

AN ANALYSIS OF THE FALLACY OF TAKING APART TECHNOLOGY AND INNOVATION

Luciano Augusto Toledo

Doutor em Administração pela Universidade de São Paulo – FEA/USP
Professor PPI da Universidade Presbiteriana Mackenzie – NEMA
E-mail: luciano@mackenzie.br (Brasil)

Moises Ari Zilber

Doutor em Administração pela Universidade de São Paulo – FEA/USP
Professor de Pós Graduação Stricto Sensu da Universidade Presbiteriana Mackenzie – NEPEI
E-mail: mazilber@mackenzie.com.br (Brasil)

ABSTRACT

This essay is composed of a review of theoretical references by means of a critical conceptual analysis of aspects applicable to the theme of innovation and technology. It indicates that the innovative process is challenging as it allows for a variety of interpretations and involves the administration of competencies in the scope of technology and management. Thoughtful practice requires time, dedication, and investment, as well as truly significant innovations. To be significant it needs to contribute to the growth of the organization while exhibiting value to clients who may experience this value. However, taking apart technology and innovation can be a fallacy.

Key-words: Innovation; Technology; Fallacy.

1 INTRODUCTION

In a competitive environment, techniques such as **Just in Time** and **stream-lined production** are presented as alternatives to overcome obstacles that affect the value chain of organizations (Casarotto, 2002). Such alternatives imply alterations in work processes, diminished stocks, and production in line with demand which improves the utilization of resources and consequently promotes cost reduction (Naisbitt, Naisbitt, & Philips, 1999). These alterations, or transformations, to which organizations are subjected to in the current business environment, are necessary so that the level of organizational competitiveness continues to grow and be constant. Meanwhile, organizations are increasingly being submitted to permanent adaptations and adjustments in products, production, and management processes. Everything indicates that economic agents that are unable to adapt to these new environmental conditions face difficulties in developing and surviving (Porter, 1989). Naisbitt et al. (1999) relates that when inserted into a dynamic and competitive environment, organizations cannot depend exclusively on operational efficiency to be competitive. It is imperative to be singular, or better, to present differentiation. Being singular implies the development and implementation of mechanisms to improve organizational productive processes and that independent of numerical results they should promote a continuous flow of innovation that is disseminated and has the complete acceptance of the various collaborators in a hierarchical organizational structure (Naisbitt et al., 1999). In this panorama of techno-cultural revolution, innovation and technology as possible landmark instruments for improving company competitiveness and driving organizational growth stands out (Laudon & Laudon, 2004). In complement, Brown (1999) notes that the heart of innovation is in the difficulty of its management and in associating the technologies that constantly emerge with the business of emerging markets. The author suggests that management of innovation is not limited exclusively to combining technological products and services that arise with the existing markets but also to showing value to the primary interested party: the client.

An academic work that studies organizational aspects that may favor competitiveness is justified and standing out amongst the aspects are Innovation and Technology. The present work allocates an essay that interweaves commentaries and critiques concerning the assertions inherent to the theme of innovation and technology. These include: To innovate is to think beyond technical abilities and the understandings of specific and necessary capacities for task execution (Schuler & Jackson, 1995); Product innovation is a way of competing in highly dynamic environments and with uninterrupted technological changes, so that organizations adopt innovations as a corporate mode of life capable of creating new products, services and processes (Tushman & Nadler, 1997). This is intimately tied to research and discovery, experimentation and adoption of new production processes

and new organizational forms (Dosi, Freeman, Nelson, & Soete, 1988). It is imperative that organizations seek significant innovations (Longenecker, Moore, & Petty, 1997) and technology is one of the conducive instruments to innovation (Ansoff, 1993). If one of the organizational objectives is to present value to clients (Lambim, 2000) it would perceive this value as a utilization of new technologies for organizations that seek innovation as a means of maintaining competitiveness (Longenecker et al., 1997). The value generated by innovation is for the organization or the client (Brown, 1999).

2 METHODOLOGY

The work is delineated as an essay, which is conceived by Medeiros (2000) as a methodological exposition on a subject and the presentation of original conclusions arrived at as a result. For the author, the essay is by nature a **problemizer** and non-dogmatic and it should project the critical spirit of the author and the novelty, or better, originality. According to Severino (2000), in the essay there is greater liberty on the part of the author to defend a determined position without having to be sustained by the rigorous and objective apparatus of empirical documentation and bibliography. In fact, the essay does not dispense with logical rigor and coherent argumentation and for this reason, demands cultural information and intellectual maturity.

In an essay, the authors should explain the background to the topic they are focusing on. This may include previous research or introducing key terms and concepts. Think of this section as a funnel; it should start by speaking more broadly about the topic and then gradually refine the readers' focus to the topic the authors wish to discuss. It may also be useful to explain why the authors chose to focus on this aspect of the topic and do they disagree with certain parts of past research. It is important to find a balance between explaining to their reader the background to the topic and being overly wordy (Severino, 2000).

The discussion is the most important part of an essay as it is most likely where the authors will report their most important thoughts. The key word is 'Discussion'; as the authors will want to fully report both sides of the argument they are reporting on, if this is the purpose of their essay. Or if they're discussing a single topic, they should explain the importance of this topic fully to the reader. In this way the present essay proposes a formal, discursive and conclusive analysis, as a logical and reflective exposition on innovation and technology (Medeiros, 2000).

3 ACADEMIC SUPPOSITIONS

Porter (1989) relates that most research on the way in which technology evolves in the market originates in the concept of product life-cycle and that technological transformation is concentrated on the need for product innovation. This makes product innovation seen as a form of competing in highly dynamic environments and with uninterrupted technological changes, so that organizations adopt innovation as a corporate way of life, capable of creating new products, services, and processes (Tushman & Nadler, 1997). Product innovation by organizations may allow them to meet new market needs, improve their positions in relation to substitutes, and reduce the need for complementary products, thus resulting in better conditions for their growth (Porter, 1989). Quinn (1985) states that innovative organizations are those that transfer a concept of innovation to the market, having to absorb alone all the costs in the event of a possible failure, perhaps being socially or administratively intolerable and placing at risk their other products, projects and opportunities. In this ambit, organizations that take on the role of market followers monitor the competition's new products, copying them with much less risk and investment (Kotler & Keller, 2005). To minimize risks and maximize profit opportunities some organizations adopt a strategy of imitation and they generally enter new markets or launch new products only after viability tests have been made by the innovators (Kotler & Keller, 2005). In this way they are able to minimize research costs and even offer similar products at inferior prices. However, such an absence of innovation can affect the sustained development of the organization because during a determined period, the stagnation of the offer induces clients to prefer new products and new services offered by the competition (Freire, 2002). Kotler and Keller (2005) emphasize that organizations with such strategies continue to run risks, as they may always be behind the competition and never able to achieve a greater market share.

For Galbraith and Lawler III (1995), innovation is defined as a process that generates something new: a product, an application or a system. It is a creative method of obtaining new applications for existing knowledge or even combining fragments of existing knowledge to create a new ability or new solutions. In this same sense, Afuah (1998) approaches innovation as a combination of invention and commercialization. In other words, it is using new knowledge to offer a new product or service that clients want. He further states that the new product or service is considered new when the attributes are better or have never existed in the market. For Dosi et al. (1988), the process of innovation is closely connected to the search and discovery, experimentation and adoption of new products, production processes and new organizational forms. Grant (1998) asserts that innovation is breaking with the pre-established models and initiating commercialization of a product that is perceived by consumers as something new, having effects beyond those of existing consumer models

(Kotler & Keller, 2005).

Innovation arises from the process of technological evolution (Grant, 1998), client need evolution, and the intensity of competition within the segment (Robertson, 1967). It is a function of the application of existing knowledge for the production of new knowledge and not the fruit of chance, which requires systematic and organized efforts to be obtained (Drucker, 1999). A creative method is necessary to obtain new applications for existing knowledge or even combining fragments of existing knowledge for the creation of a new ability or new solutions (Galbraith & Lawler III, 1995). The measurements of the degree of innovation within a company are difficult to put into effect, which is why indirect measures are utilized (Rea & Kerzner, 1997). Among the indicators of innovative activity level are expenses in R&D (Associação Nacional de Pesquisa, Desenvolvimento e Engenharia das Empresas Inovadoras [ANPEI], 2008; Rea & Kerzner, 1997) with technological services, technology acquisition, non-routine engineering, R&D&E, and investments in fixed and intangible assets (ANPEI, 2008). For innovative performance indicators one can find the finalized projects, the patents obtained in the country or abroad; the income forecasts for the sale of technology to third-parties (ANPEI, 2008), billing (Rea & Kerzner, 1997), the profit generated by new products as well as the percentage of successful innovations in relation to the total of successful innovations in the sector (Drucker, 1999).

Innovations may appear in various stages or levels, depending on the degree of product novelty. These stages are related to the different levels of technological turbulence, to which the organizations are subject, which produce different strategic responses (Ansoff, 1993). Engel, Blackwell and Miniard (2000) argue that there are many ways to define an innovation. Among the most common and accepted, however subjective, is the result from an individual's thinking and is any idea or product perceived by the potential consumer as something new. In this sense, Shelth, Mittal and Newman (1999) highlight the sense of singularity, being perceived by the client as the only one, as the product is different from existing ones. Christensen and Overdorf (2002) define innovation as: sustained technologies that give a product or service a better performance than those existing in the market, and which consumers value for its existence.

From the point of view of the organization, Tushman and Nadler (1997) deliberate innovation as the creation of any product, service or process that may be new for a business unit, as long as it is effective and demands the fusion of market needs with technological viability and capacity of manufacturing. For Afuah (1998), in the organizational context, innovation is ideas adopted as new for the organization. For Tidd, Bessant and Pavitt (2008), innovation may occur in various different ways including: continuous and discontinuous change, constructing business through innovation, architecture and innovation, fusion of technologies, incremental innovation, robust design, and

intangible innovation. The authors associate the administration of innovation with such themes as: Learning and adaptation are essential in an uncertain future; innovation is imperative; innovation is an interaction between technology, the market and the organization; innovation may be linked to a generic process in which all enterprises must find their way of being and thinking, and different organizations use different routines with greater or lesser degrees of success. The effective routines must be personalized to the organizations and relate to their technologies and products and routines are directed standards of behavior that are incorporated in their structures and in their procedures in real time. As such, they are difficult to copy; administration of innovation is the search for effective routines. In other words, it is administrating the process of learning for more effective routines to deal with challenges to the innovative process

There are various existing approaches to the concept of innovation that have been highlighted in recent years, as much for the organization as for the market, including the technological aspect. Many authors and institutions (Afuah, 1998; Chandy & Tellis, 1998; Christensen & Overdorf, 2002; Engel et al., 2000; Financiadora de Estudos e Projetos [FINEP], n.d.; Instituto Brasileiro de Geografia e Estatística [IBGE], 2000; Kotler & Keller, 2005; Organisation for Economic Co-operation and Development [OECD], 1997; Shelt et al., 1999; Tidd et al., 2008; Tushman & Nadler, 1997) conceptualize innovation as a new product, from the point of view of the organization and the market, which includes some technological aspect. In order to verify the practice of product innovation in organizations, the concept of product innovation that approaches the technological aspect is adopted. According to the definitions common to various authors and institutions (Chandy & Tellis, 1998; FINEP, n.d.; IBGE, 2000; OECD, 1997; Tidd et al., 2008; Tushman & Nadler, 1997), not approaching the innovation of processes and services, as well as the market point of view, is when the research has been directed at organizations and not the consumer market for these products.

4 LEVELS OF INNOVATION

Innovation, at its most basic level, is composed of two types: the first is product innovation – the change in the product that the company produces. The second is attributed to process innovation – the way a product change is obtained (Tushman & Nadler, 1997). Engel et al. (2000) characterize modification or extension of pre-existing products as continuous innovation, which changes little the basic standard of behavior required by consumers. From the point of view of opportunity, Birley and Muzyka (2001) state they are less dramatic. Freire (2002) synthesizes incremental innovation as small improvements in company processes, products or services. Afuah (1998) defines incremental

innovation as part of the existing knowledge that is required to offer a new product. More than anything, they continue to allow competitiveness and are regular in regards to conserving existing manufacturing technologies. On an intermediary level, they are improvements with the creative combination of ideas or technologies to develop them, which Tushman and Nadler (1997) define as synthetic. In this approach, there is no new technology being utilized, only a creative combination of a series of existing and interconnected technologies, establishing a standard to its class, which Birley and Muzyka (2001) define as the evolution of product lines, establishing a new generation of products. Freire (2002) characterizes the significant improvements or development in processes, products or services that utilize a current technological base as distinct innovations. Engel et al. (2000) attributes the alteration of those existing as a dynamically continuous innovation, and generally, does not alter the established standards of product purchase and use by the client; nevertheless, they result in a minor break in the influence of established standards of behavior.

For the OECD (1997), innovation is also divided into three levels: minor innovations, which are new for the company; intermediary innovations, which are new to the region or the country; and maximum innovations, which are new to the world. In the organizational context, the most successful organizations are those that prioritize opportunities and combinations as long as they also never neglect the incremental or evolutionary development of existing products, but always seek discontinuous innovations that aggregate high value to the organization (Birley & Muzyka, 2001). In the corporate context, organizations seek incremental development as much as discontinuous innovations (Birley & Muzyka, 2001). Innovation, according to various authors is comprised of three definitions (Afuah, 1998; Birley & Muzyka, 2001; Cohen & Graham, 2002; Engel et al., 2000; Freire, 2002; Kenny, 2003; Siqueira, 1999; Tushman & Nadler, 1997): Incremental – products that provide additional characteristics or extensions of a previously standardized line; Synthetic – products with no new technology that is only a combination of a series of existing technologies; and Discontinuous – products with the development or application of substantially new technologies or ideas that require the introduction of new qualifications, processes and systems throughout the organization.

It is pertinent and cautious to abide by the foreseen levels of innovation in the Oslo Manual, therefore the inferior level of this aspect contains new knowledge for the organization. If this is the case, then new knowledge already exists outside of the organization, being able to be useful with different levels of maturity in diverse applications. To be used internally it is necessary that the capacity of absorption for the diverse components of the hierarchic structure of a company exists. What it can suggest is that the previously displayed arguments present fallacious characters, of taking apart between technology and innovation.

The first version of the Oslo Manual, issued in 1992, and the surveys undertaken using it, notably the Community Innovation Survey (CIS) organized by the EC, showed that it is possible to develop and collect data on the complex and differentiated process of innovation. The second edition of the manual takes the original framework of concepts, definitions and methodology and updates them to incorporate survey experience and improved understanding of the innovation process and also to take in a wider range of industries. It provides guidelines by which comparable innovation indicators can be developed in OECD countries and discusses the analytical and policy problems to which the indicators are relevant. The Manual has two objectives: to provide a framework within which existing surveys can evolve towards comparability, and to assist newcomers to this important field. Also, it concentrates on two of Schumpeter's categories, new and improved products and processes, with the minimum entry set as **new to the firm** in order to take in the recommendations on diffusion. However, practical experience has shown that not all the changes in products (and to a much lesser extent processes) which firms see as being new or improved match the model of technical change described above. This is not merely a matter of excluding changes which are insignificant, minor or do not involve a significant degree of novelty, but also of deciding how to treat aesthetic changes in products which may have an important effect on their appeal to customers and thus on the performance of the firm concerned. It deals only with **technological** innovation, which requires an objective improvement in the performance of a product (OECD, 1997).

According to the Oslo Manual there is a relation between implementation of technological product and process (TPP) innovations. During a given period the TPP innovation activities of a firm may be of three kinds: Successful in leading up to the implementation of a technologically new or improved product or process; Aborted before the implementation of a technologically new or improved product and process, because the project runs into difficulties, because the idea and know-how is sold or otherwise traded to another firm, or because the market has changed; Work in progress which has not yet reached implementation. Such activities may be undertaken to lead to a specified new or improved product or process or have more diffuse aims as in the case of basic or general technological research (OECD, 1997).

For Rea & Kerzner (1997) few organizations have any type of indicator to evaluate the results of innovation. Measuring the degree of innovation of a company is difficult to evaluate, which is why indirect measurement is utilized (Rea & Kerzner, 1997). Innovation measuring methods can be divided into three types: indicators of innovative activity level, indicators of organizational configurations directed at innovation and indicators of innovative performance (ANPEI, 2008). Among the indicators of the level of innovative activity are the expenses in R&D (ANPEI, 2008; Rea & Kerzner, 1997) with

technological services, acquisition of technology, non-routine engineering, R&D, investments in fixed and intangible assets (ANPEI, 2008) and finally investments in training (ANPEI, 2008; Rea & Kerzner, 1997). Measurements of increases and growth in sales and market share are more plausible methods for measuring, although the degree of innovation in the organization is more complex to put into practice (Rea & Kerzner, 1997). Ahn (2002) points out, as a result of difficulties, several variables are found in empirical literature. Von Krogh, Ichijo and Nonaka (2001) highlight as innovation indicators the results of activities related to research and development, considering the numbers of new launches per year and the time to market. Ahn (2002) focuses on the personal level and the numbers of new ideas produced by R&D teams. There are also various indicators related to investments: the percentage of expenses with training in relation to total expenses for the organization; the percentage of expenses with research and development in relation to the total expenses for the organization (Rea & Kerzner, 1997); the percentage of expenses with research and development in relation to administrative expenses (Von Krogh et al., 2001); the percentage of expenses with research and development in relation to gross annual income; and capital investments in technological innovation (ANPEI, 2008). Ahn (2002) points out that there is no correlation between the amount invested in research and development and the respective results. Kotler and Keller (2005) also point out that the results linked to research and development are so uncertain that there are difficulties in utilizing normal criteria such as investment. In addition, the data from research and development are susceptible to errors in measurement, as they can weaken the results at the time of comparison with other organizations. It is imperative to take in consideration the size of the organization, of the market, country and the actions of informalities in the small organizations in relation to these data (Ahn, 2002).

In relation to the results of innovation, Cohen and Graham (2002) indicate that frequently the number of patents can be used as a good indicator to offer an idea on inventive activities. In its studies on innovation, ANPEI (2008), refer to the number of patents deposited or conceded during the last ten years. However, Ahn (2002) notes that not all innovations are patented. Depending on the technology and the competitive conditions, investors may prefer secrecy to patenting and another factor is that small companies tend to be more active by transforming patents as forms of promoting financing facility, thus distorting the indicator. Other indicators have been utilized due to these difficulties. ANPEI (2008) uses the percentage of finalized projects in relation to those initiated in the last three years. Engel et al. (2000) offer as an innovation success indicator new products that have achieved a certain percentage of market share. For Cohen and Graham (2002) an innovation success indicator is the comparison for the rate of return for new products with that of other existing projects. Among the most common are the percentage of income or gross billing originating from new products introduced

in the last few years (ANPEI, 2008; Birley & Muzyka, 2001; OECD, 1997; Rea & Kerzner, 1997; Ulrich, Zenger, & Smallwood, 2000).

Birley and Muzyka (2001) cite the creation of profits for the organization through the development and introduction of new products with high added value. Shelth et al. (1999) consider that organizations that cultivate a culture of innovation aim to elevate the percentage of profits from the sale of new products and that consequently the percentage of these profits is positively related to gains in market share. Also following this reasoning, Hippel, Thomke and Sonnack (2002), analyze of the results of technological innovation and adopt various indicators for the impact of innovation, among which are: the number of projects realized, the increase in market share, the number of products offered, and the percentage of income arising from new products.

In recent years, several authors (Benbasat & Moore, 1991; Karahanna, Straub, & Chervany, 1999; Rogers, 1983) have studied the principal characteristics that facilitate the adoption of technological innovation, including innovations in IT (Benbasat & Moore, 1991; Karahanna et al., 1999). Vrakking and Cozijnsen (1997) defend that all the organizational aspects can be the object of innovation and highlight that in many cases administrative and technological innovations do not act in isolation but jointly. Evaluation of the perception of the adoption of a technology was initially based on five characteristics of innovation derived from the research by Rogers (1983) and the literature on the diffusion of the innovations: Relative Advantage, Compatibility, Complexity (ease of use), Observability and Experimentation (Trialability). Three additional characteristics have been identified by Benbasat and Moore (1991), who developed a general instrument to be used, with minor modifications, to evaluate the characteristics perceived in adopting an innovation in Information Technology: Image, Voluntarity and Demonstration of Results.

In a study on the adoption of innovation in IT, Karahanna et al. (1999) compares the beliefs of the adopters relative to the periods of pre-adoption and post-adoption over time and observes that the intention of the potential adopters in adopting an innovation is determined only by normative pressures of the organization. Meanwhile, the intention of the user is determined by the attitude of the same. For Karahanna et al. (1999), the three key constructs in the adoption decision process are: perceived innovation attributes, individual attitudes and beliefs, and communication received by the individual via his/her social environment, about the innovation. The innovation adoption decision process is a mental process by which an individual or other adopting unit passes, and which goes through initial knowledge of an innovation, formation of an attitude towards the innovation, the decision to adopt or reject such innovation, the implementation of the new idea, and finally the confirmation of the decision to adopt the innovation (Huff & Mcnaughton, 1991).

Tidd et al. (2008) and Pennings (1998) emphasize that in talking about innovation the essential approach should be based on change which may assume various forms. These authors present four large categories (known as the 4 'P's of innovation): Product Innovation, Process Innovation, Position Innovation and Paradigm Innovation. Pennings (1998) classifies innovation according to three distinct types: products/services, processes and administrative innovations. According to Tidd et al. (2008) and Pennings (1998) a synthesis of the types of innovation can be identified in the literature: **Products / Services**: Changes in things (products and services) offered by an organization; **Processes**: Affects the realization of production processes, from raw material to final product, including distribution; **Administrative**: Involves the administrative component and impacts the social system of the organization; **By Position**: Changes in the context in which the product or service is introduced; **Paradigm**: Changes in the subjacent mental models that mold what the organization does.

For Kotler and Keller (2005) a structure for innovation must have means to generate systematically new ideas, in order to apply new products. Sources of these ideas may be external (clients, distributors and suppliers, among others) as well as internal (within the organization), through formal research and development, participation of scientists, engineers, production personnel, executives, and also salespeople because of their contact with consumers. While innovation is defended as an introduction of new ideas, the process for innovation refers to a temporal sequence of events that occur such that the people interact to develop and program their ideas for innovation within the institutional context. In a complementary manner, organizations should implant a positive environment with long-term rules and controls (Quinn, 1985), accepting and stimulating the rotation among groups and tasks, as well as stimulating the attitudes of the administrators towards the innovations (Quinn, 1985). Similarly, Tushman and Nadler (1997) defend that organizations should develop formal processes of internal interconnection, important to creativity and innovation, which may be encouraged by teams, committees or task-forces, which gather individuals from various areas (Tushman & Nadler, 1997). In order to maintain a climate favorable to developing innovations, the positive performances of finalized projects, whether winning or losing, should be emphasized, then reintegrating the professionals in their original specialties or in new projects (Quinn, 1985).

To introduce a new product in the market, the presence of three important figures are required (Quinn, 1985): **Product champion**: the leader of the process, exercises a fundamental role as promoter and maestro of the process of development of new products (Galbraith & Lawler III, 1995); **Authority**: the person who supervises the resources that support the project; **Specialists**: the people who follow the project (Quinn, 1985) from its conception to its conclusion; it is hoped that they possess creative personalities, in other words, they are curious, imaginative, adventurous, assertive, fun, confident, prepared to assume risks, reflective and uninhibited. Similarly, Galbraith and Lawler III

(1995) emphasizes the role of the person in collaborating in the innovation process, establishing three fundamental roles: **Idea defender:** an individual dedicated and working in integral time whose success or failure depends on the development of the idea; **Project defender:** an individual who needs to discover and finance the development and the tests; **Idea Sponsor:** an orchestrator who protects the idea defenders, promoting the opportunity to test new proposals and support those ideas that appear effective

Innovators are also characterized as professionals who desire an egalitarian culture in the organization, space, and resources; spontaneity, freedom and have an ability to have fun with the performance of a task that, for others, makes a difference in the strategic performance of the organization. For these people, the demonstration of approval, the recognition, and the opportunities for educational and professional development are even more important than assuming managerial responsibilities point out that for an organization to be capable of creating new products it must present: Departmental specialization - each department involved in the development of a new product, whether research and development, marketing or production, is treated differently and possesses abilities, goals, and their own attitude toward their specialties; Amplitude of borders – the organization invests and motivates so that each department involved with new products may have excellent connections with important sectors in the external environment; Horizontal connections – establishing that the technical personnel in marketing and production share their ideas and information, sharing a vision through shared ideas and group values; Free participation in an environment that allows individuals free expression of their ideas, reducing the resistance to change; Commitment to excellence in performance of tasks that create an environment in which the individuals evaluate and challenge organizational procedures and for the innovation to occur there must be supports in the processes of changes, which may be the cooperation of small groups or through the organization making resources available (Tidd et al., 2008).

Tidd et al. (2008) emphasizes that to make innovation happen with greater frequency and with better results the innovation life-cycle must be divided into four processes: **Idea Generation:** the primordial stage of idea creation, including everything from initial exploration, the rigor of analyses and unintended ideas; **Development:** the point at which resources are employed to transform an idea into a product, service or process, which includes prototypes, experimentation and tests that make the idea truly useful; **Adoption and Diffusion:** adoption is the absorption and application of a concept or product by a person or a group and is the point at which innovations converge with action and add real value. Diffusion represents the dissemination of that initial absorption by those involved, differentiating the innovations from mere inventions; **Game End:** the given moment in which there is no more added value to be obtained by an innovation.

5 TECHNOLOGICAL MANAGEMENT STYLES

Despite the utilization of technology in company strategies it is important to understand how the various facets that the technology management styles may assume are configured. After all, they can be decisive in the natural evolution of the technologies to be utilized in a company's innovative processes.

Utilizing the political metaphor, McGee and Prusak (1994) and Weil and Ross (2004) classify five **states** of styles of technology management. They stress that maintaining multiple styles generates confusion and reduces consumers organizational resources, with a loss of efficiency. **Technocratic Utopia:** a highly technological approach to management that emphasizes the classification and modeling of information assets of an organization, strongly supported in new technologies. It is stimulated generally by information professionals who develop detailed planning based on architecture and efficient use of organizational data. Its aim is to plan a technological infrastructure with a unique databank for information without redundancy. It is characterized by valuing the most recent hardware and software and it is concerned more with the mechanisms of information distribution than by whom the information is used. It seeks to handle all the organizations' information and presupposes that those in the highest hierarchical positions will not restrict the free flow of information; **Anarchy:** presents a complete lack of technology management; **Feudalism:** presents technology management by business or functional units, which define their needs. The leaders possess the power to decide which measures will be utilized to understand performance and the common vocabulary to be utilized. It is prevalent in environments where there is structuring by units or divisions that possess high autonomy; **Monarchy:** the power over technology management is centralized and autonomy of departments and divisions in relation to technology policies is substantially reduced. The approach is from top to bottom, autocratic. Generally they reveal short **reigns** or **monarchs** and **presidents** that bring bad bodment for the growth of persistent technology uses and traditions. The mortality of this style is high and fast. Weill and Ross (2004) approach two different monarchical styles: **in Business**, where an executive or senior executive group develops all technology decisions related to the company; and **in Information Technology**, whose decisions are made by an IT executive or group; **Federalism:** an approach to technology management based on consensus and negotiation of key-information elements (management, strategic and tactical levels) and on the flow of information for the organization. In this state, negotiation is the key by which the potentially competing and non-cooperative parties may be united. The elaboration of a collective definition of objectives and means to reach them is also important. Generally the organizations possess strong central leadership and a mentality that encourages cooperation and

learning. Here the concept of possession of technology is anti-ethical; what is promoted is the concept of technology **cultivation**, where executives and business representatives from all operational business areas collaborate with the information technology department.

Considering the political styles for information, McGee and Pruzak (1994) establish the following steps for effective management of technology: **Selecting a Political Organization:** The selection of a political organization implies the definition of a management model. Knowing that the models utilized by people in the company, which of these models predominates at the moment, which is most desirable and how to proceed to achieve it may bring the best utilization of resources to the company. The technology management models may be analyzed along four dimensions: **1) Vocabulary and meaning unit** – an agreed upon conjunct of given terms, categories and elements of data that have the same meaning throughout the whole organization; **2) A significant degree of access to technology** – those who should possess the technological elements and to what ends should they be employed; **3) Quality of technology** – achieved through detailed care with integrity, precision, prevalence, interpretability and general value of technology; and **4) Efficiency in managing technology.** **Adapting Technological Policies to the Organizational Culture:** technological policies important to the survival of a new organization are among the last things to change in an organization whose mentality undergoes alteration; **Practicing Technological Realism:** considering breaking technology down into units that administrators can understand and negotiate; **Choosing the Appropriate Policy:** an important question in choosing a technology policy is evaluating and studying the charismatic people who possess political abilities of persuasion and negotiation to discuss and negotiate with those who hold power in the organization, facilitating the sharing of technology to the benefit of the organization; **Avoiding Empire Building:** technology is a powerful tool that can drive administrators to build empires based on the possession of great volumes of information. In order for a company to be successful a consensus on what constitutes technology in the organization, which possesses it, how it is conserved, who manages it, and how it is controlled and utilized must be reached. As such, and with great care, the organization can avoid creating a technology empire.

6 INSIGHTS UNDER THE INNOVATION AND TECHNOLOGY

It is a fact that organizations are in a state of constant mutual influence with the environment in which they operate, and obviously subject to the different transformations resulting from competitive dynamics in this environment. Vergara (1995) discuss some commentaries on the transformations that organizations encounter in effecting their internal and external processes. The authors highlight that

these transformations may be understood in three areas: technological, human, and organizational. They explain that in the technological domain, organization transformations result in: new work forms, treatment of information, product individualization, and, finally, an emphasis on complementary services. In the human ambit, organizational alterations are enhanced in: the responsibility behaviors, the striving for domain, participation and autonomy, as well as confidence and ethics. In the organizational domain, there is an organizational adjustment that proceeds from the natural changes arising from the cooling of the hierarchical structure of an organization (McGee & Prusak, 1994). Corroborating Fleury and Fleury (1997), assert that in the process of organizational change stimulated by these transformations, innovation, as well as technology, plays a fundamental role in competitive organizational strategy. It is a latent function that the organizations' managers may stimulate an organizational environment suitable for the complete acceptance of the innovative processes adopted with the purpose of contributing to the improvement of business (Fleury & Fleury, 1997).

Resulting from the theoretical presumptions described in this work, and founded in works of various respected authors, is the impression that technology and innovation are inseparable. This inseparability is in the fallacy that there is no innovation without technology and vice versa. Weill and Ross (2004) note that irrespective of promoting innovative movements, whether based in technology or not, the first consideration should be in which management style an organization is located. For the authors, the technocratic utopia, anarchist, feudalism, monarchy and/or federalist management styles can, in short, contribute, or not, to the even flow of the adoption of innovation in the hierarchical structure of an organization. McGee and Prusak (1994) add to the commentaries of Weill and Ross (2004) that the utilization of new technologies for innovation must overcome the previously stated obstacles, namely: adapting technology management to the current organizational culture, practicing technological realism, choosing conducive agents for technological management, and, avoiding the growth of technocratic empires in the organizational structure.

It is opportune at this point to raise a speculation concerning the relevance of an organization innovating, whether through new processes or adopting new technologies. If the innovation is intrinsically to improve the organization's competitiveness, or better, to increase profitability, the improvement of a process, the generation of new products/services, or the utilization of new technologies, perhaps it does not reflect factors indicative of innovation. How can it be proven that the organization has an improvement in results because of the innovation and would not have obtained the same results without the innovation? It is a fact that there are more possibilities for a technologically innovative company to benefit an increase in billing, though affirming that a company, by being innovative, has a guaranteed greater billing is very risky.

Longenecker et al. (1997) investigate the relevance of organizations constantly seeking innovation. The same authors point out that innovation processes sustained by the creation of new products, though developed by small organizations, are often forgotten by large organizations in the continuous process of innovation. This occurs because large organizations only seek innovations that are related to known products. Longenecker et al. (1997) relate that there is a possibility that many financial and human capital efforts are not consumed well in the creation of new innovations. This is because the same were previously neglected for not having a clear link with existing products and services, or even in relation to the uncommon nature of the idea or innovative process. The relationship with existing products may lead organizational managers to miss the pragmatic value of an innovation.

7 FINAL CONSIDERATIONS

According to this essay, the innovative processes, technological or not, present in essence a scope in the sense of adding value to products and services offered by organizations. This makes them singular in the competitive economic arena and excessively commoditized. Innovations travel along various links that compose a chain of value for companies, implying ease of access to a variety of knowledge by the organizations. It also implies operating in new markets, increases in revenue and strengthening of partnerships. Innovations may guide organizations in the search for what are called competitive advantages and, at the same time, guarantee sustainability over the medium- and long-term. It is imperative that organizations incorporate in the hierarchical culture the idea that innovation is important, not only for the organization but also for the stakeholders. Logically, understanding the dynamics that surround the concept of innovation is fundamental to delineating strategies for innovation. After all, before being configured in the molds of innovation of processes, products or technologies, it must be aligned with the general strategy of the organization. There cannot be conflicts with the organization's goal. In other words, if the goal is to generate value for clients, the innovative processes must be consolidated with this concept. In considering innovation it is important to ponder the dimensions of the organization, as well as the sector of operations and the organizational structure.

An innovative company needs to have at the heart of its existence a clear perception of the inherent risks of its actions. It needs to perceive that for a technological innovation to work as a competitive differential there is no space for the identification of a manager as the only one responsible for its development. Of course there must be a central leader responsible for the team or teams handling the different fronts that result in the innovation, but he/she is not the only one responsible. In studying the constructs that define it, the concept of innovation inevitably presents itself as complex. The innovative process is challenging, as it allows for diffuse interpretations and involves a

management of competencies in the ambits of technology and management. Its understanding and practice require time, dedication, and investment, as well as truly significant innovation. When significant, it contributes to the growth of the organizations and at the same time, promotes value to clients, who are able to experience this value. And taking apart technology and innovation can be a fallacy since the most theoretical suppositions show that both work together.

REFERENCES

- Afuah, A. (1998). *Innovation management: strategies, implementation, and profits*. New York: Oxford University Press.
- Ahn, S. (2002). *Competition, innovation and productivity growth: a review of theory and evidence* (OECD Economics Working Paper no. 317). Paris: Author.
- Ansoff, H I. (1993). *Administração estratégica*. São Paulo: Atlas.
- Associação Nacional de Pesquisa, Desenvolvimento e Engenharia das Empresas Inovadoras. (2008). *Resultados da base de dados 2008*. São Paulo: Autor.
- Benbasat, I., & Moore, G. C. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Reserarch*, 2(3), 192-222.
- Birley, S., & Muzyka, D. F. (2001). *Dominando os desafios do empreendedor*. São Paulo: Makron Books.
- Brown, J. S. (1999). Learning, working & playing in the digital age. *Digital Age*, 2006(May 20), 1-16.
- Casarotto, N., Filho. (2002). *Projeto de negócio: estratégias e estudos de viabilidade: redes de empresas, engenharia simultânea, plano de negócio*. São Paulo: Atlas.
- Chandy, R. K., & Tellis, G. J. (1998). Organizing for radical product innovation: the overlooked role of willingness to cannibalize. *Journal of Marketing Research*, 35(4), 474-487.
- Christensen, C. M., & Overdorf, M. (2002). Meeting the challenge and disruptive change. In *Harvard Business Review on innovation* (pp. 104-127). Boston: Harvard Business School.
- Cohen, D. J., & Graham, R. J. (2002). *Gestão de projetos MBA executivo: como transformar projetos em negócios de sucesso*. Rio de Janeiro: Campus.
- Dosi, G., Freeman, C., Nelson, R., & Soete, L. (1988). *Technical change and economic theory*. London: Pinter Publishers.
- Drucker, P. (1999). *Administrando em tempos de grandes mudanças* (N. Montingelli. Jr., Trad.). São Paulo: Pioneira.
- Engel, J. F., Blackwell, R. D., & Miniard, P. W. (2000). *Comportamento do consumidor* (8a ed.). Rio de Janeiro: LTC.

- Financiadora de Estudos e Projetos (n.d.). *Glossário: termos e conceitos*. Recuperado em 17 de maio, 2010, de http://www.finep.gov.br/o_que_e_a_finep/conceitos_ct.asp.
- Fleury, A., & Fleury, M. T. L. (1997). *Aprendizagem e inovação organizacional: as experiências de Japão, Coréia e Brasil* (2a ed.). São Paulo: Atlas.
- Freire, A. (2002). *Inovação: novos produtos, serviços e negócios para Portugal*. Lisboa: Verbo.
- Galbraith, J., & Lawler III, R. (1995). *Organizando para competir no futuro: estratégia para gerenciar o futuro das organizações*. São Paulo: Makron.
- Grant, A. (1998). Entrepreneurship – the major academic discipline for the business education curriculum for the 21st century. *International Small Business Journal*, 15(3), 28-37.
- Hippel, E. V., Thomke, S., & Sonnack, M. (2002). Creating breakthroughs at 3M. In *Harvard Business Review on innovation* (pp. 31-54). Boston: Harvard Business School.
- Huff, S. L., & McNaughton, J. (1991). Diffusion of an information technology innovation. *Business Quarterly*, 56(1), 25-31.
- Instituto Brasileiro de Geografia e Estatística. (2002). *Pesquisa industrial – inovação tecnológica 2000*. Rio de Janeiro: Autor.
- Karahanna, E., Straub, D. W., & Chervany, N. I. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, 23(2), 183-213.
- Kenny, J. (2003). Effective project management for strategic innovation and change in an organizational context. *Project Management Journal*, 34(1), 43-53.
- Kotler, P., & Keller, K. L. (2005). *Administração de marketing*. São Paulo: Prentice Hall.
- Lambin, J.-J. (2000). *Marketing estratégico*. Lisboa: McGraw-Hill.
- Laudon, K. C., & Laudon, J. P. (2004). *Sistemas de informação gerencial: administrando a empresa digital*. São Paulo: Prentice Hall.
- Longenecker, J. G., Moore, C. W., & Petty, J. W. (1997). *Administração de pequenas empresas*. São Paulo: Pearson
- McGee, J. V., & Prusak, L. (1994). *Gerenciamento estratégico da informação: aumente a competitividade e a eficiência de sua empresa utilizando a informação como ferramenta estratégica*. Rio de Janeiro. Campus.
- Medeiros, J. B. (2000). *Redação científica: a prática de fichamentos, resumos, resenhas* (2a ed.). São Paulo: Atlas.
- Naisbitt, J., Naisbitt, N., & Philips, D. (1999). *High tech high touch: technology and our search for meaning*. Naperville, IL: Broadway.
- Organisation for Economic Co-operation and Development. (1997). *Oslo Manual: the measurement of scientific and technological activities - proposed guidelines for collecting and interpreting technological innovation data*. Paris: Author.

- Pennings, J. M. (1998). Innovations as precursors of organizational performance. In R. D. Galliers, & W. R. J. Baets (Eds.), *Information technology and organizational transformation: innovation for the 21st century organization* (pp. 153-178). Chichester: John Wiley & Sons.
- Porter, M. E. (1989). *Vantagem competitiva: criando e sustentando um desempenho superior* (E. M. P. Braga, Trad.). Rio de Janeiro: Campus.
- Quinn, J. B. (1985). Managing innovation: controlled chaos. *Harvard Business Review*, 63(3), 73-84.
- Rea, P., & Kerzner, H. (1997). *Strategic planning: a practical guide*. New York: John Wiley & Sons.
- Robertson, T. S. (1967). The process of innovation and the diffusion of innovation. *The Journal of Marketing*, 31(1), 14-19.
- Rogers, E. M. (1983). *Diffusion of innovation* (3rd ed.). New York: The Free Press.
- Schuler, R. S., & Jackson, S. E. (1995). Linking competitive strategies with human resource management practices. In J. B. Miner, & D. P. Brane (Eds.), *Advances in the practice, theory and research of strategic of human resource management* (p. 212). New York: Harper Collins.
- Severino, A. J. (2000). *Metodologia do trabalho científico*. São Paulo: Cortez.
- Shelth, J., Mittal, B., & Newman, B. (1999). *Comportamento do cliente: indo além do comportamento do consumidor*. São Paulo: Atlas.
- Siqueira, A. C. B. (1999). *Segmentação de mercados industriais*. São Paulo: Atlas.
- Tidd, J., Bessant, J., & Pavitt, K. (2008). *Gestão da inovação* (3a ed.). Porto Alegre: Bookman.
- Tushman, M., & Nadler, D. (1997). Organizando-se para a inovação. In K. Starkey (Ed.), *Como as organizações aprendem: relatos do sucesso das grandes empresas* (pp. 166-189). São Paulo: Futura, 1997.
- Vergara, S. C. (1995). *Projetos e relatórios de pesquisa em administração* (2a ed.). São Paulo: Atlas5.
- Von Krogh, G., Ichijo, K., & Nonaka, I. (2001). *Facilitando a criação de conhecimento: reinventando a empresa com o poder da inovação contínua*. Rio de Janeiro: Campus.
- Vracking, W. J., & Cozijnsen, A. J. (1997). Monitoring the quality of innovation process and innovation success. In D. Hussey (Ed.), *The innovation challenge* (p. 23). New York: John Wiley and Son.
- Weill, P., & Ross, J. W. (2004). *IT governance – how top performers manage IT decision rights for superior results*. Boston: Harvard Business School Press.

UMA ANÁLISE DAS FALÁCIAS DA TECNOLOGIA E INOVAÇÃO

RESUMO

Este trabalho é estruturado sob a forma de ensaio científico e é composto por uma revisão dos arcabouços teóricos que embasam inovação e tecnologia. É colocado em relevo que a inovação é um processo contínuo de desafios e que permite difusas interpretações e envolve competências nos âmbitos tecnológicos e gerenciais. É desejável reflexões, tempo, prática e investimentos para entender a relevância das inovações. Sendo significativa a inovação e as tecnologias podem colaborar com o crescimento das organizações, resultando em valor. Todavia, considerar a inovação e a tecnologia como processos isolados pode constituir em uma falácia.

Palavras-chaves: Inovação; Tecnologia; Falácia.

Data do recebimento do artigo: 21/05/2011

Data do aceite de publicação: 15/10/2011