CFA.

The initial Cronbach's alpha for the Stimulus to Innovation dimension was 0.443. We then eliminated the variables Stimulus1 and Stimulus9. Besides the substantial improvement in the dimension's coefficient of reliability after this deletion, these variables had low correlation with the others and their factor loadings were lower than 0.50. For the CFA and structural model test, this dimension was composed of six variables. We did not exclude any indicators of the Communication dimension, since all of its variables presented significant results regarding reliability, correlation matrix, factor loading and commonalities. This dimension thus consisted of five indicators for the CFA.

We submitted the excluded indicators to a series of tests to check if would be possible to create groups that could result in other factors, which, if isolated from those identified

initially, could compose the model for evaluation of culture of innovation and performance in product innovation.

## 4.1 CONFIRMATORY FACTOR ANALYSIS

To refine the proposed model, we removed the variables one by one to check if the significance would change with the deletion of each variable. This phase of factor analysis is called confirmatory, since it identifies the variables that can best represent the model. We only considered those with standardized loading greater than 0.60, as recommended by Kline (2005). Based on this criterion, we removed the variables Strategy1 and Strategy4 for having loading values lower than 0.60. After these adjustments, the standardized coefficients were satisfactory.

We also removed the indicators Structure8, Structure5 and Structure4, and after each exclusion we performed a new analysis. This procedure is in line with the proposition that variables should be removed whose coefficients are among the lowest or are not significant (KLINE, 2005). The variable Support5 was dropped from the dimension because its removal considerably improved the Cronbach's alpha, and the variable Support3 was removed because of low factor loading and commonalities values. The variables Stimulus1 and Stimulus9 were dropped to improve the internal reliability as measured by Cronbach's alpha, and Stimulus8 was removed for presenting negative correlation with the dimension's other variables.

The Communication dimension was composed of five variables. None were excluded in the EFA, but in the CFA, the variable Communic5 presented a standardized coefficient lower than 0.60, so it was excluded. Besides the standardized factor loadings, we considered the absolute, incremental and parsimonious fit measures, which indicate how much the indicators represent the theorized constructs. Table 2 shows the final indexes of the dimensions of culture of innovation.

**Table 2 – Adjustment Indexes of the Model**

| Adjustment Indexes | Acceptable Level | Strategy | Structure | Support Mechanisms | Stimulus to Innovation | Communication |
|---|---|---|---|---|---|---|
| DF | - | 15 | 5 | 5 | 5 | 5 |
| $\chi^2$ and p | - (p<0.000) | 42.484 - (p<0.000) | 17.055 - (p<0.004) | 25.147- (p<0.000) | 7.910 - (p<0.003) | 14.333 - (p<0.001) |
| $\chi^2$/DF | ≤ 5 | 3.268 | 3.441 | 5.029 | 1.582 | 7.166 |
| GFI | > 0.90 | 0.972 | 0.985 | 0.977 | 0.993 | 0.983 |
| SRMR | < 0.10 | 0.031 | 0.027 | 0.029 | 0.016 | 0.027 |
| RMSEA | 0.05 a 0.08 | 0.072 | 0.074 | 0.096 | 0.036 | 0.118 |
| TLI | > 0.90 | 0.963 | 0.961 | 0.952 | 0.994 | 0.943 |
| CFI | > 0.90 | 0.977 | 0.981 | 0.976 | 0.997 | 0.981 |
| AF | > 0.70 | 0.861 | 0.801 | 0.853 | 0.850 | 0.820 |
| CR | > 0.70 | 0.856 | 0.810 | 0.850 | 0.861 | 0.831 |
| AVE | > 0.50 | 0.461 | 0.461 | 0.530 | 0.551 | 0.552 |

With respect to the model's fit, the $\chi^2$/DF value was higher than recommended value only for the Communication dimension, and the goodness-of-fit index (GFI) was greater than 0.9 for all the dimensions. The standardized root mean-square residual (SRMR) and root mean square error of approximation (RMSEA) indexes satisfied the recommended criteria, and only the Communication dimension was higher than 0.008 for the root mean square error (RMSA). The Tucker-Lewis index (TLI) was higher than the expected level, and the same happened for the comparative fit index (CFI). The other index values also satisfied the recommendations in the literature.

The dimensions making up the culture of innovation construct presented scores higher than 0.7 for Cronbach's alpha (AF), 0.7 for composite reliability (CR) and close to 0.5 for the average variance extracted (AVE), indicating reliability of the scales to measure the final model. Finally, the results found suggest that the measures of the dimensions, in the entire sample tested, were representative of the variables, suggesting confirmation of the model to measure the construct.

## 5 DETERMINANTS OF CULTURE OF INNOVATION IN THE SANTA CATARINA TEXTILE INDUSTRY

After confirming the unidimensionality, reliability, convergent validity and discriminant validity of the measurement model, we validated the integrated model. The purpose of the second-order factor analysis was to test hypotheses H1, H2, H3, H4 and H5, as well as to choose the structural equation model. The loadings of the measurement items on the first-order factors and the loadings of the first-order factors on the second-order factors are described next. Table 3 reports the adjustment indexes for the second-order model of culture of innovation.

**Table 1 – Adjustment Indexes for the Second-Order Model of Culture of Innovation**

| Adjustment Indexes | Acceptable Level | Level Found |
|---|---|---|
| DF | - | 323 |
| $\chi^2$ and p | - (p<0.000) | 810.681 - (p<0.000) |
| $\chi^2$/DF | ≤ 5 | 2.510 |
| GFI | > 0.90 | 0.871 |
| SRMR | < 0.10 | 0.051 |
| RMSEA | 0.05 to 0.08 | 0.059 |
| TLI | > 0.90 | 0.920 |
| CFI | > 0.90 | 0.920 |

Source: Research data.

The absolute adjustment measure, GFI, although near the threshold value of 0.90, did not have satisfactory values. Despite this, the absolute goodness-of-fit measures of the culture of innovation construct presented $\chi^2$ of the likelihood ratio of 810.681 for 323 degrees of freedom (DF), so it was adequate at the level of 0.000 ($p$<0.05). When analyzing the model by the $\chi^2$ over DF metric, the value was 2.510, demonstrating its quality. Besides this, the other absolute indexes, such as RMR and RMSEA, were also satisfactory, indicating the model obtained a good fit.

The incremental adjustment indexes, such as TLI, CFI and PNFI, satisfied the reference values presented in the literature. Considering the novelty of the theoretical model proposed by Martins & Terblance (2003) and the absence of previous empirical evidence to allow effective comparisons, we believe the model, even though not demonstrating satisfactory values in all the adjustment measures, can be improved with new empirical studies, so it should be considered valid. Figure 2 presents the second-order construct for culture of innovation, along with the paths of the five dimensions for this construct.

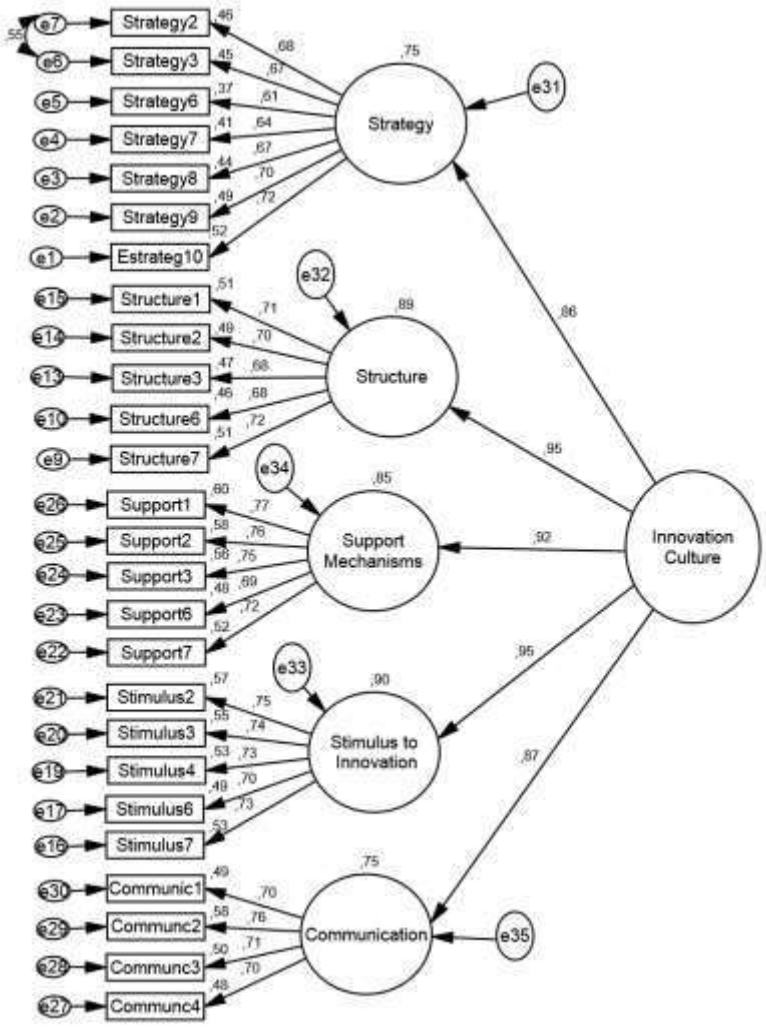


Figure 2 – Final second-order construct of culture of innovation
Source: Research data.

By means of the standardized coefficients and the significance levels of the second-order relations of the culture of innovation construct, we checked the validity of the proposed second-order model. The first-order dimensions – Strategy, Structure, Support Mechanisms, Stimulus to Innovation and Communication – presented relatively high standardized loadings, as shown in Figure 2, i.e., all the dimensions form the second-order construct – culture of innovation. The standardized coefficients were higher than 0.60, as recommended by Kline (2005), and $R^2$ was high for the majority of the dimensions, suggesting good explanation of the variance by the independent variables.

The t-values were all above 2.58, meaning appropriate significance (HAIR JUNIOR et al., 2005). The statistical results demonstrated that all 26 items converge to a single construct for culture of innovation. These 26 items can be divided into five dimensions: Strategy = 7 variables; Structure = 5 variables; Support Mechanisms = 5 variables; Stimulus to Innovation

= 5 variables; and Communication = 4 variables. Each of the 26 items converges in only one of the five dimensions. Next we discuss the results of the survey.

## 5.1 EFFECT OF ORGANIZATIONAL STRATEGY ON THE FORMATION OF A CULTURE OF INNOVATION

The results of the survey show that the first-order construct organizational strategy has a positive effect on the second-order construct culture of innovation, since the standardized (beta) coefficient ($\lambda = 0.86$) supports Hypothesis 1 – Organizational strategy is one of the components having a positive effect on the formation of an innovative culture.

The results agree with the findings of the previous studies of Arad, Hanson & Schneider (1997), Martins & Terblanche (2003) and Martins, Martins & Terblanche (2004), examining the influence of strategy on the formation of an innovative culture. For Martins & Terblanche (2003), the inclusion of innovation in an organization's strategy is the first step to demonstrate its commitment to innovation.

In the formation of the Strategy dimension, the indicators of organizational targets had the greatest impact, evidencing that at all organizational levels targets should have the same purpose, and that they should be are strongly oriented toward efficiency. According to Arad, Hanson & Schneider (1997), organizational targets represent the organization's priorities and values, and as a consequence, can foster or hinder innovation.

Among the other indicators that stood out, the results indicate that the vision and mission of textile companies are focused on the future. According to Ahmed (1998), through declarations of mission and vision textile companies can develop a strong culture of innovation, able to orient behavior adequately. Dombrowski et al. (2007) argued that the mission and vision declaration contributes to channel an organization's efforts, by uniting employees, working practices and all other aspects of the organization.

The existence of a mission and vision declaration oriented to the future generates an environment of commitment and involvement by the workers, by giving them a clearer understanding of the importance of their activities on the firm's results. Adams, Bessant & Phelps (2006) and Crossan & Apaydin (2010) also indicate that it is fundamental that all members have a clear idea of the organization's mission and vision. Integration of innovation in the mission and vision or system of beliefs is essential to establish a clear direction for companies that want to be innovative.

In the opinion of Costa & Rocha (2009), the growing presence of products from Asia, particularly China, in the global market has destabilized the economies of other countries that produce textiles and clothing. Against this backdrop, for companies in the sector to remain competitive, it is essential for them to develop differentiated competitive strategies, based on the use of technological innovation as an instrument for insertion in the world market.

## 5.2 EFFECT OF ORGANIZATIONAL STRUCTURE ON THE FORMATION OF A CULTURE OF INNOVATION

According to the data obtained from the field survey and based on the standardized coefficient ($\lambda = 0.95$), a flexible organizational structure has a positive influence on the formation of a culture of innovation, with the highest coefficient among the five dimensions. This confirms Hypothesis 2 – A flexible organizational structure is one of the components having a positive effect on the formation of an innovative culture.

The results indicate that establishing multifunctional teams (formed by people from different sectors) is a common way of working in the state's textile industry – this was the indicator with the strongest impact on this dimension. Dougherty (1990) observed that in cases of successful new products, workers organized in multifunctional teams tend to combine their perspectives in interactive form. On the other hand, Brown & Eisenhardt (1995) found that the contrary happens in cases of failed products, where workers followed a sequential process among functional groups, so that the view of each department was dominant at each phase of the project.

The transfer of knowledge between functional areas can lead to innovations. If textile companies have horizontal structures with autonomy and teamwork, they will have more success in the innovation process, while those that stress specialization, formalization, standardization and centralization will be unlikely to develop innovations (MARTINS; TERBLANCHE, 2003; DOMBROWSKI et al., 2007).

Another indicator that had a strong impact on the formation of this dimension was the work regime, particularly as stipulated in collective bargaining agreements. The establishment of flexible working arrangements (e.g., rotation of functions, flexible hours, division of labor) is commonly used by textile and clothing companies as a way to enhance competitiveness against foreign products (PICCININI; OLIVEIRA; FONTOURA, 2006).

Based on the decision-making process indicator, the firms surveyed have formalized and standardized processes for making decisions. This situation runs counter to the findings of Arad, Hanson & Schneider (1997), who found that values like rigidity, control, predictability,

stability and order (mainly when associated with hierarchical structures) tend to stifle creativity and innovation. On the other hand, organizational values like flexibility, freedom and teamwork stimulate creativity and innovation.

The survival of companies in the textile sector depends on structural aspects. Organizational flexibility is required to respond to varying fashion trends and seasonal changes in demand for various types of clothing. In this respect, small firms can have an advantage due to their greater administrative simplicity (BERMAN; COSTA; HABIB, 2000; TESLUK; FAAR; KLEIN, 1997). The organizational structure has a direct impact on the development of creativity in the workplace, such as support mechanisms to promote the development of new ideas.

## 5.3 EFFECT OF SUPPORT MECHANISMS ON THE FORMATION OF A CULTURE OF INNOVATION

The standardized coefficient of the Support Mechanisms dimension had a value of $\lambda = 0.95$, indicating there is empirical evidence of a relation between this first-order construct and the second-order construct culture of innovation, confirming Hypothesis 3 – The existence of good support mechanisms is one of the components having a positive effect on the formation of an innovative culture. This result supports the theoretical model put forward in the studies of Ahmed (1998), Martins & Terblanche (2003) and Martins, Martins & Terblanche (2004), in which the authors stated that support mechanisms should be present to nurture a culture of innovation and create an environment favorable to innovation.

The indicators on rewards stood out in the formation of this dimension. The results indicate that intrinsic rewards and financial rewards are an important part of the motivation system of the textile companies studied. Rewards and recognition, as well as availability of resources (time, information technology and creative colleagues) are mechanisms that support creativity and innovation (BRESNAHAN, 1997; KHALIL, 1996; SARAIVA; PIMENTA; CORRÊA, 2005; FIRJAM; FERRAZ, 2011). This requires not only investment in software and production machinery, but also in training personnel to use the new technologies.

Employee training is important for textile companies to gain competitiveness. According to Saraiva, Pimenta & Corrêa (2005), in the textile sector professional qualification is a strategic issue, since the very notion of qualification above all serves the organizational interests, and only secondarily the workers' interests.

The survey results show that the employees of the companies studied generally cannot provide opinions on the amount and type of training they receive – this indicator had low

correlation with the formation of the dimension. Rech (2006) noted that despite the importance of training, firms in the textile sector have small training budgets and little interest in improving technical qualification through participation in internal courses/seminars and external training programs. This indicates the need for actions to heighten awareness of the importance of training and promotion of innovation and new technologies by companies in the sector.

## 5.4 EFFECT OF STIMULUS TO INNOVATION ON THE FORMATION OF A CULTURE OF INNOVATION

The relation between the first-order construct Stimulus to Innovation and the existence of a culture of innovation presented a significant standardized coefficient ($\lambda = 0.87$), confirming Hypothesis 4 - Stimulus to innovation is one of the components having a positive effect on the formation of an innovative culture. The standout indicator in this dimension was generation of ideas, i.e., all ideas are considered seriously by management. This finding indicates that the companies studied stimulate their employees to generate new ideas and encourage creativity.

According to Martins & Terblanche (2003), cultures of innovation that focus on continuous learning and encourage employees to develop new ideas, without fear of failure, favor creativity and innovation. The results of this study confirm the previous findings of Amabile (1999) and Amabile et al. (2005). According to those authors, employees who have freedom and autonomy to assume risks, by proposing challenging targets and deciding how to meet them, will be more committed to the organization's objectives as well as more self-realized.

It is important to note that organizations should systematically evaluate their successes and failures and disseminate the results to employees. For Ahmed (1998), employees need to know the risks they can safely assume. This helps them define the leeway they have to act on their own and the situations where they need authorization from superiors. Therefore, comprehension of risk enables clear definition of priorities and the space for innovative actions.

We found that the employees are encouraged to learn from each other – this indicator stood out in the formation of the dimension. In the opinion of Cornejo & Muñoz (2010), organizations that want to promote a culture of innovation need to be flexible and open, with a shared and consensual project based on trust among the people involved. If innovation is not socialized, it will be impossible to have an effective innovation system.

In the context textile sector in Santa Catarina, creativity can be encouraged by fashion competitions or events like the "Santa Catarina Moda Contemporânea". Such events promote integration among professionals, companies and teaching institutions, instigating the participants to develop innovative products. They also aim to anticipate and share consumer trends, strengthening the state's textile and clothing sector to face foreign and domestic competition.

## 5.5 EFFECT OF COMMUNICATION ON THE FORMATION OF A CULTURE OF INNOVATION

The standardized coefficient of the Communication dimension presented a value of $\lambda = 0.87$, supporting Hypothesis 5 – Communication is one of the components having a positive effect on the formation of an innovative culture. This shows that information is shared clearly among employees – this indicator stood out in this dimension, suggesting that textile companies that have open and transparent communication, based on trust, will be better at promoting creativity and innovation (BARRET, 1997).

Open communication within working groups also was important in this dimension. Dougherty (1990) studied barriers the stifle multifunctional communication. Individuals from different departments understand the various aspects of product development in different ways. These differences imply varying interpretations, including of the same information. For Brown & Eisenhardt (1995), communication among team members, just as communication with external agents, helps improve the results of development teams, meaning that the better the internal and external communication is, the better the result will be of the product development process.

By means of communication it is possible to share information and experiences, with participation of all the organizational levels. Schein (1993) corroborates this idea, arguing that the establishment of routines for dialog within groups or with different hierarchical levels overcomes bureaucracy, enabling more consistency and creativity, since individuals can share a common thought process and become familiar with the problems and goals of the organization as a whole.

Textile and clothing companies need to develop a democratic and participative communication process to attract and retain talented people and to encourage them to develop new products to respond to the changing habits of consumers and thus compete on a global scale. According to Dombrowski et al. (2007), organizations that emphasize a culture of innovation are more likely to develop both incremental and radical innovations, since their

people are generally more willing to suggest novel ideas and improvements in the existing processes.

## 5 CONCLUSIONS

The main objective of this survey was to analyze the determinants of organizational culture – strategy, structure, support mechanisms, stimulus to innovation and communication – that influence innovation in textile companies in the state of Santa Catarina. Based on theoretical studies of this theme, we developed a model aimed at representing the theoretical and practical reality of innovative culture in the companies studied. The results confirm the theory that one of the factors that can stimulate a propensity to innovate is a culture focused on innovation. The fact the sample was confined to a single state limits generalizing the results, but these results still shed important light on the variables investigated.

Organizational Structure was the dimension with the strongest influence on the formation of a culture of innovation. The indicators referring to organizational flexibility stood out from the rest. The gathering at all levels of the best people from different areas of specialization in synergistic and multidisciplinary teams, with exchange of values and beliefs, is fundamental for organizations in the sector to develop innovative products.

In the Strategy dimension, the results indicate that organizational targets have the same purpose and are chiefly aimed at efficacy. The organizational value and norms that encourage innovation are manifested in the goals that orient the firm's actions and have the purpose of integrating it internally and adapting it to the external environment. Organizations need to indicate a clear vision of the future. This is particularly important for the long-term survival of companies due to the growing presence of Asian products in the global marketplace.

Regarding the Support Mechanisms dimension, it can be concluded that intrinsic rewards are a significant party of the motivation systems of the companies studied. Both financial and nonfinancial rewards influence how workers approach their responsibilities. It is important in rewarding innovation not to single out one person, but rather to recognize the efforts of everyone who collaborated in transforming the idea into a final product, since this is generally achieved by multifunctional teams in which the generation of ideas involves people from different departments.

With respect to the Stimulus to Innovation dimension, the companies studied for the most part have a flexible and open culture that influences creativity in the workplace, and also provide resources for the generation of ideas. Innovation is the successful implementation of

new ideas. In the competitive textile sector, innovation is not an option; it is a basic condition for survival.

Finally, for the Communication dimension, the results show that the companies analyzed typically have the practice of clear sharing information among workers. Shared communication is essential to sustain positive results. The employees need to feel secure in acting creatively and innovatively, and in trusting one another, which is determined by shared communication.

The results presented here will hopefully help academics and organizations. For researchers, this study can contribute to the valuation of companies and serve for comparison between sectors or companies of the same sector. Managers can use the model to identify the most important indicators and compare them against industry-wide benchmarks. The instrument can also be used for auditing purposes, in assessing the company's evolution over time or that of suppliers whose participation in the innovation process is relevant.

This study can serve as a starting point for future research, with application of the instrument to measure innovative culture both in dynamic sectors that are intensive in innovation and in more traditional sectors, with consolidated technology, as well as in the analysis across sectors to detect differences in the determinants of a culture of innovation. Empirical studies of innovation in companies are still incipient, so further research can help foster the social and economic development of regions or the country as a whole, to generate jobs and income.

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