

Application of the Prado - Project Management Maturity Model at a R&D Institution of the Brazilian Federal Government

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ABSTRACT: Government institutions have sought to improve their processes in project management in an effort to elevate their maturity levels using models that clearly identify the weaknesses in the management of their projects. This article aims to show a case study by applying the Project Management Maturity Model (Prado - PMMM), developed by Darci Prado, in a Research and Development (R&D) Institution of the Brazilian Federal Government. The scores show that the maturity level in project management is weak (institutional level equal to 2.47). The main causes for this score are attributed to the lack of knowledge and the unpreparedness of some sectors and project managers. It was also observed that the dimension named Technical Competence presents the highest value (46%), considered a good score. On the other hand, the dimension involving Behavioral Competence presents the lowest value (9%), which, according to the used methodology, is considered weak, indicating that investments must be made to enhance this dimension.

KEYWORDS: Maturity in management, Project management, Maturity models, Growth plan.

INTRODUCTION

Managing projects is not as simple a task as many may think. Besides having well-defined beginning and end, it involves a series of steps with specific goals, which require financial, human, as well as material resources. It is also complicated by the fact that many institutions are structured as a matrix, where projects permeate several departments within.

The concept of project management has gone through an evolution in the past few years, where the traditional idea of the project manager being a specialist, usually hired by engineering companies, is now considered limited. Nowadays, the concept of project management is viewed under a new perspective inside organizations, which includes more inter-relations that take into consideration varied profiles in medium and high level positions in the organizational charts (Barber, 2004).

In order to remain competitive, organizations have been trying to improve their process management aiming for the success of their projects by adopting project management practices. The demand for qualified professionals in this area has increased since the project manager has become essential by providing an advantage to both public and private institutions.

Public organizations are not different from their private counterparts in terms of their complexity. They are both going through the conflict arising from the changes and innovations required by the current environment against the bureaucratic dynamics of their organizational culture (Pires and Macêdo, 2006). Due to this complexity, which is a characteristic of modern organizations, studies in the area of project management have intensified, with emphasis on project handling, project

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management offices, maturity, strategic alignment, life cycle and risk management (Prado, 2010).

In the 1990's, Brazil saw the beginning of actions meant to create a greater alignment with the public administration management movement, gaining strength after the establishment, in 1995, of Ministry of Federal Administration and State Reform (MARE). At the time, the Brazilian government was becoming more concerned with such issues as administrative efficiency, contract handling, public service, and accountability; in other words, providing a better quality service to the most interested party, its citizens. In this context, government institutions are intensively utilizing tools that measure the maturity and handle the management of its projects with the purpose of directly contributing to the satisfaction of its customers. Using an informed diagnosis, public project managers can create guidelines to improve the administration of projects, which in turn increases their success rate at the end. These tools are being used to enable the evaluation of maturity in project management, taking into consideration the context and the management procedures in above mentioned institutions. The outcome of these evaluations is used to create a plan of action for short and long term growth, as well as to guide the management of programs and projects with the purpose of increasing their success rate.

Prado and Archibald (2009) did some research with public, private, and third sector (public non-profit civil institutions) institutions and confirmed the low rate of project management maturity in public organizations of both direct and indirect type administration. In other words, the study observed that these institutions were less efficient and effective in project management than their private counterparts.

In an effort to contribute to this discussion, this article aims to show the present level of project management maturity of a Research and Development (R&D) institution of the Brazilian Federal Government, using Prado-Project Management Maturity Model (Prado - PMMM) and based on the scores, make some suggestions to advance the project management maturity of the institution in question.

PROJECT MANAGEMENT MATURITY

Beginning in the 1990's, various models were developed to evaluate the maturity of organizations in managing projects, almost all of them inspired by the maturity model in software development, Capability Maturity Model Integration (CMMI),

created by Carnegie Mellon University in a partnership with the Systems Engineering Institute (SEI) (Prado, 2010). According to Kerzner (2002), Maturity in Project Management is represented by specifically designed systems and processes, which are characterized by repetitiveness, increasing the probability of success, though not guaranteeing it, in spite of this increase in probability being its main characteristic.

Globalization and the changes in the economic and business scenario forced organizations to change its way of thinking in regards to project management, since they depend on their projects, together with technological advances, to guarantee their competitiveness and survival. Therefore, Project Management Maturity has advanced since it shows that the company that makes use of it has the tools, capability, and the needs to manage its projects. The advantages of Project Management have been largely advertised and the application of their methods is ever more common in companies, especially those that need to provide a swift and effective response to the current organizational and environmental issues (Carvalho and Rabechini, 2006).

In this area of study, the best recommended practices are grouped in the maturity models, which try to identify the present level of maturity in organizations through the use of assessments and subsequently propose improvements by showing which practices are useful to advance their level of maturity in project management. This procedure allows for future assessments using the previous score as reference as well as the growth data of the organization during the period, increasing the chance of success in project execution.

Among the models developed in the 1990's and beyond, we have the Prado - PMMM, based on the experience of its author, Darci Prado, in the implementation of project management in dozens of Brazilian institutions (Prado, 2010).

PRADO - PMMM

The Prado - PMMM used in this case study is characterized by the simplicity of its questionnaire, the practical way of obtaining scores, the applicability to the various sectors of an organization as well as to the organization as a whole. It is also in alignment with our culture, since it has been used in many Brazilian institutions, and is available online.

This model developed by consultant Darci Prado is comprised of 5 levels of maturity and 6 dimensions, as shown

in Fig. 1. It takes into account the areas related to processes, people, technology, and strategies spread through the 5 levels, in accordance with the terminology used by the Project Management Body of Knowledge (PMBOK) Guide.

MATURITY LEVELS

According to Prado's model, Level 1 represents the initial stage, where the department hasn't made any coordinated effort to implement project management. In other words, in this stage projects are executed based on intuition, individual effort, and good will. There is usually no planning or control, since there are no standard procedures, and consequently there is the possibility of delay and cost overrun, and most likely the technical specifications will not be met. The first level clearly shows the total disengagement between those involved in the project and the practices of Project Management.

Level 2 "Known" demonstrates that the organization regularly invests in training and has acquired project management software. There may be isolated initiatives to standardize procedures, but their use is limited because there needs to be widespread standardization in order to facilitate project planning and control. In spite of that, failures are still frequent because the lack of standards results in a diluted use of knowledge.

Level 3 "Standardized" has seen the implementation of the Project Management Office, which has standardized the use of procedures that require the utilization of planning and control processes, which in turn demand more dedication on the part of those involved in the project. We can observe manager's improvements in terms of technical, behavioral, and contextual competency. The problems affecting project

performance are known but haven't yet been resolved and it is obvious that improvements are needed.

Level 4 "Managed" shows that investments in behavioral competency are efficient because the project managers are better prepared to handle the behavioral aspects of their teams, such as human relationships, conflicts, and negotiations. At this level, the practice of improvement is intensified in order to boost knowledge through an emphasis in advanced course participation (such as MBA's in project management) and visits to other organizations that have consolidated project management processes (benchmarking).

Finally, **Level 5 "Optimized"** indicates that the company has reached a high level of project management understanding; the processes are optimized therefore accomplished in less time, at less cost, but with quality scores, due to the wide experience, knowledge, and attitude of the people involved. That is obtained through the harmonization of the Project Management Model and the Organizational Structure, which are in complete alignment with corporate business.

THE DIMENSIONS

The correlation between the six dimensions and the five maturity levels shows how mature the project management of an institution is. Under this perspective, Prado (2010) takes into consideration this correlation, which brings into evidence the most important characteristics of each of the maturity level of the model, as well as expected success rate of the projects.

The six dimensions of the Prado - PMMM are shown in Fig. 2. In broad terms, the dimensions, or maturity factors, appear in

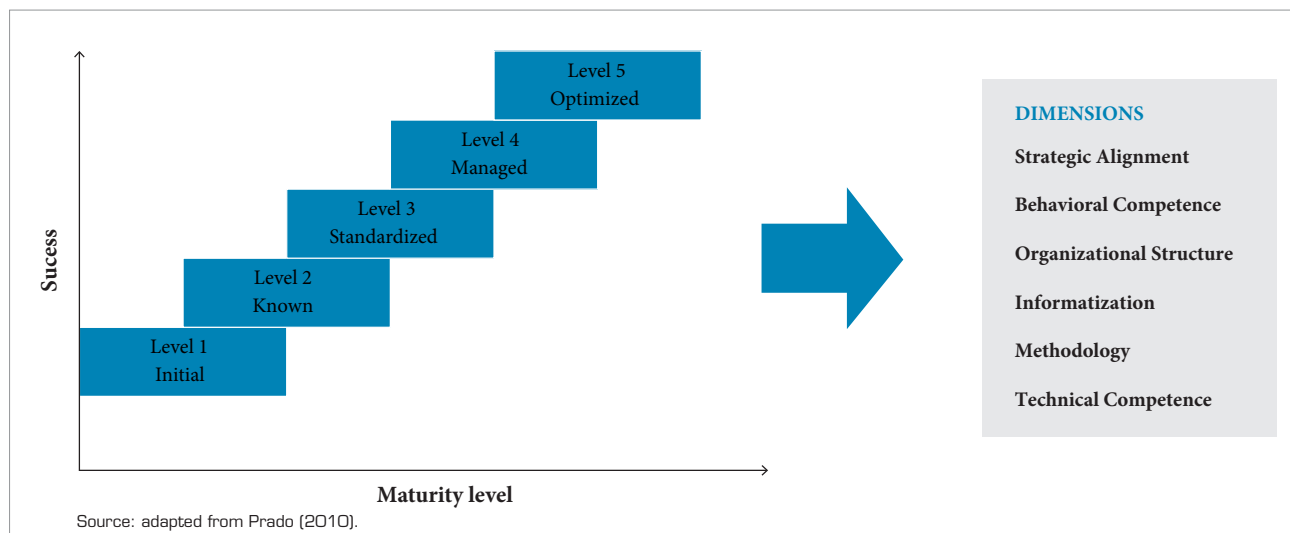


Figure 1. Maturity Level and Dimensions – Prado - PMMM.

each level with more or less intensity, depending on the moment where the peak of maturity occurs in a specific dimension.

The first dimension — **Technical Competency** — addresses the knowledge base of project management, which must be widespread among the project management sectors. In other words, project managers and others involved should strengthen their technical knowledge not only in their specific areas but also other aspects of project management.

The second dimension — **Methodology** — means that the use of a unique methodology in the whole company is highly recommended. It should also allow for small variations among the different sectors, since the correct application of methods, techniques, and tools is guaranteed by carrying out a series of steps.

The third dimension — **Informatization** — addresses the use of project management software since many aspects of the methodology need to be computerized to be used by a number of people as standard procedure.

The fourth dimension — **Organizational Structure** — concentrates on the way a company or its sectors are organized to execute its projects. The most commonly used structures are functional, matrix, and divisional. These also allow for some variations and may coexist with each other or with complementary structures, such as in a Project Management Office.

The fifth dimension — **Behavioral Competence** — recognizes that the execution of the work depends on the people therefore, it is essential that they are motivated to perform their tasks to the best of their ability. Conflicts among those in a team are usually detrimental to the project and should be avoided by managers.

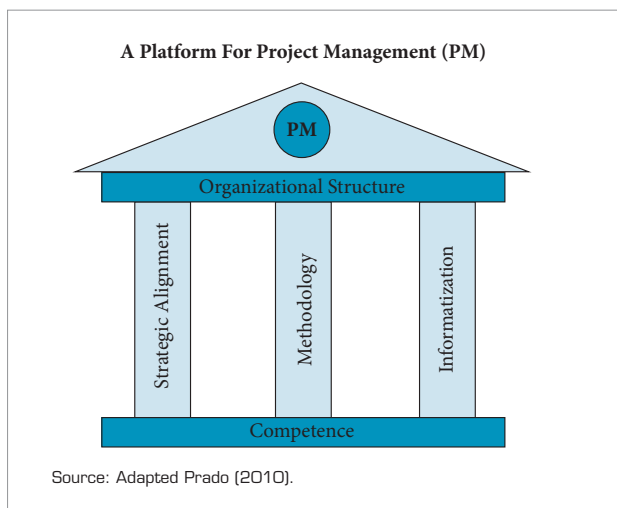


Figure 2. Dimensions of Prado-Project Management Maturity Model – PMMM.

The sixth and last dimension — **Strategic Alignment** — considers it fundamental to have the projects aligned with the business of the organization so that they are adequately planned and executed. Each project must have been assessed according to certain criteria, such as technical and financial evaluation, and risk analysis.

ASSESSMENT

The Prado - PMMM allows for the maturity assessment to be obtained through the application of a 40-item questionnaire. According to the Prado - PMMM (Prado, 2010), the final score of the maturity assessment is obtained from the answers and data of this test. This final score is given on a scale of 1 through 5, which can be interpreted according to illustration in Fig. 3.

The total points obtained from the answers at each level determine the placement in a level. Each answer is measured from 0 to 100 points, or the equivalent percentage, as shown in Fig. 4.

Based on these scores, the weak and strong points rated in each question can be analyzed, and a plan of action for the short, medium, and long term can be established.

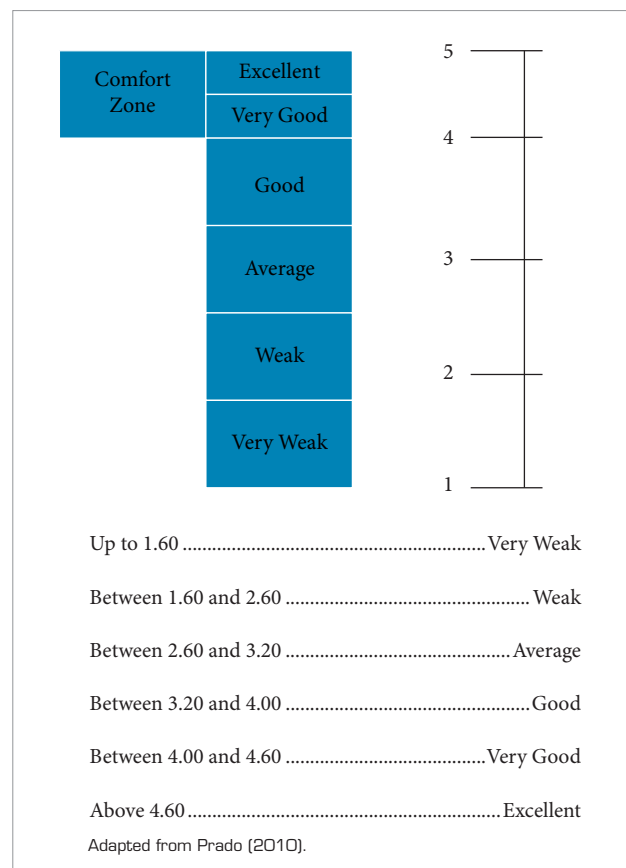


Figure 3. Management Maturity Scale.

Up to 20%	Weak Adherence
Up to 40%	Average Adherence
Up to 70%	Good Adherence
Up to 90%	Very Good Adherence
Up to 100%	Excellent Adherence

Source: Prado (2010).

Figure 4. Standards for Level Adherence Assessment.

CASE STUDY

This case study was performed at a R&D Institution of the Brazilian Federal Government. This institution has a variety of projects in its portfolio, each with its own characteristics and different funding resources. Its goal is research and development directed at increasing technical and scientific knowledge in order to provide technical solutions to strengthen the country's industrial sector, and therefore contribute to national sovereignty through research, development, and innovation.

The first step in the present research was choosing the model to evaluate project management maturity, in this case the Prado - PMMM. This choice was based on the advantages of this model as explained earlier. The next step was choosing the target audience to apply the Prado - PMMM questionnaire, involving 19 sectors of the chosen organization. The work related to this study started with sector meetings to demonstrate the importance of this research as well as the benefits it would bring to the organization.

The target audience is very important to the organization's projects due to their technical knowledge, their experience in project management, or for their part in their project's team. The selected audience included upper managers, managers, future project managers, internal service suppliers, and others involved in the projects, mainly for their position and job description in each sector of the organizational structure.

The tool used to collect data for this study was a questionnaire based on the Prado - PMMM developed by consultant Darci Prado, available online at "www.maturityresearch.com". This model was chosen for its simplicity, small number of questions, and alignment with our culture. The questionnaire is comprised of 40 questions, addressing four levels of maturity (from 2 to 5) and each level has 10 questions with 5 choices (A, B, C, D, and E), which weigh 10, 7, 4, 2, and 0, respectively. The questionnaires were handed out individually to each respondent in his own sector in order to prove once again the importance of the research. A total of 78 questionnaires were given out.

RESULTS AND DISCUSSION

In order to analyze the scores of this research, some factors were taken into consideration, such as the respondents' profile in regards to technical knowledge, professional experience, participation in project management courses, management position, and length of service in the organization. Respondents' profile: 100% are college graduates, 90% have a doctorate, masters, or a specialty degree, but only 30% have done training in project management.

During the course of this research, most of the respondents (90%) completed the questionnaire. This positive outcome may be attributed to the direct approach used for its distribution, when each could raise concerns regarding the model being used and have these promptly addressed. Of the 78 questionnaires given out, 72 were turned in. The data collected was consolidated and analyzed using the formulas provided by the Prado's model to calculate maturity levels (Prado, 2010).

The respondents who took part in this research work at 23 different sectors of the institution under study. Its organizational structure is considered a "weak" matrix, and since it is a hierarchy, managers' autonomy is limited. Not only do the sectors where the respondents work have different characteristics, the projects within a sector differ as well; some sectors concentrate on R&D, others work directly with the execution of projects, still others provide services, besides project department itself, and upper management.

Based on the analysis of the respondents' as well as the institutional profile, it is possible to improve our comprehension of the final score obtained by the institution in terms of management maturity, adherence to the levels, and adherence to the dimensions.

The institutional Final Maturity Score (FMS) was calculated using Eq. 1 (Prado, 2010). The score obtained was 2.47, which is considered a weak level of project management maturity according to the reference levels proposed by the model (Fig. 3). According to Prado (2010), the FMS obtained by this institution demonstrates a fairly good level of knowledge, and there are isolated individual efforts; it also shows that they have initiated the implementation of a standard project management platform.

$$\text{Institutional FMS} = \frac{1}{23} \left(\sum_{n=1}^{23} \text{FMS}_{\text{sector } n} \right) \quad (1)$$

$$\text{Institutional FMS} = \frac{56.88}{23}$$

$$\text{Institutional FMS} = 2.47$$

Adherence to the four levels proposed by the model used in the research is shown in Fig. 5. An analysis of this figure shows that Level 2, also called “Known”, shows the most adherence (62%). According to Prado (2010), this is a good score, since it demonstrates isolated attempts to standardize procedures as well as create a common language. Level 3, on the other hand, also called “Standardized”, shows a 48% adherence, considered average. This level is considered very important since it is where the implementation of a project management platform is verified. Nevertheless, according to Prado (2010), even adherence levels close to 100% are no guarantee for consistent and lasting scores. Finally, Levels 4 (“Managed”) and 5 (“Optimized”) show 30% and 7% adherence levels, respectively, which are considered weak profiles by Prado’s model standards.

The assessed score showing institutional adherence by levels indicate that the institution needs to improve its methods in

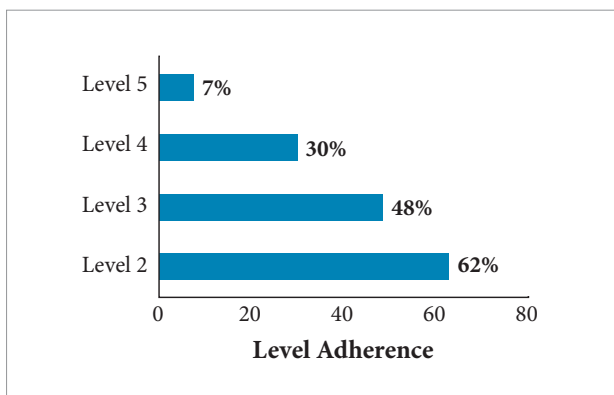


Figure 5. Subject's Percent of Adherence to the Levels of Institutional Maturity.

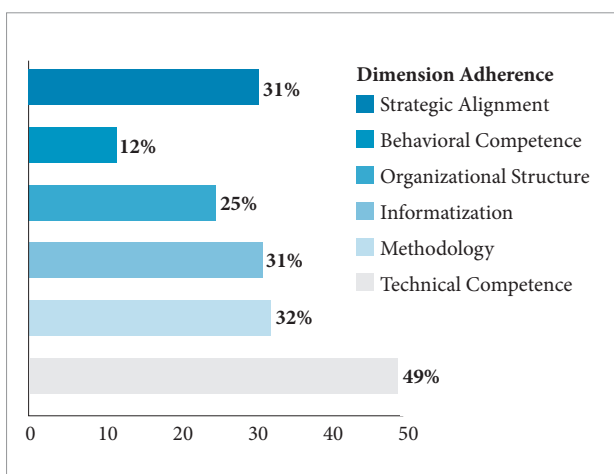


Figure 6. Subject's percent of Adherence to the Dimensions of Institutional Maturity.

the project management area. It is also worth pointing out that the assessed scores may have been influenced by the type of organizational structure. Generally speaking, it has been noticed that the institution has fairly good adherence in certain levels based on Prado’s model standards, in spite of not having a centralized model of project management.

Figure 6 represents the institutional adherence to the dimensions based on the data collected from the questionnaires. An analysis of this figure shows that the first dimension — Technical Competence — is the highest at 49%, considered good according to the Prado - PMMM (Prado, 2010). On the other hand, the second (Methodology), the third (Informatization), and the sixth (Strategic Alignment) dimensions show values considered average, i.e. 29%, 29 and 27%, respectively. The fourth dimension — Organizational Structure — has a value of 15%. Finally, the Behavioral Competence (fifth dimension: Behavioral Competence) shows a value of 9%, which is considered weak according to the methodology used.

It can be observed from these scores that the institution presents a profile typical of Level 2, where the organization invests in training and has acquired project management software, but the values in Dimensions 4 and 5 indicate that the institution has to implement actions to enhance these dimensions.

CONCLUSION

The scores obtained through this research, based on the Prado - PMMM, allowed for the identification of the level of Project Management Maturity of the subject institution. Comparing the score obtained through this case study (2.47) with the overall average scores of Brazilian companies in terms of R&D by the survey Brazil Research 2012 (available at www.maturityresearch.com), we see that the subject institution is in line with the national average of institutions in the same category (2.60). It must be emphasized that this is a low score according to the reference levels of the model used in this research (Prado - PMMM).

One of the contributing factors to this score is the lack of tools for project control and follow-up, added to poor communication, which had a significant impact on the final score, since many projects are structured as a matrix therefore permeating various sectors of the institution. In addition to that, it is known that this organization has a “weak” matrix structure, i.e. it is a hierarchical institution where managers’

decision making is limited, having a direct effect on the outcome of projects. Nevertheless, this research has identified the following as the main contributors to the score: lack of knowledge, inexperience of some project managers, the way the institution is structured, and the way resources are distributed.

This organization has been going through positive changes in the past few years, such as internal restructuring, improvement in its strategic planning, better quality management. It can be asserted that this first assessment of their project management maturity is consistent with these improvements although not the object of such changes.

One of the positive aspects of this research was pointing out the current level of maturity of the organization and which areas need improvement. The analysis of the dimension adherence scores will be used by the Project Office to prioritize improvements, especially in the areas where the dimension level was low.

In this case study, although the FMS is considered “weak”, we can classify the institution as a Level 2 “Known” in maturity, whose final score shows a 60% adherence level, which is considered “good” according to the standards of the Prado model. This means that there are isolated initiatives towards the use of good Project Management practices, but there is a lack of a methodology, which leads to a dilution of the acquired knowledge as evidenced by levels 4 and 5, where adherence was “Average” and “Weak”, respectively.

As far as dimension adherence is concerned, the organization is inadequate in all dimensions, in spite of the 49% achievement in “Technical Competence”, which is considered “Good” according to the reference scale, because the project managers are not knowledgeable in the methodologies used in project management. This behavior is made worse by the “Behavioral Competence” dimension, since managers are not encouraged to participate in conflict management training, and the “Organizational Structure” dimension, which is hierarchical. The scores point to the need of corrective measures to improve the level of project management maturity.

In order to better understand the score achieved by the institution, the offices were divided into groups based on the type of activity they perform, which made it possible to evaluate the differences among them in regards to project management maturity (Management Group, Research Group, and Service Group). The scores clearly show the respondents’ view of project management.

The Project Management Office of this institution is still in its initial stage, which hinders the implementation of a “Methodology”. Only through its empowerment and the support of upper management can the Project Management Office improve the administration of processes and prevent the use of isolated software whose sole purpose is managing deadlines. Software to manage risk, cost, and resources is not offered by the institution, though it would help improve the “Organizational Structure” as well as the “Informatization” dimensions.

Based on the scores, a plan of action aiming to develop the institution’s project management processes has been proposed, to be coordinated by the Project Management Office. The initiatives shall concentrate on how manager’s profile and organizational structure affect project management in order to develop directives meant to solve the problems affecting the performance of projects.

It is important to promote awareness among upper management, project managers, and all others involved in projects, thus creating a culture that values the use of a corporate tool for the management of projects, be it through lectures, training, or even visits to other institutions included in benchmark, as well as intensive training for the present and future project managers.

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