SYSTEMIC APPROACH FOR CREATING AND MANAGING SYSTEMIC RESEARCH GROUPS: THE EXPERIENCE OF A BRAZILIAN RESEARCH GROUP

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ABSTRACT

Universities, research and teaching institutes, as organizations, are influenced by social changes, which require more and more systemic action to deal with complex situations. They are supposed to act in a more systemic way, developing more practical solutions to fulfill the need for a stronger linkage between academic research - especially those in applied social sciences - and social transformations. The new regulatory specifications of academic action are also elements that contribute to incorporate the systemic view into the practice of research groups. It happens because they involve multiple dimensions of groups' performance, such as qualifying students, demands for publications, attention to funding agencies, monitoring the activity of international research groups, establishing international partnerships with other organizations, keeping the linkage between publications and monitoring the state of the art in its area among others. As research groups are also responsible for training qualified people to handle such situations, it is important to consider that those groups could do their job in a more effective way if they apply systemic assumptions to their own existence. The systemic approach allows groups to be systemic on their own identities. Besides that, the systemic view can help research groups understand their reality more broadly, considering various aspects through the analysis of the relationships that are established during its performance. From a literature review, this article aims at demonstrating the importance of the systemic approach to the creation and maintenance of research groups, highlighting the potential benefits of adopting systemic assumptions to the management of such groups. Furthermore, this paper presents the experience of a Brazilian research group created in order to be systemic in its own identity, describing the benefits, challenges and constraints identified over time since its creation. This academic research group was planned and designed to be systemic, based on studies of Systems Theory, the Soft Systems Methodology and the Viable System Model. The group was created upon the systemic perspective, with specific goals and objectives. Meanwhile, it has evolved into a larger structure and had modified its goals and concerns, dealing with challenges to maintain the systemic profile and the systemic way of working. Thus, this paper aims at exposing what kinds of challenges research groups can undergo while intending to be systemic. In order to accomplish these goals, a single case study is used. This is a descriptive study, with qualitative approach. Both secondary and primary data are used. Semi-structured interviews with former and current members of the group are developed. The main results obtained include a description of the group studied showing its creation process, first accomplishments, evolution and current scenario. The main difficulties faced by the

group members, as well as the solutions they have built, are also described, demonstrating the benefits of the systemic approach to the activities of research groups.

Keywords: systemic approach, systemic view, research groups, systemic assumptions.

INTRODUCTION

Research groups in Brazil and around the world undergo constant changes in academic and social environment that require a more systemic action, understanding in a more effective way their context and their relationships with different stakeholders in internal and external environment.

According to Sousa, Nijs and Hendriks (2010), universities are increasingly being managed as businesses, using concepts related to this context, such as "efficiency", "performance control" and "audit". Many research organizations in universities now require better performance of its researchers by defining publications´ goals and seeking ways to manage their resources effectively. The ability to assess the relative strengths of research groups is important for research institutes, funding agencies and governments, since they choose the focus of their investments (KENNER; BERCHEM, 2011).

In Brazil, it can be seen through the criteria used for graduation programs´ evaluation. According to CAPES - Coordination for the Improvement of Higher Education Personnel (2011), the agency responsible for this assessment, "social integration" is one of the evaluated criteria, covering aspects such as insertion and regional or national impact of the program, integration and cooperation with other programs aiming at developing research and graduate education and visibility or transparency given by the program for its activities. The criteria "students, theses and dissertations" and "intellectual production" consider publications and their impact on the nature of production and the vehicle, since articles published in international journals and books are better evaluated.

The new regulatory criteria of academic action are elements that determine the need for a more systemic view from research groups, incorporating systemic aspects to their practice. It is justified by the implication of groups´ multiple performance dimensions, such as training new researchers, publishing goals, attention to funding agencies, monitoring the state of the art of studied topics, among others. In addition, research groups are faced with the necessity of constantly monitoring the activity of international research groups, aimed at establishing relationships and encouraging opportunities for knowledge and researchers´ exchange.

Universities, research and teaching centers, as organizations, are also influenced by social transformations, faced with the need for a more systemic action to a greater linkage between the research carried out by groups in the area of Applied Social Sciences and such transformations. According to Ranga, Debackere and Tunzelmann (2003), the combination of basic research and applied research in publications of a specific research group consolidates their potential for research and development. Therefore, the assessment of the impact for academic research derived from the bond with the industry must avoid generalizations between research fields and must be performed from a more systemic view of these interactions. However, according to Strauhs, Abreu and Renaux (2000), despite the challenges faced by research groups in the link to production systems, sharing knowledge, its performance is the key to innovate and create the necessary knowledge for economic and social development.

As most research groups are associated with universities and graduate programs, its contribution to the performance of such programs is evident. In Brazil, research groups are responsible for most of the scientific publications, and in the last census conducted by CNPq (National Council for Scientific and Technological Development) in 2008, they were responsible for the publication of 278,480 full papers in circulation and for 24,239 books by PhD researchers in the period between 2005 and 2008. There was an increase of 262% in the number of articles published by research groups since the 2000 census, when 76,960 full papers in circulation were published by registered groups. According to Erdmann and Lanzoni (2008), research groups constitute the locus of knowledge production and training of human resources in research.

Research groups in Brazil exhibit high rates of mortality, whereas 6 to 7 years is the average existence of a group in the country, as shown in Table 1. Thus, more consistent management practices could be helpful for these groups.

Table 1 – Distribution of research groups in Brazil according to their time of existence (1995-2006)

Years of existence	1995		1997		2000		2002		2004		2006		2008	
	Groups	%	Groups	%	Groups	%	Groups	%	Groups	%	Groups	%	Groups	%
Less then 1	474	6,52	1144	13,39	2409	20,48	3685	24,31	2955	15,18	2938	13,97	2751	12,07
1 to 4	2793	38,41	3368	39,42	3569	30,35	4746	31,31	8352	42,90	8420	40,05	7980	35,00
5 to 9	1887	25,95	1964	22,99	2890	24,57	3458	22,81	3067	15,75	4711	22,41	6476	28,41
10 to 14	890	12,24	888	10,39	1343	11,42	1579	10,42	2267	11,64	2542	12,09	2736	12,00
15 to 19	638	8,77	579	6,78	655	5,57	751	4,95	1160	5,96	1150	5,47	1485	6,51
20 or more	507	6,97	598	7,00	890	7,57	939	6,19	1669	8,57	1263	6,01	1369	6,01
Without information	82	1,13	3	0,04	4	0,03								
Total amount	**7271**	**100**	**8544**	**100**	**11760**	**100**	**15158**	**100**	**19470**	**100**	**21024**	**100**	**22797**	**100**
Mean (years of existence)	**7**		**6**		**6**		**6**		**6**		**7**		**7**	
Median (years of existence)	**5**		**4**		**4**		**4**		**4**		**4**		**4**	

Source: CNPq, (2011).

Several authors (BERTALANFFY, 1968; BEER, 1966; CHURCHMAN, 1968) define systems and, in general, research groups can be considered this way. According to Martinelli and Ventura (2006), a system is characterized as a complex social organization, composed of people with different worldviews, contrasting and conflicting interests and asymmetric and imbalanced influence powers.

Therefore, it is evident that systems thinking can contribute to adapt research groups to changes in the concept of academic performance. Moreover, the systemic view is essential to allow the constant monitoring of a studied theme´s state of the art, since researchers must consider any developments related to the subject, directly or indirectly.

It is important to notice that systemic assumptions may help broaden the level of integration between areas, allowing interdisciplinary studies and the development of solutions to complex problems arising from social changes. Thus, it is essential to consider the various levels of systems involved from the understanding of the totality that constitutes the academic and practical environment.

Thus, this study aims at answering the following research question: How to apply systemic assumptions in creating and in practices of research groups?

The objective of this study is to examine how the systemic assumptions can be used in the creation and in practices of research groups, in order to contribute to the development of a more structured management practice for them, allowing their adaptation to changes in the research context. Thus, the specific objectives are:

- Analyze the importance of the systemic approach to research groups;
- Develop a conceptual framework for a systemic research group;
- Describe and analyze the experience of a Brazilian research group based on the proposed framework.

METHODOLOGICAL ASPECTS

This research can be characterized as qualitative and descriptive. Because it is a complex and poorly structured situation, the study was developed following the steps of Checkland´s SSM (Soft Systems Methodology) (1981): (1) explore an unstructured problem situation, (2) express it, (3) construct succinct definitions of relevant systems, (4) develop conceptual models of these systems, (5) compare the models with the problematic situation expressed, (6) meet culturally feasible and systemically desirable changes, and (7) suggest actions to change the problematic situation.

However, the steps were not followed in a linear way or in sequence. First, steps 1 and 2 were done in a less systematic and less structured way, with the detection of recurrent problems in the studied research group. This could be developed from the authors' personal experience by being members of that group and through informal and unstructured interviews with some other members. One of the authors is the professor who was responsible for the creation of the group and the other two had intense involvement with it and its evolution.

At the same time, the issues of systemic view and research groups were studied in order to find relevant theory to the scope of this study. Then, steps 3 and 4 were carried out by drafting a proposal for the structure of a systemic group. This structure has undergone cycles of improvement through semi-structured interviews with six experts in systemic view in Brazil.

In a third phase, steps 1 and 2 were repeated, now in a structured manner, describing the experience of the Brazilian research group chosen for convenience to the single case study. The group is the Systems Group from School of Economics, Management and Accounting in Ribeirão Preto, University of São Paulo (FEARP-USP). Ribeirão Preto is located in the state of São Paulo, about 300 km from the capital of the State, São Paulo.

With these steps completed, step 5 was performed by analyzing the group studied from the proposed conceptual framework.

For the case study, a research protocol was used, as shown in Figure 1.

Research question	How to apply the systemic assumptions in the creation and in practices of research groups?
Unit of analysis	Incorporation of the systemic approach assumptions in the creation and practice of research groups.

Organization	Systems Group from School of Economics, Management and Accounting of Ribeirão Preto, University of São Paulo (FEARP-USP).
Time limits	The literature review began in September 2010. The study was conducted for eight months, ending in May 2011.
Data sources and reliability	Crossing between data collected through interviews, participant observation and document analysis.
Validity of constructs	Contrast from theory and practice, based on the literature on the subject.
Internal validity	Use of multiple sources of evidence and systematic analysis of the case, through the proposed framework for a systemic research group.
External validity	Use of replication logic on the case study and discussion of proposed conceptual framework based on the literature on the subject.
Examples of key issues	How could the use of systemic assumptions in the activities of this research group be described?
	How was such use within a historical perspective?
	What are the main challenges for the creation and management of a systemic group?
	What are the most important benefits of this process?

Figure 1 – Protocol for the case study of the research

At last, there were steps 6 and 7, suggesting changes and actions to the initial problem situation.

THE CONCEPTUAL FRAMEWORK

Through theory research and the authors' experience, a first version of the framework for a systemic research group was drafted. Given the scarcity of literature on the subject, semi-structured interviews with six experts in systemic view were conducted. The interviewees have publications on the subject and they also have been involved in systems research for some years. They pointed out relevant aspects to be considered in the creation and management of research groups so their practices are systemic. They also made a critical analysis of the issues listed by the authors, producing the final version of the proposed structure, which is presented in Figure 2.

1. Structure:
1.1 Interdisciplinary structure with members from different areas and different levels with different Weltanschauungen (W);
1.2 Structure not centered on the leader (no relation of dependence);
1.3 Participation of each member in any activity within the group, whether in management, research or teaching, proactively;
1.4 Acting as a process with inputs, processing (transformation) and outputs, in addition, with continuous, positive and objective feedback (concern with feedback from stakeholders/participants as well);
1.5 Structured into subsystems:
1.5.1 People interacting with each other;
1.5.2 Effective communication;

1.6 Existence of a methodology for structuring and development of the group;
1.7 Evolutionary group;
1.8 Formalization of responsibility and leadership;
2. Group's management:
2.1 Possess an identity of purpose: systematic, continuous and coordinated work;
2.2 Sustainable group: financially (from its activities, either with public funds, either through consulting or other activities), structurally (team renewal, maintenance of positive relationships) and in terms of knowledge generation;
2.3 Making decisions based on clear, defined and communicated rules;
2.4 Planning (formal or informal): strategic, to determine next steps in the long term, analyzing the direction of the group; and short-term (monitoring: time limits, delegated activities, publications in progress and the group's structure - participants);
2.5 Permanently consider the ethical question in the group's process (ethic research, ethic participation, ethic management). For this, the group should have an internal ethics code defining which aspects will be dear;
2.6 Essential skills development for researchers and participants (teachers, students, society);
2.7 Dealing with different Weltanschauungen (W) involved;
3. Teaching, Research and Extension:
3.1 Integrated studies in research within the group (undergraduate, master's, doctoral, postdoctoral etc.).
3.2 Systemic studies, to examine research problems in a holistic manner, considering various aspects and relationships between parts of the system under consideration;
3.3 Meetings to discuss researches and mutual contributions, creating synergy between different studies;
3.4 Concern about the availability of the acquired knowledge (society and the group itself) in Extension activities, such as hosting events, training programs, courses, knowledge portal on the internet etc;
3.5 Use of resources and results of researches undertaken by the group in activities of education, aiming at including the formation of new participants and professionals with a systemic view;
3.6 Search for learning and constant upgrading of knowledge, suggesting new topics of research interests within the group;
4. Relationships with the environment:
4.1 Studies aimed at meeting demands of society, not only publication and scientific demand (including works with other institutions, such as consulting works to companies);
4.2 Search for solutions to the root causes of social and business problems, even if indirect;
4.3 Partnership in relationships with other groups, other universities, research and teaching centers, businesses, interested individuals, associations and national and international government agencies;
4.4 Effective link between the systemic world and the real world.

Figure 2 – Proposed conceptual framework for a systemic research group

THE CASE OF A BRAZILIAN GROUP

The Systems Group at FEARP-USP was designed as a Laboratory-group by Martinelli (1995a) based on the experiences described in Checkland (1981) and Checkland and

Scholes (1990). It would be a university consulting group, with systemic-evolutionary orientation, consisting of students and professors, working as an educational, research and training lab for participants. This group would guide new or existing businesses based on systemic assumptions.

As in this proposal the group was intended to be "neo-paradigmatic", everything should work consistently with the systemic assumptions (MARTINELLI; SANTOS, 1996). Thus, the first step considered by Martinelli (1995a) was the establishment of the identity of the group itself, through the Checkland's (1981) scheme. That is, the Soft Systems Methodology (SSM) of Checkland (1981), and the Viable System Model (VSM), of Beer (1972), were considered tools for continuous learning, required for the group's creation and its activities. Thus, it was created in 1994 the Laboratory-group at FEARP, later called Systems Group.

An important aspect in establishing the group was the tendency that students in Ribeirão Preto had to keep living in the region (the richest in São Paulo state), either working in local companies or starting their own businesses. Therefore, "a consulting group formed by some faculty members and students, besides acting as a laboratory all along the course, could also be an incubator for new firms" (MARTINELLI,1995b, p.739).

According to Martinelli (1995c), the group should be born in an intermediate phase, being participatory and neo-paradigmatic from its conception. The idea was to structure the group in a range of twelve months (from August 1995 to July 1996), following the steps: (a) Initial arrangements, (b) Organizing working conditions at FEARP, (c) SSM cycles for instructing the team, (d)) SSM cycles for deepening and training the team, (e) Beginning of external activities (August/96).

Initially the group had nine fourth year Business Administration Undergraduate students and the responsible professor. It was predicted that there would be the integration of students' groups and other teachers, who would provide specific services to businesses. Thus, the group would act in working groups, advising, preparing new entrants to act as consultants, integrating the knowledge absorbed in various disciplines of the course.

The group had some research funding from the Brazilian government on some occasions, with some applications for renewal of fellowships declined. However, these resources were temporary, being discontinued at the end of specific research projects. They were fundamental to the project's progress and development of students. Thus, in most cases, students developed their research and when they had the fellowships discontinued, scattered on the research work.

Currently, the funds used to pay travel expenses for research, participation in conferences and fellowships for trainees is the result of some copyrighted books published by members of the group, assigned on its behalf. Today the group has only one student with government resources.

Initially, the group should be structured around three areas: (a) technical, responsible for structuring the area of consultancy and courses; (b) commercial, responsible for prospecting customers and disclosure; and (c) administrative and financial, responsible for the internal structure, scheme of service and selection of new students.

In addition, the group would begin with a focus on three areas of study: (a) business policy and strategy; (b) life cycle of organizations; and (c) innovation, creativity and competitiveness. Subsequently, the prospects were also to cover the topics: business negotiation, agribusiness, public sector management and family business.

Currently, the group is structured into four subgroups: systemic approach, local development, negotiation, and business simulation. This division has allowed better coordination of the group, since the number of participants increased significantly and most of them live in different geographic regions. The group has thirty five members, but not all are actively involved in a continuous manner. Each group has a coordinator responsible for organizing the activities and responsibilities.

The basic concern was focused on issues (themes) that would be studied, seeking to deepen, develop and exhibit results by selecting new themes. As for externalities, the focus was on the dissemination of knowledge acquired through studies, surveys and discussions, including to businesses practices. Another concern was how to identify the main needs of companies for a possible contribution from the group. Thus, initially, the group consisted of indoor activities, characterized by studies of the topics proposed by its internal subgroup composed of students and faculty with a more academic profile; and outside activities, taking this knowledge to application and discussion in local companies, through external subgroup, composed of students and faculty with a more entrepreneurial profile (CAVALCANTI; MARTINELLI, 1996).

In 1996 the main goal was to establish the linkage between the group and business practices. The research plan for the external area of the group was structured initially by a literature search and then for a field study designed to identify key knowledge gaps of companies in the region through a questionnaire investigating the success of enterprises, administrative techniques used to manage them and suggestions about administrative necessities.

The group's mission was established in internal discussions as: "Propose to involved students different opportunities for practical action at companies in the region, as well as providing to teachers who participate in the project a richer perspective for their professional experiences, in addition to providing small and medium enterprises in the region an assistance, according to a systemic-evolutionary vision that could support a safe, consistent and effective development". Its resume has resulted in: "Establishing the link between company and school".

Thus, when the group managed to establish itself, the main goal became to stay in the most favorable point of the life cycle curve. Therefore, the main expectations for the group were defined, which included:

- functional system and organizational structure;
- Institutionalized vision and creativity;
- Results orientation;
- Planning;
- Performance expectations' separation;
- Orientation maintenance and growth;
- Increase resources to become independent;
- Implementation of laboratory-group in other colleges at USP, including other cities, establishing franchise.

Therefore, it is visible that there was, since the beginning, a concern for the future, operationalized through the planning of future actions and the strategic orientation of the

group. However, the plan failed to be followed over time and actions became more sporadic, and the work in the group was intensified in periods of greater dedication of the responsible professor and less intense at periods when he had other occupations.

The ultimate goals, for medium and long term, were, briefly:

a) To provide students opportunities for practical action at companies in the region of Ribeirão Preto;

b) To provide teachers in the project a way of enriching their professional experiences;

c) Provide small and medium enterprises in the region support according to a systemic-evolutionary vision to further safe, effective and consistent development.

The a) and b) objectives are pedagogical, about "educational technology", related to the search for a specific student environment, consisting of successive groups of students, from FEARP-USP, committed to the group. It is about investigating how to implement, maintain and develop a group of students and teachers able to achieve the objective c. In turn, it has business management approach: researching on the organizational environment of Ribeirão Preto, especially the environment of small and medium enterprises, investigating their general and specific problems, or from groups of them.

As a first step, it was verified the correctness of implementation and action guidelines of the group, internally and with companies in the region, also to discover the possible needs to modify these guidelines. Were then detailed procedures of operation, for general and specific situations. Finally, it was investigated the feasibility of introducing a Management paradigm that meets the ambitions of the "systemic-evolutionary chain", characterized by a holistic view of organizations as "viable systems", which, by the interaction of all its participants - owners, shareholders, managers, employees - become capable of self-organization and self-development.

Since its creation, several case studies were developed, useful for both the group itself as to the companies studied. Basically, it's empirical research in order to seek solutions to real problems of organizations.

About objectives a and b, of pedagogical reference, the initiative of creating a lab-group to stimulate students' creativity, based on the deepening of literature creative and critical study and on engaging with real problems of the economic region of Ribeirão Preto. It was greeted with several expressions of interest, enthusiasm, curiosity, and even with some expressions of skepticism, at all conferences in which the initiative was exposed and debated, and in the PhD thesis and Full professor contest in which the structure of the lab-group was originally proposed, as well as its use for conducing to the local companies the ideas of the systemic view in the negotiation.

The skeptical side clearly demonstrates the need to investigate how to create, maintain and develop a group like this. The results achieved so far are demonstrated by the number of students who were initially interested and those who continue to be interested, as well as the finalized work and in progress.

Some points may be listed upon students:

1. Some students, despite initial interest, depart from the group as soon as they realize that the activities require commitment, creativity and critical thinking, higher than those with which they were used to be charged. How to avoid or reduce this departure demands diversity of approaches that also deserve much study and reflection;

2. A few other students, however, totally adhere to the basic scheme proposed for the formation of the group, the Soft Systems Methodology (SSM, from Peter Checkland) used to integrate the group and to act towards the companies. Those students also get involved with the research of various topics proposed, in addition to strong participation in all internal preparatory activities and activities in contact with companies. This has happened in a much more intense way since the moment it was possible to have post-graduate students (more mature, more involved and with deeper works);
3. Between these two extremes, there is at least one group clearly marked, tightly directed for immediate action within the companies, even at the expense of more solid preparation.

There are approaches in the group to deal with the profiles of all students. The first group is, generally, attracted by the prospect of publication, by practical activities and the diversity of topics relevant to the business environment. The second group is treated by following the basic plan of gradual preparation; and the third, leading them immediately to some interventions - which, naturally, require greater assistance from the advisor, to compensate the relative students´ lack of solid preparation .

The students' participation in research discussions related to the creation and operation of the group has been the subject of reports in papers published (MARTINELLI, 1995a; MARTINELLI, 1995b; MARTINELLI, 1995c; MARTINELLI, AMARAL, 1996; MARTINELLI, CAVALCANTI, 1996; CAVALCANTI, MARTINELLI, 1996; MARTINELLI, SANTOS, 1996; MARTINELLI, 1996; CAVALCANTI, MARTINELLI, 2000).

Thus, despite the restricted activities of advisory and consultancy to organizations, all objectives are being achieved through research, in which empirical approach results in direct practical benefits for all involved.

Regarding objective b, towards other professors, the great interest shown by many of them originally was really implemented by the continuous participation of students who were members since the creation of the group and who are now doctors. In addition, other faculty members were added to the group, who actively participate and even coordinate subgroups within the larger group.

About item c, related to Ribeirão Preto's business environment, and the environment of SME (small and medium enterprises) particularly, many results have been achieved. These results were described in published papers.

Some results can be seen, such as:

a) Survey and preliminary characterization of companies in the region, prospecting possible actions the group could offer them, such as preparation of questionnaires etc.;

b) Case studies in organizations of the region of Ribeirão Preto, with:

   - Identification of the characteristics of each company and its plans, proposals, recommendations and monitoring their implementation;
   - The systematic use of concepts and techniques of negotiation, either inside the group's environment or in its interactions with the business environment;

- The five books and five book chapters published;
- Research on the reality of small and medium enterprises in the countryside of São Paulo State, regarding the use of information, innovation capacity and power of exports of those SME;
- The use of concepts of the systemic view and its practical application in business management.

As soon as it was possible to have graduate students in the research team (which took place on February 2002, with the arrival of the first master's and doctoring students at Ribeirão Preto – from the graduate program of FEA-SP), the main concern was to start developing integrated research projects with broader projects of doctoral students, graduate and undergraduate research fellows working together on integrated projects. This approach results in great synergy between projects, with interesting discussions among students, in addition to a more clearly defined research focus. Besides that, doctoral students end up helping the orientation of master's, undergraduate and scientific initiation researches, which also constitutes a very interesting and rich experience for them.

Currently the group's projects are developed in a less integrated way, as it was divided into four subgroups and there is some difficulty in coordinating the interests of participants. Thus, individual surveys are developed in each of the subgroups in specific subjects.

At the beginning, the works were more conceptual and theoretical, seeking to homogenize the members' knowledge about the issues. However, some students felt the need for practical experiences of contact with organizations (MARTINELLI; AMARAL, 1996). Therefore, the consulting activities of the group within companies started with the first practical work in April 1996. However, this was the only work with this consultancy profile. The subsequent works are characterized as field research of empirical academic studies. The advisory work consisted of a pilot project in a commercial company that provides services and sell trucks accessories and articles in the city of Ribeirão Preto. With this work, although important for learning, the group decided to focus on studying the subjects and on structuring an effective external subgroup to act within companies as consultants.

However, consulting activities had no profit intention, but they had the sole purpose of enabling the stay of students in the group, since the approval of research funding by the government agencies was difficult and the students ended up choosing to work in the business market as a source of resources.

CASE ANALYSIS AND DISCUSSION

Considering the conceptual framework proposed for a research group to maintain systemic practices and to be systemic in its own identity, it is possible to analyze the Systems Group at FEARP. It can be done considering the history of the group, since its creation (through studies of related documents and unstructured interviews with members of the group) to the present, with an overview of the observed points.

1. Structure:

1.1. Interdisciplinary structure with members from different areas and different levels with different Weltanschauungen (W): the group has always consisted of members from various fields like business administration, computer science, psychology, laws, information science, among others. Its structure includes undergraduate, master's and doctoral students, and teachers who are masters and doctors. There are also participants who, although not currently involved with academic activities, are professionals interested in the topics of study and who contribute with their practical experience. Thus, we can see different perspectives and different world views that directly contribute to the development of activities;

1.2. Structure not centered on the leader (no relation of dependence): the teacher responsible for creating and maintaining the group had and still has great influence on group members, as their engagement in activities is still very dependent on the direct participation of that professor. This dependence can be detrimental to the group as it has restricted its development to periods of greater dedication of their leader, having its potential reduced for this reason;

1.3. Participation of each member in any activity within the group, whether in management, research or teaching, proactively: it was possible to see that the involvement of members, actively participating in some activity within the group, is discontinuous and not always produce direct results. The difficulties of communication between members, due to geographical distance, can cause this problem. Moreover, as most researchers are not solely devoted to group activities, the time available for these may not be sufficient for a greater commitment;

1.4. *Acting as a process with inputs, processing (transformation) and outputs, in addition, with continuous, positive and objective feedback (concern with feedback from stakeholders/participants as well):* it is possible to say that the group acts as a process as it receives knowledge through the academic training of its members and contacts with other institutions and researchers, besides receiving demands of organizations that report their real problems to be searched. So, this knowledge is processed through questioning and systematic search for solutions. The outputs are configured by the availability of knowledge through publications, events, feedback to organizations and learning for its participants. Feedback is valued in the group, through meetings for discussions of research results, the group's situation and lessons learned;

1.5. Structured into subsystems:

1.5.1. People interacting with each other: different members constantly interact with each other, even participating in different subgroups within the larger group. In fact, most members participate in more than one subgroup, and it is even difficult, in some situations, to define who are the participants in each subgroup. Thus, the interaction is positive and recommended within the group. However, as some members do not participate actively in some instances, they have little interaction with the rest of the group, wasting very rich opportunities for learning and contributing;

1.5.2. Effective communication: communication within the group is not always effective, since, due to distance, it is restricted to impersonal communication (email, skype, phone) for members who reside in other locations. Besides that, the group faces difficulties to gather the participants in meetings and, when they do it, meetings are not really productive;

1.6. Existence of a methodology for structuring and development of the group: the creation and development of the group were based on well-defined and studied methodologies, with systematized and analyzed steps aimed at adapting existing

methodologies to the reality of the group. It was really important in an initial phase;

1.7. Evolutionary group: the evolution of the group is evident, from the maturity of its members who have a unique experience during their participation in the group. However, the group presents some difficult periods to maintain its structure and its activities. These difficulties include the need for financial resources, physical infrastructure needs to allocate equipment and personnel, lack of proactive engagement of some members, dependence on specific individuals, among others;

1.8. Formalization of responsibility and leaderships: the leaders were always well formalized within the group, especially the figure of the creator and professor responsible, beyond the coordinators of the subgroups. However, the responsibilities of each member have not been formalized and some members may not be aware of their potential to contribute. It was unclear, in some instances, the role of each participant and many do not contribute directly to the group's activities;

2. Group's management:

2.1. Possess an identity of purpose (systematic, continuous and coordinated work): work on the group alternate periods of greatest moments in evolution and that moments when many projects are abandoned for various reasons, with no systematic and little coordination between the activities of the participants;

2.2. Sustainable group: financially (from its activities, either with public funds, either through consulting or other activities), structurally (team renewal, maintenance of positive relationships) and in terms of knowledge generation: it can't be considered financially or structurally sustainable, as it had suffered periods of activities discontinuation due to lack of engaged personnel and lack of resources to keep participants on research. In terms of knowledge generation, it is possible to say that it is sustainable, because even if with less integrated research, there was continuous generation of publications;

2.3. Making decisions based on clear, defined and communicated rules: decision making has always been too centered on the group's leader, held mostly in a subjective manner;

2.4. Planning (formal or informal): strategic, to determine next steps in the long term, analyzing the direction of the group; and short-term (monitoring: time limits, delegated activities, publications in progress and the group's structure - participants): group has had informal strategic planning and short-term in its beginning. Currently, there are efforts being made to formalize and organize again such initiatives, in a formal way;

2.5. Permanently consider the ethical question in the group's process (ethic research, ethic participation, ethic management). For this, the group should have an internal ethics code defining which aspects will be dear: the ethical question has always been considered during the performance of the group; however, there is no formal definition of an ethics code distributed to all participants. This was accomplished through common sense and trial of individuals;

2.6. *Essential skills development for researchers and participants (teachers, students, society):* skills and competencies of all participants were developed, there is a constant concern about the group's contribution to society and its members;

2.7. *Dealing with different Weltanschauungen (W) involved:* all participants, but particularly the leader and the coordinators of the subgroups, seek ways to encourage participation of all in an attempt to understand all the world's visions and add different perspectives to the work of the group. This becomes clear through the different lines of research developed, the concern with theoretical

and practical aspects and the continuing opening up to new ideas and feedback during meetings and group presentations;

3. Teaching, Research and Extension:

3.1. Integrated studies in research within the group (undergraduate, master's, doctoral, postdoctoral etc.): research have been integrated in some occasions, developing broader doctoral works, with undergraduate and master's students involved. Nevertheless, most works are now detached, with more specific topics, according to the researcher's area of interest. Efforts are being made to find related topics of research and interest, seeking greater integration;

3.2. Systemic studies, to examine research problems in a holistic manner, considering various aspects and relationships between parts of the system under consideration: all work of the group consider the problems in a systemic manner, by analyzing the various perspectives and studying all the parties involved;

3.3. Meetings to discuss researches and mutual contributions, creating synergy between different studies: meetings are held to exchange knowledge and seek input from different areas. However, most of them are held with members of each specific subgroup, with few general meetings. There is still a difficulty to organize it as the members have little time available. In the past, most of the meetings were general, but few members used to participate effectively, being very unproductive meetings;

3.4. *Concern about the availability of the acquired knowledge (society and the group itself) in Extension activities, such as hosting events, training programs, courses, knowledge portal on the internet etc:* availability of knowledge is done through publications mostly, with few extension activities;

3.5. Use of resources and results of researches undertaken by the group in activities of education, aiming at including the formation of new participants and professionals with a systemic view: acquired knowledge is continuously used for teaching, since many of the participants are teachers that contribute to the education of more skilled professionals;

3.6. Search for learning and constant upgrading of knowledge, suggesting new topics of research interests within the group: the group's members are constantly updating their knowledge, whether they are teachers, students or professionals, all being charged for continuous updating. Moreover, as the group studies broad and relevant topics of interest, new ideas can always be aggregated;

4. Relationships with the environment:

4.1. Studies aimed at meeting demands of society, not only publication and scientific demand (including works with other institutions, such as consulting works to companies): group's works, in general, have had concerns about the actual contribution to society, seeking solutions to real concerns in organizations and in their environment. This is also consequence of the fact that he is inserted into the area of Applied Social Sciences, which has further strengthened this characteristic. However, some studies are developed without focusing this concern;

4.2. Search for solutions to the root causes of social and business problems, even if indirect: through the systemic analysis of problems, the group's works aim to understand the true causes of these;

4.3. Partnership in relationships with other groups, other universities, research and teaching centers, businesses, interested individuals, associations and national and international government agencies: at various periods throughout its existence, the group maintained partnerships with other research groups and universities, such as relationships with researchers abroad and at home (university researchers in Canada, Belgium, England, Australia, Argentina,

Brazil, among others). Relations with public sector and private organizations are constant, due to empirical research. In addition, the group maintains an extensive network of contacts with stakeholders and associations to hold events such as conferences and workshops;

4.4. *Effective link between the systemic world and the real world:* the performance of the group consolidates the link between systemic and the real world, seeking solutions from theory to practical issues of everyday life. All papers seek to analyze the systemic and ideal world, checking best practices that can be adapted to reality. However, they could be better integrated.

With the aspects analyzed, one can observe that the group shows some systemic features. However, there are many practices and characteristics that can be applied in their reality to assist for more effective management practices.

CONCLUSIONS

Whereas the analyzed group has some systemic characteristics, it is possible to suggest some actions to strengthen these points and add new aspects to their practices in order to contribute to its consolidation, such as:

- Conduct integrated research projects;
- Strengthen interdisciplinary structure, seeking members from different areas of interest;
- Decentralization of responsibilities, seeking a less dependent structured on the leader and coordinators;
- Clear definition of responsibilities and activities of each member, in order to maintain a high commitment of all;
- More frequent meetings and conducting some meetings of the whole group;
- Search for members with greater availability of time;
- More effective organization in order to raise funds;
- Set clear rules for decision making;
- Creation of a committee to strategic decision making;
- Develop and continuously update a strategic planning;
- Continuously monitor the activities in the short term, through techniques of project management;
- Creation and dissemination of a code of ethics;
- Conducting research linking different interests, through discussions to generate ideas for new researches;
- Creation of a knowledge portal on the Internet;
- Events held more frequently, spreading the group's activities;
- Enter into more partnerships with researchers from different universities in the country and abroad.

The study has some limitations such as lack of literature on the subject, leading to the need for structure based on interviews with a small amount of scholars in systemic vision, due to time constraints and availability. Another aspect to consider is the analysis of a single case, while the authors may have a biased view by being members of the group analyzed. Another limitation, though, is the difficulty of identifying key aspects of the management of any research group, regardless of whether systemic or not, necessarily relevant to the group to be considered as systemic. There is also a limitation due to subjectivity of the assumptions proposed, which is difficult to assess in groups.

SUGGESTIONS FOR FUTURE STUDIES

The conceptual framework proposed in this study is a preliminary framework that could and should be developed and validated through interviews with more scholars on the subject around the world and through its practical application in research groups from different areas of study. In addition, a suggestion for future studies is to compare different experiences of the creation, management and consolidation of research groups in different areas and different countries, aiming to find best practices that can be generalized, guiding leaders of research groups worldwide.

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