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Competitive advantages gained through the establishment of Innovation

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1 INTRODUCTION

For the business world, innovation can not be regarded only as an opportunity to start a business, to grow an existing business, or even to survive. It also is a way to define the direction of the industry, business, or community where the organization operates. However, in every instance of dealing with the theme of innovation, whether for a new product, a new process, or even a new management practice, one faces the obstacle of development and implementation.

According to Tidd, Bessant, and Pavitt (2008), a major problem in Brazil is that there are few companies that have accounted for the importance of the organization, deliberate and formally managed, of the process of innovation. According to the IPEA, in a study conducted in 2005, only 1,199 companies, in a population of over 72,000 companies - that is, 1.7% - could be regarded as innovative and having differentiated their products.

Moreover, studies of product innovation, for example, point safely to a high rate of "failure" between initial concept and implementation and launch of a successful product to market. Current figures range from 30% to 95%; an acceptable average is around 38% (CRAWFORD, 1999).

Not unlike the business world, in academia still very little is discussed and studied on the themes of Innovation and Innovation Management, in Brazil. And most of that knowledge is not yet widespread and well established among the researchers who could benefit from studies in this area (PEREIRA; MUNIZ, 2006 and FREITAS; GONÇALVES, CHENG, 2010).

Evaluating opportunities in this scenario, this paper aims to talk about innovation development and its management in Brazil, presenting together a quantitative and qualitative study on the perceived importance of innovation, and the

application of innovation management and development tools, by researchers from teaching and research institutions, and businesses. The work is part of a study conducted by Martins (2011).

2 INNOVATION

Innovation is a broad topic that is being increasingly discussed in both the academic and the business context. As a result, various authors have distinct views on innovation, as seen in Table 1.

Table 1 - Definitions of Innovation

AUTHOR	DEFINITION
C.K. Prahalad (University of Michigan)	Innovation is the adopting of new technologies that increase the competitiveness of the company
Ernest Gundling (3M)	Innovation is a new idea successfully implemented, that produces economic results.
Operational Policies FINEP	Innovation is the successful introduction, in the market, of products, services, processes, methods, and systems that did not previously exist, or containing some new feature different from the standard in force.
Joe Tidd, John Bessant, and Keith Pavitt Innovation Management (2008)	Innovation is something new that adds social value or wealth, is the development of new values that maintain or enhance the competitive position of a company (generating profit).
Joseph Schumpeter (economist)	What counts is the competition for new consumer goods, new technology, new source of supply, new type of organization ... competition that ... does not affect the existing companies' margin of profits and results, but their foundations and their very lives.
Michel Porter (The Competitive Advantage of Nations, 1990)	Companies achieve competitive advantage through innovative actions. They approach innovation in its broadest sense, including both new technologies and new ways of doing things.
Peter Drucker (Claremont University) (Innovation and entrepreneurship, 1985)	Innovation is the specific tool of entrepreneurs, through which they exploit change as an opportunity for different businesses or services. It can be presented as a discipline, which can be learned, which can be practiced.
Price Pritchett (Price Pritchett consulting)	Innovation is how we stay ahead of our environment. The innovations outside of our organization will happen 'when they want to' - ready or not.
Richard Branson (DTI Innovation Lecture)	An innovative business is one that lives and breathes outside the box. It is not just good ideas, but their combination with a motivated team and an instinctive understanding of what its customers need.
Ronald Jonash and Tom Sommerlatte (consultants)	Innovation is a process of leveraging creativity to create value in new ways, through new products, new services, and new business.
Roy Rothwell and Paul Gardier (Invention, innovation, re- innovation and the role of the user, 1985)	Innovation does not necessarily imply only the commercialization of technological breakthroughs (radical innovation), but also includes the use of changes in technological know-how on a small scale (incremental improvement or innovation).

AUTHOR	DEFINITION
Steve Jobs (Former CEO at Apple)	Innovation knows only one limit: your imagination. One who wants to win a prominent place must think in an original way, beyond the four corners of the office. Innovation need not be technology, it may be a new way of doing things with greater simplicity and efficiency, a different approach to the customer, a more elegant design line.
Tony Davila, Marc J. Epstein, and Robert Shelton The rules of innovation (2007)	Innovation is the power to redefine the industry

Source: Simantob and Lippi (2003), Davila, Epstein and Shelton (2007), Tidd, Bessant and Pavitt (2008), and FINEP (2011).

Regardless of the various ways to present the definition, it is clear that all the definitions are related to doing something new that generates profit and improves the competitiveness of the organization, creating benefits for society.

3 METHODOLOGY

To develop this work, a survey study was conducted with twenty-seven companies, prominent in their business segments, and twenty Brazilian researchers. Questionnaires were administered that addressed various issues related to innovation and its management. Thus, it was possible to collect information about the main advantages obtained through the practice of Innovation Management.

This study had two research units: companies and academic researchers that develop recognized innovative activity. In both cases, Brazilian organizations and researchers, or those having installations in Brazil, were analyzed.

4 RESULTS AND DISCUSSION

4.1 Companies surveyed

Table 2 presents the companies interviewed and their industries. Since not all companies that participated in the survey authorized the disclosure of their names, they were identified by the letters X, Y, Z, and W.

Table 2 - Companies interviewed and their sectors

COMPANIES	SECTOR
Altave	Aerospace
Amsted Maxion	Railroads equipments
Antares Acoplamentos	Metalworking
ArcelorMittal	Steel plant
Br Opportunities	Financial businesses
byMK (Fashion.me)	Fashion
Disk Caçamba	Services of cleaning and construction
Empresa X	Aerospace
Empresa Y	Consultant services
Empresa Z	Medical technology & Health
Empresa W	Medical softwares
GE	Metalworking and others
Gerdau	Steel plant
Instituto Inovação	Consultant services
Kawá Indústria e Comércio Ltda.	Footwears, Leather, Belts and Bags
Marssetti Moagem de Minérios Ltda.	Mining
Master Alimentos Ltda.	Animal feeding
Monity	Equipments of electronic security
MRS Logística S/A	Railwais
Nanoita Ltda.	Innovations services
Orbisat Indústria e Aerolevanteamento S.A.	Aerospace & Equipments of electronic security
Pragmatis Consultoria	Businesses Consultant services
Prática Produtos SA	Metalworking
Rodoviário Camilo dos Santos	Logistics services
SiliconReef	Electronic
U&M Mineração e Construção S/A	Mining and Construction
Usiminas Mecânica	Railroads equipments and Metalworking

Part 1 - General Approach to Innovation in the Enterprise

Tables 3, 4, and 5 show the results obtained from the first questions on the questionnaire for the companies. Such questions are important to elucidate general themes of innovation in the organizations and the main advantages obtained by the company, in its practice.

Table 3 - Innovation types developed in the companies

TYPES OF INNOVATION	NUM.	PERCENT.
Products and Services	16	59%
Process	19	70%
Business models	13	48%
Other: Technological	2	7%

Table 4 - Innovation Focus in the companies

INNOVATION FOCUS	NUM.	PORCENT.
Radical Innovation	7	26%
Incremental Innovation	20	74%

Table 5 - Advantages obtained through innovation

ADVANTAGE	NUM.	PORCENT.
Increased competitiveness of the company	23	85%
Increased market share or entry in new markets	16	59%
Improved financial performance	14	52%
Reduction of production costs	17	63%
Increase of the flexibility or of the production capacity	12	44%
Increased productivity of the company	12	44%
Differentiation of products / services offered	16	59%
Increase of the quality of the products / services offered	12	44%
Diversification of the products and services portfolio	9	33%
Reduction of the environmental impacts or improvement of the health & safety	9	33%
Fast adaptation to the changes demanded by the consumers or government	5	19%

From tables 3, 4, and 5, one can see that the main type of innovation developed by the companies is process innovation, with major emphasis on incremental innovation.

Regarding the advantages the companies obtained through innovation, the main one was the increased competitiveness of the company (85%), followed by the reduction of production costs (63%), increased market share or entry in new markets (59%), differentiation of products / services offered (59%), and improved financial performance (52%), with all the latter advantages leading to increase the first one.

Part 2 - Tools for Innovation Management

Tables 6 and 7 show the results obtained in questions relating to the use of tools or systems for innovation management (IM) by the companies, and the advantages obtained through the use of management tools.

Table 6 - Use of IM tools by the companies

Yes	12	44%
Not	15	56%

Table 7 - Advantages obtained using IM tools

ADVANTAGES GAINED WITH OF THE USE OF TOOLS	NUM.	PERCENT
Improved structuring of innovation process stages	6	50%
Stimulated creativity and idea generation	7	58%
Encouraged teamwork and cooperation	8	67%
Improved knowledge sharing and storing	9	75%

ADVANTAGES GAINED WITH OF THE USE OF TOOLS	NUM.	PERCENT
Improved protection of the knowledge developed	2	17%
Improved progress monitoring of the innovation process	6	50%
Improved communication and service to stakeholders (with an interest in the process)	7	58%
Improved monitoring of external changes (market, competitors, and science)	6	50%
Improved financial performance of the innovation process	6	50%
Reduced risks associated with innovation	6	50%
Improved quality of products / services developed	10	83%
Continuous improvement of processes and products / services	7	58%
Guaranteed fulfillment of stages and requirements of the innovation process	3	25%
Reduced environmental impacts of the innovation process	3	25%
Other	0	0%

From Table 6, it is seen that just under half of the companies surveyed use management tools in their innovation process, and for them, the main benefits generated by the adoption of these practices are the increased quality of products / services developed (83%), improved knowledge sharing and storing (75%), and the encouragement of teamwork and cooperation (67%).

Part 3 - Complementary Aspects of Innovation

Tables 8 and 9 show the results obtained on issues related to partnerships and the benefits obtained through them.

Table 8 - Establishing partnerships

Yes	20	74%
Not	7	26%

Table 9 - Advantages gained in establishing partnerships

ADVANTAGE OF ESTABLISHING A PARTNERSHIP	NUM.	PERCENT
Obtaining strategic advantage (leadership and learning)	14	70%
Reduced R&D cost	11	55%
Reduced R&D risk	10	50%
Achieving economies of scale	5	25%
Reduced time to market (development and marketing of new products)	9	45%
Promotion of shared learning	10	50%
Increase existing competencies	15	75%
Incorporation of complex technologies and knowledge	11	55%
Other: Access to qualified human resources	1	5%

Thus, based on the data presented in the table above, the main advantages gained by companies through the establishment of partnerships are: increase in existing

competencies (75%), strategic advantages obtained (70%), reduction in R&D costs (55%), and the incorporation of knowledge and complex technologies (55%).

4.2 Universities and Research Centers

In relation to the educational institutions and research centers that are known to develop innovative activities, 20 institutions were evaluated. Table 10 lists the institutions that participated in the survey and their respective departments.

Table 10 - Lists the institutions that participated in the survey and their respective departments.

DEPARTMENT	UNIVERSITY OR RESEARCH CENTER
Department of Mechanical Engineering	University of São Paulo -USP
Department of Science and Technology	Southeast Federal Institute of Technology -MG
Department of Production and Mechanical Engineering	Federal University of Juiz de Fora - UFJF
Electric power department	Federal University of Juiz de Fora - UFJF
Department of Electric Circuits	Federal University of Juiz de Fora - UFJF
CODAGEO	Ouro Preto Federal Institute of Technology MG
Departamento de Educação Física	Federal University of São Carlos - UFSCar
I Vision Laboratory	Federal University of Bahia- UFBA
Department of Chemicals	Federal University of Juiz de Fora - UFJF
Bioinformatics and Animal Genômico Laboratory	Embrapa Gado de Leite
Building site department	Federal University of Juiz de Fora - UFJF
Department of pharmaceuticises	Federal University of Juiz de Fora - UFJF
Department of Biotechnology	Universidade Católica de Brasília
Department of Geology	Federal University of Minas Gerais - UFMG
Department of Entomology	National Institute of Research - Amazonia
Pró-reitoria de Graduação	State University of Feira de Santana- Bahia
Department of Materials and Spectroscopy	Federal University of Juiz de Fora - UFJF

Part 1 - General Approach to Innovation

Tables 11, 12, and 13 present the results obtained from the first questions on the questionnaire applied to researchers from universities and research centers (RC). Such questions are important to elucidate general themes of innovation in laboratories and departments, as well as the main advantages obtained through innovation.

Unlike the business environment, among researchers the main type of innovation developed is technological (usually associated with a new product, component, or system), but their focus, just like in companies, is mainly toward incremental achievements and minor improvements.

Table 11 - Innovation types developed in the institutions or laboratories

INNOVATION TYPE	NUM.	PORCENT.
Products and Services	5	25%
Process	6	30%
Technological	13	65%
Social and Sustainable	6	30%
Other: Development of Methodologies and Modellings	1	5%

Table 12 - Innovation focus in the institutions or laboratories

INNOVATION FOCUS	NUM.	PORCENT.
Radical Innovation	2	10%
Incremental Innovation	10	50%
The two previous answers	8	40%

Table 13 - Advantages gained, by Universities or RCs and by Researchers, through innovation

ADVANTAGES	NUM.	PERCENT
National and international recognition of the institution and the researcher	11	55%
Increased scientific and technological capacity/training at the national and individual level	16	80%
Curriculum enrichment arising from individual's participation in the projects	11	55%
Publication-patent generation (product development that can generate article publication and conference participation, and royalties generated if patent secured)	14	70%
Establishment of partnerships (exchange of knowledge, information, and experience between the parties involved in the projects)	18	90%
Obtaining practical results (having an immediate return of a product on the market, cost savings, and other financial returns)	9	45%
Obtaining financial resources (through which to buy equipment, acquire grants, hire qualified staff, etc.)	14	70%
Other	0	0%

For the researchers, the main advantages obtained through innovation are related to the possibility of establishing partnerships for exchange of knowledge, information, and experience among those involved (90%), increased scientific and technological capacity/training at the national and individual level (80%), followed by generation of publications and patents, and obtaining financial resources (both 70%).

Part 2 - Tools for Innovation Management (IM)

Tables 14 and 15 present the results obtained in questions relating to the use of tools or systems of innovation management (IM) by the researchers, and the advantages arising from the use of management practices.

Table 14 – Use of Innovation Management (IM) tools

Yes	3	15%
Not	17	85%

Table 15 - Advantages obtained with the use of IM tools

ADVANTAGE	NUM	PERCENT
Improved structuring of the innovation process stages	2	67%
Stimulated creativity and idea generation	1	33%
Encouraged teamwork and cooperation	2	67%
Improved knowledge sharing and storage	2	67%
Improved protection of the knowledge developed	2	67%
Improved progress monitoring the of the innovation process	2	67%
Improved communication and service to stakeholders (with an interest in the process)	2	67%
Improved monitoring of external changes (market, competitors, and science)	0	0%
Improved financial performance of the innovation process	1	33%
Reduced risks associated with innovation	2	67%
Improved quality of products / services developed	2	67%
Continuous improvement of processes and products / services	0	0%
Guaranteed the fulfillment of stages and requirements of the innovation process	1	33%
Reduced environmental impacts of the innovation process	1	33%
Other	0	0%

Based on the data presented above, one can see that most of the researchers, for lack of familiarity with the tools, do not use management practices in their innovation processes, and, aligned with this, those using them (15%) perceive various advantages in adopting such tools.

Part 3 - Complementary Aspects of Innovation

The tables 16 and below show the results obtained in the questions relating to establishing partnerships, and their benefits.

Table 16 - Partnerships established

Yes	16	80%
Not	4	20%

Table 17 - Advantages in establishing partnerships

ADVANTAGE	NUM	PERCENT
Obtaining strategic advantage (leadership and learning) and recognition	8	50%
Obtaining financial resources for research	12	75%
Reduced R&D cost	4	25%
Reduced R&D risk	3	19%
Achieving economies of scale	1	6%
Reduced time to market (development and marketing of new products)	5	31%
Promotion of shared learning	11	69%

ADVANTAGE	NUM	PERCENT
Increase existing competencies	7	44%
Development of complex technologies and knowledge	9	56%
Incorporation of complex technologies and knowledge	6	38%
Other	0	0%

Thus, based on the data presented in the table above, for researchers the main advantages obtained by working in partnerships are: raising funds for research (75%), promoting shared learning (69%), the development of knowledge and complex technologies (56%), and gaining strategic advantages (50%).

5 CONCLUSIONS

From the research results one can conclude that:

1) In accordance with the literature, companies see innovation as an important factor for increasing their market competitiveness, incrementally improving the quality of their products and processes, and creating strategic advantage over competitors. Such a view is in line with global aspirations for improved quality, reduced costs, and increased markets.

2) For the researchers, reflecting the culture of the Brazilian academic environment, the main benefits perceived are the possibility of accessing and disseminating the knowledge generated, and obtaining financial resources for the researcher and the institution.

The research results also suggest that there is a large gap between universities and businesses in Brazil, thus being an excellent opportunity to improve performance for both, through the University-Industry partnership, targeting the development of research to improve processes and products, with a consequent increase in company competitiveness, and greater capability for the university. This whole process would culminate in further development for Brazil.

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