The role of project management offices as performance drivers for new product development in a Brazilian technology-based company

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THE ROLE OF PROJECT MANAGEMENT OFFICES AS PERFORMANCE DRIVERS FOR NEW PRODUCT DEVELOPMENT IN A BRAZILIAN TECHNOLOGY-BASED COMPANY

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Abstract
This paper analyzes the profile of evolutionary change of a Project Management Office (PMO) that supports new product development in a technology-based company. The study focuses on understanding how the PMO influence the procedures of portfolio management in the projects of new product development carried out by the company. Two paths were used to conduct the research: (1) diagnosing the evolution of PMO on the company by interviews and participative observation; and (2) participative observation on project management procedures and PMO. Results from project performance were searched for infer the effectiveness of the companies’ approach. It was found that a PMO acting as liaison unit deliver great results in new product development projects. This result will be used for testing in a more quantitative research.

Keywords:
Project Management Offices; Longitudinal case study; Project Management; New Product Development; Portfolio Management; Technology-based companies.

1 INTRODUCTION
Project Management Office is the organizational structure established to facilitate the activities of project management (PM) and bring improvements to the process of management of the organization by managing the portfolio and aligning projects with corporate strategy [1]. The Project Management Office (PMO) has expanded its scope to projects from different areas of knowledge and industries. As a result, members from different functional areas of organizations, not specialists in projects, were allocated in these offices that have assumed the function to support various projects. The performance of PMOs in several companies, evolved from focus on projects relatively simple and isolated to multi-project environments and complex projects, changing from controlling performance and supporting the overall management of projects, dynamically aligning them to business strategies [1]. Generally, it is considered that the PM organizational aspect is one of the main issues opened to research, especially regarding to the role of PMOs as enablers and conductors of organizational change [2].

In the second half of the 2000s many studies and publications focused on the PMO as an appropriate organizational structure for the implementation of organizational change, either conducted on the basis of a major reconstructing plan, or based on the current company operations. Noteworthy are the work of [3], [4], [5], [6], [7], [8] that point to the multiplicity of functions performed by PMOs as well as their importance for organizational change. Empirical data also show that PMOs are not static organizational structures, instead, suffer constant transitions over time to reflect the business strategy.

This paper presents a longitudinal case study about a PMO of a Brazilian technology-based company. The paper aims to demonstrate the logic that justified the transitions in the structure and functioning of the PMO studied.

2 PROJECT MANAGEMENT OFFICES
2.1 Types and functions
There is a significant difference between PMOs according to the hierarchical level to which it serves in the company [1]. Level 1 of the PMOs is characteristic of large and complex projects being totally focused to the project that created it. At this level, the PMO performs support functions to project manager often being directly subordinated to him. These functions can range from the development and maintenance of project schedules, monitoring and controlling activities and outputs from knowledge areas of PM; to simple activities of administrative profile, scheduling of appointment of the projects and archiving. The Level 2 of PMOs occurs when the focus of the office is not a project in itself, but all projects of a business unit. In this case, the PMO has the important function to perform resource management projects directed to the unit. The level 3 of PMOs is a direct link with the CEO of the company in order to give support to the project management of all business units of the organization. This structure, therefore, allows projects and programs to be viable and aligned to the strategies of the organization and not just to a business unit.

The functions of PMOs are another important object of study in the area. A study with 500 Canadians, Americans and Australians PMOs was conducted with the aim of raising their *modus operandi* [9]. The presence and degree of importance of 27 different functions and roles assigned to PMOs were analyzed. These functions and roles were grouped based on factor analysis yielding the following groups: (1) monitoring and control activities of the projects performance, (2) skills and project management methodologies development, (3) multi-project management; (4) strategic management, and (5) organizational learning. The authors also identified other activities that were considered important, but were not grouped for conceptual coherence reasons: (6) performing specialized tasks for project managers; (7) managing the
interfaces with customers and (8) recruit, select, evaluate and determine salaries of project managers.

2.2 Research and results
Research in project management have commonly adopted a positivist stance presenting difficulties in understanding how PMOs should be designed and managed in companies that do not work exclusively with projects to meet their business objectives[4].

This approach led to the study described in [5] in which 11 PMOs were analyzed for about 10 years. The authors mapped the tensions involved in the structuring of the PMOs researched. The success of the PMO brings an imminent risk that it can be considered unnecessary, as it consolidates the PM methodologies and tools in the company. PMO leaders should continually seek to generate new values through the redefinition of its purposes and objectives in the company, which would be in the base of transitions experienced by some PMOs [6].

A global survey with 184 PMOs was conducted to identify the main aspects related to transitions in PMOs within organizations in general [8]. This study demonstrates that the most present PMO evolution profile is related to increase portfolio management activities in the PMO quotidian.

3 METHODOLOGICAL APPROACH
Data collection was conducted over thirteen years, between 1999 and 2012 following the steps:

- Participant observation. Held over 10 years in which individual project notebooks were used in order to register the project activities and the project management, both related to planning, as on execution, monitoring and control of projects, participation in formal reviews with customers, elaboration of proposals and quotations of projects that were subsequently contracted and executed by the company under the coordination of the PMO.
- Documentary analysis of operational procedures, through the reading of executive reports and records of the project management system of the company with status of ongoing projects over the period examined.
- An early version of a structure that represents the stages of evolution of the PMO was used to discuss with project managers, engineers and directors of the area, in order to validate the identified stages, as temporally as on the characterization of it. The discussion generated subsidized changes in the initial proposal and compiling the stages.
- Quantitative data on the performance of projects over the stages consolidated.
- Interviews with personnel involved in the PMO through the use of a roadmap for research in which aspects related to tensions, functions, results and other critical success factors experienced by the PMO in the corporate environment were raised. This script was applied to five engineers who coordinate the tasks of PM. This data collection aimed to once again test and validate the stages proposed to explain the evolution of the office.
- Conducting a semi structured interview with the board responsible for projects and their main managers in order to discuss the results of the interviews.

4 CASE STUDY
The company consists of four boards. The PMO is the formal interface between the board of research and development and other areas of the company, for the execution of contracted projects and developing new products.

4.1 Stages of evolution of the PMO to perform activities of portfolio management
Table 1 presents a summary of developments identified in the PMO of the company. The motivating factors allowed to characterize 05 stages in the evolution of the PMO studied. Each of these stages are described and analyzed.
Table 1: Summary of the critical elements in the evolution of the PMO applied to the case studied

<table>
<thead>
<tr>
<th>Period</th>
<th>Initial Stage</th>
<th>ISO 9001 Stage</th>
<th>Centralized Management Stage</th>
<th>Multi-Project Management Stage</th>
<th>Portfolio Management Stage</th>
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<tr>
<td>Summary of main functions</td>
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<td>Technology strategy activities</td>
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<td>New product development activities</td>
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<td>Interface contractors about quality requirements.</td>
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<td>Product portfolio management.</td>
<td>Participation on new product portfolio committees.</td>
<td>Planning the business unit related to new products and contracted projects.</td>
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<td>Projects’ quality assurance.</td>
<td></td>
<td></td>
<td>Project planning and control.</td>
<td>Multi project management.</td>
<td>Multi project management.</td>
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<tr>
<td>Support project planning. Perform monitoring and controlling activities focusing on time management.</td>
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4.2 Initial stage

The initial stage of the PMO, created in the company in 1999, can be defined as "technical conflict". There was not an organizational structure focused on the management of projects, but a framework of quality management of projects, architected according to the demand of project contractors of Defense sector.

The main function of the PMO was the provision of technical services in quality management, especially regarding to product certifications requested by the contractor. The interface of the PMO with project managers and their teams was related to the quality demands of the contractor. The PMO deployed the demands for the project manager and the project team, which suited the products and supplied the PMO with the information to the contractor. The concept of the function performed by the PMO was to relieve project teams from quality demands related to product assurance, aspects of traceability, control of calibration, encryption of documents, records of prototypes test, configuration management etc.

Such activities were considered non-value-adding and the Board felt that they were best performed by a non-directly involved with the projects. A strong tension existed between the project team and the staff of the PMO in relation to two aspects intrinsic to the architecture of the PMO performance: (1) the PMO did not perform directly the activities of quality management nor exercised management over the team and, therefore, met their demands requesting favors from members of the project teams or reporting to the Board any non-compliance of a delivery demanded to the team or an specific; and (2) not even performing the necessary activities to ensure the quality, the interface with the customer was conducted by PMO and this did not pleased the teams who felt that their role was very operational. In general, the function performed was understood as not creating value for the projects, which contributed to the existence of tensions described above. On the other hand, the performance of the PMO could be considered reactive and with a profile more managerial than technical. In this stage nothing was done about technology strategy.

4.3 ISO 9001 Stage

Between September 2003 and December 2004 was performed a change in the PMO management. The previous leader began to play a different role in the management system of the company. In its place was contracted a professional whose profile was more closely related to the management of product development. On the profile, the professional began to carry out some technical functions demanded by contractors of projects in partnership with project teams. This profile helped mitigate the problems of relationship that existed between the PMO and the teams. Additionally, the PMO has incorporated the performing functions related to the technical documentation of products, in other words, development of user manuals, assembly procedures, material lists etc.

The main feature of this phase, however, was ISO 9001 certification in the area of company’s projects. To this end, the work processes of project teams went through a systematization and standardization, planning and monitoring works and project outcomes records. PMO began to perform regular planning meetings and the leader of the PMO performed the consolidation and publication of schedules discussed by the teams, providing technical support to project managers on the use of planning and control methodologies and softwares.

The role of the PMO with managers from other functional areas of the company became to be the transfer of the project specifications for the various departments of the company. So, for Marketing and Sales, the PMO developed user manuals and discussed product communication, while for the Manufacture it developed the list of materials and the assembly documents and quality control. This phase can be considered an initial awareness of the project department of the company to the activities of project management itself. It is considered that some tensions of the previous stage were mitigated. The support
profile embedded by the PMO brought difficulties to the project teams and to the PMO itself on the use of best practices in project management. That is, the performance had focus on mitigate the existing pressures and maintain the projects in progress without an emphasis on proposing methods for improving planning and monitoring of projects, but just keeping the documentation and alignment to procedures previously agreed with staff and Board. Also in this stage nothing was done about technology strategy.

4.4 Centralized management stage

The next stage was characterized by centralization of a large set of management functions that started to be performed by the PMO. New contracts were negotiated by the company, which doubled the company's revenue. Such contracts demanded a better system for managing deadlines, since contractual penalties were provided for delays in the intermediate and final stages.

Thus, the PMO began to develop schedules for projects with the teams and their managers and report them to the Board. The most critical projects were monitored weekly and monthly. Management reports have been carried out and reported to the client. In partnership with the accounting department of the company, it was started to manage development costs on a monthly basis. The risk management of projects started to be performed in a more systematic and standardized way. In larger projects, the risks were analyzed both from the technical and management perspectives. Reports of risk analysis were consolidated monthly by the teams, and compiled by the PMO that reported them to clients. In minor projects, risk analysis was incorporated into the monitoring activities of schedules and costs. The responsibility for the technical quality of the products became more strongly shared with project teams: a checklist of requirements for product quality was generated, compiling customer requirements and regulatory requirements and this checklist was used for the verification and validation of projects. Functional requirements were the responsibility of project teams and security requirements were the responsibility of the PMO. Quality audits were conducted by the PMO through the projects, focusing mainly on the use of management procedures provided.

The interfacing activities performed by the PMO with the manufacture, for the transfer of new products for the production was increased.

The visibility brought by the projects interface with the Manufacturing and learning of previous stage of the PMO allowed to incorporate interface with other functions: (1) with the IT department, the PMO was responsible for controlling the accesses to the project staff areas of general documentation of projects and IT systems used in the company, as well as the management of information system projects, (2) with Supply department, the PMO was responsible for placing purchase orders and priorities management for acquisition between projects, (3) with Costs and Controlling, the PMO was responsible for allocating expenses to projects and planning the cost structure of the department, (4) with Quality, the PMO was responsible for the project management system and for the requirements of quality control of products, (5) with PPC, the PMO was responsible for product structure of the developed equipments, and (6) with the Maintenance, the PMO was responsible for the department's infrastructure management of projects requesting maintenance services on a central way.

As for the interface with project teams, the PMO has reduced its operations to support quality management of projects, starting to act more strongly in the final stage of development where product documentation was consolidated.

Some activities of technology strategy started to be performed. As new product portfolio was managed by PMO personnel, the Board required a more structured approach for portfolio planning and this brings a possibility for performing technology planning activities. It was carried out by analyzing jointly with project managers how each basic technology was evolving and planning new products based on it.

4.5 Multi project management stage

The pressure exerted by the increase of number of projects and the power of project managers meant that the activities of schedule management and reporting of status of projects for contractors begin to be exercised by the manager of each project. Risk management also began to be performed by the project manager and his team, as well as aspects related to the quality of the project, although the audit management procedures remained with the PMO. This stage can be configured as focused on managing multi-projects, because it was still responsibility of the PMO to consolidate the schedules of all projects in development, planning integrated budgets of the projects and the department of R&D, as well as the execution of this budget and the definition of inter-project priorities when allocating resources to other areas of the company.

The PMO, rather than an advisory to the Board of R&D, has become a subject of this Management Board, as well as project leaders became to be formally known as project managers in the structure of the company. Training activities in the project management system started to be performed by the PMO with teams as with newly managers focusing on the functions of traditional PM.

At this stage, company management committees were created, whose representation of R&D Department was designated to PMO, reinforcing its role of consolidating information and prioritizing resources across projects. At the interface with project teams, the volume of product documentation tasks was reduced, the PMO became more devoted to the activities of configuration management and product structures management with the PPC. Cost management and planning of budgets per project evolved to an approval role of spending by the PMO for all projects of the department.

Tensions with project managers were reduced, while the role of the PMO became more specialized and focused on the interface of R&D with other areas of the company. A strong pressure began to be exerted by the central administration in reducing project costs and deliver the products within the schedule. This pressure is directly exercised on the R&D Board and over the PMO as its representative on multifunctional committees. Previous technology planning activities were better systematized on technology roadmaps. PMO personnel were trained on road mapping methods in form to help project managers in planning new products. The PMO worked together with the Board to consolidate the roadmaps of all technologies for support strategic planning.

4.6 Portfolio management stage

The last stage, currently in the company, is characterized by a transition in progress in which the company is divided into business units. The multi-project management is being emphasized and a transition to a more professional management based on indicators of portfolio management is occurring. At the current stage, the PMO began to conduct a financial management of the department based on the planning already done, but increasing his work at the interface with the financial and accounting departments
of the company. Monthly indicators of stocks and direct expenses, margins and recurrent costs are assessed. The interface with manufacturing incorporated medium and long term plans, and a better system of Planning and Production Control in the short term.

A lot of emphasis had to be given in the interaction between the PMO and project managers. Managers are responsible for each project schedules and execution of their duties, while the PMO is responsible for tracking and monitoring the contractual milestones, for which there are events payments and delivery held on the project. Indicators of time, costs and results management became to be consolidated monthly and discussed by the PMO with the Board and managers. Activities to support the strategic planning of the company were incremented, consisting of compilation of projects performance indicators and analysis of the business unit related to new products and projects from large contracts.

Technology roadmaps were maintained by PMO personnel and were better linked to financial analysis and long term planning. All of this was used to meet a strategy for transforming the previous R&D department in a business unit focused on large contracts related to new products for critical contractors as Governmental Agencies.

4.7 The PMO results along its stages

Data related to the performances of the projects that were supported by the PMO along the stages 1-5, are in Figure 1. This performance was measured by calculating the total lead-time of the projects, which, according to [10], along with engineering productivity and product quality, are the main performance indicators in projects of new products. The lead-time data of the projects along the stages of PMO are shown in Figure 1.

![Figure 1: Full Lead-time of projects along the stages of PMO. Stage 1 - initial, stage 2 - ISO 9001, stage 3 - centralizing the PMO; Stage 4 – multi-project management; Stage 5 - portfolio management.](image)

It can be observed in Figure 1 a bar graph that shows the average lead-time projects at each stage. It presents also the quantity of each stage in months considering the start date of the project as the basis for identifying the stage of the PMO.

It is noted that the lead-time curve over the stages of the PMO is strongly downward. In none of the stages identified there were an increment in the average performance of projects, which demonstrates that the evolution of project management methodology, involving managers and the PMO towards product portfolio and technology management, has brought positive effects for the company.

The other finding is related to the specific results of the PMO. Accordingly, it was found that the office kept a systematic measurement of indicators related to lead-times of the activities that it managed. A detailed presentation of these indicators is beyond the scope of this paper, but can be summarized by the following:

- The average lead-time for manufactured parts for prototypes dropped from about 110 days to a level of 10-15 days for each part demanded for the contracted projects and prototypes;
- The average lead-time of purchased item for prototypes and projects contracted dropped from about 200 days to less than 50 days;
- The lead-time of configuration changes and developed projects documenting dropped from about 50 days to a week.

The literature emphasizes that the quantification of the results of the PMO is not easy to be made, depending on the variety of functions performed by offices [3]. For the PMO examined that situation applies. For example, how to check the effectiveness of multi-project consolidation for the R&D department of the company performance? Generally, it is considered that the outcome of the project in time is more significant that partial measurements on specific processes of the office. It is further considered that the result reached by the products represent, in addition, a more accurate indicator of the performance of management actions related to the projects. This analysis, however, is beyond the scope of the paper. Finally, a strict analysis of the data presented in this section allows us to check that the performance of the projects remained successful throughout the research period and in all stages of evolution of the office.

5 FINAL REMARKS

This paper, through a longitudinal case study, sought to verify the transitions occurring in a PMO over the 13 years of its operations into a new product development process and technology strategy activities. It was observed that four transitions occurred on PMO functions and its profile is strongly related to reinforce the role of the project management office as a central actor in portfolio and strategy management.

From the understanding of what each identified stage consisted, as well as data related to the performance of projects and office, it was possible to suggest that when a PMO transit incrementally from project support for portfolio management and technology strategy functions, better results can be found. This finding will be tested in a more quantitative way as a second phase of this research.

6 REFERENCES


