



A NALYSIS OF THE ORGANIZATIONAL STRUCTURE OF ENTERPRISES OF TECHNOLOGICAL BASIS WITH PROJECTS WITHOUT INCUBATORS

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ABSTRACT

The contingency theory assumes that the structure of the organization involves environment, people, technologies and administrative techniques for achieving the objectives of the company, which must comply with the contingent factors and the environment in which it is inserted. Being that, by the evolution of technology companies must be innovative from an organic structure. Thus, the incubated companies have innovative feature, this way: how is the organizational structure of enterprises of technological basis with projects in incubators? This research aims to asses and classify the organizational structure of enterprises of technological basis with projects in incubators in the State of Paraná. To achieve this goal it carried out a literature review on the contingency theory. Afterwards it was applied the questionnaire with companies incubated in that sought to identify their organizational structure Trough the applied methodology was found that, in General, incubated companies presented some mechanistic designs features with command-based rules and procedures in that only one person takes the decision, which way be the reflection of a technological breakthrough in which companies migrate to a mechanistic designs structure for organic , as well as in the results of Joan Woodward (1958), in which the occurrence of technological advancement, companies use the mechanistic designs structure, changing later to organic.

Key words: Innovation; Flexibility; Contingency; Organic; Mechanical; Getting Started.

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A

NÁLISE DA ESTRUTURA ORGANIZACIONAL DAS EMPRESAS DE BASE TECNOLÓGICA COM PROJETOS SEM INCUBADORAS

A teoria da contingência pressupõe que a estrutura da organização envolve o meio ambiente, as pessoas, as tecnologias e as técnicas administrativas para a consecução dos objetivos da empresa, os quais devem obedecer aos fatores contingentes e ao ambiente em que está inserido. Sendo que, pela evolução da tecnologia as empresas devem ser inovadoras a partir de uma estrutura orgânica. Assim, as empresas incubadas têm característica inovadora, desta forma: como é a estrutura organizacional de empresas de base tecnológica com projetos em incubadoras? Esta pesquisa tem como objetivo avaliar e classificar a estrutura organizacional de empreendimentos de base tecnológica com projetos em incubadoras no Estado do Paraná. Para tanto, realizou-se uma revisão bibliográfica sobre a teoria da contingência. Posteriormente, foi aplicado o questionário com empresas incubadas, buscando identificar sua estrutura organizacional. Com a metodologia aplicada, verificou-se que, em geral, as empresas incubadas apresentavam características mecanicistas com regras e procedimentos baseados em comando, em que apenas uma pessoa toma a decisão, que pode ser o reflexo de um avanço tecnológico em que as empresas migram para uma estrutura de desenhos mecanicista para orgânicos, bem como nos resultados de Joan Woodward (1958), em que a ocorrência de avanço tecnológico, as empresas utilizam a estrutura de desenhos mecanicista, mudando depois para orgânico.

Palavras-chave: Inovação; Empresas Tecnológicas; Empresas de Base Tecnológica; Incubadoras.

INTRODUCTION

The economic scenario has required constant innovation companies to maintain competitiveness in the market. The search for innovation as a factor of differentiation and uncertainty may be influenced by environmental variables or contingent, that may lead companies to seek a model of organizational structure that fits the environment where they are inserted.

However, there is no single model of effective organizational structure for all businesses (Donaldson, 2001). According to the contingency theory the organization is seen as an open system, varying according to the environment, the technology and strategy; pointed by relativity, to the extent that nothing can be regarded as absolute within companies (Pereira, Rao & Gessi, 2012).

Thus, the contingency theory to deal with influence of internal and external factors in organizations, in which the Administration has a functional role, stressing that everything is relative, there is no absolute (Chiavenato, 2000). The internal factors related to management techniques and the external environmental conditions.

Business incubators provide a propitious environment for the development of innovative business, because it features support for companies that develop new ideas of product, process and/or service. These companies generally are new on the market and are in a position in which it is up to the task of adjusting the organizational structure to the environment, which can lead to a higher performance while the maladjustment can take them to a lower performance (Donaldson, 2001).

In this way, the contingency approach explains a relationship between the conditions, environment, people, technologies and administrative techniques for the achievement of company objectives (Chiavenato, 1979). Stressing the representativeness of the innovations developed by technology-based companies and the need to identify the organizational conditions of these innovative companies are characterised by the **following research question**: How is organized the

organizational structure of enterprises of technological basis with projects in incubators?

The contingency theory based on assumption to optimize the structure of the company as contingent factors and the environment, and that the evolution of technology, organizations must be innovative from an organic structure (Scheffel, Cunha & Lima, 2012). According to the same author, the Department of P&D should be structured more organically than production, dominated by rationality.

Thus, the objective of this research is to sort the organizational structure of enterprises of technological basis with projects in incubators in the State of Paraná. In accordance with the contingency theory of technology-based companies need to have a more flexible organizational structure, i.e. close to the organic. In this sense, this work is justified because it will show whether the enterprises of technological basis has an organizational structure according to the theory.

This search is limited to incubated companies in Technological Incubators of Paraná/Brazil in the year 2015. In this perspective, the context elected to effectuation of this study, was of the incubated companies, in which business incubators support in the process of P&D. It is in this context that the research investigates the organizational structure of the incubated companies in the year 2015.

The article is divided into six sections: the first is an introduction; the second and third are a literature review about the incubators and contingency theory; the fourth is devoted to the development of the method used; the fifth section is the presentation of results and, finally, the main conclusions.

INCUBATORS OF TECHNOLOGY-BASED COMPANIES

From 1959, in New York (USA), was used for the first time, the concept of business incubators, in order to support business or projects in the early stages of development. Aiming at the reduction of operational costs and increased competitiveness, the incubator model allowed companies to share the

same physical infrastructure, Secretariat, accounting, sales, marketing and other (Anprotec, 2015).

Thus, during the year of 1959, it is reported the formal start of the concept of business incubators in the United States, with the spread of the idea, other countries have joined this project, which came from growing and took new forms. In the 1980s, there was an expansion of the incubation process in America and then to Europe and the United Kingdom, in different formats such as: technology parks, research and Innovation Center (Anprotec, 2015).

In Brazil the first incubators were created in 1980, through initiatives of the CNPq (National Council of Development and Technological), with the purpose of creation of technology-based companies, in sectors such as: computer science, industrial automation and biotechnology (Anprotec, 2015). In the following decades, the Brazilian incubators expanded across the country contributing to the promotion of innovation in several sectors as well as regional development. It should be noted that currently the country has more than 400 nationwide incubators (Anprotec, 2015).

The incubators of enterprises provide a propitious environment for the development of innovative business, by closing the academic environment and the business environment. This approach fosters the process of research and development (P&D) which results in technological innovation, being the value creation process (Souza, Oliveira & Bergamini, 2008).

The value creation process of a company depends on numerous factors related to the internal and external environment, as well as the willingness of managers in developing strategies and innovations. Thus, the incubated companies have all the support for the generation of value, since it has a physical infrastructure at low cost and still has the support of universities in stimulus to promote research.

CONTINGENCY THEORY

The contingency is defined as something uncertain that can arise (Muecke, 2004). However, in theory the term organizations is not about contingency as an emergency, but as a usual, back to something particular, seeking to identify how

organizations are structured and influenced by the environment (Muecke, 2004).

The contingency theory marks a new phase in the studies of administration, from a vision of the organization as an open system, in which S states that there is not a single structure that is effective for all organizations, varying according to the relationship with the environment, technologies and strategies; pointed to by relativity, to the extent that nothing can be regarded as absolute in the organizations (Donaldson, 2001).

The contingency theory arises from the work of Woodward (1958), Burns and Stalker (1961) and Lawrence & Lorsch (1967). According to Fagundes et. al. (2010), Joan Woodward (1958) found that all the company's operating cycle is affected by technology and there is a strong correlation between structure and predictability of production techniques; as the technological breakthrough companies change a mechanistic structure for organic. Thus, organizations with stable operations need structures other than those which have a stable technology.

It should be noted that companies with characteristics and conditions of mechanistic structures are permanently rigid and bureaucratic organizations. With authority based on hierarchy and in charge, being stable and defined positions, as well as centralized decisions taken at the Summit of the Organization (Silva, 2005).

Companies with characteristics and conditions of organic structures present the positions widely defined with few rules and procedures, but with ambiguous responsibilities, being subjective systems, selection and performance, with vague goals and tasks and indivisible, as employees motivated by complex needs (Silva, 2005).

Burns and Stalker (1961) analyzed the effects of the external environment on the pattern of administration and economic performance of 20 British and Scottish companies in industrial activity and his research argue that a company, in which the environment is stable, mechanistic structure is more effective. That because of its predictability, each task and set preplanned.

However, if the environment is dynamic, Burns and Stalker (1961) argued that it is necessary to have an organizational structure which has no hierarchy, and the decision-making occurs through people with greater expertise or experience in leadership in a decentralized manner, with changing positions, being a more flexible organizational form, necessary to cope with the changing environment.

Thus, according to Burns and Stalker (1961), effective organizational structure is one that responds more effectively to changing conditions such as the economics of innovation.

An organization in which innovation is the basis of survival, flexible arrangements, matrix-oriented

projects, will be higher than the mechanistic-bureaucratic form (Morgan, 2002).

Lawrence and Lorsch (1967) investigate the relationship between the structural characteristics of organizations and what to do to deal with the various conditions of the economy and the market, as noted in **table 1**.

Narrow positions	Positions content widely defined
Many rules and procedures	With few rules and procedures
Clear responsibilities	Ambiguous Responsibilities
Hierarchy	
Goals and rewards systems	Subjective Systems of rewards
Objective criteria	Subjective selection Systems selection
Official and impersonal	Personal and Informal
Mechanistic	Organic
Tasks and goals known	Tasks and targets slots
Divisible tasks	Tasks indivisible
Performance by objective measures	Performance by subjective measures
Responsive and monetary rewards employees	Employees motivated by complex needs
Authority accepts as lawful	Authority challenged

Table 1. Features and conditions of the Mechanistic and organic Structures

Source: Silva (2005, p. 374)

Research of Lawrence and Lorsch (1967) enhances the contingency theory showing that different rates of changes in technology, science and market require different skills organizations in dealing with these changes through differentiation and integration. The theory emphasizes that there is no single model of management and that "everything is relative" contingent factors that affect decisively in decision-making, such as structure, technology, environment, strategy (Pereira, Rao & Gessi, 2012).

The contingency theory opposes Administration's classical school, which defend the existence of a single structure that could be used by various organizations and would be efficient for all (Silva, 2014). In relation to variables in the structure of the company, according to Calia and Guerrini (2006), are defined by the result of the process of distribution of authority, will be developed activities and the form of communication systems will be used to achieve the objectives of the company.

Thus, the contingency approach is based on the fact that there is no better way to administer, everything depends on the environment in question, and the leadership must worry about achieve their goals effectively with "good" adjustments to the environment and the organization, and that different approaches and different types and species of organizations might be required in different types of organizations and environment (Morgan, 2002).

"Organizations are open systems that need to be carefully managed to meet the balance of internal needs and adapt to environmental conditions" (Morgan, 2002, p. 63). The contingency theory exists within a context in which organizations are open systems and suffer environmental influences where they are inserted, and a change in the same reflect simultaneously in the structure of organizations (Junqueira, 2010).

This theory emphasizes that everything is relative, and that there is nothing absolute in organizations, explaining the functional relationship between environmental conditions and appropriate administrative techniques for the effective range of company objectives (Chiavenato, 2004). According to Molinari and Guerreiro (2004), the contingency theory can be used in several fields of study of business management, is a contingency represents a situation of external environment to which the organization needs to adapt to ensure its effectiveness.

METHODOLOGICAL APPROACH

This research presents descriptive character, as it seeks to discover, the frequency at which a phenomenon occur, your relationship and connection with others, their nature and characteristics, correlating facts or phenomena

without manipulating it (Deer & Bervian, 1996). The research studies the structural factor of technology-based companies which are incubated in order to sort the same.

In addition to the descriptive character, the research is also considered exploratory because it seeks to map the conditions of manifestation of an object, getting up information about the same, delimiting the field of work (Severino, 2007). For this reason the study is limited to analyzing questionnaires applied to 17 incubated companies that are located in the State of Paraná/Brazil, in order to observe and compare if the organizational structure is facing an environment of innovation.

The work was conducted, with a field research, qualitatively. Godoy (1995) complements the qualitative research, involves descriptive information about people, places, and interactive processes by direct contact of the researcher with the situation studied.

With respect to the sample search, was held by incubated companies in the State of Paraná/Brazil in the year 2015 and held contact with local incubators. Hatcheries who participated actively sent an email for the incubated companies with the electronic address of the questionnaire, explaining the importance of research. The approximate population is 130 incubated companies in the State of Paraná/Brazil, 17 of which approximately 13% participated in the survey. For data analysis, descriptive statistics was used.

The questionnaire was based on structured with Morgan (2002) and Lawrence & Lorsch (1967), being divided into two parts: the initially aimed to know the General characteristics of the companies, such as number of employees, age, and level of qualification and subsequently identifies the organizational structure of the company.

The positions of officials are widely defined?

Employees are highly specialized in their functions

There are many rules and procedures within the company?

The type of system, flexible or hierarchical, used by the company?

How is the participation of employees in the company?

How does the knowledge of the employees with respect to the desktop?

The responsibilities of staff are clearly defined?

Is there hierarchy in the company?
There's authority within the company to the employees
There are centralization of decision-making
Employee reward systems widely defined
The treatment of employees occurs formally and impersonal
The tasks and goals are known by the staff
Standardization of activities

Table 2. Classification of organizational structure

Source: Adapted from Morgan (2002) and Lawrence & Lorsch (1967)

As the contingency theory part of the assumption that the technological development organizations must be innovative from an organic structure, sought to develop a questionnaire to capture if the incubated companies because they have innovative organizational structures closest to the organic.

RESULTS

This item was intended to analyze the information collected by means of questionnaires applied to undertakings which are incubated in the technological incubators in the State of Paraná/Brazil. The questionnaire was divided into two parts: the first aimed to know the general characteristics of the companies, such as number of employees, age, and level of qualification and the second part, identifies the organizational structure of the company.

Among the companies surveyed, 52.94% answered 1 to 3 employees have to, followed by 4 to

7 41.18%, and only one company has over 10 employees. It was found that most of them are micro and small enterprise, being a feature of incubated businesses who need support, provided by incubators, in order to remain on the market.

It was found that of the 17 companies, about 80% of the employees has between the ages of 18 to 32 years. Among the companies interviewed there are 4 employees with high school. The rest of the staff is attending grad school or are graduates with master's degree and a PhD has.

To ask what type of system used in the company, it was found that most of the incubated companies has as a characteristic to be flexible, that is compatible with the organic organizational structure. According to Morgan (2002), a Organization in which innovation is the basis of survival, flexible arrangements will be superior in performance to the mechanistic way-bureaucratic. As can be seen in Figure 1.

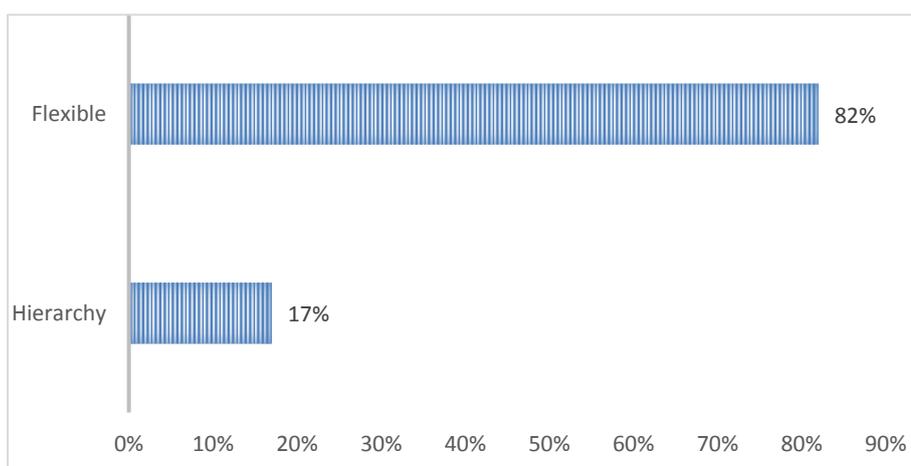


Figure 1. Tiered system or flexible

Source: survey data.

To analyze figure 1 checks that, 17.45%, responded to have the organization governed by hierarchy, through the standards and rules for all activities within the organization, aiming at maximum use of resources to better achieve their financial goals. However, 82.35% responded that the company is governed through a flexible and adaptable system to resources willing by the company, with decentralized command aimed at better quality of work, product or service.

Sought to question also the manager with respect to the participation of employees in the production decisions and/or services provided by the company.

And it was found that most companies have a wide and open participation of officials from all sectors and people. Thus, 87.50% of respondents claim to be open to the participation of staff from all sectors. This characteristic of participation of employees in all sectors is according to the organizational structure.

However, the question about the knowledge that employees have within your desktop 52.94% responded that they know only the specifics of the function which are empowered and 47.06% has several functions within the company. As evidenced in Figure 2.

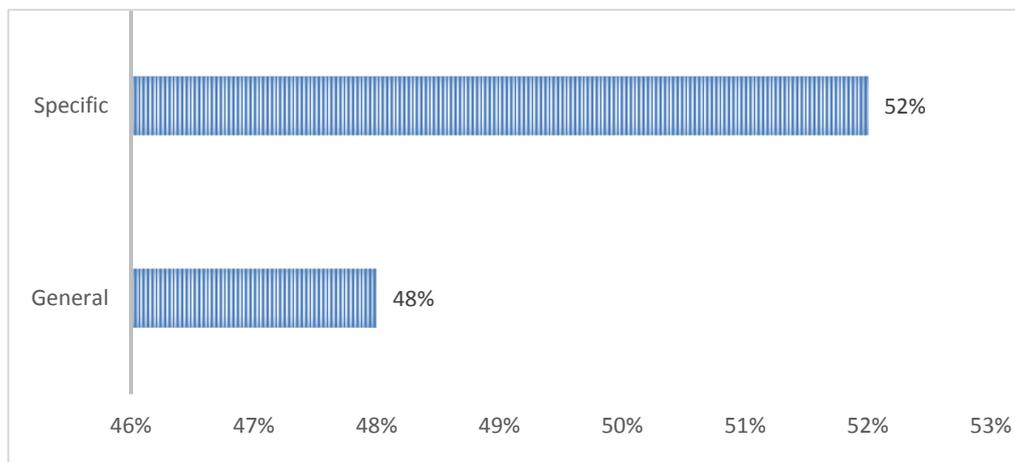


Figure 2. Knowledge of officials within the Organization
Source: survey data.

According to figure 2, note that more than 50% have a mechanist for feature to have specific knowledge of the function engaged, being companies with organic feature employees have more general knowledge of all functions within the organization.

So, for the purpose of testing and more information on the questionnaire developed the 3 frame with questions aiming to capture the characteristics and conditions of the incubated companies.

	Nothing	little	more or less	Very	Fully
<i>The positions of officials are widely defined</i>	0,00%	0,00%	29,41%	47,06%	23,53%
<i>Employees are highly specialized in their functions</i>	0,00%	0,00%	17,65%	58,82%	23,53%
<i>There are many rules and procedures within the company</i>	0,00%	35,29%	17,65%	35,29%	11,76%
<i>The responsibilities of staff are clearly defined</i>	0,00%	6,25%	6,25%	50,00%	37,50%
<i>There is in the company hierarchy</i>	0,00%	17,65%	23,53%	41,18%	17,65%

<i>There's authority within the company before employees</i>	0,00%	11,76%	23,53%	41,18%	23,53%
Centralization of decision-making	0,00%	23,53%	17,65%	29,41%	29,41%
<i>Employee reward systems widely defined</i>	23,53%	5,88%	35,29%	29,41%	5,88%
<i>The treatment of employees occurs formally and impersonal</i>	0,00%	23,53%	47,06%	11,76%	17,65%
<i>The tasks and goals are known by</i>	0,00%	0,00%	0,00%	64,71%	35,29%
<i>Standardization of activities</i>	0,00%	5,88%	23,53%	52,94%	17,65%

Table 3. Characteristics and conditions of the incubated companies
Source: survey data.

Table 3 ask if the positions of officials are widely defined, 23.53% responded that fully defined and 47.06% very defined, approaching an organic structure in which the positions are well defined.

It was also verified if there are too many rules and procedures within companies and approximately 50% of them were with a mechanistic structure from different rules and procedures. Another factor that drew attention was that 87.5% of companies have the responsibilities of employees as well defined.

And when asked again about the hierarchy, 60% have responded have a well-defined hierarchy, which demonstrates a mechanistic structure feature. However, the confrontation with the responses of Figure 1, in which 82.35% responded that the company is governed through a flexible and adaptable system to resources willing by the company, with decentralized command aimed at better quality of work, product or service.

With regard to the questionnaire emphasizes that more than 60% have responded have well defined authority within the company to the employees, in addition to centralizing decision-making and standardized activities. Opposing the question presented in Figure 3, in which 87.50% of respondents claim to be open to participation of employees in decision-making. This contradiction can arise that you hear entrepreneurs or employees, but make decisions based on their perception and this reaction causes the enterprise has a characteristic mechanistic structure.

Moreover, to ask if the tasks and goals are known by the staff, and 35.29% and 64.71% responded very fully known. What demonstrates a characteristic of mechanistic organizational structure. When questioned about the form of treatment of employees of formal and impersonal way, about 70% responded that has little informality or is not so formal. Presenting in this issue a feature of organic organizational structure.

Given this, there is a concern with the motivation of human capital within the Organization, showing a characteristic of innovation in companies that the employee has the freedom to make decisions within their responsibilities compatible with exercising and even assist in the generation of ideas within the business environment.

CONCLUSION

The objective of this research was to classify the organizational structure of enterprises of technological basis with projects in incubators in the State of Paraná/Brazil. Through the application of a questionnaire found that the same feature in most issues features and mechanistic conditions.

In general, incubated companies presented mechanistic features with command-based rules and procedures in that only one person makes the decision, and may reflect a technological breakthrough in which companies migrate to a mechanistic structure and then organic. That was one of the insights in the studies conducted by Joan Woodward (1958), as the one where technological

advance companies use a mechanistic structure and then organic.

It was also verified that most of the incubated companies born from innovation and its organizational structure in depends on how training will be distributed the authority, as well as the communication systems and the activities that will be developed to achieve the goals of the business.

Thus, this research brings contributions to technology-based companies that are entering the market and need to create an organizational structure which the innovative environment, and to identify how are structured organizationally incubated business was possible to check how businesses are structured, in order to compete on the market according to the many changes that have been happening in politics , economics and technology.

As the studies of Burns and Stalker (1961), in more stable environmental conditions, the economy does not vary a lot and there are not many competitors, the company must assume a more mechanistic structure, however, when environmental conditions are in constant change as in an economy in crisis, forces companies to acquire a more flexible posture to accompany those transformations.

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This research contributes to the academy in order to classify the enterprises of technological basis showed a mechanistic structure, opposed the theory that P&D-intensive companies tend to have a nearby organic structure. Highlights one of the limitations of this study is that approximately 50% of the incubated companies that responded to the survey have to 1 to 3 employees. This makes the classification of an organizational structure in which decisions turn out to be more centralized.

Still, this research is limited to incubated companies in the State of Paraná, in the year 2015, through application of online questionnaires. By not having conducted on-site research, the data were limited to questionnaires, i.e. it has not been possible together additional information, or challenge, different answers to the same question held more than once during the survey.

For future research suggests compare the organizational structure of technology based businesses incubated with the same companies incubated, not with the purpose to identify the differences between the organizational structures covering the area that discusses the environmental interference in the company's organizational structure.

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