SYSTEMIC THINKING BY PROJECT MANAGERS.

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ABSTRACT

Currently project management has become a major factor in the survival of organizations in the competitive environment, they seek to expand their knowledge, practices, tools and methodologies to achieve the best results. In an organizational environment more and more the manager must understand that a project is part of a larger and more complex set, understanding that the elements have dynamic and simultaneous interrelationships. With this phenomenon observed, the work seeks to present a theoretical-practical framework that will exemplify the complexity surrounding the environment that surrounds the projects, classifying the cases presented in archetypes or dynamic structures. To achieve this classification, the work applies a critical mapping of systemic variables and their dynamic relationships,

Keywords: Systemic Thinking, Project Management

1. INTRODUCTION

A project differs from a process because it is a set of activities that led to a single result. As it is a single result, the activities involved are often complex, for the execution of these activities there is usually the union of a multifunctional group with diverse knowledge.

With the formation of the functional group, the project receives several influences from individuals and organizations, who seek their vision of the ideal, in addition to the environment in which the project is immersed. With the various influences a project can be compared to a living organism, as it is unstable and changing, always occurring internal and external interactions. According to Senge (1990), organizations need to learn generatively and adaptively.

For the project management it is necessary a qualified manager who integrates and commands the activities, delegates the functions and responsibilities, with the main objective of success of the project, being that the organizations understand that the main responsible for the success or failure of a project is yours manager.

To assist the project manager in the dissemination of the areas to be controlled, the Project Management Institute (PMI, 2008) defines that the project management must cover ten areas, integration, scope, costs, quality, acquisitions, resources, communications, risks, schedule and stakeholders.

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Systemic Thinking by Project Managers

As noted, a project manager has a varied possibility of influences, systemic thinking aims to identify the integrated whole, the variables that influence positively or negatively, creating methods of analysis. Systemic thinking seeks to describe the complex world in a coherent way, to look beyond a simple isolated event, looking for its root and consequences.

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According to Churchman (1971), systemic thinking is a way of thinking about total systems and their components, even according to Sterman (2000) it is the ability to see the world as a complex system.

Current project management techniques tend to focus on controlling expenses, meeting dates, not using resources unnecessarily and meeting the overall objectives of clients. Rodrigues and Bowers (1996) argue that traditional project management fails to consider that the knowledge of each stage and area of the project presents complete control of the project.

The control of segmented parts of the project is useful and uses appropriate tools, but they fail to consider the interrelationships that are responsible for not meeting deadlines, increasing budgets, resources used in the wrong way. The interrelationships found in a project can be communication between the team, the psychological skills of individuals, among other root causes that will be addressed in this work.

Many of the project managers have a scientific view of what the project involves, be it internal factors or the environment in which it is immersed. This limited view prevents the holistic view, perceiving only the surface of the problems encountered.

As many projects have deviations from their original planning and difficulties that managers have in understanding the causes of deviations, this study seeks to understand what are the most common types of archetypes involved in project management in organizations. It is still proposed by this work to present which actions and reactions, according to the archetype, are found in the literature on systemic structures to assist the manager in his function, seeking to reduce the deviations found in the current context. In order to present to managers the need for a holistic view, as this is broad, long-term and dynamic, constantly changing, allowing for more efficient learning.

This work is presented in four sections. Section two will present the theoretical concepts that were used as a basis for the elaboration of the work, concepts related to project management, later concepts and tools of systemic thinking will be presented. The third section presents the applied methodology, detailing the steps used in structuring this work. In section four, the research results are presented according to the applied interviews, observing the difficulties encountered and presenting what the literature defines. In the fifth and last section, final considerations, limitations found and proposals for future work are presented.

2 LITERATURE REVIEW

2.1 PROJECT MANAGEMENT

As previously mentioned, a project has a well-defined start and end date, with activities carried out by a group with the aim of generating a unique product, service or result. Therefore, for the management of a project, great knowledge and skills are required,

according to PMI (2008) project management is "the application of knowledge, skills and techniques for the execution in an effective and efficient way".

Many authors define that an efficient project management presents expressive results for the organization, increasing its competitiveness in the market. The authors also demonstrate that the management of a project is evolutionary, as the project is executed new information is found that must be analyzed to achieve good management.

2.2 SYSTEMIC THINKING

Systemic thinking aims to find a way to exemplify the complex world, analyzing the relationships between everything that is around what is being studied. According to Sterman (2002), systemic thinking develops new levels of perceptions, sensitivity and awareness, with the aim of uniting individual and collective thinking to understand the complexity of relationships.

Human capacity is limited and biased, an individual always ends up using the same perception to explain a phenomenon, with which only the surface is observed. Going against it, systemic thinking seeks to find a better perception, defining that a phenomenon is structured in several layers, Andrade et al. (2006) presents a metaphor with an iceberg for the perception of reality, shown in Figure 1, where it is noted that the human capacity having to visualize only the surface, not understanding the bases for the occurrence of the phenomena.

Figure 1 - Perception metaphor human.
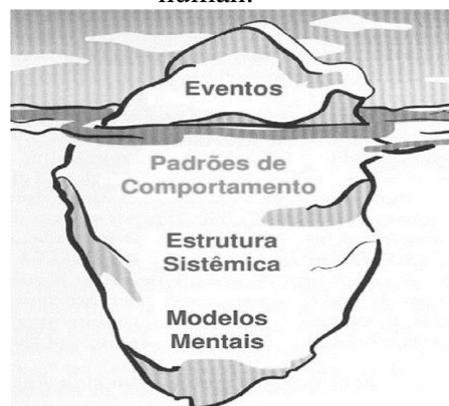
Source: Andrade et al. (2006)

As noted by the figure, the individual is able to perceive events or phenomena and from this perception to react. Following the image, it is observed that below the events are the behavior patterns, these patterns are only perceived over time, checking their trends and implications, so it is possible to advance in the perception of the event and sometimes even predict it.

The systemic structure comes below the behavior patterns and it is in this part that it is possible to find and observe the interactions between the variables, this is where it is possible to understand which variables can be changed to achieve the desired objectives or avoid the undesirable ones.

Finally, there are the mental models, which are the models that each individual brings in his mind, define his reactions to certain events, and these reactions generate new

patterns of behavior and finally new events. It is necessary to understand and identify mental models in order to be able to influence and modify them to achieve the goals. The mental models will be presented ahead in more detail.

2.2.1 Systems dynamics

Systems dynamics began to be studied in the 1950s by engineer Jay Wright Forrester to understand the complexity of systems in the industry. This approach helps to understand the complexity of systems over time, using feedback to understand how negative and positive causal variables affect the system.

For Senge (2003) the behavior of the system is influenced over time by the most important interrelationships, which are the systemic structures. According to Andrade et al. (2006) circular cause and effect relationships are important in understanding the behavior and support of complex systems. The human mind with its limitations, when faced with complex situations tends to find intuitive solutions, the dynamics of systems elucidate that which is not intuitive, achieving surprising results. Sterman (2000) contributes by saying that the elaboration of causal models follows accordingly for the identification of variables and their relationships. Thus, it is possible to understand how these variables behave individually and as a whole.

Realizing all the importance of analyzing the relationship of variables for the understanding of the whole, it is therefore more important to understand the relationships in larger networks instead of analyzing the sets separately and in isolation.

2.2.2 Understanding reality

Human understanding tends to always seek a single cause effect for a situation, often in a linear way, for Senge (2003), individuals determine that certain actions cause certain consequences, but rarely make the connection that these consequences are causing new ones actions / consequences, which ends up in many cases positively or negatively influencing the initial action. Thus, the systemic perspective encourages to broaden the view of errors beyond individual errors.

The comprehension of reality becomes complicated due to the different situations in which the reality deviates from what was planned, according to Pidd (1997) emphasizes that the lack of information and scarcity of resources also impair the understanding of reality.

Senge (1990) develops the theory about the levels of understanding of reality, for the author at a first level, the understanding in the vast majority of individuals starts from the explanation of events. Contemplating this difficulty in understanding Andrade et al. (2006) points out that individuals apply materialized filters to internal structures and life experiences that delimit the understanding of reality. With this it is possible to observe that for each individual an understanding of reality is formed. The author also warns that reactive action on an event may impair the understanding of reality, as a fragmented view of reality will occur.

At another level, Senge (2003) demonstrates that explanations based on behavior patterns tend to identify long-term trends, thereby assessing their implications. On this level, Andrade et al. (2006) points out that preventive behavior in individuals is initiated, given that problems arise.

At a third level, Senge (2003) presents that, although uncommon but of great importance, it is the structural explanation that responds to certain causes of certain patterns of behavior. Presenting that only they address the underlying causes of the behavior, so the structures produce behaviors, and changes in underlying patterns can generate different patterns. Concluding that when widely understood they have considerable impacts.

Following this thought Andrade et al. (2006) mentions that the relationships between variables and their boundaries are limited by the subjectivities, interests, beliefs and paradigms of the individual who select them. Still having to consider the context, relationships, forms and patterns in which the system is immersed.

But the definition of relationships and standards are not easy to perceive for human rationality, making it difficult to measure, with these difficulties a more flexible approach is required that involves mapping and visualization

2.2.3 Mental models

Several authors have definitions about mental models, but all are similar, in general, a mental model is the perception that an individual creates to explain some phenomenon. Senge (2003) exemplifies it by saying that mental models are deeply rooted assumptions, generalizations or even images that influence the way we see the world and act.

Following the line of thought Andrade et al. (2006) defines that mental models are all kinds of beliefs, opinions, interests, values, rules of behavior, theories about reality and stories that we carry in our minds about ourselves, other people and the world of general form.

Understanding how mental models are defined, it is possible to perceive that the mental model of each individual can present difficulties for the interpretation of a phenomenon, Senge (1990) finds that individuals learn to break the problems down into small pieces to understand them better, but with this fragmentation the perception of the influences and consequences of each action in the whole is impaired, with this, the individual loses the perception of the whole, being limited to each action.

With what has been presented so far, it is possible to understand that each individual creates their perception of reality. Now thinking about an organization, it is made up of people, each with their perception of reality, so this becomes a problem. As a result, the perception that an individual has may not be in accordance with reality, and the greater the discrepancy, the greater the divergence between the desired behavior and the one actually performed, resulting in a dispersion of organizational energy.

According to Senge (2003) managers are inherently pragmatic, learning only what they need for the business environment, being good advocates, where the competence is in solving problems effectively. To change this scenario, Senge (2003) suggests that the internal images that he has of the world must be unearthed, bringing them to the surface and rigorously monitored and analyzed. For the author, the capacity for generative learning requires managers to reflect and inquire, so it is possible to challenge mental models. Following the thought, Andrade et al. (2006) define that with the knowledge of mental models related to the situation, it presents the possibility of thinking about the best strategies with reality.

There are limitations of mental models, the human being has a limited capacity for thinking, so often he cannot understand the feedback relationships of an action, ignoring the elements of dynamic complexity. The greater the amount of feedback in a system, the greater the number of correlations and, consequently, the greater the difficulty of understanding.

2.2.4 Systemic management process

The traditional management process has great differences in focus in relation to that of the systemic process, the traditional tends to divide single steps with specific subjects. According to Andrade et al. (2006) the objective is to detail the processes more and more, creating as a result several reports and analytical plans, understanding that when treating objects in an isolated way, management is facilitated.

Within an organization it is common to define problems linearly, that is, if there is a problem there is a cause, this cause is often defined and communicated in the form of linear systems, as a single cause for the problem. According to Andrade et al. (2006) to avoid oscillations and turbulence, organizations seek to define specific functions in specialized areas, aiming to isolate themselves from the environment in which they are immersed. Also according to the author, as long as organizations do not believe that interpretations, views and subjective knowledge have value, they continued to explain the phenomena with knowledge that is tangible and reliable, applying technical knowledge.

In contrast, the systemic management process aims at understanding the organizational whole, seeking to understand how the parts interact and form larger interconnected parts, managing to see the connections between objectives and actions. Translating this into practice, the systemic management process defines that managers must continuously reflect on what happened, what happens and what will happen. Shared perception and understanding is necessary, creating a system without lag between individuals and the whole.

Andrade et al. (2006) suggest that the systemic process focuses on the perception of the broadest set of relationships between variables, realizing how they dynamically influence the network. With this, it is possible to recognize consequences extended in the past, present, future and global scope. The systemic process also seeks interaction with the environment, to act collaboratively with it. Explicitly declaring knowledge to explore and challenge assumptions.

According to Andrade et al. (2006), a systemic process is able to provide a living organism, with multiple relationships, socio-cultural-political, intelligent, being all this at the same time. With that, it is possible to understand that the systems are influenced, not controllable. Then Andrade et al. (2006) exemplifies that managers must stop analyzing, teaching and controlling, and start to synthesize, connect, learn and influence self-organization together with self-control. Also according to the authors, flexible, circular and self-organized networks should be created, extending understanding and intervention to more creative and leveraging points. For this, managers should approach and move away, observe qualities and quantities, explore the spatial and temporal view.

As noted, the systemic process comes in reverse and completely modifies the concepts established in classic organizations, and the organization's thinking stops being mechanical and becomes part of a complex and living system. According to Andrade et al.

(2006) need to stop commanding to build structuring processes, starting from the influence on the living system while promoting the opening to wider flows of knowledge.

2.2.5 Causal relationship

The ideas and concepts that the tools have presented so far, need to be transformed into a language for understanding causalities. Systemic language aims to encourage people to think more about the whole than about the parts and promote an understanding of reality as a relationship network, thereby seeing circles of causality instead of linear chains and seeing the world as a living organism.

Following this reasoning Andrade et al. (2006) describe that, the variables that are part or component elements of the system are also the central elements of language. Exemplifying this, in a project, some possible variables would be a resource that was used, acceptance of the setakholders, team performance and productivity, among many others.

According to Andrade et al. (2006), the systemic language uses symbols to represent the relationships between the variables of a system. Several authors such as Andrade et al. (2006) and Sterman (2000), agree that a relationship between variables is represented by an arrow, and the variable at the end of the arrow has a causal effect on the variable at the arrowhead. In addition, there is another representation of the type of cause that one variable has over the other, usually represented by a "+" sign when it represents a positive effect and a "-" sign when it is a negative effect. A positive representation indicates that both variables are in the same direction, and a negative representation that they are in opposite directions.

Imagine that in a project the organization invested 20% of its resources, so this investment is in the same direction as the project in question, the greater the availability of resources the more the project has to spend. And an opposite effect, other projects lose these resources, being a negative effect. This can be seen in Figure 2.

Figure 2: Causal relationship between variables.
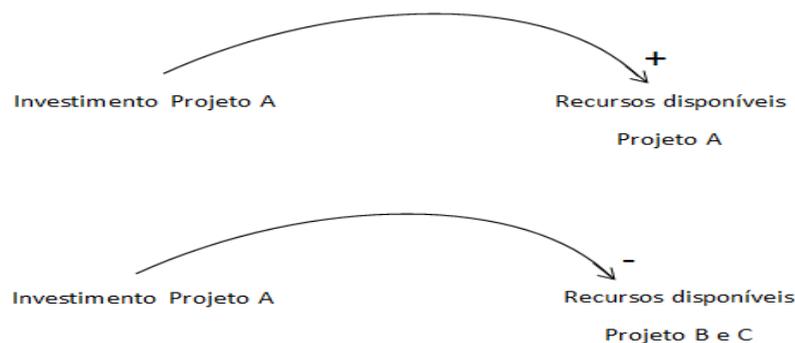
Andrade et al. (2006) still highlights the need to evaluate the instantaneous relationship. In other words, some effects of the decision will only be observed after some waiting time. As an example, when an individual ingests alcoholic beverages, he is relaxed at the moment, but only after some time other effects appear, such as the hangover. This instantaneous, delayed or delayed effect is represented with two parallel lines and perpendicular to the relationship arrow, as shown in Figure 3.

Figure 3: Delay ratio.
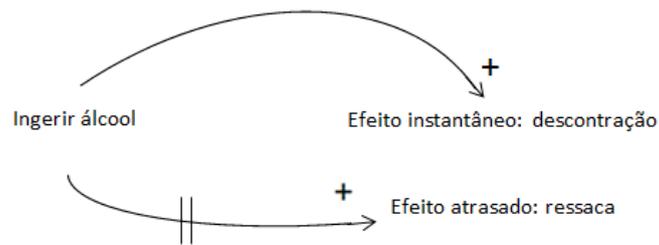
Source: Andrade et al. (2006), adapted.

But as previously presented, a dynamic system does not only observe linear relationships, the most important are feedback, which generates the dynamics of the system. Andrade et al. (2006) present two types of circular relationships, reinforcing circular relationships and balancing circular relationships. Also according to the authors "The reinforcing relationships are responsible for growth processes, with typically exponential behavior. Balancing relationships are responsible for balance. " Still a characteristic that the authors present is that the number of arrows in the opposite direction must be odd in the balance cycle and even in the reinforcement cycle.

The reinforcement cycle tends to increase any type of disturbance in the system, thus generating a growth or decline, and reinforced variables may be desired or unwanted.

From the point of view of the balance cycle, Senge (2003) states that they seek to achieve goals, transforming an unwanted situation into a desired situation, thus achieving system balance. With what was presented it is observed that the language of thought of causal relationships is structured from cycles of reinforcement and balancing, to systematically describe a reality. Still Sterman (2000) exemplifies learning in cycles or double loop, it is a process where from an action, answers are obtained and compared with the results generating a new action for a new answer, always continuing this process, as shown in Figure 4.

Figure 4: Double loop or loop of
Learning.

Systemic language is an important tool for understanding systemic thinking, which aims to understand the causal relationships between variables. Thus, an individual can observe how reinforcement cycles influence other cycles or are limited by balancing cycles. Understanding this interaction between causal relationships, it is possible to write systemic maps or archetypes.

2.2.6 Systemic maps

According to Sterman (2000) they are graphic representations of the interrelationship of a set of variables, demonstrating the effects resulting from the enlargement or reduction of a determined variable. Also according to the author, the elaboration of the systemic map must start by identifying the determining variables that are part of the system set in order to systematically analyze, subsequently, map the effects between the variables. With the understanding of the related variables, the functioning of the system is observed, establishing systemic maps that will display the complexity of the system. Forrester (1961 apud ANDRADE,

For Andrade et al. (2006) systemic maps are fundamental to find deep causes of behavior patterns, resulting in finding the leverage points for effective and sustained action. The authors emphasize that maps should be used as support tools to understand the consequences of their views of reality and not used merely for future predictions.

As presented, the systemic map is an excellent tool that should be used to analyze relationships over time in a system. But this is not the only tool available, there are systemic archetypes that are noticeable from reflections and map analysis.

2.2.7 Archetypes

Generic structures are used in order to associate behavior over time with a system structure. According to Senge (2003), he describes that a new and potentially important perception that arises in systemic thinking is that behaviors of certain patterns occur with a certain frequency. The author further describes these patterns of behavior as archetypes "System archetypes suggest that not all managerial problems are specific, something experienced managers know to intuit".

Wolstenholme (2003, 2004) describes characteristics for the definition of a basic archetype, which demonstrates with greater clarity what are the intentional and unintended consequences, the characteristics are as follows:

- It has a feedback loop of intentional consequences which combines in an action that starts in a specific sector of the organization;
- It has a mesh with feedback on unintended consequences, which are the result of an internal reaction or coming from another sector of the organization;
- There is an organizational boundary that hides unintended consequences for those who are expecting the intentional consequence;
- There is a delay before the unintended consequence appears;
- Each problem archetype has a corresponding solution archetype.

Still according to Wolstenholme (2003,2004), he describes that the problem of an archetype is that when the time passes, the behavior obtained is different from the planned one. Since the reactions generated can often be caused by the individuals who performed the initial action (in some cases due to the impatience to wait for the effect to be delayed) or external reactions, either by other individuals or by the environment itself.

According to Andadre et al. (2006) affirm that when the leveraging actions and the main barriers are perceived, conditions arise to build strategic actions and plans that use indicators from the various departments involved. Senge (2003) adds by describing that only when managers understand system archetypes does systemic thinking become an active agent.

Still describing the systemic archetypes Andrade et al. (2006) mention that they guide actions when there is an understanding of the systemic structure, mental models and the behavior of the system. They are built considering circular cause and effect relationships. According to Senge (2003), problems appear in patterns and when these patterns are represented by systemic archetypes, effective actions emerge in the face of these structures, which fundamentally solve the problems.

There are several archetypes, forming structures that generate the examples of each, these are presented in the texts on Systems Dynamics (SENGE, 2002; WOLSTENHOLME, 2003, 2004).

3 METHODOLOGICAL PROCEDURES

For the understanding of the phenomenon and measurement, this work aimed to extract the greatest quantity and quality of information and data for the modeling of dynamic systems. Understanding this path, this work developed the methodology of interviews with experienced professionals in project management.

With the survey it became necessary to define the dynamic structures, guaranteeing the understanding, identification and validation of each manager, the second step was to elaborate the mapping of the actions that can be implemented to favor the systemic structure and result in leverage points. With that, the systemic archetypes were defined (SENGE, 2003; KIM, 1998) elaborating the graphic representation, associating the systemic definitions of behavior for each structure. From this point on, a generic graphic representation of what the theory presents and what were the archetypes found by managers in practice will be elaborated, with which divergences will be presented. With the presentation of the structure, the results will be presented so that managers develop the capacity to analyze and have solutions for complex systems.

Systemic Thinking by Project Managers

Understanding this whole process, exploratory research will use a qualitative approach, which will involve a literature search and then a field research, as shown in Figure 11.

Figure 5: Map of the methodological process.
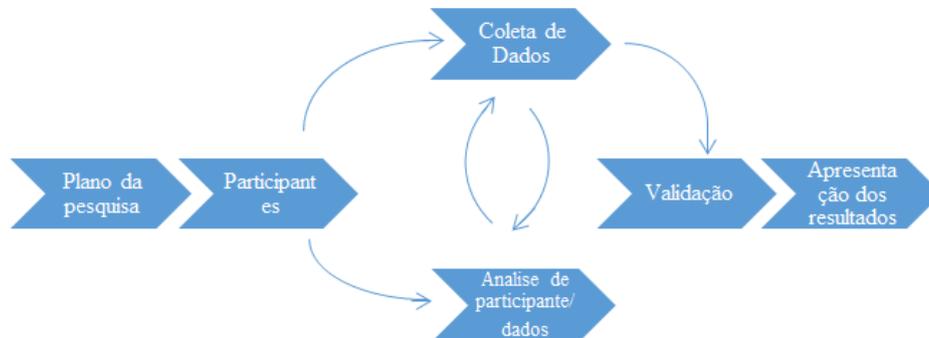
3.1 RESEARCH PLAN

This work aims to understand the importance that systemic thinking has in decision making by project managers. Based on this, research and studies were started to understand the theory. With the studies, a quantitative research was carried out to analyze the critical factors that influence the project management, with the development of the research it was possible to understand how the systemic thinking is important for organizations and project managers.

3.2 PARTICIPANTS

In order to conduct the interviews, invitations were sent to project managers from three different organizations. The organizations in this work will be defined as company A, B and C and consequently the interviewees as interviewee 1, 2, 3 or 4 of the respective company.

Company A studied is a large private electricity transmission concessionaire with around 1,600 employees, present in 17 Brazilian states. The main projects carried out are infrastructure, expansion and maintenance of the electrical system.

Company B is a medium-sized public distributor of natural gas in the Petrobras system with around 80 employees, operating in the Northwest region of the state of São Paulo. The main projects are infrastructure, expansion of the distribution network mainly within cities, a challenge since distribution occurs through buried pipelines.

Company C is a group that operates in several areas of the market, such as fuel distribution, production of chemical specialties and drugstores, being a multinational present in 9 countries, but the large mass of employees are located in Brazil, with only 4% working outside the country, the managers interviewed are working in the IT infrastructure sector.

Table 2: Description of respondents.

Company	Interviewee	description
THE	1	Operation Manager, graduated in electrical engineering, responsible for maintenance projects and operation of electrical substations, with 11 years of experience.

	2		Project Manager, graduated in electrical engineering, responsible for projects of protection system against electrical discharges.
B	1		Manager of Environment and Safety at work, responsible for environmental projects to expand the network, with 16 years of experience.
	2		Project Manager, graduated in civil engineering, responsible for civil projects to expand the distribution network, with 7 years of experience.
	3		Project Manager, graduated in physical engineering, responsible for maintenance projects and operation of the distribution network, with 5 years of experience.
	4		Process Coordinator, graduated in chemical engineering, responsible for projects of natural gas odorization systems, with 10 years of experience.
Ç	1		Governance Coordinator, graduated in administration, responsible for a team of managers, with 12 years of experience.
	2		Project Manager, graduated in information system, responsible for corporate IT projects, with 9 years of experience.
	3		Project Manager, graduated in computer engineering, responsible for CRM projects, intranet and IT infrastructure of the organization, with 6 years of experience.
	4		Project Manager, graduated in computer engineering, responsible for CRM projects, intranet and IT infrastructure of the organization, with 8 years of experience.

3.3 DATA COLLECTION

To obtain the data, semi-structured interviews were conducted, as presented by Carvalho (2010), represented in Appendix A of this work, to understand how the theory of mental and archetypal models are related in the practice and daily life of project managers. As Andrade et al. (2006), defining the situation of interest, it is necessary that the systemic method aggregates the survey of history. In the same line of thought Senge (1995) suggests that for the initial survey of the data be done with conversations with people involved.

The interviews of this work were carried out from October to February 2019, all followed the same question script and were carried out in two ways, in company A and B were carried out in person and within the company in which the interviewee works, in relation to the managers of company C, the interview was conducted via video call. All interviews last approximately one hour.

3.4 DATA ANALYSIS

With the data from the interviews in hand, a thorough analysis was carried out to standardize all the information obtained during the questionnaires. This analysis is important for the survey of key variables, as stated by Andrade et al. (2006) taking the analysis of events as a starting point, it is necessary to find the key variables of a given situation. This work then considers that the variables are a set of relevant information observed during the application of the interviews. Still according to Valença (2007) variables are factors of importance to the system, they can be quantified and varied over time.

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The survey of the variables in this work aimed to find a correlation between them and the situations in which the interviewees find themselves, either in the organization's environment or in the stage of a given project. The variables were correlated with those presented in item 2.3 of this work, to find an alignment between reality and theory, that is, to observe how the literature presents the results of decisions made by project managers that have consequences not only immediately, but also in the long run and thereby show them how systemic thinking in decision making can lessen the negative impacts on a project.

From this observation and correlation, it was possible to observe which archetypes each respondent is related to, so some archetypes were mapped for the respondents, according to the adherence of the archetype to the variables found in the questionnaire responses. This stage is important, as highlighted by Andrade et al. (2006), with systemic archetypes it is possible to identify patterns of behavior, as well as points for effective and sustained action.

4 RESULTS FOUND

4.1 DEFINITION OF INTERVIEWS

This work sought to find the greatest diversity among the interviewees to obtain different answers within different environments, as already mentioned in this article, the interviewees are from three different organizations.

In addition to the diversity of the interviewees' organizations, the research participants have several backgrounds, including engineering, administration and information system. Another important factor for the selection of the interviewee was the time in the position as project manager, with the minimum time for interviewees being five years of experience.

4.2 IMPORTANT VARIABLES IDENTIFIED

An organization's environment is already complex in its standardized processes, when a project environment is studied it is possible to observe greater complexity at all levels. Therefore, this work is probably far from mapping all the complexity involved, but it was possible to analyze some pertinent variables in the studied environments. In this way, this section of the paper sought to present the variables that showed the highest frequency in the interviews and weight in their consequences. The table below presents the variables discussed in the interviews.

Table 1: Presence of variables in the interviews.

Variable	Presence
1- Scope of the project	10
2- Term (meet the specified term)	10
3- Cost	10
4- Customer satisfaction	9
5- Project success	9
6- Management control	9
7- Team engagement	9

8- Threats	8
9- Team quality	7
10- Understand what is value for the customer	7
11- Leadership	7
12- Quality of the environment	7
13- Beware of risks	7
14- Adaptation of techniques to the company	5
15- Administrative support	4
16- Resources	2
17- Use of agile methodologies	2
18- Participation in training / seminars	2

The results were based on the interviews, as ten interviews were carried out, the value "presence" represents the number of citations of the variable in the total of the interviews. It is possible to observe that only a few variables were observed by all participants, this demonstrates that depending on the environment in which the manager is present, the sector in which the organization operates the important variables differs.

Analyzing the data obtained, it was possible to observe that the variables most mentioned in the literature were mentioned with high frequency in the interviews. Applying the Pareto principle, adding all the quotes of the variables in the interviews and after the sum finding the variables that represent 80% of the total, it was possible to establish the 11 that have a high weight of importance, while the values of the quotes of the variables in the literature were found by adding these and applying the percentage value of frequency. As can be seen in the table below, which presents the frequency of variables in the archetypes versus the quote in the interviews.

Table 2: Frequency of variables in archetypes and citation in interviews.

Variable	Citation in literature	Interview quote
1- Management control	22.58%	90%
2- Leadership	16.12%	70%
3- Quality of the team	13.97%	70%
4- Team engagement	11.88%	90%
5- Project success	10.75%	90%
6- Understand what is value for the customer	10.75%	70%
7- Scope	8.60%	100%
8- Deadline	7.52%	100%
9- Cost	7.52%	100%
10- Customer satisfaction	5.37%	90%
11- Threats	4.30%	80%

With these results presented it is possible to observe that the manager works constantly according to the level of management control, controlling the term and cost, seeking to harmonize the environment, engage the team and offer opportunities for growth of

the team members and deliver a project that meets the needs of the team. customer expectations.

4.3 RELATIONSHIP BETWEEN THEORY AND PRACTICE

In this section, the relationship between the archetypes cited in theory and those observed in practice will be presented, to help understand the correlation, figures will be presented that represented in arrow shape in blue the correlation cited in theory and in practice and in red the one mentioned only in the literature and not present in practice. The objective is to present what is the breadth of the literature and what are the results in practice.

4.3.1 Management control.

As can be seen in Figure 6, management control has a relationship presented in theory and practice with administrative support, focus on management relations which in turn favors the engagement of the team, the understanding of what is important for the client and with that harmonizing the team environment. However, in the respondents' responses, there was no correlation between managerial control and centralization of activities or decision errors, nor was there any correlation between care with risks and systemic meetings impacting deadlines.

Figure 5: Correlation of management control.
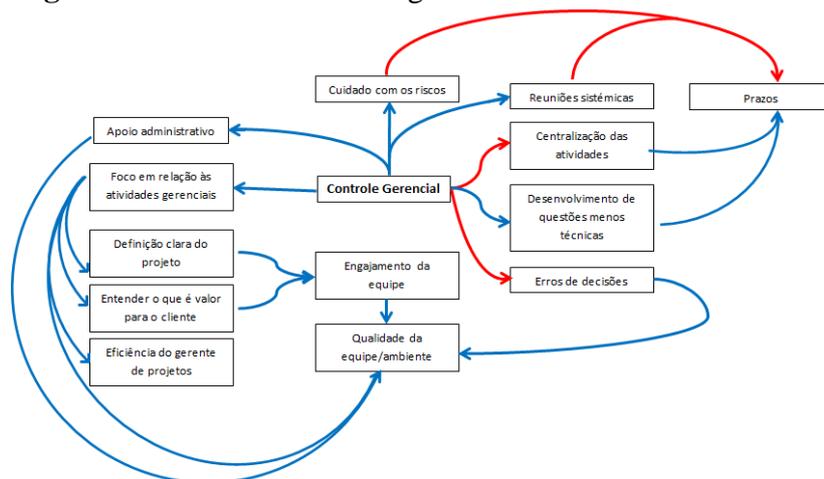
4.3.2 Leadership.

The correlations of theory and the results of practice in the case of leadership were very close, the only one not being presented was between administrative support and resources, because in the results it was shown that resources are more present in important and more profitable projects, as shown in Figure 6.

Figure 6: Correlation of leadership quality.
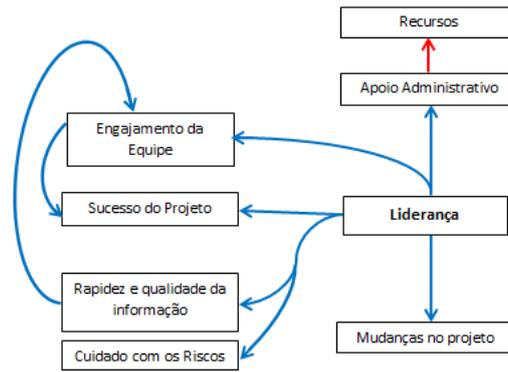
4.3.3 Quality of the team.

The quality of the team shows outstanding correlations in practice and theory with agility in decision making, project innovation and the ability to solve problems, as shown in Figure 7. On the other hand, it did not show in practice a correlation between the problem solving capacity and care for risks, quality of the team with administrative support and managerial control with conflicts.

Figure 7: Correlation of team quality.
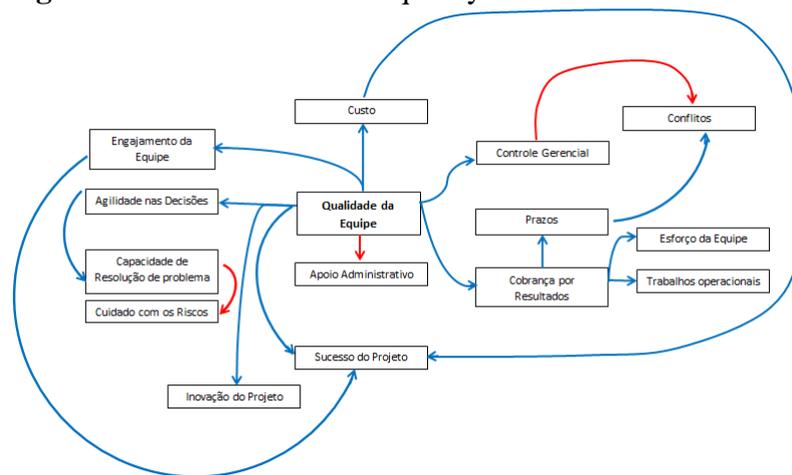
4.3.4 Team Engagement.

Team engagement shows results very similar to the quality of the team, as shown in Figure 8, however it is worth noting the fact that there are no results in practice that present administrative support and focus in relation to managerial activities, it was observed with the results that administrative support depends much more on the manager and that an engaged team is always looking for improvements in its operational and non-managerial activities.

Figure 8: Correlation of team engagement.
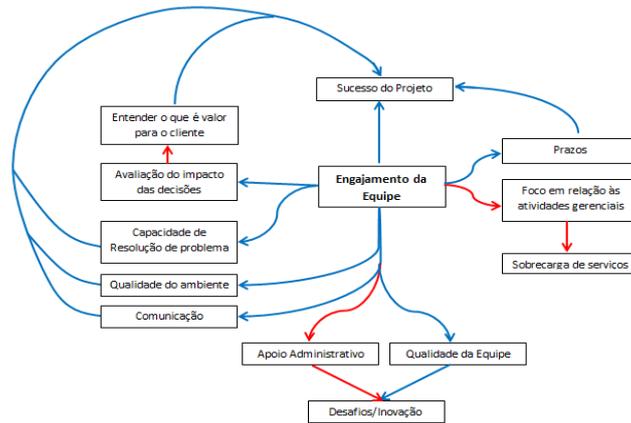
4.3.5 Project success.

The success as well as the leadership showed little divergence between theory and practice as shown in Figure 9, however in practice there was no correlation between the success of the project with challenges and the innovation of the project, the results collected presented a difficulty in reconciling challenges with the outcome of the project.

Figure 9: Correlation of project success.
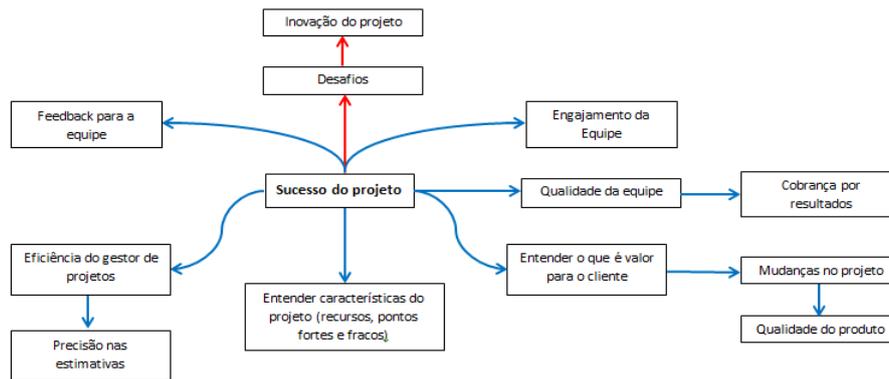
4.3.6 Understand what is value to the customer.

The theory shows several correlations between understanding what is value to the client and the results obtained in practice are the same as many of them, as shown in Figure 10, however, in practice, the correlation with administrative support and management control was not observed, according with the results, this correlation does not exist, as managerial control and administrative support do not change according to the understanding of what is value for the client, in fact it was found that this is almost an obligation imposed by organizations.

Figure 10: Correlation understand what value is to the customer.
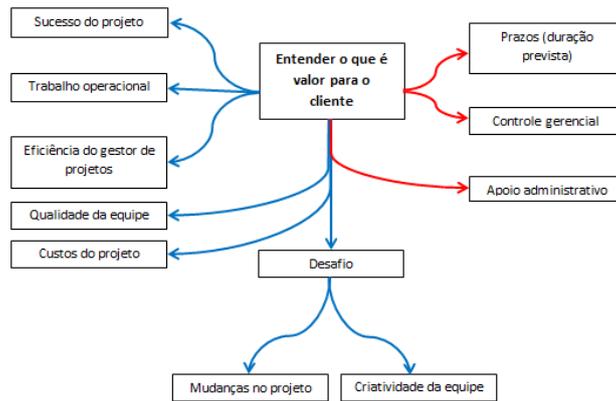
4.3.7 Scope.

The variable scope most cited and given importance in the interviews did not differ in theory, as shown in Figure 11. One point to note is that a well-defined scope changes the original project, as quoted in one of the interviews "if a client asks me a house with only one entrance door, I as a good manager should change the scope and do with at least two entrance doors, as this is the best for the quality of the project ".

Figure 11: Scope correlation.
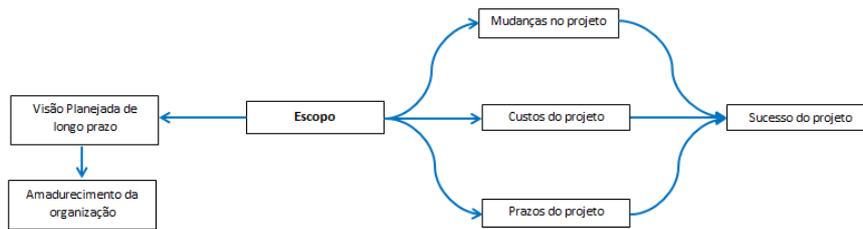
4.3.8 Term.

As well as other variables, the term also showed a strong relationship between theory and practice, as can be seen in Figure 12, only the training of the team that did not show any correlation, the practical results showed that the training occurs when there is a new technology or a new regulation.

Figure 12: Correlation of time.
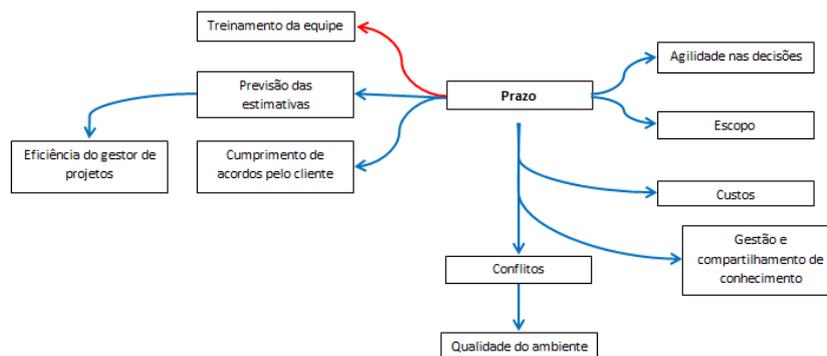
4.3.9 Cost.

The results obtained in practice are very similar to the data presented in theory, as shown in Figure 13, however there was no relationship with knowledge sharing.

Figure 13: Correlation of cost.
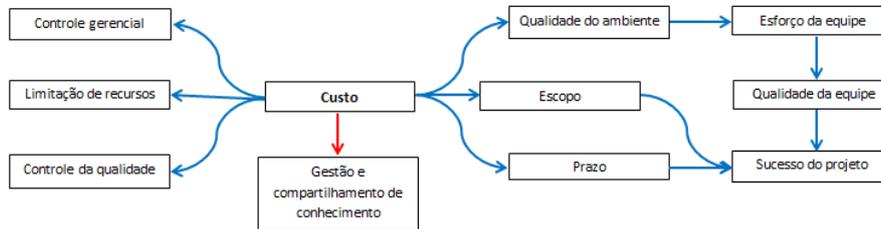
4.3.10 Customer satisfaction.

Customer satisfaction showed divergences in the development of less technical issues, in this sense the result of the practice showed that in a successful or unsuccessful project, variable is not changed, as shown in Figure 14.

Figure 14: Correlation of customer satisfaction.

4.3.11 Threats.

As in section 4.3.8, there was no correlation with threats and team training in the results of the practice, the other variables showed a correlation in theory and in practice.

Figure 15: Correlation of threats.
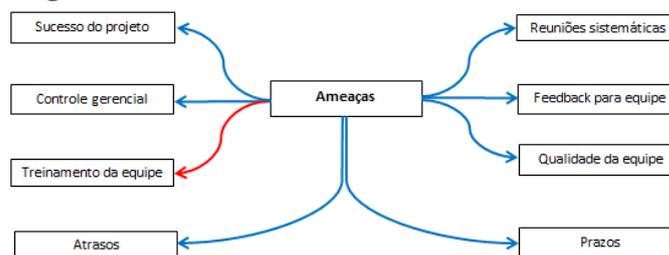
4.3.12 Correlation between the studied variables.

Finally, this study correlated the interrelationships between the 11 variables studied, according to theory and practice, to present how a systemic vision and thinking is important when it comes to understanding the consequences of actions taken in isolation, as shown in Figure 16.

Figure 16: Correlation between eleven variables studied.
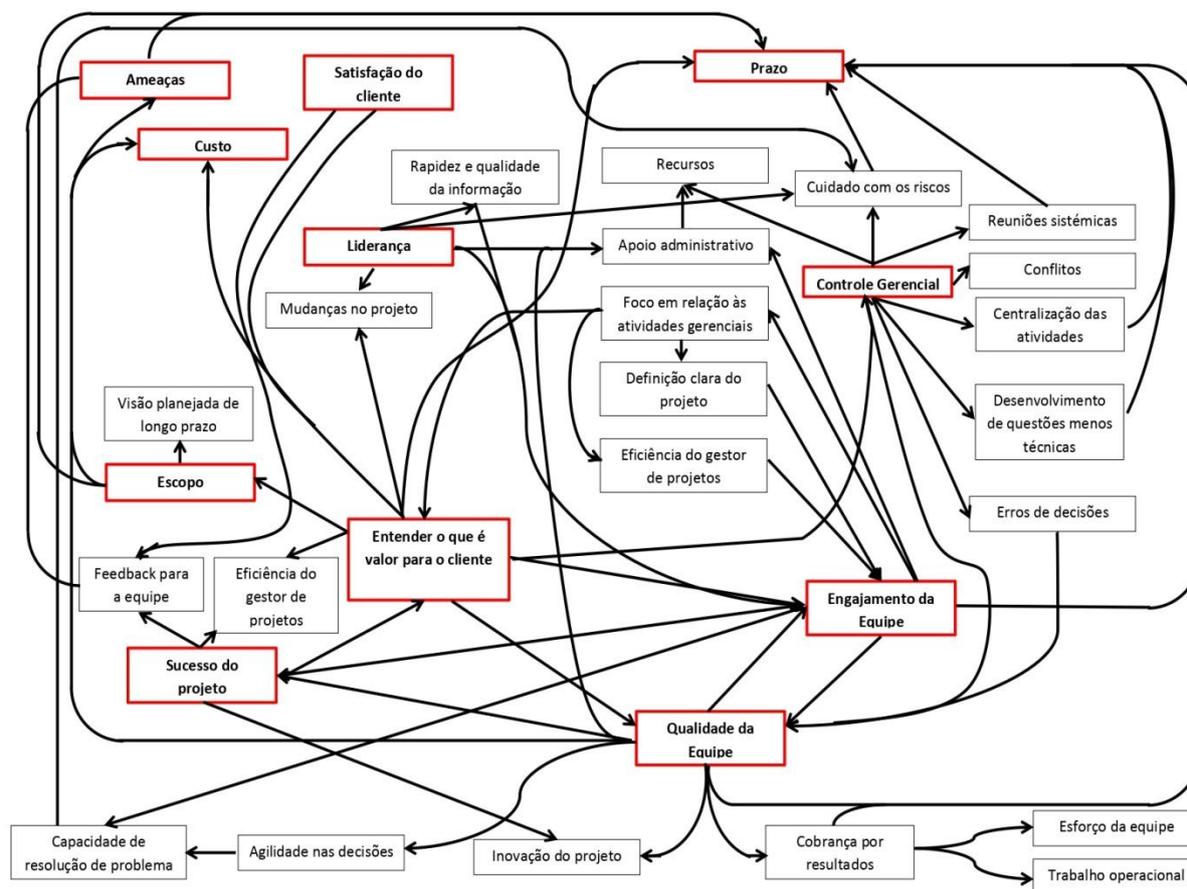
5 CONCLUSION

With the results presented, the importance of the project manager in a projected organization is indisputable, since they assume from low to high levels of responsibilities. As noted in the results, the manager has roles far beyond the projects under his responsibility, he is responsible for maintaining the quality of the team and environment, understanding the strategic objectives and transmitting this to the activities, in the client's understanding and much more.

To this end, this work presented a theoretical survey to understand the factors that influence a project and then compared it with the application in practice, finding some deviations, so it was presented how there are consequences of actions applied in practice that react in an unknown way by managers . From this point on, the manager must seek to improve his theoretical knowledge about archetypes so that he can see a certain situation from a systemic perspective.

It was also possible to observe that the managers suffer great influence from the processes of the organizations as presented in sections 4.3.8 and 4.3.11 that team training is only defined by the organization and not by the managers, therefore they are unable to implement an archetype that would have better adherence in your reality.

This work has limitations due to some factors, such as the interviews being conducted in a punctual way and there is no monitoring of the project manager's daily routine, in this sense the same interviewee could give a completely different answer after a certain situation in which he had no knowledge until the date of the interview. Another limitation is

the interviewees themselves, since the survey was conducted on a small sample number and the larger the sample, the more faithful the conclusions would be and due to their areas of expertise, all are submerged in technology and engineering environments, with managers other environments have different responses.

It is proposed for future work to develop a questionnaire more specific to the environment in which the interviewee is immersed (health, education, equipment development, etc.), in addition to increasing the sample size. Another suggestion is to present more operational examples related to archetypes instead of presenting them in strategic ways. In addition to conducting a more in-depth study of the divergence of theory with practice to counter the results and understand how they complement or contradict each other.

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