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Model of Culture for Innovation

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Abstract

In the current economic panorama, innovation is considered to be an important source of sustainable competitive advantage. The literature indicates that organizational culture is one of the most important factors in innovation stimulation, given that influencing employee behavior promotes the acceptance of innovation as a fundamental organizational value and employee commitment to it. As such, organizations should concentrate on promoting an innovative culture that permits the institutionalization of innovation, which may occur by way of planned action or by means controlled by leaders or indirect mechanisms, such as structures, procedures, or institutional policy declarations. The importance of an innovative culture model which serves as a basis for cultural transformation emerges therefrom. Previous investigations have addressed innovative culture models focused on cultural traits and/or cultural determinants. The present study offers a holistic innovative culture model that in addition to addressing cultural traits and their determinants, as is done in other models, and takes into account management competencies and organizational capacities that are required to conform to cultural traits, to achieve innovative behavior on the part of the individuals of the organization.

Keywords: organizational culture, innovation, innovative culture, cultural traits, model innovative culture

1. Introduction

In a competitive global market, innovation is the source of a sustainable competitive advantage and has a significant impact on organizational results [1, 2]. Additionally, it is considered the basis for economic development and higher-than-average profits in the sector [3].

High R&D investment is insufficient to foster innovation. There must also be a culture present which motivates innovation, as well as an atmosphere which favors creativity, and eliminates obstacles to its success [12, 25]. The relevance of culture in innovation is explained by its individual characteristics, including uncertainty, high levels of risk, and unpredictability in innovation [4].

It has been documented that an appropriate culture stimulates product innovation [5–7] as much as process and marketing innovation [3, 8]. Similarly, it can stimulate incremental innovation as well as radical or ambidextrous innovation [9, 10].

Consequently, given the significant influence of organizational culture on a company's propensity to innovate [11], and considering that it may become either a facilitator or inhibitor, organizational effort cannot be limited to the generation of new products or processes but rather should focus on the promotion of an innovative culture, which helps to institutionalize innovation [12].

Organizational culture is the set of meanings, basic presumptions, values, and beliefs which are shared by the members of an organization [13, 14] and is the way that things are done here [9]. It identifies the members of an organization, guides its behavior [15, 16], and influences the way in which the organization does business and reacts to the environment [17, 18]. One important role of culture is guiding perception toward that which is important, desirable, acceptable [19] and, as such, may be compensated.

Although there is no consensus regarding the possibility of intentional intervention, there is a large group of authors who believe it possible [14, 15, 20, 21]. Such an intervention could be performed directly, via planned action and means which can be controlled either by leaders or indirect mechanisms like structures, procedures, or institutional policy declarations. This is the basis for considering the creation of an innovative culture model which can be developed by companies and which would be the foundation for cultural transformation. This is the goal of the present chapter.

Although many authors have addressed the topic of innovative culture [9, 22–24], it is thought that an operational formulation that facilitates its implementation on an organizational level is still lacking [12]. The present study's main contribution is the proposal of a holistic innovative culture model. In addition to addressing cultural traits and its determinants, as done in other models, it further takes into account management competencies and organizational capacities that are required to conform to cultural traits, to achieve innovative behavior on the part of individuals and the organization.

For the construction of the innovative culture model, a literature review of descriptive nature was performed and subsequently contrasted with the results of the authors' consulting activities.

This chapter is structured as follows: it begins by describing the concept of innovative culture, the different approaches to the said culture that have been examined in the literature, and the dimensions which have been suggested by various authors. Next, the methodology is presented. Later, the proposed model is provided, and, finally, conclusions are drawn.

2. Review of literature: approach to innovative culture

Innovative culture can be defined as the multidimensional atmosphere which includes the values, assumptions, and beliefs shared of the members of an organization that cause it to be prone to explore new opportunities and knowledge and generate innovation, in order to respond to market demands [12, 25–27].

The concept additionally includes the intention to innovate, the organization's market orientation, and organizational learning but further involves the existence of certain specific features which are many and various, in accordance with the author who proposes them [4, 28].

Innovation culture is considered to be an intangible strategic resource [27] which leads to increased adaptability. As such, it generates adaptive advantages as it promotes collaboration and interaction with the environment of the company [29].

Additionally, it promotes initiative instead of obedience and dependence [30] and stimulates practices like creativity, freedom of thought, openness, and flexibility, all of which increase innovative activity [31].

Various authors have studied innovative culture, the majority of them concentrate on individual features and behaviors to understand this phenomenon, although some have used more holistic models which include organizational factors. In **Table 1**, the components of

[22]	Structure, strategy, support mechanisms, behavioral patterns, and communication
[81]	Innovative intention, infrastructure to support innovation, market orientation, and a setting conducive to innovation [4]
[9]	Values (growth/development, external confidence, freedom/latitude, attitude to risk, internal confidence) Instruments (clear objectives, company infrastructure, external perspective, team constitution)
[32]	Freedom/tolerance, risk orientation, growth/development, internal and external confidence, external perspective, clear objectives, teamwork infrastructure
[33]	Teamwork and knowledge exchange, delegation and recognition, R&D (obstacles), risk-taking, client orientation, social network structure
[27]	Orientation toward technological innovation and knowledge, willingness to take risks, and market orientation
[24]	Values, behaviors, climate, resources, processes, and perception of success
[34]	Market orientation, organizational learning, openness to new solutions, technology, markets, risk-taking, and tolerance of failure
[12]	Knowledge exchange and open communication, learning and social development, networks and external cooperation, allocation of free time, tolerance for errors, reward and incentive systems, management of differences, teamwork
[10]	Autonomy/freedom, cannibalism, proactivity, risk assumption

Table 1. The components of innovative culture, according to various authors.

innovative culture, which have been used by certain researchers, are summarized. Below, the models proposed by certain authors are analyzed in greater detail.

Martins and Terblanche [22], supported by the organizational culture model developed by Martins [35, 36], create a proposal to explain the specific determinants of cultures which promote innovation and creativity in organizations. These authors consider six determinants:

- *Strategy*, emphasized by individual understanding and appropriation of the mission and vision, as well as goals and objectives.
- *Structure* reflects organizational values. Thus, the flexibility, freedom, collaborative work, decision-making speed, empowerment, and teamwork that are reflected in the structure are facilitators of innovation.
- *Support mechanisms*, such as rewarded behavior, use of information technology in processes, and human management practices can also reinforce innovation and creativity.
- *Behaviors that promote innovation* include error management, encouragement of new idea generation, fair idea evaluation, support for curiosity, risk-taking, experimentation, reduced control, encouragement of competition, a positive attitude toward change, tolerance and constructive conflict management, and constructive confrontation.
- Lastly, *communication* is open, transparent, and based on trust, which promotes the idea that disagreement is acceptable, which also influences innovation.

McLaughlin [9], based on Greenwood and Hinings' (1993) concept of organizational archetypes and on Schein's (1984) organizational culture model, proposes certain characteristics to consider, in order to create a radical innovation culture model. These characteristics are procedures, structure, people, organizational aspects, focus, and management. Each one of these is analyzed continuously, from incremental innovation to radical innovation.

Another model considered was that of Büschgens et al. [11], in which it is concluded that Quinn and Rohrbaugh's [37] Competing Values Framework constitutes a model appropriate for the comprehension of the culture-innovation relationship. They consider three dimensions such as flexibility versus control, external versus internal orientation, and organizational means and ends, which, in accordance with their conclusions, synthesize the multiple variables which have been used for the study of innovative culture.

Lastly, Rao and Weintraub [24] propose six innovative culture components. *Values*, which determine organizational priorities and decisions; *behaviors*, which are the way in which employees act when faced with innovation; *climate*, which challenges one to take risks in safe environments and promotes learning and independent thought; *resources*, which include people, systems, and projects; *processes*, which are considered to be the route to innovation development; and, finally, the perception of *success* on external, business, and personal levels.

In conclusion, the models presented have focused on cultural traits [9] or on traits and their determinants [11]. The present proposal precisely aims to remedy this limitation by proposing a model which joins innovative culture determinants, innovative cultural traits, management

competencies, and the organizational capabilities which adjust cultural traits and, as a result, behavior roles for innovation. This innovative culture finally leads to innovation results.

3. Methodology

A descriptive literature review was carried out and later contrasted with the results of the authors' consulting activities. In accordance with Marins and Terblanche [22], the management science literature has been used to describe the organizational culture, creativity, and innovation present in organizations.

The steps used for the construction of the innovative culture model are the following:

- (1) The theoretical and empirical literature was reviewed, in regard to determinants of culture.
- (2) The literature on cultural determinants that favor innovation was reviewed.
- (3) The literature on cultural factors which influence the innovative behavior of employees was reviewed.
- (4) The innovative culture models proposed in the literature were analyzed.
- (5) The culture for innovation categories which had emerged in the authors' consulting work was analyzed.
- (6) The literature review performed in steps 1–3 was contrasted with the models proposed in the literature (step 4) and with the emerging categories (step 5).
- (7) Based on the comparison, the need for adjustment between cultural traits and two organizational setting elements, management competencies and organizational abilities, was established.
- (8) Innovative culture was modeled on three levels of analysis: determinants of culture, cultural traits adjusted to organizational abilities and management competencies, and behavioral roles.
- (9) The dimensions of each one of the analysis level categories were identified.
- (10) Each one of the categories was described, in function of its pertinence or relationship to innovative culture.

4. Proposed model for innovative culture

The model proposed here is a holistic model which permits an understanding of those elements which interact in an innovative culture from a broader scope. The elements which compose the said model are separated into five categories and four levels.

On the first level is the *determinants of culture*. These factors determine or generate a certain type of culture. For effects of an innovative culture, both the literature review and author experience in organizational processes lead to the proposal of five factors: strategy, structure, leadership, metrics, and environmental.

On the second level is the cultural essence, or *cultural traits*. This category identifies the content of the culture. On this same level, two additional categories are included, in which, although they are not determinants of culture as such, they do affect them in terms of adjustment: *management competencies* and *organizational capabilities*. In other words, for these competencies and capabilities to take root in the organizational essence, certain specific cultural traits must be developed.

It is considered vital to develop the following seven managing organizational competencies for the innovative culture model: communication, teamwork, tolerance for error, conflict management, decision-making, simplicity and agility, and prioritization. Seven organizational capabilities must also be cultivated: ambidexterity, customer and market orientation, speed, relationships, execution, adaptability, and entrepreneurial orientation. Consequently, there are nine cultural traits of innovation: freedom, risk-taking, commitment and trust, mental flexibility, confrontation, acceptance of diversity, curiosity, association, and respect.

On the third level, and as an effect of the existence of certain innovative cultural traits, the *behavioral roles*, or innovative behavior, this category is found in the organization which identifies with the three innovation phases: idea generation (inventors), idea promotion (champions), and development (implementers).

Lastly, the *results* of innovative culture are presented. These can be in the form of continuous or disruptive, technological (product or process), organizational, or marketing innovations. **Figure 1** presents these components.

A number of the model's characteristics should be emphasized:

- (1) The causality and adjustment relationships both between and within the different levels
- (2) The difference between individual and organizational perspectives
- (3) Its undertaking of both the individual and the organization, which causes one to value the difference between the person and the organization
- (4) Comprehension improvement of the different elements present in an innovative culture—determinants of culture, cultural traits, management competencies, organizational capabilities, and behavioral roles—inasmuch as it delimits them and defines its connotation, depending on the model category to which they belong within the model

This is the case, for example, of risk-taking. The literature makes reference to risk-taking, risk assumption, willingness to risk, risk orientation, and error tolerance, as a fundamental element of innovative culture. In the model proposed here, this variable is delimited and differentiated. It includes risk-taking as a cultural trait of the individual, tolerance for error as a management behavior which relates to reasonable acceptance of error, and risk orientation as

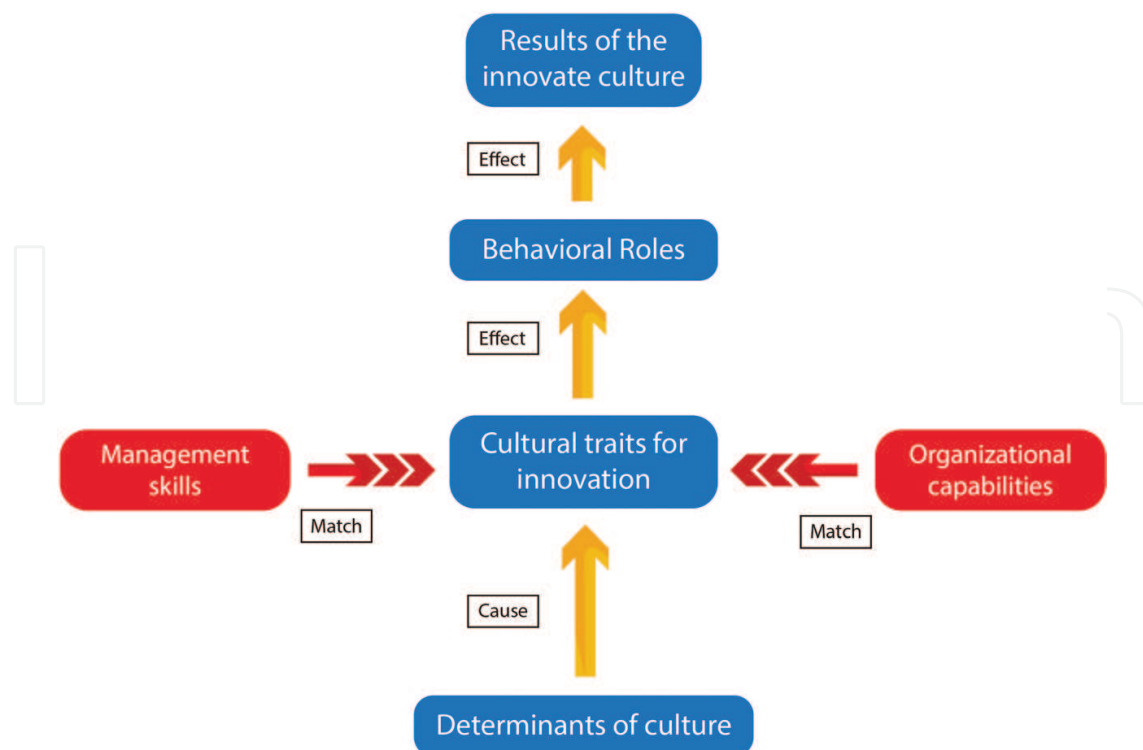


Figure 1. Model of culture for innovation.

an organizational capability which indicates top management's inclination to take business-related risks.

4.1. Determinants of culture

The possibility and convenience of organizational culture intervention have been debated since the seminal work of Smircich [13]. Some authors consider culture to be "something" that an organization IS, which thus cannot be intentionally modified [38], while others believe that culture is something that an organization HAS, which therefore can be modified through organizational management [15, 18, 39].

In the present investigation, the latter position is assumed, which makes the formulation of a desirable innovative culture model, as well as organizational action to achieve this, viable. Various authors [22, 40] agree in the existence of five determining factors of innovative culture: strategy, structure, leadership, metrics, and environmental.

Strategy, considered to be the cornerstone of organizational design, is based on the mission, vision, and short- and long-term objectives [41]. Strategy, through the formulation of goals and objectives, indirectly reflects organizational priorities and values and, as such, inspires its members.

Uncovering the meaning of the goals and objectives and achieving employee understanding of the mission and vision lend a special value to the promotion of creativity and innovation in organizational members [22].

Structure is one of the determinants of culture which is recognized in the specialized literature [22, 40, 41]. In the present model, the proposals of Damanpour [42] and Damanpour and Gopalakrishnan [43], who consider structural elements to be associated with innovation via two constructs, organizational complexity (specialization, functional differentiation, and professionalism) and bureaucratic control (centralization, formalization, and vertical differentiation) are used.

Organizational complexity is reflected in the quantity and diversity of specializations found therein, and the degree of professionalization of an organization's plant personnel makes innovation more probable, as a wide base of knowledge, together with self-confidence and the possibility to exchange ideas, motivates changes in the status quo and the degree of division into units—functional differentiation; frequently, it incites technological development and system improvement [43].

Once decentralization disperses the autonomy to make decisions, it favors creativity, communication, agility in decisions and, generally, the exploration of new knowledge and innovation [42, 44, 45]. While low formalization levels reduce the emphasis on rules and procedures, it allows for the perception of problems and circumstances from other perspectives, motivating the search for new solutions [46, 47]. Little vertical differentiation, or minimal hierarchical levels, facilitates communication and interaction.

Leadership is the ability to promote the innovation and creativity found among the highest-level competencies required of leaders [48]. Evidence shows that the three determinant leadership factors for innovation are organizational stimulus, challenging work, and work group support [49].

Two types of leadership best respond to the three abovementioned determinants: transformational leadership [50], which is based on four components (idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration), and supportive leadership, which focuses on the satisfaction of employee needs and preferences, positive attitude development, and the promotion of trust in and of itself [30].

Metrics and rewards, in organizations, metrics and rewards serve the function of aligning individual behavior and performance with organizational objectives. Thus, employees perceive that the evaluation system (scorecard) and rewards communicate the company values more clearly than any written declaration [41]. In accordance with Nacinovic et al. [51], the creation of a corporate culture that promotes innovation begins with compensation systems, because the desired behaviors are rewarded and, as such, employees are motivated to repeat the said behaviors. A periodic employee evaluation system can be a crucial tool for employee motivation to change and adopt innovative behaviors, as this includes creativity and innovation criteria and values innovative practices [52].

The *environment* constitutes a determinant of culture, in that the most dynamic environment, as compared to the most stable environment, demands different cultural feature emphases. More dynamic environments are characterized by market and technological uncertainty and competitive intensity [53], which means that competitor product design changes, consumer demand for new products, the technology which affects how products are used or manufactured, market structure changes, and the degree of competition are unpredictable [54, 55].

Companies which form part of a market with these idiosyncrasies should develop abilities which permit them to be continuously competitive. Products have short life cycles and become rapidly obsolete, which obliges companies to be highly innovative in order to continue at the speed of change. Souder and Song [56] found that, in conditions of great market uncertainty, companies should highlight their technical superiority and revolutionary designs.

4.2. Cultural traits for innovation

Different investigations recommend studying culture from the point of view of content, which includes the basic characteristics valued by the organization or its operating values [57]. Cameron and Ettington's [58] study summarized by Cameron and Quinn [59] revealed the importance of cultural content, or cultural traits, as they found that organizational results were more closely associated with cultural traits than with congruency or cultural strength.

Regarding cultural traits which should be present in an innovative culture, the review of theoretical literature and results of the authors' empirical studies [1, 40, 53, 40–69] indicate a consensus on the relevance of nine innovative culture traits: freedom, risk-taking, commitment and trust, mental flexibility, confrontation, acceptance of diversity, curiosity, association, and respect.

Freedom, which manifests itself as autonomy, empowerment, and participation in decision-making, is one of the most common elements associated with an innovative culture. An atmosphere of freedom and autonomy increases the employees' intrinsic motivation, considered as a key factor in promoting creativity in an organization [1].

Risk-taking is generally associated with innovative personalities. These individuals have a high tolerance for ambiguity, wish to be challenged, and accept the risks of facing difficult challenges. They are patient and willing to persevere in order to resolve challenges, although they may be difficult [70].

Commitment, understood as the degree to which individuals feel united with or tied to their organization or its parts [71], and *trust*, understood as the degree of emotional security that employees feel in their work relationships [72], are considered to be fundamental for the innovation process. In accordance with Amabile [73, 74] and Jafri [75], employees are only motivated to involve themselves in innovative activities if they are strongly identified with the organization. McLaughlin et al. [9] indicate that, in innovation processes, trusting teams to conduct their development projects, experimentation, collection activities, and idea selection, without interference from management, is fundamental.

Mental flexibility refers to openness and the ability to respond to new ideas, as well as a flexible approach to problem solving [6], which derives from an appreciation of novelty, a pursuit of variety, receptiveness to new ideas, and tolerance for the ambiguity associated with creativity and innovation [76, 77].

Confrontation is the ability to address situations without intimidating others or becoming intimidated. In this sense, beyond simply addressing a situation, one must have the ability to find similarities and differences between two or more positions, make them explicit, and

seek agreement. When there is a conflict between the different ideas, perceptions, and ways in which one may process and evaluate information, the conflict should be managed constructively, so as to promote creativity and innovation [22, 78].

Acceptance of diversity concerns the ability to interact with different people (from varying hierarchical levels, stages of knowledge, external areas, and interdisciplinary areas). Work teams characterized by diversity, interdisciplinarity, the talent of its members, and the emergence of challenging ideas are considered to promote creativity and innovation [63].

Curiosity references the ability to perceive things in observed reality that others do not see. One pays special attention to sources of new opportunities. In order to obtain results in innovation, people must have innate curiosity, be open to experimentation [70], and have a healthy dose of alertness [79]. It merits mention that this feature joins three elements of the so-called innovator DNA: ask, observe, and experiment [80].

Association is the ability to connect successfully with that which is apparently disconnected, which requires the ability to transfer potential from one place to another [40]. Association is like a mental muscle which can grow stronger by using the other abilities that it discovers, as innovators practice the association, they build their ability to generate ideas that can be recombined in new ways [80]

Respect is seeing a person's value, recognizing their expertise and knowledge, and considering their human dignity. While this is a value more than a cultural trait as such, and the specialized literature has rarely noted it as a determining factor for innovation [81], our empirical investigative findings indicate that, in this context, respect is a nonnegotiable condition for the generation of trust and commitment.

4.3. Managing organization competencies

The knowledge, beliefs, behavior, and attitudes of management at an organization do not solely exist as an aggregate of the individual characteristics of the members of the said team. They are also, essentially, the result of policies, everyday practices, intentional declarations, and reward systems which the organization uses on a daily basis.

In the present proposal, managing organization competencies have been termed, "the decisions that upper-level management make, which impact the total operation of the organizations they lead, and which maintain a close connection to the knowledge and beliefs cultivated" [82]. According to Barlett and Ghoshal [83], owing to the current global conditions and new organizational demands, business managers have had to exchange their central controlling role for one of employee development, such that employees become empowered and autonomous, fundamental conditions for innovation.

The review of innovative culture literature enabled the selection of seven management competencies that are closely associated with innovation and creativity: communication, teamwork, tolerance for error, conflict management, decision-making, simplicity and agility, and prioritization.

Effective communication is the most widely recognized management competency in previous innovative culture investigations. In order for communication to stimulate innovation and

creativity, it must be open and transparent; this promotes trust and transmits the idea that disagreement is acceptable within the organization [22].

It must facilitate the free exchange of ideas, promoting horizontal communication between individuals, as well as between teams and departments, as this removes bureaucratic procedures [84, 85]. However, additionally, it should share lessons learned from both success and failure, tell stories which inspire, or warn of possible failings [48].

Once the sensation of emotional security has been created, an employee may feel driven toward divergent thinking and discover new and creative possibilities, without fear of punishment [22]. This is achieved with open and unrestricted communication.

Teamwork is a critical competency used to both stimulate and support innovation [12], provided that empathy and trust are built, and the synergetic effect of participative and collective work is understood.

Multifunctional teams (R&D, design, engineering, sales) are more effective if they are additionally able to exchange ways of thinking and expertise [48] with an open mind, so as to work with a certain degree of uncertainty and conflict [9]. All teams must have the support of a leader and appropriate resource allocation.

According to Leifer et al. [86], team members who work on radical innovation processes should combine their technical abilities with curiosity, passion, flexibility, and ability to take risks.

Tolerance for error has to do with accepting a reasonable margin of error especially the one that is committed trying new things that generate learnings [65]. It values the assumption of risk; encourages taking significant, calculated risks within the scope of one's work; and encourages defiance of the status quo, in an effort to produce positive results. It promotes employee experimentation with new ideas and doing things differently, without fear of negative consequences to their self-image, status, or professional career [6]. Successful organizations not only reward success but also tolerate mistakes, in order to create opportunities for discussion and learning from mistakes [22].

When the organization permits a functional level of conflict, and when the management team is capable of *tolerating and constructively managing* conflict, innovative behavior is stimulated in organizations. This implies accepting different styles of thinking among the members of the organization but at the same time encouraging constructive confrontation between them [22].

On the other hand, participative *decision-making*, which involves others and offers freedom and empowerment to perform one's job and choose the procedures to be used abiding by a few minimal, predictable guidelines, is the source of creativity and innovation [22].

The complexity and dynamics of the global environmental demand that decision-making be quick and timely, in addition to being participative and efficient, which is characteristic of innovative organizations [30].

Another important management competency for innovation is *simplicity and agility* in organizational processes. Managers should eliminate the belief that if something is simple and quick,

it cannot be appropriate for a world-class organization. Process perfectionism, sluggishness in decision-making, and excessive action sophistication are the enemies of innovation [40].

One must remember that the time resource is costly, and not unlimited, especially in innovation processes. One must create a sense of urgency and pressure in innovation projects [9].

Recognition and rigorousness are the ways in which achievements are recognized, remunerated, and celebrated, in accordance with the level of rigorousness applied. Care should be taken with contradictions that could weaken these efforts. For example, if the rewards are structured for innovation but are given for the efficient performance of routine operations, it does not matter how alluring the other signals may be, and it is probable that employees will respond with caution and uncertainty [72].

Lastly, the ability to *prioritize* is key for innovation success. This requires the ability to balance the process-result relationship. In other words, the appropriate level of priority must be given to innovative processes, without sacrificing quality conditions. Stringer [87] found that radical innovation was only possible when it was prioritized in company culture and strategy.

This also means that the company must learn to make sacrifices and understand when to abandon projects, strategies, or actions. This is not an easy task, as many times the egos and interests of managers are entangled in these projects [65].

4.4. Organizational capabilities

Organizational capability is the distinctive way in which a company combines resources, policies, routines, and processes to generate organizational results [88]. These are constructed from a continuous learning and as a result of the way in which each company solves its problems on a daily basis.

The social capability construction process requires companies to develop a number of specific cultural traits. This dimension, then, acts as an adjustment to those features generated by determinants of culture.

In a previous study [40], seven indispensable organizational capacities were identified for innovation: ambidexterity, customer and market orientation, speed, relationships, execution, adaptability, and entrepreneurial orientation.

Capacity for ambidexterity: a company is considered ambidextrous when it simultaneously develops exploration and exploitation competencies. Competence exploitation refers to a company's tendency to invest resources, in order to refine and extend its existing product innovation knowledge, skills, and processes, with the goal of increased efficiency and reliability in existing innovation activities. Competence exploration, conversely, refers to a company's tendency to invest resources so as to acquire entirely new knowledge, skills, and processes, aiming to attain flexibility and novelty in product innovation through increased variation and experimentation [89].

March [90] believes that an organization should agree upon a sufficient amount of exploitation, in order to ensure present viability, and simultaneously put sufficient energy into

exploration to ensure future viability. In order to act in this ambiguity, the organization must possess certain features, including mental flexibility, trust, and acceptance of risk [40].

Capacity for client and market orientation: understood as the capability to have one's eye on both the market and its players such as clients, competitors, suppliers, as well as the variables which determine the competitive context on social, political, geographical, technological, and economic levels [40]. This capability is considered to be fundamental, as in many cases, it is the source itself of innovation [91, 92].

If the company is isolated from the market, it will be incapable of discovering or capitalizing on the opportunities which exist beyond its centers of activity or beyond its current technical or operative capacity [40, 93]. A company which compares, analyzes, and responds to competitor movements may generate new solutions and improve the performance of new products [94].

Capacity for speed: this refers to the capability to develop and launch innovative products more quickly than the competition and is considered a key factor for the success of new products. Above all, it is considered a condition to capitalize on the early benefits of innovation [40, 95].

Because competition has intensified, product life cycles have been reduced, and product obsolescence now occurs more quickly. Companies are increasing their efforts to improve the product development cycle, deliver innovative products to the market quickly, and be the first to move in their industries, such that they can create relative advantages in market participation and benefits and a competitive advantage in the long term [96, 97].

Capacity for relationships: this refers to an organization's ability to establish effective relationships between organizational players as well as those external to the organization. In the internal setting, the cross-functional information exchange between the main players in the development process offers multiple benefits: (1) the available knowledge base is broadened, which reduces uncertainty regarding future difficulties and opportunities, (2) product concept alignment with functional and corporate strategies is ensured, and (3) design phases can occur in parallel [40, 98].

Regarding external relationships, Olmos-Peñuela et al. [4] indicate that, given that academic and commercial activities have different objectives—those of the former center on ways to carry out rigorous investigations, and the latter seek commercial achievements—they require different skills and abilities. Although the differences may produce collaborative tension and difficulties, they can also amplify the learning possibilities, which aid to strengthen company innovation culture [4].

Capacity for execution: in the process of innovation development, this is associated with the ability to go from the initiation phase, in which ideas are generated, to an idea application or implementation phase [40]. This implies favoring characteristics like the initiative to mobilize resources, the ability to plan which concerns coordination and execution, and rationale; such decisions made are supported by the use of logical arguments and accurate information [67].

Adaptive capacity is defined as the combination of factors which permit a company to learn and adapt nimbly to a changing environment and even allow for the prediction of the said changes [99]. Thus, the culture which most effects innovation is most highly adaptable [29].

There are two key adaptive capacity components: the first component has to do with management team sensitivity to perceive existing tension between adaptive challenges and the possibility of internal adaptation. The second component has to do with the containing environment or the amount of help, support, and accompaniment available for adaptation [78].

Entrepreneurial orientation's importance for innovation performance improvement has been indicated consistently in the literature. Entrepreneurial values improve the creation of new businesses within the existing company, as well as the renewal or rebirth of existing businesses that have become stagnant or require transformation [62].

Entrepreneurial orientation should be understood as a multidimensional concept that entails organizational actions related to the following dimensions: innovativeness, proactiveness, and risk-taking. Entrepreneurial orientation of a firm is demonstrated by the extent to which the top managers are inclined to take business-related risks (the risk-taking dimension), to favor change and innovation in order to obtain a competitive advantage for their firm (the innovation dimension), and to compete aggressively with other firms (the proactiveness dimension) [100, 101].

4.5. Behavioral roles

Employee's innovative behavior has been defined from different perspectives, but, in general, it is linked to the different stages of the innovation process. From this perspective, innovative behavior is usually understood as individual actions directed toward the generation, introduction, and application of novel benefits on some organizational level [63, 102].

In accordance with Naranjo-Valencia (following Tushman and Nadler, 1986; Scott and Bruce, 1994; Sim et al., 2007; Martins et al., 2008; Wolfe, 1995; Kanter, 1988) [53, 63], each of the stages of innovative behavior corresponds to a behavioral role: in the first stage of the innovation process, the *inventor*, or idea generator role, is fundamental. In other words, this is the role of individuals who recognize a problem and generate new ideas or solutions and those who focus on scientific and technical invention prior to concept development. Thereafter, people are required for the role of product *champions*, who must promote these new ideas and garner support for them, both within and outside of the organization.

In the final stage of the innovation process, the *implementer* role is required. This is the role of those who try to facilitate an innovation's formal development by obtaining resources, organizing innovation execution, and assuring that each task and important activity are completed on time and within the budget.

5. Conclusions

Innovation in organizations is imperative in a global world, with turbulent settings and ever more demanding markets. Innovation requires R&D investment as well as an organizational culture which stimulates and promotes it. The characteristics of a culture that encourages, and does not inhibit or restrict, innovation have been studied by various authors, but the diverse models proposed thereby possess limitations, in which the present investigation has attempted to redress.

The model designed in the present investigation systematically integrates four levels. Firstly, it integrates a group of factors called determinants of culture, owing to their strong impact on the generation of cultural traits. On the second level are the features and behaviors (traits) of an innovative culture which are parallel to two categories that act as adjustment mechanisms, organizational capacities and management competencies.

On the third level are the behavioral roles derived from these cultural traits which define an organization's innovative behavior in its three components, idea generation, promotion, implementation. Lastly, the model registers the results expected from the innovative culture model, in terms of products and processes for technological innovation, as well as administrative and marketing processes, regardless of whether they are products of continuous improvement or disruptive innovation.

All of these components interact with each other, whether between dimensions and categories or there within, and this dynamic depends upon whether innovation and creativity in an organization are supported or inhibited.

Although the proposed model is derived from previous qualitative and quantitative investigations, including from experience in the authors' organizational consultation, this study's lack of empirical contrasting is proposed as a limitation. As such, it constitutes a source of future applied investigations, so as to establish relationships between dimensions and categories, such as the moderating or mediating effects thereof.

For company decision-makers, the model constitutes an alternative to the performance of culture diagnostics and consequently enables them to formulate plans which close innovative culture idea gaps.

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