# Program and Project Management Articulation: Evidences from the Infrastructure Sector

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# Chapter 15
# Program and Project Management Articulation: Evidences from the Infrastructure Sector


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**Abstract** Project-focused structures in infrastructure endeavors involve the execution of simultaneous efforts with shared resources. This research highlights to what end such organizational structure is complex to manage. The study focuses on project governance structures' impact over project-oriented organizations, particularly by exploring the ineffective co-operation/interaction between project(s) and the program. The paper is based on a single case study carried out at a Railway Infrastructure Companies' programs located in Northern Europe, involving two embedded projects. From the study, it becomes possible to understand the relevance of the governance approaches in projects and programs. Moreover, some guidance is proposed in order to help in the accommodation procedure.

**Keywords** Program management · Project complexity · Project–program tensions · Governance · Organizational design

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## 15.1 Introduction

A contemporary dynamic business environment requires organizations to orchestrate a number of concurrent change initiatives and adjustments, many of them executed as projects.[1] This often means that organizations become project-oriented, where to a large extent, the operations are executed as simultaneous or successive projects, while drawing at least some resources from a common resource pool. Increasingly, projects are being used strategically to transform organizational practices and processes, not only to deliver products, services, or infrastructure [5].

Public investments for large-scale infrastructure projects have traditionally been delivered by line managers in the larger regional system. This has caused intra-organizational tensions, due to fragmentation caused by several autonomous projects. The following types of fragmentation can be identified in complex projects or programs, elaborated from previous works [8]:

- Fragmentation of content, as every autonomous project has its own interest and goals, and
- Fragmentation of management, as there is a natural tendency to manage projects separately.

In this particular field, there are significant intersections between Project Managers (PMs) and those line managers, understood as Chief System Engineers (CSEs). Because of the intersections, sometimes the CSE becomes PM and in other cases is the PM who leads the project, but some other intermediate configurations are possible. However, when roles and responsibilities are not well defined early in the project life cycle, it becomes a source of tensions between figures, which was widely analyzed in former studies [7].

Other sources of tensions in projects that have been well studied in the past show that tensions are a product of the precursors of complexity, uncertainty, and equivocality, and an attempt is made to characterize tension as it arises in projects—its genesis, its nature, its effects, and (sometimes) its resolution [31].

Huge efforts have been dedicated in the past to analyze conflict mechanisms inside projects, conceived as a rather isolated entity [18, 25, 26]. However, in this research we are mostly interested in tensions when fitting into the perspective of projects interacting with business strategy. The concept is to consider those instruments as vectors for change and, from this perspective; tensions can affect their expected benefits. As Martinsuo and Hoverfält [20] state, programs have evolved from fuzzy and unmanaged entities or extensions of projects into mechanisms of coordinating and integrating various strategic change activities toward business benefits.

Standards have been carried out at ISO level covering different topics as project management, portfolio management, and program management [16, 28, 29], which consolidates the clear recognition of professional utility for most businesses in most situations.

[1] The European Railway Operation Company helps protect the confidentiality agreement, does not reveal the actual company.

Program management can be considered one form of multi-project organizing that is usually established to achieve certain strategic benefits through organizing and managing changes in the organization. Program management makes the execution of the project portfolio more effective [17], as it aims to coordinate projects delivered in parallel and efficiently allocate resources of the organization along the portfolio.

Program managers have to deal with several projects simultaneously, which by definition are activities with their own logic and limitations in scope and schedule (cf. [8]), while applying the same managerial style to all projects of their program, at the same time. This kind of organizational structure is often complex and requires clear procedures and guidelines.

The interest of this research is to realize the distance between the research outcomes and the practical implementation for the particular case of the infrastructure sector, to understand the sources of tensions on the dynamic interplay among project and program forces. The structure of the paper starts with Sect. 15.2, providing the literature background, particularly revealing the literature on sources of tensions, then in Sect. 15.3, the context for the accomplished case study and the data collection is presented. The next one, Sect. 15.4, presents the preliminary analysis of governing structures. Section 15.5 is devoted to the discussion, analyzing those effects under the lights of the research outcomes, discussing the advantages and limitations involved. The last section will draw the main conclusions.

## 15.2 Literature Background: Sources of Tension

It is strongly argued and well established in the literature that the understanding of projects cannot be easily transferred to the program settings—the multi-project setting (cf. [23]). This due to distinctions between the two organizational forms [1]. The contingency perspective forms the cornerstone of program management research [20]. Herein, extant literature seeks to align the program management structures with the program context (e.g., [24]), on the other hand, the particularities of the project tasks are emphasized (e.g., [21]).

Prior studies have explored various aspects of tensions in project-oriented organizations, and studies show that sources of tensions are first and foremost created by the coexistence of fundamentally different organizing routines. To this end it is relevant how the actors perceive themselves as line functions, or as more related with the projects and competing for limited organizational resources (cf. [2]). The van Buuren et al. [8] study on comparisons between program and project management approaches has reinforced the interplay between the integration of interrelated activities and the segregations of activities. According to the authors, program management is about the synchronization of project implementation trajectories. Another study that recognizes that program management sits between the project delivery and the overall organizational strategy is the one by Lycett et al. [19]. In the authors' view, significant tensions arise between the "inward focus and task-oriented" set of projects, and the "strategy focused" set of programs. Important for this paper's

purpose is the argument that the standard program management approach exacerbates the project–program tensions.

Tensions around projects being developed and their effects have been studied from different perspectives. Projects are complex social settings characterized by tensions between unpredictability, control and collaborative interaction among diverse participants on a project [9]. Such perspectives also include the business value for the project's outcome depending on the used styles for project management [20]. Indeed, tensions within the organization play an important role in determining the path that an organization's development will follow. In turn, new structural configuration, as for instance, the Project Management Office (PMO), realigns the power structure and creates new tensions [3].

Although previous studies are relevant and have brought the knowledge to the forefront, their perspectives on the research are relatively holistic. There are still aspects very relevant to the present analysis, e.g., how challenging the implementation of spatial projects can be. Indeed, implementation has traditionally been done by public line managers (cf. [8]). During the last few decades, however, the implementation of spatial investments has more often than not been placed in the hands of project managers [12, 14].

The main characteristic and focus of project management seems (in words of [8] p. 672) also "to be its main disadvantage: it tends to focus primarily on the realisation of one single project ambition, suffers from a singular logic and is limited in terms of scope and time". This is rather problematic in project and program settings, it presents a grand challenge where the management is intertwined with social, technical, and environmental elements (cf. [6, 10]). There are often a variety of problems as well as a variety of projects in these settings. All the projects have to be realized in the same implementation space [8]. This perspective interests most to our research, as it addresses intra-structural organization tensions (projects-programs), as well as the relationship with the spatial dimension.

On the other side, there is a relevant dimension under consideration when the project owner becomes a Public Body. Holt and Rowe [15] established that the problems posed by different stakeholder views were both technical and managerial. The project sponsor has the responsibility to explore divergent issues as to harmonize interests, and to realize satisfactory solutions given both, constraints and various points of views. A relevant aspect directly related to this end is the way to monitor and to report the program evolution.

Consequently, there is still a need to study and trace back the tensions underlying project–program management.

## 15.3 Methodology

In line with the research interest at hand, the study is based on a case study method of a multi-project setting: the program involving two embedded projects in the infrastructure sector in the Netherlands. The case study method adopted here seems appropriate to tackle the complex and evolving mix of technical and social elements (cf. [10, 11]). Indeed previous research building from cases has powerfully addressed issues of tensions arising from project–program settings, thus developing insightful theorizing (e.g., [2, 8]).

### *15.3.1 The Context: Rail Infrastructure in the Netherlands*

The Netherlands is the most densely populated country of the European Union, and one of the most densely populated countries in the world. It has a rail network of approximately 3.200 km in length that contributes to transportation as a key factor of the Netherlands' economy [22].

The railway network is dense, mostly focused on passengers' transport—most distances traveled on Dutch public transport is by rail—and connection toward major towns and cities. In fact, there are as many train stations as there are municipalities in the Netherlands. The network has been found the most cost-effective in Europe, together with Finland's: per kilometer of track, the Dutch rail network is the busiest in the European Union, handling over a million passengers a day.

The Railway Infrastructure Company has responsibilities for caring for existing rails and tracks along the country, extensions, allocating rail capacity, traffic control, and development of new railway stations. The infrastructural facilities are related to the traffic on the main railway network and are managed by the Railway Infrastructure Company, such as the transfer areas in stations, refueling facilities, and bicycle storage facilities. Another company, however, operates the network as such.

The Railway Infrastructure Company implements a dual structure, on one side the hierarchical and functional configuration, with one Board, and one Executive Committee, and Functional Departments. On the other side, there is a project-oriented structure, including the program layer and the project layer.

Infrastructural programs in the Railway Infrastructure Company are focused either on realizing the same type of physical objects on the network (hereafter "repetitive programs") and programs which reach their goals by realizing different assets in the network. Examples for the first category of programs is the Accessibility Program for disabled people and the Bicycle Parking Program. An example of the second category is the High Frequent trains program that aims to improve the density of utilization of the trains in the country.

All programs consist of different projects and those programs fit into the Railway Infrastructure Companies' strategic framework, through different strategic objectives, including Safety, Reliability, Sustainability, etc.

The adopted methodology to better understand the tensions in the organization is a case study, as it allows performing explorative research and the possibility of analyzing qualitative data for gaining insight into complex social processes [11]. Such methodology enables direct observation of the interesting processes as well as the capability to inquire process owners about specific evidences found.

In particular, this work aims to maximize the utility of information from small samples and single cases, as recommended from [11]. Two different sources of evidence have been analyzed. Reliability, on the other hand, will be achieved by the repeatability of the operations of the case study. A case study protocol will be used—structured interviews—and repeated through the timeline to different subjects and subcomponents.

In the Railway Infrastructure Companies' case, the frequency of reporting from the Program Manager to the end client—the Ministry, and from the subprograms to the main program—is fixed for every four months. The Program Manager and the Ministry representatives meet every six months, to review the evolution of the program, including requirements for extra resources. In order to be prepared, an internal deadline is established, requiring reporting every three months.

In order to fully understand the complexity involved in the Railway Infrastructure Companies' case, it is worth mentioning that its public nature and the requested actions from its strategic mandate require strong agreements with all the stakeholders, but in particular with the station's operator. Those aspects introduce additional constraints which require additional managerial decisions. Such decisions are sources of tensions as well as elements challenging the existing organizational structure.

### *15.3.2 Program Descriptions and Overview*

The Accessibility Program is part of a larger portfolio and comprises the services provided to passengers with physical disabilities on railway stations.

This program aims to comply with the European Regulations for Accessibility in the European Union, which requires stations that are currently under construction to be accessible and meet the accessibility requirements stated. However, the Netherlands is the only country from the European Union that is also implementing the accessibility standards in existing stations. This program coordinates three projects in parallel, related to Platform Heights, aiming to give individuals the possibility of getting into any train without the aid of other persons. The program also is related to Step Free Station Project, aiming to give individuals the possibility in reaching every platform of the station by covering existing height differences with either an elevator or ramps. Finally, the program initiated a Small Measures subprogram. This subprogram realizes measures to help individuals with visual impairment into—without the aid of other persons—finding their way in the train stations, by means of Braille maps and transport card readers and floor signaling.

The Bicycle Parking Program has the main objective of providing every station of the Netherlands with parking for bicycles. This program has a slight difference in the organizational structure, as the layer of subprogram does not exist, as the diversity of goals is lower: the program is directly divided into projects, looking at each one to develop a bicycle parking in one station (or similar ones). It is worth remembering that, in the Netherlands, stations belong to a different company not related to Railway Infrastructure Companies. This means that specific agreements are mandatory between the two companies when planned projects are going to be developed into those specific areas.

### *15.3.3 Data Collection*

A total of 12 interviews were conducted for drawing conclusions from the empirical data. Interviews were scheduled in advance, and questions were designed according to the role of the interviewee. All interviews were recorded and a transcript was sent to the interviewed person for his consent. In addition, procedures, reports, and different documentation relating to the programs were reviewed. Table 15.1 presents a schematic view of all data collection methods.

As Flyvbjerg [13] suggests, it is important to write down whatever impressions occur when developing case studies, because it is often difficult to know what will and will not be useful in the future. During the duration of the study, resources were achievable, as well as conversations with any kind of employees.

The organization allowed rescheduling interviews, repeating meetings, and changing the agenda during the period of the study.

Every member of both programs examined presented a positive attitude about the semi-structured interviews, sharing resources and time. Table 15.2 shows an overview of the interviews scheduled.

Despite each interview focusing on one aspect more than the others, depending on the interviewee, all of them followed the same structure:

Presentation and Functions.

In this section, candidates were asked about the program and their contribution, how the program was organized, and daily activities.

Relation between Program and Project.

**Table 15.1** Overview of data collection in the programs studied

| Program # | Interviews with Program Manager | Interviews with Program Team Member | Participant Observation | Document Analysis | Informal Communication |
|---|---|---|---|---|---|
| Stations Accessibility Program - SAP | 2 | 6 | + | + | + |
| Bicycle Parking Program - BP | 1 | 3 | | + | + |

**Table 15.2** Overview of interview roles and interest for the study. SAP stands for stations accessibility program; bp stands for bicycle parking program

| Role | Program | Description | Remarks |
|---|---|---|---|
| Program Manager | SAP | Program Manager of Stations Accessibility Program, divided into three subprograms depending on category of asset constructed and also divided in project within the subprogram, regarding the specific station | Double role: also project manager of a category of subprogram |
| Project Manager | SAP | Project Manager of Platform Heights | Project manager of the project with the bigger scope within the program. One year performing the role |
| Program Manager Assistant | SAP | Program Manager Assistant, supporting the Program Manager | Double role: also assistant at a project level |
| Program Controller | SAP and BP | Supervisor of program risk analyst, planner and financial controller | Double role: the program controller plays the same role in both programs examined |
| Planner | SAP | Planning the program, subprograms and projects | Triple role: interesting role due to his broad view of the program |
| Risk Analyst | SAP | Risk analyst of the program and three subprograms | Triple role: interesting role due to his broad view of the program |
| Project Manager Assistant | SAP | Project Manager Assistant of Project Manager of Platform Heights: biggest scope | Taking part in the program since its beginning |
| Program Manager | BP | Program Manager of Bicycle Parking Program | Previously performing the role of Project Manager |
| Program Manager Assistant | BP | Program Manager Assistant, supporting the Program Manager | In the program since its beginning |
| Project Manager | BP | Project Manager of all actions taking place in the Bicycle Parking Program | Interesting role as this program is not divided into subprograms, and the program layer directly continues into project location |

This section of the interview mainly focused in finding if there was a formal description of Program Management in the company, as well as figuring out the relation between the different layers that are present in the program: reporting procedures, contact, and key performance indicators (KPIs) of both program and project.

Decision-making in the Program and Project levels.

Every candidate was asked how the decision-making process worked, from his/her point of view, especially in the allocation of resources, client requests, and change management.

Most common conflicts and failures.

This section focused on gathering information about the common problems that the candidate faced at work, as classifying the source of the conflict.

Room for improvement.

Based on the previous talk, and whenever it was possible, it was suggested to candidates to give a solution or recommendation to previous conflicts described.

For the interviews, it was crucial that every answer tended to be anecdotic rather than pragmatic: examples were asked every time, as a way of supporting the argument, and anecdotes were linked to one another. Despite some interviews following the structure, others turned out to a discussion of a topic and still, valuable information was acquired: most questions included follow-ups to get more insight and a deeper understanding of the situation.

Documentation was also a relevant source of information to gain a deeper understanding of the current procedures and organizational methodologies at the company. The Railway Infrastructure Company provided access to the following documentation: KPIs evaluation, contact list within the program, stakeholder list, overview of the planning, documents of their processes (based on PRINCE2 standard), examples of client reporting structures, and internal reporting methodologies, at the program level.

## 15.4 Data Analysis

### *15.4.1 Organizational Structure*

The organization is mainly functional as expected for long-term repeatable activities. However, as it aims to achieve temporal goals, it has implemented a matrix organization belonging to the Operations Area, with one Project Department hosting program and project managers. The programs are defined to cope with the development of strategic opportunities or goals.

In the Railway Infrastructure Company, they have defined a particular configuration valid for the context they are committed to develop, and this configuration is presented in Fig. 15.1.

According to such configuration, main programs are connected with high-level strategic goals (for instance, to increase Accessibility levels in Stations). Such

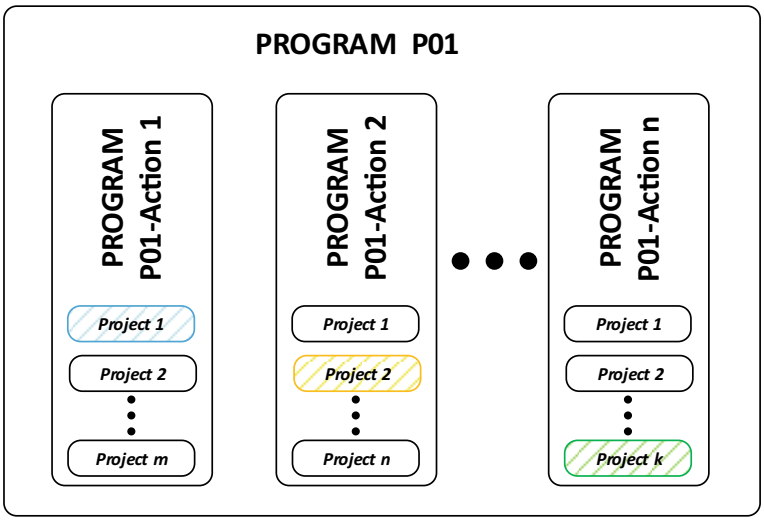


**Fig. 15.1** Configuration of programs in the railway infrastructure company, including both programs and projects

programs are decomposed into narrow programs, addressing specific actions (for instance, Platform Heights, Step Free Station, and Small Measures). Inside of such subprograms, there are projects looking to implement such actions as per station. However, not all the stations require all the actions, therefore, projects inside subprograms are the convenient organizational representation. Such configuration that matches the new form of cooperation, called "interactive planning", is characterized in terms of "political space", "architecture", and "action mechanisms" [14].

From the project management methods' point of view, the Railway Infrastructure Company has developed its own made methodology to deal with projects, strongly based on the PRINCE2 standard [4].

In terms of roles, the Railway Infrastructure Company establishes per program one program manager, one program controller, one responsible for finance, one program planner, and one risk analyst as well as a program assistant. Almost all of those figures are part time devoted to the program. As per the subprogram, the team is similar, plus one technical team, with the number of members variable, depending on the workload compromised.

## 15.5 Discussion

The case study carried out at the Railway Infrastructure Company included the analysis of different internal documents as well as seven semi-structured interviews with different roles in the Railway Infrastructure Companies, including Program Manager, Subprogram Manager, Program Planner, Program risk analyst, Program Assistant, Subprogram Assistant, and Program Coordinators.

Through the analysis of the collected material, we found induced patterns for tensions, out of the already known sources:

1. Overlap between expectations at different structural levels,
2. Lack of flexibility because of the existing methodologies,
3. Lack of governance guidance, providing guidance when exceptions arise, and
4. Overlaid or overladen managerial decisions because of the specific regulation of public bodies and time constraints.

Regarding the overlap of expectations at different structural levels, it is possible to realize how the adopted methodology enables the management of projects but its hierarchical extension to cover programs lacks enough managerial differentiation. The final effect is the over-management from the different roles for the same dimensions. Such decision-making process, as producing interferences between agents, is easily understood as a source of tensions and, at least, it becomes somehow inefficient.

Part of these interferences happen as the adopted methodology is not clear enough in assigning fully differentiated layers of management, including coherent articulation of responsibilities.

In the Railway Infrastructure Companies' case, the lack of differentiation happens as the PRINCE2-like adopted methodology was scaled up over the program

layers, but such an escalation process does not establish differentiated goals and responsibilities.

The lack of flexibility happens because of the defined Key Performance Indicators (KPIs) which are based on the integration of the same KPIs at lower levels.

Therefore, a learned lesson is that which when managing a set of projects in an integrated way provides benefits; there shall be an articulated methodology, caring about such different levels. Therefore, the scope management at the program level must not be the overview of the added scopes from the underlying projects, instead, it must consider the scheduled actions to cope with the expected outcomes at such a program level. Specifically, at the program level, it means considering when the scheduled projects are going to produce the expected products or services instead of just reviewing the performance of activity or Work Package items.

Implementing flexibility at the appropriate management level allows to kick-off new projects or to reconfigure existing ones to cope with the changing context (cf. [1]). Lack of flexibility becomes a clear source for tensions, because of misalignments between current goals and scheduled instruments' focus. It generates frustration when adequate decisions are not made, but it also happens at lower levels, when clear governing rules are required to manage specific situations (rewards, provide steering to specific agents, etc.).

The Railway Infrastructure Company somehow lacks a formal governance guide at different managerial levels, which hardly helps to consolidate best practices through the different organizational structures when required to manage specific situations. By implementing such a governance guide, uncertainty levels get reduced as higher levels of reproducible decision-making are reached with higher levels of accountability.

In addition to the other already discussed dimensions, specific constraints are linked to the interventions being carried out during operation of infrastructures when the responsible body is public, and it is enforced to follow strict regulations not only in terms of budget but also in terms of time for advertisements, etc. These constraints are not frequent enough; therefore, they have not been addressed in a formal and abstract way.

In some cases, the approach represented in Fig. 15.1 is not fully respected. Such situations happen when the implementation of one specific project belonging to one specific subprogram as per one specific station is going to be implemented when some other project from another subprogram is scheduled to be deployed at the same station. Because of the delays in the bidding process and the overheads for work monitoring, the Railway Infrastructure Company has decided to implement a smart solution, which is to merge such two projects (scope, budget, quality, risks, etc.) integrating the on-site works in a way that distortions get reduced and better managed than when they become operated independently.

Although the mentioned approach produces theoretical benefits, it also becomes a source of risk, when the methodology is not aware of it. When the project manager of the hosting project receives the extension, no matter if she wanted to, the risk is to manage such components as an added part. It can be perceived that her performance is not depending on the added part and, transparency upwards becomes accepted

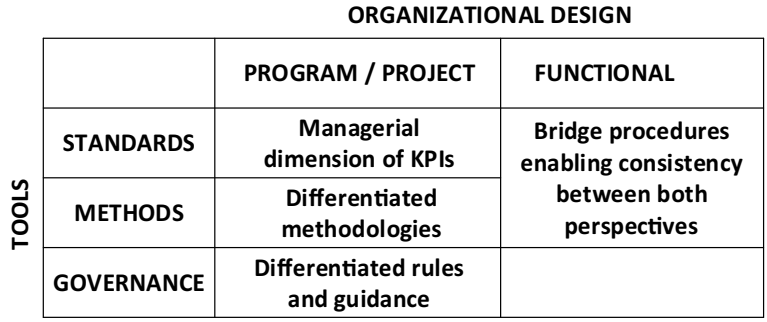


**Fig. 15.2** Elements able to reduce tensions at different organizational levels, depending on the selected tool

when activities account for tasks related to both projects. This is because when the new activities are configured, it is not usual to establish how to be related to the original tasks. Therefore, imputation to the relevant subprograms will be affected, and additional uncertainty values or extra efforts from the subprogram controllers will be required. Such external requirements, usually under pressure, become evident sources of tensions across the organizational structure.

Overall, and considering that the study is ongoing, it is feasible to put forth a framework showing the relationship between management (tools) and organizational design, as presented in Fig. 15.2.

In order to reduce tensions, there are different operational tools organizations can use. The lower level is to increase the standardization of the KPIs; establishing procedures to agree with KPIs should be used as well as the formal mechanism to increase their performance [30]. When the organization implements both project and programs, specific methodologies for managing them are convenient. In the same way, it would be a benefit to developing specific governance rules both at project and program management levels, providing guidance in dealing with aspects like accountability, responsibility, etc., having impacts on the managerial level. When the focus is the integration between program/projects and the functional part of the organization, it is particularly relevant to establish procedures not only for resource acquisition but also for outcomes' transference.

No matter what tool is going to be considered, to adopt a holistic vision both in logical and temporal dimensions becomes an additional advantage. Therefore, such a logical perspective enables to implement longitudinal actions capable of incremental improving mechanisms, e.g., maturity models.

## 15.6 Conclusions

In this research, carried out by a case study methodology looking at the infrastructure sector, an analysis of the sources of tensions between programs and projects has

been carried out. The method used here enabled the importance of emergent and spontaneous work activities into understanding the tensions' landscape.

Based on findings from interviews, non-participant observations, and reviewed documents, it was clarified that tensions are related to organizational misalignments as well as to individual preferences or interests. It was also found that those sources of tensions were not only related to the connection between functional and matrix perspectives, but also related to the effective management tool being the most convenient in use. Neglect of inter-project coordination is what we observed, thus confirming the theoretical arguments in practice [1], the learning myopia.

In addition, the case study shows the limitations and impact of specific decisions, like hierarchical scale-up of the project management methodology to the program levels, etc. Yet, program management is not just scale-ups of projects, and must not be treated with such instrumental approach (cf. [1, 19]). It is proposed that through a synthesis process, a framework identifying relevant elements becomes adopted. This framework will be able to act at different organizational levels and tools to reduce the intensity of tensions.

Certainly, there are specificities for each element which depend on the organization decision-making process, thus, yet misalignments (internal subcontracting of execution activities, etc.) can occur. However, the awareness will help responsible people in the most suitable ways of governing that helps accommodate and reduce such tensions. The articulated intervention will provide additional benefits as corporate learning contributes to the organization's growth.

The core argument here is that attention to the governance in projects implies a detailed analysis of the tensions among projects and programs. Particularly, the governing projects need to be seen not only through a set of organizational formals associated with governance, but focusing on spontaneous events enables a fruitful understanding of sources of tensions—and why they develop as they do. This should not be understood as governance being replaced by the governing focus, but as a complementary approach shedding new light on the tensions' landscape. That is, governance cannot be conceptualized as a preplanned form of organization and consciously interpreted (cf. [27]).

More detailed analysis is needed to give insight into how the studied programs effectively deal with tensions identified in the literature and how they perform in dealing with other kinds of existing tensions. From there, the next step will be to formulate suggestions by which programs can better cope with observed tensions in a project-oriented organization.

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