

## **The Development of a Methodology to Knowledge Management in an Engineering and Construction Company**

O Desenvolvimento de uma Metodologia para Gestão do Conhecimento em uma Empresa de Engenharia e Construção

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### **Resumo**

O conhecimento tem se tornado um ativo de grande importância para as organizações modernas, por ser a principal matéria-prima com a qual todas trabalham, sendo assim mais valioso e poderoso que qualquer outro ativo físico ou financeiro.

Este artigo aborda os principais conceitos utilizados em organizações que buscam, a partir de sua experiência e especialização, os conhecimentos necessários para o desenvolvimento de novos projetos, serviços e produtos. É apresentada a maneira pela qual os processos de criação, registro e disseminação do conhecimento se tornaram fatores críticos para a sobrevivência das grandes corporações, bem como o papel que as tecnologias de informação têm exercido na gestão adequada do conhecimento.

O trabalho tem a intenção de transmitir uma experiência prática de um projeto de gestão do conhecimento, desenvolvido e gerenciado pelo autor, aos demais interessados pelo assunto.

É descrita a metodologia de trabalho utilizada para a gestão do conhecimento em uma empresa brasileira de engenharia e construção. Seus projetos envolvem organizações e países com suas próprias culturas e funcionários que falam línguas diferentes.

Palavras Chave: conhecimento, metodologia, disseminação, tecnologia, engenharia,

**Abstract**

Knowledge has become a very important asset to modern organizations, more valuable and powerful than any other physical or financial asset.

This paper describes important concepts used by companies that seek, according to their experiences, the necessary knowledge to develop new projects, services and products. It is shown how the creation, codification and dissemination processes became critical factors for the survival of big companies as well the role that the information technology has developed to manage the knowledge.

The aim is to show a practical experience of a knowledge management project developed and managed by the author. The paper describes a methodology used in a Brazilian engineering and construction company to manage the knowledge. Its projects and services involve companies and countries with their own cultures and employees that speak different languages.

Keywords: Knowledge, methodology, dissemination, technology, engineering

**1. Introduction**

The role of generating all richness and power of present society is no longer exclusivity of the traditional production factors (capital, land and work). This statement itself is enough to justify the fact that many companies have a market value extremely higher than its equity one.

This occurs because the product and service values depend more and more on the innovation, technology and intelligence values incorporated to them. As these factors are intangible, they are hard to be managed. For this reason, the company that knows how to deal with them in an efficient manner will be in an eminent position in its market. The companies should understand that knowledge has become a very important asset, as it is the main raw material they work with. Based on this understanding, it is possible to observe how knowledge is more worthy and powerful than any other physical or financial asset. This effective value of knowledge has become a surviving factor in large corporations. The main changes occurred in the market in the latest years started to demand a better and higher usage of all experience and knowledge acquired by each company during its whole existence. It is a general understanding that only this adequate usage of knowledge will allow the development of products and services with more competitive costs and higher quality.

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Researches carried out by specialized consulting companies at large corporations has shown that initiatives oriented to knowledge management may bring large benefits to:

- Decision-Making;
- Customers Management;
- Responses to Market Demands;
- Development of Professional Skills;
- Productivity;
- Profitability;
- Best Practices Sharing;
- Cost Reduction.

Besides that, it may be noted that knowledge has always been the main source of a long-term economic growth. The great difference between what happened on the agricultural revolution time and what happens currently is the impact provided by the intensive use of information technology. It has contributed in an effective way for the changing of direction to a knowledge-based, as it has allowed the transmission and rapid access to a huge volume of available information.

The use of information technology as a strategic weapon and facilitating tool for knowledge management has been very discussed. Presently, there are great doubts about its true efficacy, mainly due to the need of organizational changes in the company and lack of evidences to prove that the significant gains are attributed to its usage.

In addition to this, most of the problems related to availability of knowledge on the organizations occur due the following issues:

- Problems with knowledge transference;

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- Errors related to lack of knowledge;
  - Critical knowledge in hands of few people;
  - Impossibility of measuring the knowledge usage;
  - Loss of relevant knowledge at adequate moments;
  - Lack of sharing processes.

The actions directed to knowledge management should aim improvement on the most varied activities developed by the company. Out of them, it is possible to highlight the better management of relationship with customers, adoption and sharing of best practices, allocation of the right people at the adequate locations, development of corporate training, monitoring of business environment, management of supplying chain management, etc. These actions will be aligned with the improvement of results in the organization that will help to justify the knowledge management.

In the opinion of large Brazilian companies, the opening of new business opportunities, existence of a more innovating process, profit increase, better retention of experts and a more efficient customer assistance are the main benefits expected by the companies that implement a knowledge management project.

## **2. The New Corporate Scenario**

The great change through which the companies have to be submitted to continue being competitive is the quickness with which their activities may be developed. This is mainly due to the fact that they have started to be more concerned about their partners and customers.

Essentially from the '90s on, with the opening of the Brazilian market to the remainder countries, the companies started to consider the customers as the main objective of their production process instead of the product as a result of it. This fact has evidenced the importance of observing all actions taken by the competitors, defining performance strategies, creating distribution networks and studying the life cycles of products and services.

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This response time reduction has made the companies, in general, to start being concerned with the following issues:

- Why not to study the actions and decisions taken in the past and verify if they can be used once again?
- Wouldn't it be positive to analyze the errors made in the past with the aim to avoid them to occur again?
- Why not to repeat the well-succeeded activities?

For an organization to learn with its past it is necessary to be structured in an adequate way for this purpose. Only this way, the learning process will occur naturally and will aggregate value to its products and services.

In addition, it should be noted that the organization already possess most part of the knowledge it needs to remain competitive but, for many reasons, it is inaccessible. The creation of an environment propitious to identify, create and disseminate the knowledge will aggregate value to the company and will lead it to achieve its goals.

The intangible assets that aggregate value to most part of the products and services are based on knowledge. Out of them, it is possible to mention technical know-how, product project, understanding of the customer, personal creativity and innovation. It is exactly on the measurement of these values that the higher difficulty is found. Opposite to the financial and material stocks, the economic value of knowledge is not easily comprehended, classified and measured as it is an invisible resource.

The value of an organization is more and more disentailed from the market one, mainly due to the extreme difficulty to measure the value of its intangible assets. This difficulty leads the market to consider the rates of investment on knowledge as an important indicator. This may explain the fact that some relatively low profitable companies are preferred at the stock markets to the detriment of other ones that have higher profitability but low investment rates on knowledge. The market value of the companies tends to be much higher than the equity

value because of their intangible assets that tend to have a much higher importance on companies based on knowledge.

It is important to emphasize that one of the greatest features of knowledge is the fact to be highly reusable. The more used and diffused is the knowledge, higher is its value. Contrary to the material resources, the depreciation effect works on the opposite way, as it happens exactly when the knowledge is not used.

Charles Handy (1994) has identified nine paradoxes, aiming to explain how our society works. According to him, the paradoxes should not be solved but controlled, as they are concepts that may be or only seem to be opposite to the usual, at least apparently, and, at the same time, they seem to be partners of the economic progress. Among the nine identified paradoxes the intelligence one should be highlighted:

*“The intelligence is the new kind of asset. It does not behave as the other types of asset and that is the paradox. Opposite to other assets, the intelligence cannot be given as a gift and will always be kept, although shared. Also, it is not possible to possess somebody else’s intelligence, even being the owner of the company at which the person works. If the person leaves the company and goes to another one, he will take the intelligence with him.”*

The concentrated intelligence, the capacity to acquire and apply the knowledge and know-how are the new sources of richness, although being impossible to convey them to other people by decree. The good news is that it is not possible to avoid people to acquire them.

Thus, the great challenge is to create a methodology to reuse the existent knowledge of an organization, as well as adequate means to capture new ones.

### **3. Knowledge Management Efficiency**

In order to achieve the success on the knowledge management it is essential to have the support of the most influential people in the organization, since, at in any other project, the lack of commitment of top management leads any initiative to failure. The main executive of the company has to “buy” the idea. The implementation of a knowledge management system

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may demand strategic and organizational changes and if they are not aligned to the top management of the company it will not show practical effects.

To achieve this objective, it is important to work with the employees' culture. Then, they will be able to understand the need to adopt a strategic knowledge management model. This initiative aims not only to guarantee to the employees their own jobs but also and mainly to keep the company at a good market position.

It is essential that the top management take over a profile that makes possible the development of an organizational structure that accepts the capture, sharing and dissemination of knowledge. The organization should clearly define the competences and attributions of each area and respective jobs, reward its employees according to their abilities and quality on the accomplishment of their tasks. The employees should use their creativity and learning capacity as means to solve the existing problems. The activities that are limited to the accomplishment of procedures and rules should not be stimulated as they may also result in the "lousy" bureaucracy.

The medium level managers play an essential role in this scenario as they work as "knowledge engineers" in the organization. They are great facilitators on the knowledge creation process, as they involve and integrate the top management and the front line employees through a management process called "*middle-up-down*".

It is the top management's duty to make the company to move from the training paradigm to the learning paradigm. The training paradigm is based on programs directed only to the technical and functional areas demanded by the jobs and uses instructors and internal and external professionals as learning sources.

On the other hand, the learning paradigm, besides considering the formal programs, also uses informal processes of capturing, such as coaching and group discussions and is based not only on the task scope but also on management, behavior and strategic techniques. It recognizes all employees of the company as knowledge sources and the responsibility for the teamwork capacity is shared between the company and their employees.

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It is understood that knowledge management solutions should always allow the existence of the right persons at the right processes at the right time.

Thus, people would be able to develop their activities, reuse the knowledge acquired on similar projects in a transparent way and create a totally integrated and refeedable information and knowledge database.

It is estimated that few companies use well defined methods to measure the return provided by the knowledge management. The main reason for it is the fact that there are no traditional methods designed for that purpose. The more used indicators are the customer retention rates, register of new patents and creation of innovating work practices.

The ideal and, theoretically, more efficient manner of measuring the success of a knowledge management is to establish a correlation between knowledge and financial performance. Nevertheless, the major concern at the beginning of a project with this scope is to maintain the strategic focus with no immediate vindications related to financial returns. Just opposite to the measuring of material and natural resources stock and even labor, it is very difficult to economically measure the knowledge. By this time, it is very important to remember that one of the most significant features of knowledge is the fact that it is highly reusable and that the more it is used, higher will be its value.

It is possible to consider the following attributes as important factors that feature the success on knowledge management:

- Increase of resources associated to the knowledge management project (including headcount and quotations).
- Increase on content volume and knowledge usage (for instance: number of documents or accesses to repositories or participants of group discussion projects).
- Probability of the project to sustain itself in case of absence of one or two specific individuals, that is, the project is an organizational initiative and not a personal project.



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- Familiarity with the knowledge management concepts by the whole organization.
  - Any evidence of financial return related either to the knowledge management activities (if it is seen as a profit center) or to the organization as a whole.

The companies need to increase their investments on recruiting processes of new employees, qualification of their professionals, implementation of modern management practices oriented to the innovation of products and processes. Finally, they should take strategic attitudes to position them as knowledge companies' syntonized to the existing competitiveness of the present market. They are expected to have more qualified employees as well as the top management should be able to communicate the company strategies more efficiently, so that the workers that are on the lower hierarchical levels are able to take decisions aligned to the strategy.

According to Davenport & Prusak (1998), the following are the factors that lead the knowledge management to success:

- **A knowledge-oriented culture:** stimulate the employees to capture, disseminate and share knowledge.
- **Organizational and technical infrastructure:** use last generation technologies and applications.
- **Top management support:** project aligned to the strategic plans of the company.
- **Entailment to the economical or sectorial value:** percentage of company income used for knowledge management.
- **Vision and language clarity:** purpose and terminology clarity, from the simplest trainings to the most deep organizational changes.
- **Non-trivial motivating elements:** incentives and motivating means to stimulate the employees to create, share and use knowledge.

- **Any level of the knowledge structure:** in order to knowledge to roam naturally and closely to the people who possess it.
- **Multiple channels for knowledge transference:** the conveyance of knowledge to the remainder areas of the company should be done in an efficient and quick way.

Undoubtedly, it is possible to consider that the potential new ideas arisen from the knowledge stock of each company is infinite and this will make the organizations to find out how to develop new activities in an efficient and quick way.

#### 4. Case Study

The data and information used on this study were obtained from the registers of activities developed during the implementation of a knowledge management project on an Engineering Brazilian company and through the analysis made by the author, who managed the process.

The studied company develops activities related to the engineering project development for the energy, transport and building sectors.

At first, it is important to present in a summarized way the organizational structure of the company:

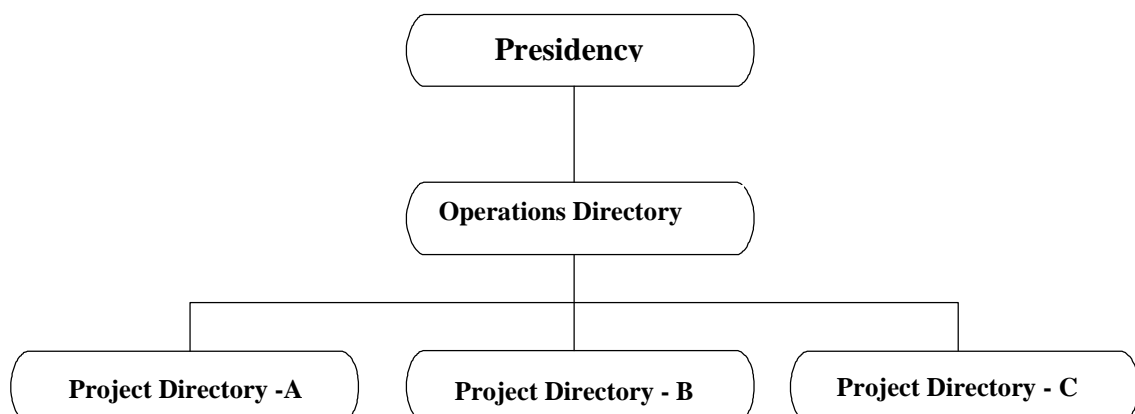


Figure 1. – Original Organizational Chart of the Company

- **Operations Directory:** the main activities were the control of human resources and equipment to be allocated to the projects and follow-up of engineering activities performed at each of them.
- **Project Directories:** directories responsible for the project management. Each of them had an own teamwork to elaborate the technical proposals and project development.

According to this organizational chart, the Project Directories were hierarchically linked to the Operations Directory and, consequently, to its deliberations.

After the restructuring was completed, by the end of the '90s, the company reinforced its managing ability and know-how. For this, it was created an independent relationship between the Project Directories and Operations Directory that started to be called Technical Directory and had its attributions deeply changed. Each one of the Project Directories, based on the new management models, would start to operate the business integral chain – prospecting, contracting and accomplishment of the works.

Able to offer complete solutions on the EPC concept (Engineering, Procurement and Construction), the organization started to emphasize the energy, transport and basic sanitation sectors, in line with the governmental efforts for privatization.

The decision to work on EPC works shows a great demand to manage its knowledge in the most adequate way, as observed on the following stages and activities peculiar to an EPC project:

#### 1. Engineering

On the preliminary phase of the project the fundamental parameters are determined such as production process, quantity to be produced, etc. These technical issues are the basis for the whole economic and viability study that allows the start-up of the basic project.

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**Basic Project**

Initial information is gathered for the development of the basic project and it includes the preliminary designs and descriptive memorials. These documents enable the final definition of the undertaking, by dimensioning the main components, preparation of chronograms and cost estimates.

During this phase, the general data of the equipment to be used are defined, as well as their productivity and required labor. At this point, it is already possible to observe the great importance of using the existing information from similar projects previously completed in the company. The adequate knowledge management enables the development of the basic project in line with what will be produced during the executive project.

**Executive Project**

The executive project consists of the detailed development of the basic decisions related to the supplying, manufacturing, purchasing, construction, assembly and start-up of the installations. This is possible through the accomplishment designs, specification documents and material listings. These documents will provide subsidies to the quotation and price gathering with the suppliers.

Most of these documents will only be obtained during the construction phase. Nevertheless, the experience acquired with previous projects will also help, in a decisive way, to define the required material and equipment to accomplish the project.

**2. Procurement**

It gathers all the activities associated to the effort of making the required assets available for the completion of the project. It does not consist of a mere act of making a purchasing order, as its involvement to the detailing phase of the project previously made is much more complex. The following activities make part of this stage:

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**Purchasing**

During all the purchasing activities it is important to have a feedback of the events occurred in the previous projects, mainly regarding the suppliers that have not provided good results for the company on previous negotiations.

**Inspection**

It is the follow-up of rules and procedures used in the manufacturing of components and equipment.

The use of the knowledge acquired in similar inspections previously conducted, as well as the meeting of these professionals with the new workers in charge of future inspections is extremely worthy for the adequate conduction of this activity.

**Diligence**

The manufacturing diligence services occur simultaneously to the inspection ones. Routines are established in the suppliers' plant related to the arrangements to be followed, which are also based on previous experiences.

**Traffic**

The traffic control services (transport and handling) are made by the teamwork that coordinate the actions related to suppliers and carrier companies until the equipment or material is delivered at the work place and they are based on the evaluations made during the transportations done for previous projects.

**3. Construction**

This stage is related to the industrial construction and assembly. The due register and dissemination of experiences obtained from previous projects have as main objective the quality improvement of the services performed and the reduction of the planned time for the completion of the project.

The integration of the stages presented on an EPC project and this final stage of industrial construction and assembly enables all previsions, plans and cost/gain estimates to be in line with the expected figures. This fact itself will help the company to reach an eminent position in the market.

The changes made by the administrative council resulted in an organizational chart where the five directories were put at the same hierarchical level, reporting directly to the presidency.

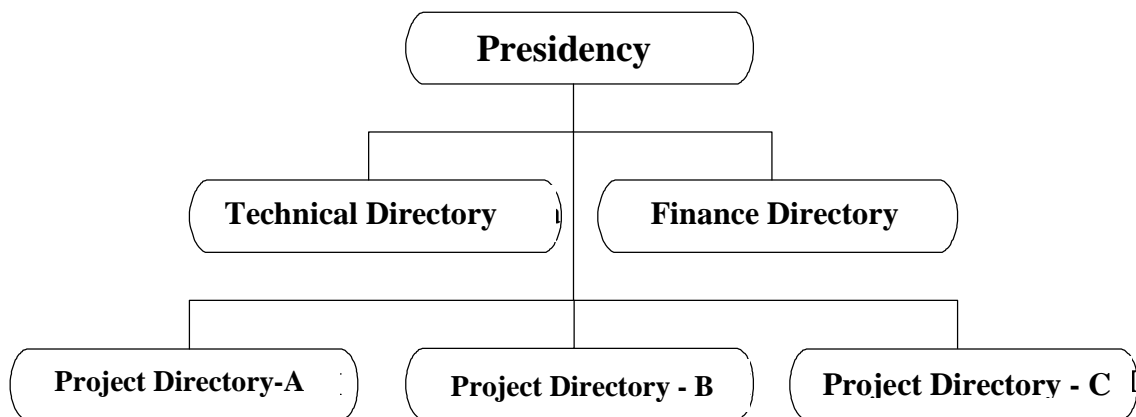


Figure 2. – Current Organizational Chart of the Company

- **Project Directories:** responsible for the projects management.
- **Technical Directory:** responsible for the maintenance of the unification among the project directories. This directory is responsible for retrieving and disseminating the technical knowledge existing in the company.

The great change happened in this restructuring is related to the fact that the Project Directories are no longer hierarchically located under other directory. In this scenario, the role of the Technical Directory has also changed. For its determinations to be followed, there should have a negotiation with the Project Directories.

The main objective of the Technical Directory was to maintain the unification and be an agency to indicate the positive course of the projects.

To achieve this goal, the Technical Directory has detected the primordial actions for the adequacy of a new organizational model in the company, which are to gather, create and disseminate the technical knowledge of the company. Its structure would be the following:

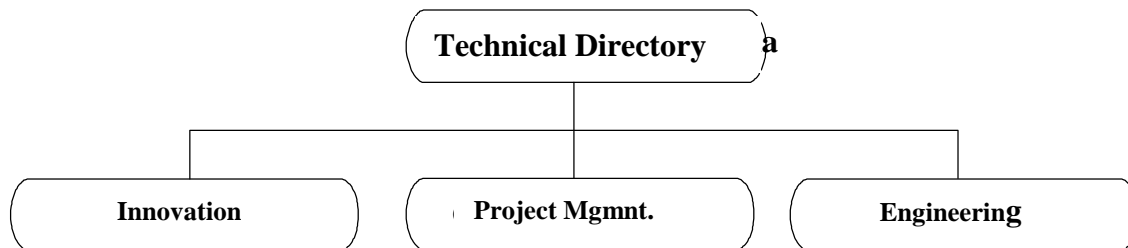


Figure 3. – Technical Directory Organizational Chart

- **Innovation:** responsible for the research and implementation of new technologies and innovation processes.
- **Project Management:** responsible for the development, implementation and methodology administration to manage the company projects.
- **Engineering:** responsible for the development of the engineering technical procedures and unification and dissemination of the best practices.

## 5. Methodology for Knowledge Management

The concepts related to the creation, register and dissemination of knowledge led to the development of a new methodology with the aim of structuring the knowledge so that it could become clear and easily accessed. Thus, it could be used on the operational activities of the company, as well as a qualification tool for the employees. This methodology comprehends the following stages:

- a) **Survey of the knowledge required for the development of the company activities.**

**Purpose:**

Define the knowledge to be acquired and/or developed.

**Main activities:**

- Find out the knowledge required for the development of the activities performed by the company;
- Define the significance of the previously defined knowledge;
- Identify the responsibilities of each area of the company;
- Associate knowledge with the responsibilities of each area of the company;
- Associate the responsibilities of each area with the competences required to perform the company activities.

**b) Definition of a qualification and technical career plan consisting of several technical competences required for the development of the company activities.**

**Purpose:**

Put into practice the “search” for knowledge required for development of the company activities.

**Main Activities:**

- Analyze, in a critical way, the technical competences identified on the previous stage;
- Find out how the defined competences may be acquired and/or developed;
- Identify the means for acquisition of the required competences (courses, workshops, etc.);
- Budget the investment to develop the qualification plan;
- Validate the qualification plan.



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**c) Dissemination of the competences through the company areas.****Purpose:**

Share and disseminate the required competences through the organization areas.

**Main Activities:**

- Establish guidelines for the dissemination of competences at the company areas;
- Define pre-requirements and elaborate a qualification plan to develop multiplying agents (professionals responsible for the dissemination of knowledge and competences to the company areas);
- Elaborate operational procedures about the activities performed at each company area;
- Define the priority degree for implementation of the procedures to be disseminated and identify the demand to create new knowledge and change of attitude by the employees;
- Identify the professional of each area that will take over the role of multiplying agent;
- Structure the system that will make a follow-up on the multiplying agents;
- Plan and accomplish the implementation of the descriptive procedures;
- Follow-up and evaluate the knowledge dissemination registered on the descriptive procedures.

**d) Retrieve of explicit knowledge in the company.****Purpose:**

Research the registered knowledge and experience collection available in the company and create conditions to make their utilization feasible.

**Main Activities:**

- Identify the area responsible for filing the explicit knowledge already existing in the company and make a diagnosis on how and how much of this knowledge is effectively used by the developing projects;
- Identify the need to stimulate the utilization of the already explicit knowledge;
- Create a knowledge center to allow a higher involvement of the explicit knowledge collection with the activities performed in the company;
- Modernize the librarian role in the organization context.

**e) Development of a knowledge analytical structure.**

**Purpose:**

Facilitate the search and use of identified, surveyed and registered knowledge by the company workers.

**Main Activities:**

- Identify a structure to index the knowledge related to the activities and publications of the several performing areas of the company;
- Classify knowledge according to the performed services and as per the performing areas pointed out during the company strategic planning.

**f) Create a system to file, retrieve, update and disseminate.**

**Purpose:**

Develop an information technology tool directed to the information and knowledge dissemination, using resources that allow the integration among the employees.

**Main Activities:**

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- Analyze and implement a supporting technology infrastructure for the implementation of the knowledge analytical structure;
  - Evaluate the adequate technology to develop the system;
  - Define the guard system objective;
  - Make a research with the employees about which knowledge should be kept and/or made available in the system;
  - Evaluate the existing systems in the company with the aim to avoid duplicity and allow an integration among them and the system to be developed;
  - Create a system prototype and submit it to the company top management;
  - Plan the stages to be developed during the system creation and define the applicative functioning and resources;
  - Develop a complete version of the system.

**g) Define a structure to survey and register the practical knowledge.**

**Purpose:**

Find out and create a model to register the practical knowledge. Such activity will help to map the expert professionals and disseminate the knowledge to the several company areas.

**Activities:**

- Create a model to register the practical knowledge;
- Identify the employees who possess the practical knowledge related to the activities performed in the company;

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- Define a methodology to enable the register of hints on how to deal with interferences and variable issues that may affect the job performance;
  - Find out the most frequent questions about the activities performed by each employee;
  - Propose check-lists on the developed operating activities;
  - List the critical points of the operational processes;
  - Prepare a guideline to record the statements on the performed activities;
  - Establish a didactic way to present the registered knowledge.

**h) Study of a collaboration system to integrate the companies that participate in a same project.**

**Purpose:**

Integrate and put into contact the people that work in different companies but conduct the same projects.

**Main Activities:**

- Identify a technology that allows the integration of companies that make part of a same project;
- Find out the advantages and disadvantages of using collaboration systems;
- Evaluate the features and points of attention to implement and use the collaboration tools;
- Technically analyze the existing systems in order to choose the most adequate one to be used by the company (Develop a Decision-Making Analysis);

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- Evaluate and adequate the usage of a collaboration system with applications and tools already implemented in the company;
  - Disseminate the system utilization for all the companies involved in the company projects.
- i) Creation of an incentive policy related to the register and dissemination of the existing knowledge in the company.**

**Purpose:**

Use the knowledge dissemination process so that the employees may feel motivated and stimulated.

**Main Activities:**

- Evaluate the motivating issues with the employees of the company;
- Create and organize events that stimulate the workers' participation, enable the integration among them and map the professionals;
- Elaborate an incentive strategy in order to have the involvement of the teamwork and people that possess certain knowledge and may value the creation and dissemination of knowledge in the organization;
- Define through objective criteria a award directed to the incentive of registering and disseminating knowledge;
- Present and disseminate the concepts related to the register incentive.

**6. Conclusions and Final Considerations**

The major contribution to this work is the presentation of a methodology that enables the adequate usage of the knowledge and experiences existing in the company for the development of its activities and new projects. The work has emphasized the need of

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organizing the knowledge so that it can be used as a resource on the company processes in the quest to aggregate value to its services and products.

The presented concepts on knowledge management are related to the creation, register, mapping and dissemination of knowledge and are inserted on the proposed methodology in more than one activity. This is a result of the great difficulty to deal with them in a sequential and isolated way, as during the methodology development it was noted that these concepts were always integrating to one another, what make them highly inter-related.

During the work it was noticed the great relevance of the active participation of all members of the organization, no matter the hierarchical level. This fact shows the need of a human resources policy with the objective to maintain a very united team directed not only to the individual evolution but also and mainly to the organization increase as a whole. It is understood that this will only be possible with the total commitment of objectives between the company and its workers.

The use of already known methods during the conducted research such as the QFD (Quality Functional Deployment) to define the required competences and the methodology for decision-making analysis has shown how much the organization was focused on the reuse of the already existing knowledge. It is important to note that such methods were already used during the process to choose the equipment related to the projects and studies on the quality of the performed activities.

Another very clear issue in the conducted study is related to the utilization of the information technology as a great facilitator in the knowledge management process, although not being mandatory. This was reinforced by the need to make a series of alterations in the structure of the studied organization, as well as in the flow of activities performed on the developed projects. The development and utilization of tools in the web platform are the great responsible factors for the integration among the workers, as through them it was possible to have a positive interface among the organization members.

The conducted research was useful to show a great change occurred in the demand degree of products and performed services. Some years ago, focus was given to prices, as the financial

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issue was a decisive factor to choose which company would be in charge of the project. Nowadays, with private customers, the financial issue is still of great importance but the issues related to quality and terms started to have a higher value in the decision-making analysis about which company would be in charge of the management of these projects. Through this reality, it is clearly understood that the existing knowledge in a company is the differential factor to be aggregated in its products and services.

The planning and development of the knowledge management project from an initiative of the Technical Directory of the company, without the direct involvement of the human resources and information technology areas makes more evident the fact that this subject belongs to the organization as a whole. Opposite to what is generally seen, in some large companies the knowledge management is dealt as a human resources exclusive project by means of the traditional processes of competence survey and training methods or as an information technology project by means of dedicated and specialized software. This fact was one of the greatest reasons for the success of this project in the studied corporation.

In spite of that, it is important to emphasize the important role developed both by the human resources area, which, in an exemplary way, has limited the scope of the activities who really make a direct part of its scope, such as the qualification of professionals from the needs identified in the strategic planning of the organization, and by the information technology area that, although not having technical conditions to develop the applications used in the project, has managed all the technological infrastructure required for that. It is important to emphasize such issues, as in several studies of previous cases it was possible to observe how a project of such eminence needs to integrate all these areas.

It is important to highlight that during the methodology development there were several alterations in the tenor of the programmed activities. This occurred due to internal resistances that happened because of the understanding that this subject was not related to a technical area. Because of this, the methodology is often linked to the technical knowledge of the organization. This was the means the researcher used to minimize eventual difficulties related to the appearance of this kind of resistance.

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Following this same line, in case there was a new opportunity to develop a similar process in another organization, a specific work to present the basic concepts of knowledge management, as well as to show how this subject is not related to a single area of the company but to the whole organization, it is very important to avoid resistances when using these concepts.

With the development of this methodology in the organization, it was noted perceptible improvements related to its utilization in new projects through the knowledge previously acquired by the organization. The effective measurement of the return this knowledge management has brought to the organization is still associated to subjective factors whose measurement is done in a less structured way and even based on people's sensitivity. Despite the considerations arisen by Sveiby (1998), it is necessary to focus efforts on the development of an efficient measurement system for knowledge management by using objective criteria that could be easily measured.

There is still a long path to follow in order to achieve the excellence in a knowledge management project and this path passes directly through the organization's culture which should be not only disseminated to all workers but also through all activities. This culture oriented to the creation and dissemination of knowledge to all members of the corporation should be clear to all. From then on, the incentive and motivation are mere consequences and the organization will be definitely oriented to the utilization of its knowledge, as well as the one possessed by its professionals. In the study carried out, this culture was not observed, since a series of actions had to be taken to convey this understanding to everyone. Even these actions, such as the creation of a knowledge award, have not reached part of the workers of the corporation who possessed a deep individualist culture rooted after a long professional life at the same company.

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