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Framework for Innovations at Brazilian Apple Production Chain

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Abstract

This paper aimed presenting a framework for identifying how and why innovations emerge in the productive chain of the Brazilian apple. The methodological procedures have applied a case study, which it was effected through the qualitative research approaches. The research was performed by exploratory research with experts from the productive chain of Brazilian apples to identify the innovations that have been implemented and to classify them according to the chaining tetralogical ring. The main findings emphasize the identification of aspects that made up the framework and served as a guiding for conducting research. It also highlights the linkage obtained between the aspects identified empirically and the junction with the theories used, especially the assumptions of Edgar Morin, by complexity theory.

Keywords: Innovation processes. Complexity theory. Brazilian apple production chain

1. Introduction

Innovation processes bring in essence advantages for businesses, as well as serving as a tool for developing strategies. From this and the intention to develop a framework that can serve as a way to check the different elements that make up the context, monitoring and control of innovation processes in a supply chain is that this study was conducted.

Among the elements of the framework are the phenomena that lead to the emergence of innovation, barriers to the productive chain of the Brazilian apple, not only to the emergence of innovations as for its effectiveness. In addition, the facilities and the difficulties encountered in the study object can be used as new practices to be followed for the next innovation processes in the segment (CRUZ, et al. (2012); MILBERGS; VONORTAS, 2007; EUROPEAN COMISSION, 2004; INNOVATE AMERICA, 2004).

Among the studies as a theoretical framework, which were developed with the intention to present the environment surrounding innovation and investigate the results they provide are referred to the documents prepared by the Organisation for Economic Co-Operation and Development (OECD) - Oslo Manual; European Commission - Innovation Union Scoreboard and Innobarometer; Council on Competitiveness - Innovate America; Washington Economic Development Commission - The Washington Innovation Economy and Community Innovation Survey - Innovation Survey and the Brazilian document held by the Brazilian Institute of Geography and Statistics (IBGE), with the support of the Financier of Studies and Projects (FINEP) and the Ministry of Science, technology and Innovation - Innovation Research (PINTEC).

The documents cited, as well as studies of Ludeña (2008), Marins (2010) and Souza (2011) have no concrete consensus or situations on the specifics involving innovation processes. Because of this, it is necessary to propose other phenomena that can help, along with the theories already consolidated in the innovations emergence of understanding and even the results that companies get.

Due to the lack of consistent theories about the context in which the innovation is that arises the problem raised in this study. Among the points to be studied and justifying the drafting of the framework is that the different stages that permeate the actions resulting from the production chain needs of the Brazilian apple and result in new opportunities and result in innovations will be investigated.

The study is justified by the identification of phenomena that lead to the emergence of innovations in other productive chains. Their drivers, the context in which the innovation process and the result that the social, economic, organizational, political and market bring to the segment.

The definition of the phenomena is important for the operationalization of the study, understanding the whole context in which innovations in this production chain, and for the contribution in the implementation of new methods in this segment.

Research is important for contributing to the transdisciplinary studies on innovation through the use of the concepts of complexity theory in the aspect of Morin (1977). To this it followed the logic of tetralogical ring, which features for different situations a cycle, from the identification of adversity or problem situations arises a disorder. This disorder causes the need for interaction between the different actors in the context in disarray from there obtained an organization, the result is a new order with a new process or new procedure to be followed in this study effectively innovations.

The objective of the study is to present a theoretical framework for the emergence of innovations in the productive chain of the Brazilian apple. The research question that guided the construction of the framework was: how and why emerging innovations in the productive chain of the Brazilian apple?

This article contains four sections: section 2 presents the theorical framewor, in section 3 are described the methodological procedures and in section 4 are presented the results and analysis. The final considerations are in section 5.

2. Theoretical Framework

2.1 Innovation

According to Schumpeter (1934) innovation is the commercial or industrial application of something new, a new product, process or production method, a new type of business or financial organization's business; a new market or sources of supply (MARINS, 2010; BRANTLE, 2010).

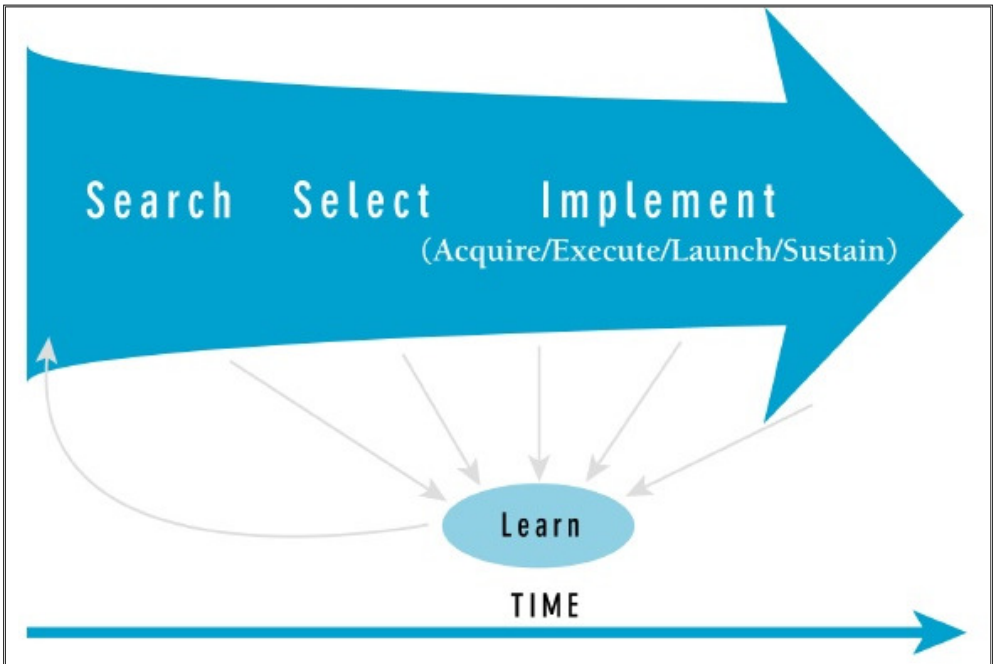
The view Becheikh (2006) innovation has five parts which include the addition of a new well, or new attribute on something that already exists; Inclusion of a new form of production; discovery of new market; acquisition of new supply markets of raw materials and; new forms of organization in the industry.

For Becheikh (2006), Oke (2007) and Baba (2012) innovation should not be restricted only to technological and economic aspects and should then also bring social innovation and change in the way the company manages its resources.

The Oslo Manual (OECD, 2005, p. 55) shows the definition of innovation as the "implementation of a product (good or service) new or significantly improved, or a process, or a new marketing method, or a new method organizational in business practices, the organization of the workplace or external relations".

Tidd, Bessant and Pavitt (2005) presents different levels of updates for innovations. As such incremental or radical innovations where the result of which may be quite different as regards the way will be used in practice. In Figure 1 are the phases of innovation.

Figure 1: Phases of the innovation process



Source: Tidd, Bessant and Pavitt (2005)

The description of the steps for Tidd, Bessant and Pavitt (2005) has the demand, identifying the opportunity outside the company context, it may be a new technology, new market, changes in legislation, etc. The selection includes the choice of opportunities taking into account the potential, lines of strategy, capabilities and skills of the company.

In implementing the identified and selected opportunity is put into practice. Starts a new process with the adoption of new technology or new form of business. It occurs interaction between the components and occurs gradually. It occurs where the acquisition of resources within and outside the company, which are used and appropriate with the strategies.

The learning phase refers to real learning company with the emergence of innovation. It is where they are evaluated the activities that were successful. The authors believe that failed innovations are important for learning the company.

The European Commission (2004) believes that innovation covers a wide range of activities to improve the company's performance, including the implementation of a new or significantly improved

product, a new service, a distribution process, a manufacturing process, a method organizational or marketing.

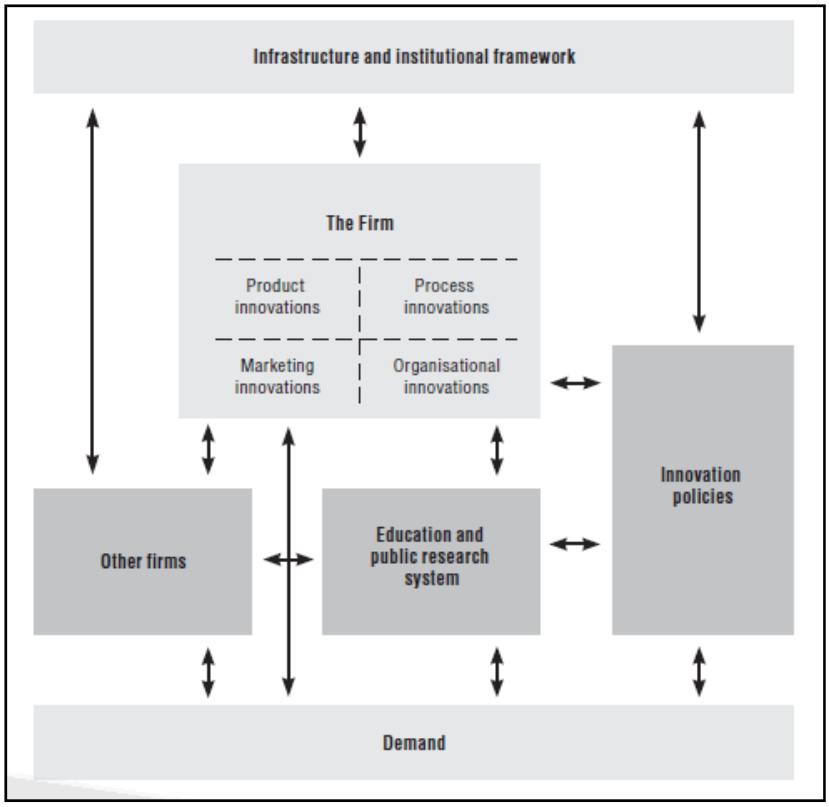
2.2 Measuring Innovation

The challenge for companies that invest in innovation is like and what is the best way to evaluate the results of innovative activities bring from their effectiveness. There is difficulty in measuring the impact that innovation provides business and the market (BRENTANI; KLEINSCHMIDT, 2004; FRISHAMMAR; HORTE, 2005).

The OECD (2005) considers the process context for evaluation, emphasizing the importance of business innovation. Since the focus is the company, the measurement is outlined with questions: what we want to measure? How we measure it? Where to measure it?Figure 2 presents the proposal of OECD for the measurement of innovation.

The Oslo Manual (2005) focused the activities of measurement of innovation in the categories proposed by Schumpeter (1950). However in practice it is clear that all the changes that occur in products and processes can be classified in the delimitations cited for measurement. These changes include not only major changes, but also changes in aesthetics, which, for example, can have a major impact on their attractiveness to customers, and that can influence the performance of the company.

Figure 2: The innovation measurement framework

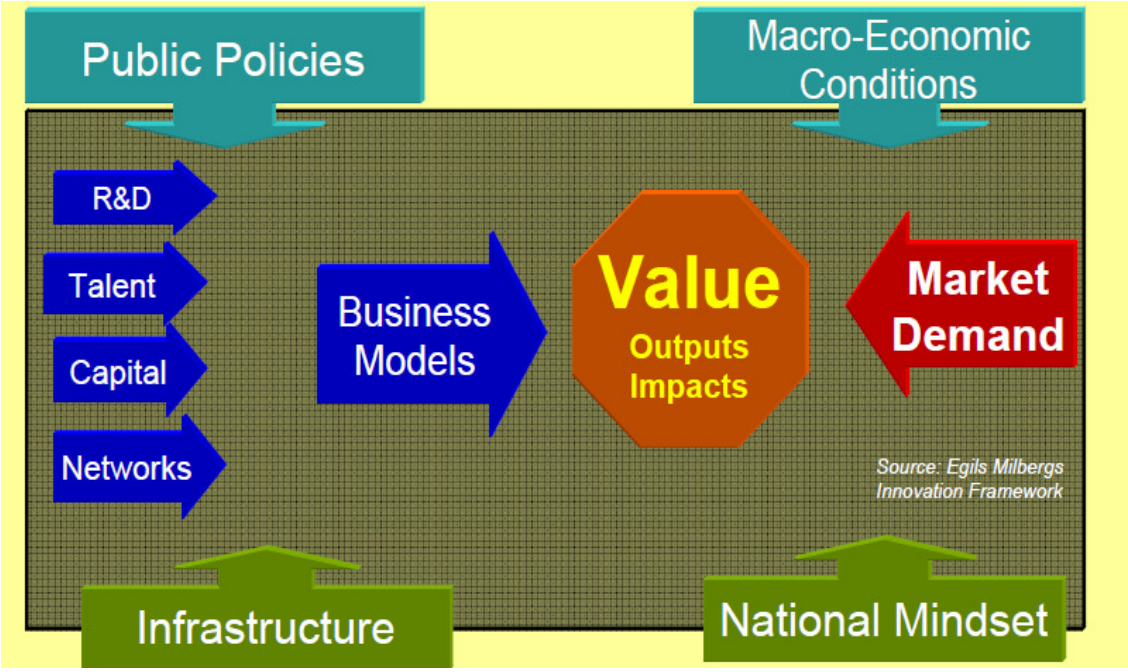


Source: OECD (2005, p. 34)

Figure 3, Milbergs and Vonortas (2007) present an indicator framework for the analysis of innovations starting from individual technology projects, for the company, an industry sector or a global level. For the authors, innovation is not a linear and independent singular activity, but as a multidimensional system with interaction of factors, processes and employee agents, considered ecosystem of national innovation.

The authors adopted a comprehensive model, able to integrate a wide range of indicators from traditional linear R&D chain model. The model presents a vision of innovation that recognizes the ideation to market complete cycle, including inputs, processes of innovative companies, innovation outputs and factors involving the impact of context on innovation activities. The model basically consists of the following areas and innovation factors: innovation inputs - R&D, talent, capital and networks; innovation processes - private enterprise as a source of ideas, product development cycle time, strategy and management practices, business model, internationalization of innovative activity and marketing; results of innovation - including outputs at the enterprise level, such as new products, penetration and market growth, cost reduction, profit, revenue and value to customers. Impact indicators, as a contribution to GDP growth, employment, productivity, standard of living, competitiveness and global market share.

Figure 3: Innovation Ecosystem: subsystems and linkages

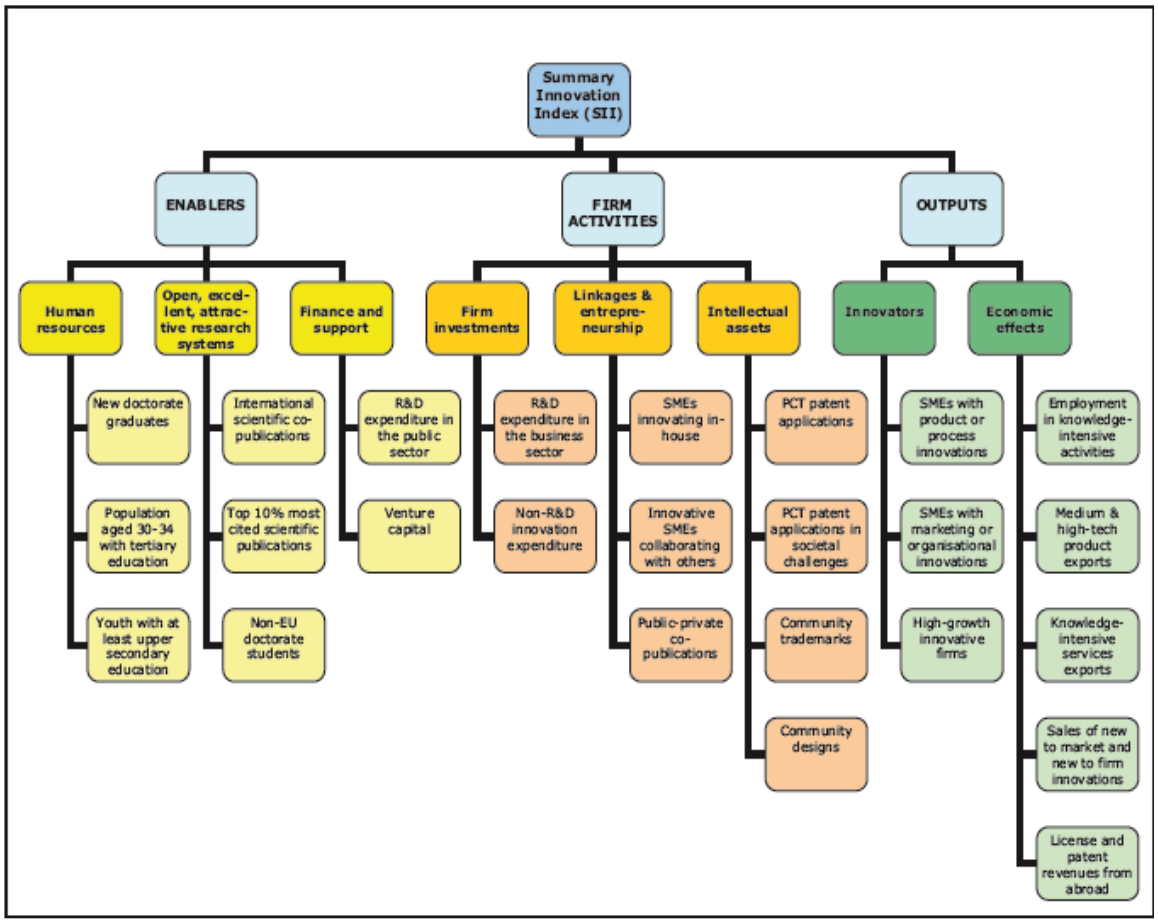


Source: Milbergs and Vonortas (2007, p.11.)

These authors identified besides those directly related to innovative activity the four domains that influence its direction. Where: macroeconomic conditions, involving the tax environment / monetary, interest rates, economic growth rates, global and gross investment trends. The conditions of public policies such as R&D funding policy, taxation, intellectual property, regulation, standards and market access policies. The infrastructure conditions, the legal system, information infrastructure, intellectual property rights, physical infrastructure quality. National Mentality including interest of young people in science, cultural factors and scientific literacy, attitude and openness to collaboration.

The Community Innovation Survey (2011) highlights the innovation or innovation activities defined them as activities where companies are involved in any of the following: introduction of a new or significantly improved product (good or service) or process; engage in innovation projects not completed or abandoned yet; new and significantly improved in the form of organization, business structure or practices and marketing concepts and strategies; activities in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities.The framework of the innovation union scoreboard in Figure 4.

Figure 4: Framework innovation union Scoreboard



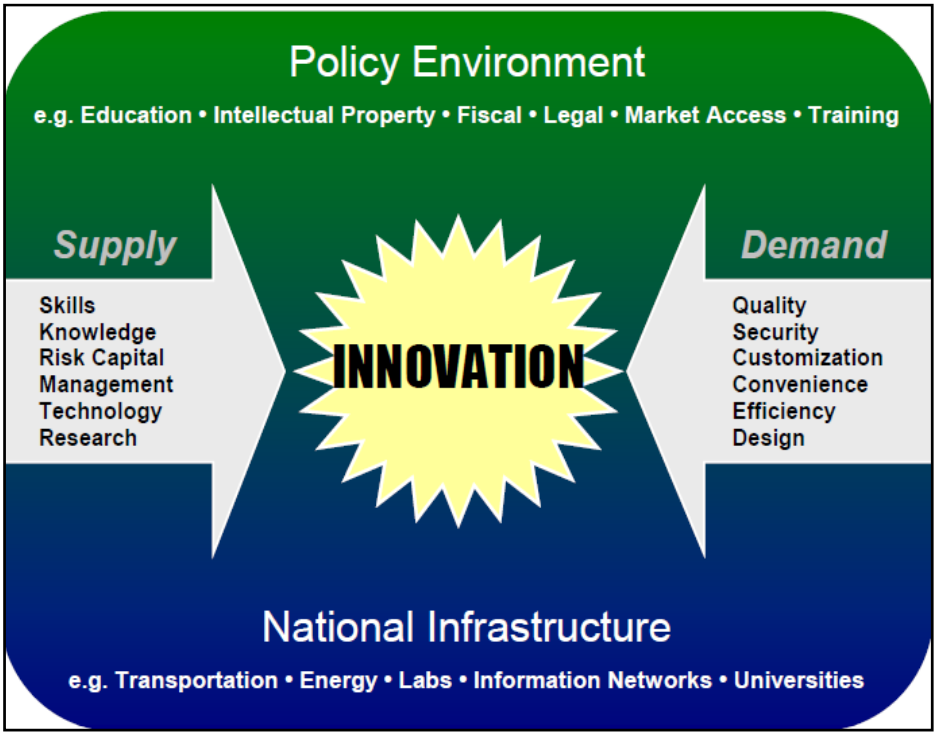
Source: European Commission (2011, p. 6)

To Innovate America (2004) successful innovation is the degree to which value is created for customers through companies that transform new knowledge and technologies into profitable products and services to national and global markets. The high rate of innovation in turn contributes to the creation of more market, economic growth, job creation, wealth and a better quality of life.The context of the innovations of the Innovate America in Figure 5.

In Brazil, the Brazilian Institute of Geography and Statistics - IBGE, supported by the Financier of Studies and Projects - FINEP has as a parameter to measure research and innovation in the country to call Innovation Survey - PINTEC. The research aims to investigate the industry companies and certain selected services. For example, in the 2011 edition of the segments surveyed services were: editing and recording and music publishing, telecommunications, information technology, research and development, architecture, engineering, testing and technical analysis (IBGE, 2014).

The PINTEC the goal according to the IBGE is to know the innovative activities that are developed in industrial and service companies, with the intention to follow up the evolution in time. The research is aimed at companies listed in the National Register of Legal Entities (CNPJ) of the Ministry of Finance, and also recorded the in the register of the IBGE, appearing to have as its main activity understood in the C and D sections (mining and quarrying and manufacturing industries , respectively). Belonging to the group 59.2 (editing and recording and music publishing) and group 63.1 (data processing, hosting on the Internet, and related activities); in divisions 61 (telecommunications), 62 (information technology services), 71 (architectural services, engineering, testing and technical analysis) and 72 (research and development services) of the National Classification of Economic Activities version 2.0 (CNAE 2.0) (IBGE, 2014).

Figure 5: Innovation Framework



Source: Innovate America (2004, p. 7)

The themes and concepts of the variables investigated by PINTEC, according to the IBGE (2014), following the logical structure for the content of the questionnaire, whose division is by blocks, which are arranged the themes of research and enabling conditions the 13 survey blocks.

PINTEC, IBGE (2014), presents the companies surveyed a questionnaire, which consists of an initial chapter of presentation of research, company identification and thirteen chapters, which are intended for data collection of the following, which they can be subdivided in sub-items: characteristics of the company; products and new or substantially improved processes; product innovation; innovation process; incomplete and abandoned projects; innovative activities; sources of financing of innovative activities; purchase of research and development services; internal research and development; impact of innovation; information sources; cooperation for innovation; government support; problems and obstacles to innovation; organizational and marketing innovations and; use of biotechnology and nanotechnology.

2.2 Theory of Complexity

The theory of complexity, by Edgar Morin, presents concepts and interpretations that lead researcher on the way to look, see and study the phenomena. Conducts the search, when it comes to research new ways to collect, analyze and present the study object data, trying not to simplify or reduce, but present them in an interconnected way, connected, complete and complex.

In the case of a study on the subject of innovation, complexity theory is presented as a practical, intelligent and dynamic to understand the context in which the processes, organization and innovation. In this study, we chose to use the tetralogical ring, for its configuration to assist in building a step by step to the emergence of innovation in the productive chain of the Brazilian apple and the steps they go through to the time of use of the results by segment.

In the search for explicit the path traced by the innovations of the production chain of the apple and the relationships that exist in the construction of these processes was used complexity theory, which is guided by the idea that the phenomena have pendency both between subjects, as objects and

phenomena. The ring tetralogical Morin (1977), by presenting a thread and an understanding both simple, full-time and complex in its composition was the guiding this study.

The complexity theory in the light of Morin (2001b) presents situations that go beyond the simplicity of epistemology and methods. This is due to this paradigm involves the understanding of thought and the nature of reality. These two items make reference to the essentials that underlie the different phenomena and thoughts (CRUZ, 2006; NUNN, 2007; WELLS, 2009; SERVANT, 2010).

Among the premises of Morin (1977) to the complexity is the view that the system has associated itself the notions of unity and also multiplicity. But they repel each other and are excluded it is because the whole cannot be reduced to the parties or the part to the whole, that is, "not one to multiple or multiple to one" (MORIN, 2002, p. 133).

Morin (1977) proposes that the complexity is not understood as atomistic knowledge nor holistic, but is seen as simplified. This should be done from a cognitive practice with an active ring which pulls the interaction between situations that appear to separated or antagonists. This means that thought must be rather reductionist or simplifying a retrogression game and recursion generator of knowledge (ALHADEFF-JONES, 2010; PATHAK, 2007).

The interventions of Morin (1977) the complex thought to the concepts of order and disorder. For him the order exceeds the notion of stability, rigidity, repetition and regularity. The order has a union with the interaction being recursive disorder, which is seen in two poles a goal that involves the agitations, dispersions, bumps, irregularities, instabilities and errors. The subjective pole is seen as unpredictable and indeterminate. The disorder is permeated by uncertainty and also brings the chance, this inevitably leads to the disorder of appearance according to the author.

Based on the concepts of order and disorder can be seen that the adverse events the established order have necessary conditions for the system components unbalanced seek interactions resulting in adjustment of adversity, Morin (2002) calls the system organization.

The slewing ring, which according to Morin (1977) is the action between the terms acting and reacting according to the events. This occurs with the disorder identification in the environment, are made networks of interactions that result in forming the organization tetralogical ring in Figure 7.

The tetralogical ring has a conception of the universe, which is the dialogic between the terms that make up. The dialogue is with a link by calling the other, with each link depending on the other to be formed, each link is inseparable from each other, each link complements the other while the other is antagonistic (MORIN, 1977).

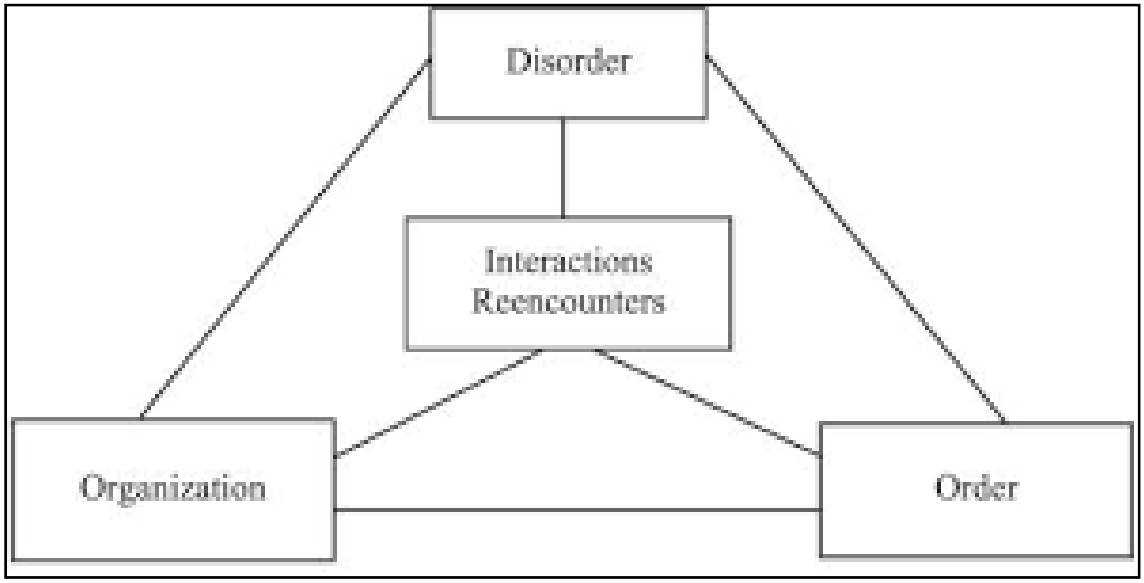
With the application of the ring in different contexts it is evident that Morin (1977) intends to present the antagonisms, the complexity and contradictions that always seem to be disintegrating may be important in interactions and reorganizations systems.

Morin (2001a) in the tetragram portrays of the event demonstrates the recursive relationship that makes up the mutual supply circuit; complementarity involving society, associations and mutualism; competition is through competitions and rivalries and antagonism is explained by the parasitism and the depredations.

The swivel tetralogical ring leads the researcher to seek the object of study, with constant monitoring of theoretical assumptions dynamics involving the different stages and procedures that the actors involved in the construction of the innovations run until they reached the moment of realization of innovation for the segment.

Thus, it is possible to understand the construction that occurs in the innovation process, as well as the ring tetralogical shows a sequence of activities that require disorder or opportunity for change. These from their identification lead members to mobilize and starting the interaction processes, which result from changes that are presented as new processes, techniques and procedures to be followed by other members of the group.

Figure 7: Tetralogical Ring



Source: Adapted from Morin (1977)

3. Methodological Procedures

3.1 Field Procedures for Research

The questioning of the study was conducted from four propositions arising from the literature review, which are presented below. Data collection had the first procedure the choice of experts, whose intentionality of choice was the level of education and knowledge of the different links that comprise the productive chain of the Brazilian apple, and are people who actively participate in decisions, investigations and procedures adopted in jail.

We conducted interviews with twelve experts who are members and researchers of the productive chain of Brazilian apples in the states of Santa Catarina and Rio Grande do Sul. They authorized the study and participated contributing at all stages of data collection, the however they requested that were not disclosed their names at work, but is broken down the function of each in jail. The level of education of specialists is Full higher education and some with doctorates, the formations are in Administration, Accounting, Law, Agronomy, Economics and those with doctoral training are in the areas of biology and plant pathology. Experts exercise function Presidency, Vice Presidency of Associations Directors, Production Manager, Directors companies, producers and researchers.

After this stage was built the first drawing of the proposed theoretical framework, with him a pilot survey was conducted, which consisted of the application of the interview in a sample of three respondents, which were used in further analysis in order to identify and eliminate future problems, perfecting it and ensuring that the researcher obtain the expected results (AAKER, 2002).

They participated in the pilot study, two experts on innovation from the Federal University of Sergipe and three specialists in the production chain apple (President of ABPM, President and Vice-President of AGAPOMI). Three technicians in charge of packing-houses, two (2) of Rio Grande do Sul and one (1) of Santa Catarina and ten (10) producers, five of Rio Grande do Sul and five (5) of Santa Catarina. There were suggestions on variables to measure the results of innovation.

It was submitted the first draft of the model to experts, which after analysis suggested some changes. The adjustments were made, the design was altered and forwarded again to the experts who made the validation. The validated model was called theoretical framework developed during the study.

3.2 Analysis of Theoretical Propositions

The theoretical framework was developed based on a systemic perspective, where they were used authors and academic papers that refer to organizations realizing in context a holistic and complex vision of management, production processes, in administration, in negotiations on integration into society and acting.

Morgan (1986) contributes to the view that organizations can be analyzed in ways that have scope for analysis and development of identification. This Morgan vision passes through the understanding of notions of the nature of science, the subjective-objective dimension, the nature of society, the size of the radical-regulation change.

In addition, Morgan contributions in understanding the context in which organizations pass through the open system concept, where companies tend to organize themselves, interact, influencing and being influenced.

Morgan's contributions (1986), Bauer (1999) and Morin (1977) notions are highlighted for a company to understand the environment in which it operates needs to understand itself. For these authors, after this understanding, the company will realize that the environment is a result of its own projection, this occurs due to the interaction with their environment provide the self-reproduction, self-organization through the noise, whose origin is in disorder, uncertainty, instability and randomness.

The assumptions of the Innovate America (2004), OECD (2005), Milbergs and Vonortas (2007) and European Commission (2011) is highlighted that the inclusion of innovation in the context of the company goes through awareness and inclusion of elements such as education, property intellectual, tax and legal analysis, training, marketing, quality, efficiency, knowledge, skills, research, technology, human resources, funding and financial support, investments, among other no less important.

In Milbergs vision and Vonortas (2007) an environment where innovation ecosystem evolution provides its members creating value for the customer. This is because they respond quickly to changes in demand, increase the transfer of research to production and is easy to adapt to changes.

In proposing Milbergs and Vonortas (2007) and Innovate America (2004) are highlighted in innovation processes, interactions between different resources, human, physical, material, economic, internal and external, infrastructure, culture, information and interactions. All of these factors or ecosystem with constant interaction between customers, suppliers, partners and institutions as a result of getting new products or services.

With the displayed context it is understood that the concepts of innovation in the case of intra-organizational level can be seen in the evolutionary aspects that make learning processes where companies adapt the environmental conditions in which they operate and generate and adopt new knowledge and new techniques constantly. In an interactionist perspective where the central focus is the interconnections that happen both with partners and with society and the environment in which it operates innovations bring those involved in its processes new contexts, new realities based on new directions for the business each component.

It can be seen from the theoretical propositions presented the composition of the innovations is permeated by social, economic, political and environmental factors, where all these combined with the processes of knowledge creation and transfer establish links between the opportunities perceived by the company and the needs presented the market and skills that the company shows.

The framework proposed for analysis of the context in which the innovation processes in the productive chain of the Brazilian apple, was built from the theoretical assumptions made and other analyzes in the field and interviews with experts.

3.3 Propositions Research

The literature review suggests that the company operates in a context where there are interfaces for different purposes, in different situations and purposes which may vary according to what has been previously determined.

The concepts and assumptions of the themes innovation and complexity theory allow the interpretation that an organization can be studied by analyzing the different perspectives that make up the innovation processes and the link can be made between these two approaches contributes to learning and to the development of the organization and its partners.

The path is usually driven by innovation processes in different contexts, companies, sectors presents different possibilities of interpretation, is the basis for that in future cases the errors serve as learning for the evolution and can increasingly leverage the visibility and skills of companies.

From this it is evident that innovation passes through different paths, different situations, many contexts and their implementation is the composition of complex and interactive procedures that can be considered as made by Milbergs and Vonortas (2007) as a compound ecosystem of living organisms and many simply inanimate, but also contribute to the different stages of construction of innovations and has considerable importance in contributing to the success or failure of innovative activities.

The first proposal was based on the circuit presented by Morin (1977), where the author proposes a sequence saying that the environments with apparent order, the events and the nature of phenomena of flow are affected instabilities and start to present disorder characteristics. These call to be resolved the need to interactions between the involved and this interaction results in a reshaping of the systems considered by Morin (1977) as an organization and thus obtains order in this environment. Propositions of this study are:

Proposition 1: innovation processes in the productive chain of the Brazilian apple originates from the identification by the members of a disorder (MORIN, 1977; STYHRE, 2002; AMAGOH, 2008; PHILIP, 2002; MISCHEN; Jackson, 2008; SANGER; GIDDINGS, 2012).

This proposition can be detached intended use of the complexity theory contributing to the innovation studies, the authors as Amagoh (2008), Philip (2002) Mischen and Jackson (2008) and Sanger and Giddings (2012) presents the possibility of union among the topics complexity theory, knowledge, change, interactions, social networks and innovation in policy implementations and processes in organizations. This can be followed from the idea that the disorders that arise in environments are situations that lead to the search for solutions and can in this case be considered innovation opportunities both in product as processes or techniques.

According to Styhre (2002) to be adapted to the changes or to gain competitive advantage the company needs to be aware of the opportunities and this can come along with the instabilities that occur often out of what is in the preplanning. For Sanger and Giddings (2012) complexity theory leads by providing a more open mind, managers to approach the practical phenomena keeping the uniqueness of situations and contributing to their understanding.

To Styhre (2002) systemic vision combined with complexity theory enables managers with knowledge and understanding to deal with the uncertainties and respond to changing demands. According to the author this view contributes areas of the company: innovation, organizational intelligence, organizational design, knowledge management and corporate strategy, among others.

The author also shows that the theories of organizational changes contribute to the understanding of the origin of the processes that drive changes and describe the complex, dynamic, unpredictable and often chaotic in organizational transformations. In tetralogical ring, disorder, called as subsequent link, interaction, so the Proposition 2 is made from this understanding.

Proposition 2: the interactions that occur between the actors of the productive chain of Brazilian apples are decisive for the outcome of innovations (MORIN, 1977; PINA et al, 2006; WEBER; SCHWENTICK,2007; CICMIL et al., 2009.).

Weber and Schwentick (2007) complexity theory has at least two ways to contribute to the learning of systems, these forms are understanding the structure of the problems and the dynamics surrounding its complexity. These authors believe that complexity theory should be seen as a dynamic, which presents a more accurate assessment and a sense of dynamic problems and can be categorized into complexity classes. The authors suggest the understanding of the complexity of the facts, when afflicted with problems, they are characterized as open problems that allow for different understandings and clarifications and lead to a broad view.

Cicmil et al. (2009) defend the idea that organizational change activities can be examined and succeed from the understanding of the complexity and structure of the systems involved.

According to Philip (2002) to understand a company must understand the interactions that its members perform with members of other partner companies. The communication that the members of a company and also maintain the relationships they establish with the other members of other companies. He said the key to communication that bring results are the interactions that take place between the actors.

The sequence of tetralogical ring, from the interactions between members of groups, systems, organizations, among others, is to link or result in the organization, this concept is referred to in the third proposition:

Proposition 3: The result of the interactions between the actors of the productive chain of the Brazilian apple results in an organization (MORIN, 1977; PINA et al, 2006; WEBER; SCHWENTICK, 2007; BRANTLE, 2010.).

Pina et al (2006) the complexity theory contribution to the concept of organization of systems is the creation of a number of ideas interconnected make up the strategies and the ways that the company map with the intention of obtaining stability and organizational resilience. Furthermore, the concept organization to the complexity theory shows that now after the event co-evolve disorders and has not only planning, but works with constant flow of reconstruction and self-organization, learning and feeding actions one another in a succession of interactions.

According to Stacey (2003) often changes in the organizations world cause changes in the way viewing your own business. These changes are outlined in a series of new forms of organization, diverging from conventional Newtonian thinking and approaching the logic complexity theory or complex adaptive systems.

Brantle (2010) presents the perspective of complexity, which strategies are the art of keeping the company on the brink of chaos, but with a space where freedom and guidance combine in order to produce creative outlets. The author demonstrates an integration of ideas starting innovation with Schumpeterian vision where environments influence organizational structures toward more simple designs and then point to environments where they fomented the strategic improvisation needs leading the company to rehabilitation and organizational restructuring (BRANTLE , 2010; PINA et al, 2006).

Proposition 4: the organization in the productive chain of the Brazilian apple, from interactions have as a result a new order, whose processes are now used by their members (MORIN, 1977; SKARZAUSKIENE 2010; WELLS, 2009; BRANTLE, 2010).

Wells (2009) using the perspective of complexity theory helps with explanations about the uncertainties, knowledge and complexity that appear in the constitutions in networks or chains. For the author the activities that are carried out in organizations networked companies need governance and well-defined roles and policies that serve as support for the activities are carried out successfully and also serving as a precaution for the stocks of companies.

According to Wells (2009) theory of complexity to their perspectives assists in setting up a complete way for the integration of factors that make up a network or chain of companies. This contribution also gives the effect that can be used both theories and everyday aspects to strengthen the decisions.

Already Pathak (2007) and Reinstaller (2006) present the idea of the complexity theory contribution to the formats in networks emphasizing that this theory is an important element in understanding the context in which the changes and the different activities when it comes to the connection of a large number of companies from different sectors, which is the case of the productive chain of the Brazilian apple.

For Pathak (2007) the theory of complexity contributes to the integration of forms of management or new management practices, which have other possibilities of inter-relationships between the members of generating chains, validating and perfecting new ways to take effect the new knowledge they are obtained in the sector.

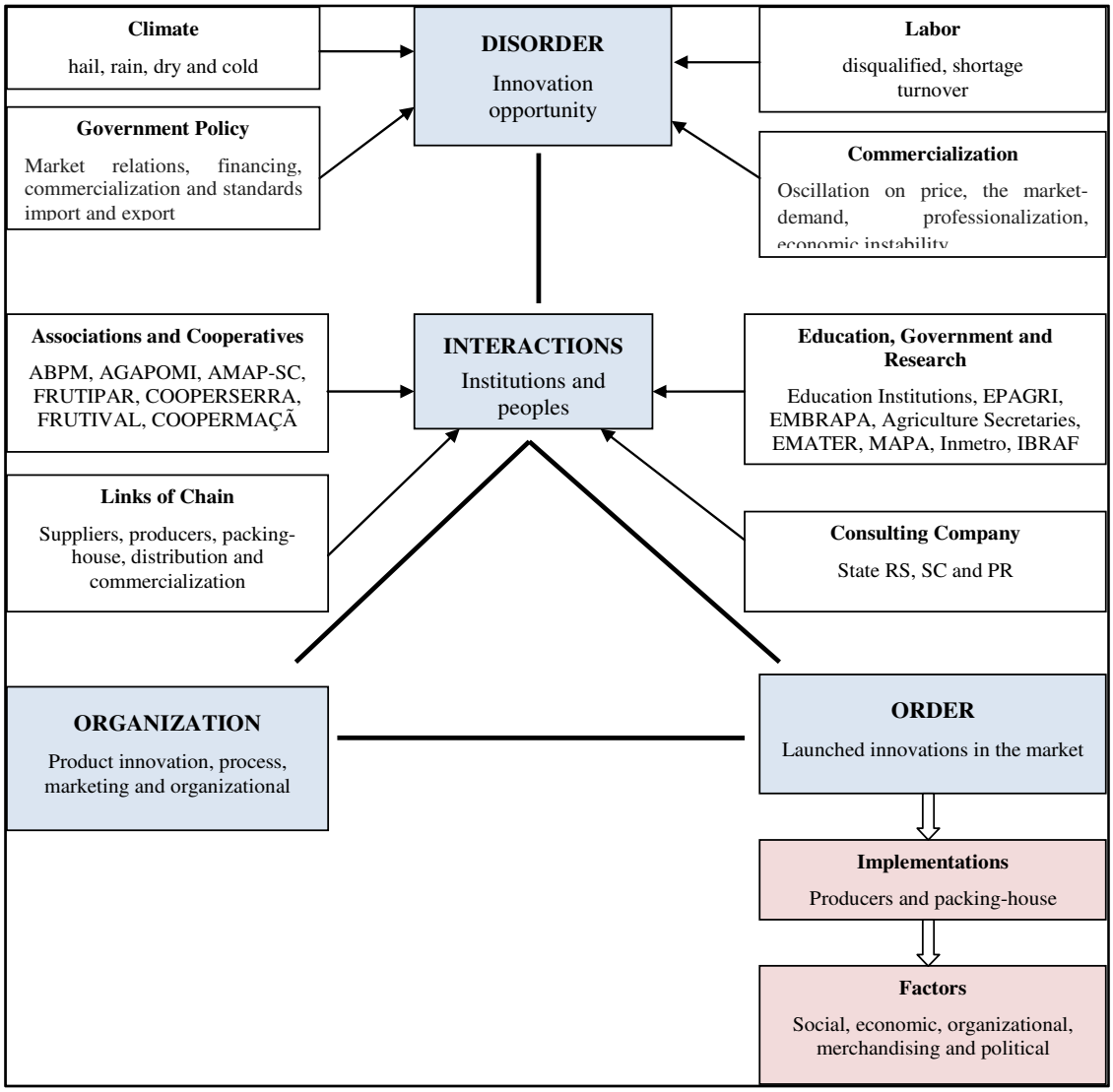
Thus, it can be noted that the diffusion of innovation is a process that must be well thought out by the companies, especially in the productive chain of the constitution, the complexity of the relationships and interactions that exist beyond that there are several contexts that are in vogue, the different links that make up a production chain.

4. Results and Analysis

4.1 Framework Theoretical

The theoretical framework was drawn from the circuit suggested by Morin (1977). The author emphasizes the importance of the occurrence of certain steps so that the construction is understood and the result of the different phenomena that occur in nature, in society and in daily life. Figure 8 shows the proposed theoretical framework.

Figure 8: Theoretical Framework



Source: Authors (2014)

As the presented innovation models, which suggest that innovation processes go through a discovery sequence, perception and demand, followed by decisions to choose the best way to go for the sequence of activities, and are also checked the steps of obtaining, acquisition and implementation of

ideas, resources and procedures culminating in the launch of innovations and may be such a new process, product, marketing procedures or organizational (OECD, 2005; TIDD; BESSANT; PAVITT 2005; MILBERGS; VONORTAS 2007; INNOVATE AMERICA, 2004; EUROPEAN COMISSION, 2011).

5. Final Considerations

This study was proposed with the intention of presenting a design that can represent the steps taken by the productive chain of the Brazilian apple for the development of their innovation processes, as well as demonstrate the thread that occurs between the different participants in these processes in the segment.

The framework provides the link clutter elements: labor, climate, government policies and marketing as the great adversity. Are presented in the link interaction: associations and cooperatives of producers, educational institutions, research and government agencies, the productive chain links and consulting firms. Which are the actors involved in interactions to solve the adversities presented by segment.

A relevant fact of identification of innovations is that they revolve around the major problems experienced by segment. The problems are closely related to the condition of activity predominantly performed manually, craft and extremely dependent on manpower. Besides the problem with labor which, according to experts, has grown over the years by disqualification, lack, lack of tolerance among other reasons, there are also the instability caused by climate with very little frequent and provided oscillations.

There are also two adverse situations in the segment of the Brazilian apple that causes much discomfort companies and producers. These adversities concern policies that are adopted by the Brazilian government in relation to agricultural production and also the marketing of fruit, also responsible for withdrawal of many fruit production producers in the country.

Among the reasons given by experts to the emergence of innovations in Brazilian apple production can be highlighted: the need to adapt to the consumer market, the search for a fruit with more quality characteristics of most color and flavor and adjustments to the health standards and employee safety, environment, food safety and mediated for marketing.

In the interpretation made from the content of the interviews sought to identify the factors emerging from the innovations in the productive chain of the Brazilian apple. These factors can serve as a reference for analyzing the impacts of innovations for producers and packing-house.

Thus the structure of the framework, at its center, follows the logic of tetralogical ring where from disorders, considered opportunities for innovation, the need arises of interactions, a fact highlighted by the study Milbergs and Vonortas (2007) represented, for example, by dynamic innovation ecosystem where interactive processes with constant feedbacks conducted among the members of the processes are highlighted.

The next stage of the framework is presented the ring link: organization, considered in this study, the result of interactions and presented from the Oslo Manual as innovations in product, process, marketing and organizational. Following the tetralogical ring comes the order represented in this investigation for the implementation of innovations in the links of the productive chain of the Brazilian apple.

In the order, the final stage of the framework is presented step where you want to perform the measurement of the innovations implemented in the producing and packing-houses links in addition to the measurement of some of the social, economic, political, market and organizational resulting from actions provided by the implemented innovations. These factors, as well as the notion of context in which innovations were built based mainly on European Commission (2011) and Innovate America (2004).

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