METHOD FOR DECISION MAKING IN THE MANAGEMENT OF INNOVATION: CRITERIA FOR THE EVALUATION OF IDEAS

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ABSTRACT

This article aims at the construction of a method to aid decision associated to the initial processes of innovation management decision, which was applied in a company in the energy sector, located in the state of Rio Grande do Sul, Brazil. Field research were conducted in companies that have defined the innovation processes, two within the energy sector and two outside, seeking to understand their operation. Meetings with experts were also conducted, aiming to define important aspects, both strategic and cultural factors to the company. Complementing, were identified and compared in the literature, different ways to select and prioritize innovative ideas that assist the process of innovation management, generating a list of relevant criteria. As a result there was obtained a quantitative structure of decision making that makes explicit the panorama related to earnings and the implications that a project proposal (idea) can generate for the company, considering both their strategic issues as its annual investments.

Key words: Management, Innovation, Innovation Criteria, Projects, Research and Development (R & D).

INTRODUCTION

With the appearance of the globalization, companies have intensified the search for new consuming markets, which generated a need of change including in those more conservative ones. Due to competitiveness, many companies have undertaken the obligation to innovate in products and processes as a way of maintaining themselves competitive. For such, they started to consider the investments in Research and Development (R&D) essential in their strategic planning. According to Boston Consulting Group (2010), in a research conducted with 1,590 executives of the main markets and world industries, it was identified that innovating is among the three main strategic priorities to the companies.

In Brazilian scenario, Coral et al, (2009) affirm that there still is the need of doubling the investments in R&D as a way of facing the international competitiveness and consolidating their presence in global market. In 2013, the country invested around 1% of the Gross Domestic Product (GDP) in R&D, which is very little and needs to be quickly revised, so that the country does not start to loose market in the international run for the commercialization of goods and services as the Cooperation and Economic Development Organization - OCDE alerts (OCDE, 2014). In the sector of electric power, the innovative character was not so present in the concessionaires, since they always had as main

purpose the power generation, transmission and distribution, but with the enactment of Law no. 9.991/2000 (BRAZIL, 2014a), the started to include innovation in their strategies and routines. Such Law determines that the concessionaire, licensee, and authorized companies of the electric power utility shall apply a certain percentage of their Net Operational Income (ROL) in innovation projects, being the R&D Program regulated and inspected by the Brazilian Electric Power National Agency - ANEEL. In 2010, such Law went through changes in Law 12.212/2010, changing the percentages in items I and III of art. 1. Table 1 contains the percentages of investments forecast by Law, which were changed, to the Distribution segment, from 2016 on, to 0.3% of the investment in R&D, which represents an addition of 50%.

Table 1 - Forecast Investments - Law 12.212/2010

Segment	Effectiveness 1/21/2010 to 12/31/2015				From January 1, 2016			
	P&D	PEE	FNDCT	MME	P&D	PEE	FNDCT	MME
Distribution	0.20	0.5	0.2	0.1	0.3	0.25	0.3	**0.15**
Generation	0.40		0.4	0.2	0.4		0.4	**0.2**
Transmission	0.4		0.4	0.2	0.4		0.4	**0.2**

As a result of the obligation, the investments in R&D of the electric sector in the period between 2000 and 2007 were approximately 1.4 billion Brazilian Reais (IPEA, 2014). However, the culture of innovating started to significantly advance in 2009, 2010, and 2011, when it was invested, only in the R&D projects of the electric power, 1.35 billion Brazilian Reais, which indicates that, after the implementation of the new systematic of ANEEL, for evaluation of the projects, the process became less bureaucratic and long and, at the same time, it gave more freedom to the concessionaires apply their resources, without having to depend on an initial evaluation of ANEEL to start the performance of a service. In Table 2, it is possible to visualize the values invested in R&D, meeting the new regulation of investments between 2009, 2010, and 2011, as well as the distribution of such values through more relevant areas.

Table 2 - Invested Values - New Regulation

Forecast Investments - New Regulation				
Project Topic	**Proj. Qty.**	**Proj. %**	**Investment per Topic**	**Total invest.(%)**
Alternative sources of power generation	77	10.24%	221,100,059.67	16.74%
Alternative sources of power generation	23	3.06%	21,711,129.80	1.64%
Management of Basins and Reservoirs	22	2.93%	68,237,881.23	5.17%
Environment	50	6.65%	76,096,135.53	5.76%
Safety	52	6.91%	63,904,844.27	4.84%
Electrical Efficiency	48	6.38%	56,585,977.66	4.29%
Planning of Electrical Power Systems	64	8.51%	73,014,329.06	5.53%
Operation of Electrical Power Systems	81	10.77%	150,296,356.63	11.38%
Supervision, Control and Protection of Electrical Power Systems	145	19.28%	250,695,898.00	18.99%
Quality and Reliability of Electrical Power Services	54	7.18%	117,449,428.67	8.89%

Forecast Investments - New Regulation				
Project Topic	**Proj. Qty.**	**Proj. %**	**Investment per Topic**	**Total invest.(%)**
Measurement, invoicing, and commercial loss fighting	63	8.38%	78,974,490.35	5.98%
Other	73	9.71%	142,361,511.70	10.78%
Total	752	100%	1,320,428,042.64	100.00%

Even with the obligation of investments due to Law, many concessionaires, since they do not have innovative character, executed many projects that were not bound to the company's strategy, which many times resulted in projects of little use.

Recently, with the change in the electric power sector, from the Provisional Measure no. 579/2012 (BRAZIL, 2012), which provides on the concessions of Generation, Transmission, and Distribution concessions, on the reduction of the sector charges, which are values paid by the consumers through their bill and that are charged by legal determination to fund the development of Brazilian Electric Sector and the energetic policies of Federal Government, and on the tariff modicity.

Tariff modicity according to the definition of Instituto de Pesquisa Econômica Aplicada (IPEA - Applied Economic Research Institute) is the principle that allows, on the long term of performance of a contract, that the users may share with the concessionaires the economic, productivity gains, as well as additional increases of revenue obtained by the projects under concession, which in other words means that the tariff modicity is a tariff afforded by all citizens, created by the Federal Government with support of Laws no. 10.847 and 10.848, as of March 15, 2004; and by Decree no. 5.163, as of July 30, 2004.

Upon such new scenario, the companies of the electric sector obtained a significant reduction in their revenue, which made that the management attempted to create new mechanisms aiming at compensating the drop of company's revenue, as the reduction of costs, the improvement of processes and products, the increase of revenue, and the licensing of goods of Intellectual Property - PI.

At such time, the innovation in products and processes arose as alternative. Some Electric Power companies have started their internal processes of creation of an innovation culture for some time, so enabling to focus their investment on projects in line with the company's strategy. Thus, the internal demands of projects are built together with the end areas, through meetings, approaching universities and the suppliers' chain to the proposal of projects. Over the time, the resources have decreased and the offer has increased, there being the need of creating mechanisms to select and make ideas a priority.

Thus, the present article aims at developing methods for decision-making in the innovation management of a quasi-public company of the energy sector, from the definition of criteria for evaluation of ideas in the innovation process. While results, it is expected a more accurate decision-making process to the selection and planning of innovation projects of the company, through evaluation criteria.

The present article is divided into six sections, started by this introduction, followed by section two that contains the reference o innovation, going through the industrial revolution time until the present days; section three considers innovation management models, as well as analysis and selection criteria of innovation project portfolio. Section four contains the methodology procedures, where the scenario of application of the study is presented, the classification of the performed research and the work method. The section reports the results found in the study and suggests a proposal of systematic to the decision-making in the innovation management, defining criteria for selection of ideas. Finally, section six presents the final considerations, as well as the suggestion of future works.

INNOVATION

Innovation, according to Michaelis (2014) is derived from the Latin term *Innovatione*, meaning the act or effect of innovating. Innovation has been present in the life of people for a long time, even if sometimes it is not noticed in the day-by-day and, generally, it arises from needs, aiming at fulfilling deficiencies or demands, whether personal or business ones.

According to Tigre (2006) a first wave of innovations arose by mid-18th Century, with the industrial revolution, where the introduction of machines and equipment, new forms of organization of production and development of new material and energy sources drove the West economic history. The author also emphasizes that, in the fordist age, in addition to the revolutions in the transportation and communications areas, three systems had great contribution to change the industry structure, creating new models of markets: the first discoveries in the electricity and magnetism field, through Ampére and Joseph Henry; the combustion engine, which gave rise to vehicles and airplanes; and the organizational innovations known as "Fordist-Taylorist" innovations that favored the transformation of the firm and market, from the work scientific administration.

In a supplement, Terra (2007) presents that such process occurs within logic sequence, starting by the conception of the idea going through several phases until its implementation. Such phases may significantly vary their development time, since some have a very short implementation time, which make them almost instant. Such innovations are generally idealized and developed by the employee him/herself or by his/her immediate management, which automatically already tests their efficacy or not. However, other ones need many years of research, and they need, many times, monitoring of the environment, subcontracting of other companies, and even researches with the potential consuming public, to decrease their risk. Such last ideas generally tend to have an added value higher than the immediate ones.

In relation to the types of innovation, Oslo Manual (2005, p. 55-63) defines four types: in product, in process, marketing, and organizational innovations. The **Innovation in product** is defined as "the introduction of a new good or service, or a good or service significantly improved regarding its characteristics of forecast uses. They include significant improvements in technical specifications, components and materials, incorporated software, facility of use, or other functional characteristics". The Innovation in process is defined as "the implementation of a new or significantly improved production or distribution method. Significant changes in techniques, equipment and/or software are included. The **Innovations in Marketing** are defined as "the implementation of a marketing method with significant changes in the conception of the product or in its package, in the product placement, in its promotion or in the pricing". Whereas **Organizational**

Innovations are defined as "the implementation of new organizational method in the company's business practices, in the organization of its workplace, or in its external relationships".

Terra (2007) reinforces an effective thought that there may be great innovation opportunities upon the aggregation of innovations of services associated to products, since the transactional horizon is enhanced between the company and its client, and the sale time of a product only ceases to exist giving place to a service of a permanent product, for instance, in the segment of elevators, it is more interesting to the company that, in addition to the sale of the product itself, it also performs the maintenance of such equipment, since a single transaction ceases to exist giving place to the operationalization of a partnership.

It is applicable to emphasize that, in addition to the classification of the innovation type, it is relevant to analyze the innovation methods, which are linked to the degree of innovation of a product, service or business, unfolding them in incremental and radical innovations (Garcia & Calantone, 2001) according to Oslo Manual (2005). The incremental innovations are understood as the ones of performance improvement or the ones of reconfiguration of a technology in products or process already existing. On the other hand, the radical ones are defined as products or processes which characteristics, attributes or uses have significant changes, if compared to the existing products and processes. The radical innovations may involve technologies totally new or may be based on the combination of existing technologies to new uses, which brings with them a technology revolution, leading to disuse what existed before it, such as, for example, what happened to fax due to Internet invention.

According to Davila, Epstein, and Shelton (2007), and Tidd et al. (2008) the innovations are divided as described in Oslo Manual, the authors agree with the incremental and radical innovations, but Davila, Epstein, and Shelton (2007) in addition to the incremental and radical technologies, the semi-radical technologies are also differentiated, which have significant changes in one or more levers of the business models: proposal of value; value chain and target client, and which have small changes in one or more technology levers: products and services; process technology and enabling technology. The semi-radical innovations, which are technology driven, present significant changes in the technology levers and small changes in the levers of the business models.

Davila, Epstein, and Shelton (2007) conclude that the semi-radical or radical innovations require a different mix of business model and a technology change, if compared to the incremental innovations. Thus, it is responsibility of the innovation command with the creation of a balanced portfolio of incremental, semi-radical, and radical innovations, as well as for the creation of the business model and its management.

According to Padovani *et al.* (2008) regardless the institution model, whether public or private, the actuation area, its location or the degree of profitability; there shall be a process of evaluation per criteria, a selection stage and a list of project priority.

According to Souder (1988), Meredith (2003), and Tidd *et al.* (2008), the strategies of evaluation of projects, developed by the companies are extremely important, since each project represents an allocation of resource, and they represent a future investment, so it is possible to say that the authors pass the idea that the correct choice of the projects is essential to the survival of the company. On the other side, Tidd *et al.* (2008) supplements informing that such selection phase aims at providing information into the company, as concept of innovation and that may be enhanced,

being such phase supplied by three types of information: the first envisions the technology and market opportunities, which are available to the company; the second is related to the current technology base of the company, what the company knows about the product or service, as well as it is manufactured and made available in the market. Such knowledge may be in the products or equipment, as well as in people and systems required to the working of the process. The third piece of information is in line with the market demand, noticing the need and trend in relation to the proposed innovation, thus, in such phase the alignment between the general strategy of the business with the innovation is essential. In a supplementary manner, Souder (1988) considers that, in such phase, it shall have a model of project selection that shall consider the following criteria:

i. realism - when the model reflects the reality of the manager's decision situation, including the multiple purposes of both, company and its managers. To the direct comparison, a common measurement system is required;

ii. capacity - when a model allows the treatment of multiple time periods, simulation of situations internal and external to the project and optimization of the decision;

iii. flexibility - when the model simulates valid results within the range of conditions that the company may go through, having to be of easy handling for exchanges or adjustments as a response to the changes in the company's environment;

iv. easy to use - when the model is reasonably convenient, easy to use, of simple language, not taking much time of execution;

v. cost - when the model allows the data collection and low cost modeling, in relation to the project cost, making them very smaller in relation to the potential benefits of the project; and,

vi. simple computerization - when the model allows to easily collect and store the information in a data base, and allows the association of standard packages for computers.

Gray and Larson (2009) alert that, in some organizations, the management of projects fails to support the strategic plan, since the activities of selection and implementation of projects are performed by groups of different people, there may not be a total harmony between the groups, resulting in decisions that, generally, cause conflicts, confusions, and, frequently, dissatisfied clients. Therefore, to an integrated system of projects, it is required that the parties are inter-connected and, among other things, make a controlled use of the financial resources.

According to Tidd *et al.* (2008) it is possible to highlight that, among the approaches adopted to the innovation management, all are intended to balance risks and potential rewards in the projects of the portfolio. The authors present that, in general, there are three types of approaches for the construction of strategic portfolios, which are: benefit measurement techniques, economic models, evaluation of a set of projects. The benefit measurement techniques, generally through questionnaires that are based on criteria of compliance or not, there are also other more advanced techniques in such approach that consider scores or measurement, so that the projects may be compared in general terms. The techniques of economic models are the ones that seek for aggregating financial or quantitative information to the equation, such as return projections. However, such two techniques go through disadvantages to consider projects in relatively individual manner.

The technique of set of projects seek for dealing with the evaluation of a range of projects, being generally used in such stage a kind of measurement matrix, being it possible to compare risks to benefits, or costs for performance to estimated return. In such technique, it is possible to build multi-layered maps, able to analyze the broadest ideas.

According to David *et al.* (2011), as it is not always possible to financially measure the ideas, it is important to previously define the conditions for such classification, being it possible to accept, for example, only the ones in line with the company's strategy or the ones that are not part of the pool of assignments to which the planner was contracted. In summary, the classification phase serves to check common errors of filling in, incoherencies in writing, as well as to check and separate the ones that bring financial benefits to the company from those where it is not possible to measure the gains with the result. Such stage is important when the number of proposals is high, so facilitating the technical and economical evaluation of the idea, where matters such as how to implement the proposal, which the materials and resources are required, if there is the technology, if it has technical competence for development, among others, are approached. It is also made questioning regarding what changes will occur in the company such as, for example: how the implementation will occur, what the estimated return is, what the short-, medium-, and long-term advantages are, of the ideas are in line with the organizational strategy, as well as the involved risks. However, to the good working of the criteria definition and idea evaluation process, it is required that the process is clear and in line with the entity's purposes.

According to Davila *et al.* (2007), to be successful in the innovation it is essential to measure the results, however, more important than measure it know to measure, since it is not sufficient to have thousands of indicators if they do not meet the organization's purposes, nor supplying indicators that are little, or almost not useful to the innovation management. The authors also emphasize that it is required that there are goals defined so that the innovation indicators have a clear benchmark, so enabling the best evaluation of the advances.

According to Coral *et al.* (2009) indicators facilitate the company in the management and control of its innovation system, assist in the management in the sense of having an accurate view of the behavior of the preset factors, which need to be monitored. Generally, the indicators are created to follow up the performance of critical processes that may directly influence the system success, being divided in three groups, the input, process, and the output indicators. The input indicators assist the company: to check its innovation degree; the level of involvement of its employees, as well as to notice the percentage of approved ideas. The process indicators act in the input components, seeking for transforming them into results, while the output indicators serve to measure the results of the company's innovation system.

The ANEEL R&D Manual of the Electric Sector (ANEEL, 2012) presents as aspects and criteria of innovation evaluation the items of originality, applicability, relevance, and reasonability of costs, which are measures in a scale of 5 points, being 1 considered inadequate, 2 sufficient, 3 acceptable, 4 good, and 5 considered excellent. Figure 1 presents the evaluation criteria considered by ANEEL (2012), the subdivisions within the criteria, as well as the scale of evaluation of the proposals.

The evaluation criteria presented in Figure 1 are divided into four macro items, described below:

i. The item Originality is an eliminating item and has as purpose to classify the innovation degree, characterizing it as R&D activity or not, being that the minimum score for approval in such criterion is 3;

ii. The Applicability analyzes the potentiality of applying the proposal in the company and/or electric sector;

iii. The Relevance is measured through the benefits the project may return to the company as a whole. Thus, it is considered the returns: in the Professional Qualification, considering the qualification type generated to the team involved in the project, in addition to the impact or importance of such qualifications to the company; in the Technology Qualification, considering the technical-scientific productions, the support to infrastructure and PI; in the Social-Environmental Impacts, analyzing the benefits and/or losses to the environment and society; and, in the Economic Impacts, evaluating the applications of the financial results of the project;

iv. The criterion Reasonability of Costs consider the following sub-criteria: Productivity, measured by the improvement caused in the operational or administrative processes of the organization; Supply Quality, measured through the reduction of the percentage of complaints, indexes of continuity service and quality of supplied energy; Asset Management, measured by the improvement in the company's asset management; Non-Technical Losses, measured by the reductions of frauds and deviations, measurement and invoicing errors, or decrease of consumers' default; Company's Market, measured by the impacts that may reduce the costs of the generated or acquired energy, as well as errors of demand forecast; and, finally, Energy Efficiency, checked by the economic gains of the consumption reduction and the conscious use of energy.

Evaluation Criteria - Aneel R&D Manual Of The Electric Sector - 2012					
Evaluation Criteria	**Scores**				
	Inappropriate	**Insufficient**	**Acceptable**	**Good**	**Excellent**
	1	2	3	4	5
1. Originality					
2. Applicability					
3. Relevance					
3.1 Professional Qualification					
3.2 Technological Qualification					
3.2.1 Scientific Technical Production					
3.2.2 Support To Infrastructure					
3.2.3 Intellectual Property					
3.3 Social And Environmental Impacts					

3.4 Economic Impacts					
4. Reasonableness Of Costs					
4.1 Productivity					
4.2 Quality Of Supply					
4.3 Asset Management					
4.4 Non-Technical Losses					
4.5 Company's Market					
4.6 Energy Efficiency					

Figure 1 - Evaluation Criteria - ANEEL R&D Manual of the Electric Sector - 2012

INNOVATION MANAGEMENT MODELS

Authors such as Meredith and Mantel (2003), Mattos and Guimarães (2005), Danilevicz (2006), Tigre (2006), Davila *et al.* (2007), Terra *et al.* (2007), Tidd *et al.* (2008), Coral *et al.* (2009), Gray and Larson (2009), David *et al.* (2011) and Danilevicz and Ribeiro (2013) mention the importance of innovation in enterprises, as a way of improving processes and products, with a focus on strategy. Aiming at enhancing its market share, such authors also present relevant criteria to the selection and prioritization of ideas, but not all authors adopt models to their application.

After revision of the aforementioned authors and the R&D Manual of the Electric Sector (ANEEL, 2012), the model of Strategic Decisions of Innovation in Products (DENI0 was chose, by Danilevicz (2006), to serve as comparative reference of the dimensions and/or analysis criteria adopted by the authors. Figure 2 contains the four dimensions defined by the author, which are: Strategy, Profitability, Implementation, and Time and, in each dimension, the criteria to the process of idea selection are presented. The columns contain the analyzed authors, being marked with an X when the mentioned criterion is adopted by the authors.

Upon analyzing Figure 2, it is possible to check that in the dimension Strategy all researched authors report the importance of the criteria of idea selection are linked so that the innovations are adherent to reach the company's strategies, it is also visible in the great majority of the authors the question of the risks involved in the development of the new idea.

The dimension Profitability is appointed by all authors as essential criterion to the selection of ideas, since to forecast sales is extremely relevant to the company.

The dimension Implementation is the one that the authors seem to be more worried about, since the great majority of them shows to be concerned upon selecting ideas if there are financial resources available, as well as if they have competences to conduct them and if with the existing technology it is possible to execute it. But the criterion of patent analysis is not taken as relevant by almost half of the authors at the time of selecting ideas.

But in the time dimension, the most relevant criterion to the authors is the time of the product development cycle.

Supplementing the analysis performed, it is possible to check that all authors report the importance of the company to have criteria of selection of ideas, but a few authors present such criteria in the form of indicators to facilitate the management in the follow-up of the development of ideas.

Comparative analysis between idea selection criteria in the Innovation Management												
	Criteria for Idea Selection	DEIN (DANILEVICZ, 2013)	TIDD *et al.* (2008)	DAVILA *et al.* (2007)	CORAL *et al.* (2009)	TIGRE, P.B (2006)	GRAY, LARSON (2009)	MEREDITH, MANTEL (2003)	R&D MANUAL OF THE ELECTRICSECTOR (ANEEL, 2012)	TERRA *et al* (2007)	DAVID *et al.* (2011)	MATTOS, GUIMARÃES, (2005)
Strategy	Impact of innovations in the remainder of the portfolio	X	X		X		X	X			X	
	Contribution of innovations in the achievement of strategies	X	X	X	X	X	X	X	X	X	X	X
	Risk degree for the development of the new idea	X	X	X			X	X	X	X	X	X
	Social and environmental impact	X						X	X	X	X	
Profitability	Sales forecasting and billing	X	X	X	X	X	X	X	X	X	X	X
Deployment	Patent analysis (existence/cost)	X		X	X	X		X	X			
	Existence of technology to develop the idea	X	X	X	X		X	X			X	X
	Existence of competence to develop the idea	X	X		X		X	X		X	X	X
	Potential investment of the development	X	X	X	X		X	X		X	X	X
Time	Cycle time of product development	X		X	X		X	X	X	X		X
	Time until the acceptance of the innovation on the market	X		X	X			X				X
	Replication time of innovation by the competition	X		X								X

Figure 2 - Comparative analysis between idea selection criteria in the Innovation Management

METHODOLOGICAL PROCEDURES

This section contains, initially, the presentation of the peculiarities of a public energy company, ruled by the electric sector. Following the research is classified so that to present the method adapted to the work attainment.

Research Scenario

The research was performed by CEEE Group, which acts in the segments of energy distribution, transmission, generation, and commercialization, in addition to related services. It is a quasi-public

company, having as main shareholders the Government of the State of Rio Grande do Sul (majority) and the Federal Government (with one third of the shares). Together, such business resulted in a net operational revenue over R$ 3 billion in 2012. The performed investments of CEEE Group, over 2012, made a total of R$ 450 million.

With more than 4.4 thousand employees, the Group is in the 117th place in the ranking of the greatest Brazilian companies, in 17th place in the ranking of south region, and in 6th in Rio Grande do Sul, presenting the 8th greatest gross revenue of the State, and the 10th greatest asset of Brazilian south region (CEEE, 2014a).

Created in 1943, CEEE was the predecessor of the companies that currently compose CEEE Group. From the shareholding re-structuring of CEEE, occurred in 2006, the following arose:

i. Companhia Estadual de Energia Elétrica Participações - CEEE-Par;

ii. Companhia Estadual de Geração e Transmissão de Energia Elétrica - CEEE-GT; and

iii. Companhia Estadual de Distribuição de Energia Elétrica - CEEE-D.

Companhia Estadual de Energia Elétrica Participações - CEEE-Par is a parent corporation and holding of the companies of CEEE Group. The main shareholder of CEEE Participações is the State of Rio Grande do Sul. The company has as purpose to participate in other companies, in the condition of shareholder or partner, in activities to the development of the energy sector, under any of its sources, aiming at the economic and commercial exploration of its activity field. As a supplement, CEEE-Par aims at provide consultancy services within its actuation area, in Brazil or abroad.

CEEE-GT is the responsible for the majority of facilities that compose the State Basic Transmission Network, making feasible the transportation and the supply of energy to the other Distribution Concessionaires that act in RS. Its Transmission System interconnects generating plants and the National Interconnected System to the supply stations and the consumption centers in the entire State, playing a strategic role.

The facilities property of CEEE-GT and the ones that are under its responsibility, are composed by 66 Substations (54 own, 2 with use assignment, 8 shared, and 2 with operation and maintenance contract), which, together, make a total power of 9,131.7 MVA (Mega Volt-Amperes). Its Transmission Lines are 6,055.61 km log, and are supported by 15,058 structures being operated at voltages of 230, 138, and 69 kV (kiloVolts). The company holds the certification ISO 9001/2000 since 2001 related to the process of Coordination, Supervision, and Control of the Operation of Power Electric Systems, comprehending the processes of Pre-Operation, Operation in Real Time, Post-Operation, and Standardization (CEEE 2014b).

CEEE-D is responsible for the service to 1.6 million of consuming units, equivalent to 4.8 million people or one third of Rio Grande do Sul - RS directly providing 9,976 GWh. Its concession area comprehends the regions: Metropolitan, South, Coast, and Campanha Gaúcha, serves 72 cities, which approximately correspond to 34% of the consuming market of Rio Grande do Sul, through its 72,138 k, of urban and rural networks (CEEE, 2014c).

CEEE Group has a Planning and Special Projects Directorate that, among other assignments, is responsible for the strategic action of the strategic plan of the Group "Developing Innovation culture". Such strategic action is under execution of the Special Projects Division and of the Studies and Technology Development Department that is responsible for the innovative projects of the

group. In addition to such structure, the Department maintains contract with a Marks and Patents office, to search for prior registrations, write patent letters, and filing them before INPI.

Currently, CEEE Group has more than 12 applications of Intellectual Property filed with Brazilian National Intellectual Property Institute - INPI, in addition to a granted patent letter, and an international application request.

Although having a formal structure to perform the innovative activities of the organization, CEEE Group does not have a formal system of decision of innovative ideas in the company, which makes it difficult the choice process, many times because the same becomes much bureaucratic and vulnerable to interferences. Thus, the use of a system in the company would assist to make the process less bureaucratic making it more agile and robust, in addition to standardize an evaluation systematic equal to all.

Research Classification

The research performed in the present article is classified in the engineering area, being its nature considered as applied research, due to the fact the performed researches are towards the application in a specific situation. The applied research aims at the application of acquired knowledge, aiming at the development or improvement of products or processes. It directs the discovery of applications of the knowledge from basic research or from new methods and manners of reaching a specific purpose (GIL, 2010).

In relation to the purposes, the same is considered as exploratory, since it aims at a greater familiarization with the main problem (GIL, 2010). The qualitative approach was adopted in order to address the data collected, since the focus is on the primary data survey, through benchmarking interviews performed with other companies and secondary data survey from the literature. The research-action technical procedure (THIOLLENT, 1998) was the one used in this research paper, since it is connected to the solution of a problem of business need, where all involved ones are engaged gathering and sharing knowledge searching for a solution (GIL, 2010).

Work Method

The present research was conducted in three stages, presented in figure 3 and following described:

Figure 3 - Stages of the work method

In the first stage, four benchmarking visits were made to companies that performed innovations, being two of them of the electric sector, and other two of several sectors. The survey of data associated to the visits was performed through interviews with the ones responsible for the innovation processes in the companies, using a semi-structured research guide and audio recording thereof, within the period of January to April, 2013. The answers were transcribed and compiled, serving as base to the performance of the analysis of the innovation management systematics of the visited companies. .

In the second stage, the flow of the innovation process existing in CEEE Group was mapped, as well as the demands associated to the existence of a computerized innovation management process for CEEE were identified before experts. The information from the experts was surveyed during the project conducted inside the company's facilities.

In the third stage, the criteria relevant to the selection of ideas were identified, considering the previous stages, and the theoretical reference. Then , those criteria that would guide the preparation of an Innovation Management System - SGI were defined to CEEE.

DEVELOPMENT OF DECISION-MAKING METHOD OF INNOVATIVE IDEAS IN CEEE

Following are the results associated to such research.

Benchmarking for Companies' SGI Assessment

The companies selected for benchmarking visits were defined by convenience and considering their similarity to the actuation sector, in the cases of companies A and B, and since they are reference companies in innovation, to the cases C and D. The details of each company are in Table 3.

Table 3 - Categorization of the focus companies of the benchmarking visit

Categories	Company A	Company B	Company C	Company D
Sector of activity	Energy Electric	Energy Electric	Chemical and Petrochemical	Chemical and Petrochemical
Net Income- Billion BRL	5.1	9.2	41.0	2.3
Type of Company	National	National	Multinational	Multinational
Number of employees	3394	6375	4925	4215
Type of innovation	Product and Process	Product and Process	Product	Product
Position in the National market	21st*	51st*	7th*	218th*

** For the classification of market position, Consolidated Statements have been taken into consideration.*

The visited companies have a highlight position in the national sector being among the greatest ones in net revenue in the country, in 2013. The companies A and B centralize their innovations in products and processes, while C and D are focused on the launching of their products in the market.

All companies are considered of great size and have quantities of employees varying from 3394 in company A, up to 6375, in company B, which reinforces the interest of such companies to search for, through their staff, innovative solutions that add value to their solution portfolio.

CEEE Group, as well as the visited companies, also has a national highlight and figures among the greatest ones in the country, being in the 162nd place, in 2013, with net revenue of almost R$ 3.0 billion, and with 4414 employees, acting in the national energy sector, and having as its main innovation types the process and product ones.

Data obtained in the four benchmarking visits allowed identifying different features of application of the innovation concept. However different the companies are one to another, the adopted concept focuses on the generation of positive results, measured through the definition of indicators of innovation evaluation (Companies A, C, and D), or while strategic purpose (Company B). It was diagnosed that four companies have internal programs to foster innovation, and that the same is open to the employees, through a computerized system where the employee may enter his/her idea, which is evaluated in different instances. If the idea is approved, then we can proceed to the next stage of project development. On the other side, if the same is not a priority, it is stored in a data base to be assessed at an opportune time.

In the visits, it was also possible to check that companies A, B, and C have a formal structure in charge of the innovation management, company D does not have an organizational structure, since it considers that the innovation is in the company's culture, being the technical director responsible for the innovation indicators. Companies C and D have innovation representatives in all productive sectors, but only company C has an specific area to deal with the developed PI. There are different policies applied to the developed PI, for example, company A considers that 80% of the PI rights belongs to the company and 20% to the investors; and companies B, C, and D consider that PI is a 100% of the company, being the investor's rights assigned to the organization. Company D justifies such policy since the employment contract forecasts such function to the employees.

Companies A, C, and D perform evolution analysis of technology or technology forecasts to assist in the selections of ideas, being noticeable that companies C and D, which innovation is the main focus, the analysis is more aggressive, since they use analysis tool of local and international scenarios, in addition to develop and monitor business roadmaps.

Out of the visited companies, only B does not have a set of indicators to measure innovation, the other three does, including common indicators such as: percentage of revenue from new market products (companies C and D), number of launched products (companies A and D), and pipeline analysis (companies C and D). In addition to the indicators to measure and monitor the innovative process, all companies have a recognition and award program to the best ideas, being some financial and other recognition ones. Generally, such award occurs on an annual basis, with the purpose of spreading the innovation among the company's people, as well as of motivating the group for innovation.

The factors of organizational climate were approached in the questionnaire, and it was possible to notice, in the case of companies A, C, and D, that the innovation is already present in the strategic planning, being less vulnerable to the management change, which ratifies their good positioning in relation to the most innovative companies in the country. On the other side, in company B, where there is no express innovation in this strategic planning, there were times when the stimulation to innovation was more intense, since it is connected to the management profile exercised in the company, so dictating the pace or the importance to the Innovation Program.

In addition to the questions that allowed the confirmations previously presented, other questions were also made: time management to innovate; negative factors associated to innovation, among others. But the same compose different focuses of this research, being detailed in other works.

Mapping of the Existing Innovation Process

After the performance of the benchmarking visits, the mapping of the innovation process existing in CEEE Group was started. First, there were meetings with the members of the innovation management team, in order to draw and detail the existing flows.

When the flow drawing was finished, it was again presented to the experts in innovation management of the Group, which evaluated the mapped process and presented recommendations being attentive so that the new innovation process of the company would be a simplified method, in order to reduce the risks of not adoption/maintenance by the employees.

Definition of Criteria for Idea Selection

In line with the information of the previous stages, it was attempted to define which the criteria highlighted in the literature were, identified in the benchmarking visit, as well as pointed out by the experts, which were required to the innovation management in the company, and that would meet the regulatory aspects imposed to the energy sector. Thus, the following criteria were defined:

i. Alignment of the proposal with the company's strategy – Such criterion will check if the proposal is consistent with the company's current strategic plan;

ii. Analysis of the technical feasibility of the proposal – Such criterion will serve to check if there is available technology, as well as technical qualification so that the same may be performed;

iii. Direct financial return on the proposal – Such proposal will check the direct gains with the proposal, such as: reduction of man-hour, reduction of manufacturing costs, or process time,

iv. Environmental return – Such criterion will check if the proposal forecasts environmental returns, such as:

v. Social return – Such criterion will check which benefits the proposal will bring to the society;

vi. Enhanced return in other projects – Such criteria will check if the presented proposal will cause any impact in other projects of the company's portfolio;

vii. Other intangible returns – Such criterion will check if the proposal describes any gain that is not classified in the previous ones, such as: possible gains from PI, image gains, among others.

It is checked that the choice of seven criteria goes towards an initial concern presented by the experts and by some of the visited companies, which is to make the system as simplified as possible so that, this way, the evaluation of the ideas does not become a bureaucratic and complex process, which would increase the risks of its non-adoption in the company. It is also possible to check that with the adoption of the proposed criteria, other returns are not excluded so that an idea may forecast, and they are not easy to measure, as for example: gains of image and/or right of PI, which may be considered in the criterion other intangible returns.

Figure 4 contains the list of criteria and its relation to the referenced sources.

Criteria / Source	Literature	Regulation	Experts	*Benchmarking*
Alignment of the proposal with the company's strategy	X		X	X
Analysis of the proposal's technical feasibility	X		X	X
Direct financial return on the proposal	X	X	X	X
Environmental return	X	X	X	X
Social return	X	X		X
Enhanced return in other projects	X			
Other intangible returns	X	X		X

Figure 4 - Idea Selection Criteria versus reference sources

Results

As results of the present article, seven criteria were proposed to the selection of ideas: (i) alignment of the proposal with the company's strategy; (ii) analysis of technical feasibility of the proposal; (iii) direct financial return on the proposal; (iv) environmental return; (v) social return; (vi) enhanced return in other projects; (vii) other intangible returns, in this last criterion, it is considered, for example, PI deposits, as well as the gains of image the idea may forecasts. Such criteria will assist the innovation management in the classification, according to performance obtained in the evaluation.

The criteria will be part of SGI of CEEE, serving as judgment mechanism of the received innovation proposals. It will be allowed to the innovation management, through the system, the possibility of assigning different weights to each criterion, according to the company's strategy. The ideas will be evaluated by at least three different appraisers, being considered as approved the one that obtains at least two positive indications of their appraisers, and that are with a general average over the cut limit of the score.

FINAL CONSIDERATIONS

Upon an increasingly demanding market, the companies have put their eyes towards the search for new trends, as well as towards the mapping of consumers' profiles and the launching of new products, among other actions that are adopted by the organizations, aiming at enhancing their clients' portfolio. Upon checking all such market changes, it is confirmed that innovating is required to the company's survival. Thus, an innovative process, so that the company may manage its ideas, according to the current reality, directing the resources as best as possible, is essential to the survival thereof.

The present work has the purpose of creating a method to assist the decision making associated to the initial processes of the innovation management. To the development of the method, four stages were performed: benchmarking; regulation; experts, and literature. In the first stage, benchmarking visits were performed in innovative companies belonging to the same actuation sector, and also in the companies which main purpose is to innovate. After the visits have been made, the gathered information was compiled, with the purpose of obtaining a diagnosis of the companies' innovative process. In the second stage, the results of the visits to the innovation experts of CEEE Group were presented, where the current process was mapped, and leading to the most relevant aspects to the company, and which should be part of the method that would be proposed. In the third stage, the requirements that would be required in the regulatory legislation of the sector were checked, and in the fourth stage, the survey of what was being proposed in the literature was performed.

After all such stages have been performed, a comparison between all data sources was created. With that, a system based on seven criteria was prepared, which aim at since the classification of the idea with the company's current strategy to the impact in the projects of the portfolio, as well as the perspective of possibility of intellectual property.

Thus, the proposed model attempted to consider the criteria used in the market, the ones suggested by the literature, the ones mandatory by the regulation, and the ones surveyed by the experts in innovation, aiming at providing the innovation managers with the possibility of evaluating different ideas.

As suggestion for future works, it is recommended the development of indicators to measure the results of the performed projects, so enabling the comparison of the results of the projects to the received evaluations, considering the defined criterion.

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