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Innovation and cross-functional teams

Analysis of innovative initiatives in a Brazilian public organization

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Abstract

Purpose – The aim of this paper is to characterize how innovation may happen through cross-functional teams (CFT) in an organization of the public sector.

Design/methodology/approach – A case study helped to characterize several behavior patterns, team structures and respective links with generating innovation in internal processes and public answering contexts.

Findings – The results highlight that formal-temporary teams present a higher capacity to generate incremental innovation in products, whereas permanent-informal teams have a higher capacity to generate innovation in the internal processes and public answering contexts.

Research limitations/implications – The limitations of this research relate to the fact that this is a single case study, and although it is an important case to examine innovation and CFTs, by its very nature, it is not possible to extend and generalize the obtained data to other organizations. The evaluation of its propositions was merely qualitative, and future research is needed to validate its characteristics.

Practical implications – Several settings of CFTs are presented, as well as their ability to generate different types of innovation, such as the computerization of documents, petitions and papers, which decreases the time to answer the taxpayer. Moreover, CFTs can help to create products, such as computer programs that can be used not only locally but also in several public organizations related to tax management.

Originality/value – The field research provides the perceptions of the respondents regarding CFT characteristics that can lead to specific types of innovation, as well as the types of products or services that can be generated by these processes.

Keywords Innovation, Teams, Public management, Cross-functional integration

Paper type Case study

1. Introduction

The challenge to improve performance imposes the need to innovate on public organizations. In public administration, process innovation (Dosi, 1988; Brito *et al.*, 2009; Cunningham and Karakasidou, 2009) corresponds to new procedures and ways of working,



such as customer service, decentralization of public answering (Seabra, 2001; Pollitt and Bouckaert, 2002), as well as the management of cross-functional integration (Page, 2005).

Cross-functional integration is the state of interaction and collaboration between the internal functions of an organization (Kahn and Mentzer, 1996). According to Pimenta *et al.* (2014), cross-functional teams (CFTs) constitute an important managerial mechanism that provides integration between internal functions by means of formal and informal cooperation processes.

The use of CFTs can allow resources to be used more effectively than when managed by isolated departments or functions, as proposed by the approach suggested by classic administration. This effectiveness refers to the ability to solve problems, produce quality goods and services and increase creativity and innovation (Pinto *et al.*, 1993). The literature about CFT has mainly been based on studies of the development of projects and products (Pimenta *et al.*, 2014).

The studied literature covers innovation application contexts (Golden, 1990; Sanger and Levin, 1992; Borins, 2002; Tushman and Smith, 2002; Potts, 2009; Potts and Kastle, 2010; Sartori, 2011), as well as proposals for the formation of innovation diagnostic tools in organizations (Kupfer and Hasenclever, 2002; Ibge, 2005; OECD, 2005; Cunningham and Karakasidou, 2009; Australian Government, 2011). Moreover, some authors have identified relationships between innovation and the public sector (Sanger and Levin, 1992; Kearney *et al.*, 2000; Røste, 2004; Vigoda-Gadot *et al.*, 2008; Cunningham and Karakasidou, 2009; Damanpour and Schneider, 2009; Potts, 2009; Potts and Kastle, 2010).

The studied literature on CFTs concentrates on the following lines:

- the performance impact resulting from the use of CFTs (Maltz and Kohli, 2000; Krohmer *et al.*, 2002; Luo *et al.*, 2006; Turkulainen and Ketokivi, 2012);
- research and product development (Love and Roper, 2009; Hirunyawipada *et al.*, 2010);
- CFTs in the context of the supply chain (Alvarado and Kotzab, 2001; Gimenez, 2006; Van Hoek and Chapman, 2007); and
- knowledge management within the CFTs (Luo *et al.*, 2006; Edmondson and Nembhard, 2009; Hirunyawipada *et al.*, 2010).

However, there are research studies that specifically address the impact of cross-functional integration in innovations in the public sector (Barrows and Mcinerney, 2002; Wong *et al.*, 2009; Zheng and Zheng, 2013; Wilkinson, 2015). These research studies present important investigations and concepts in the CFT literature. However, they do not specifically characterize the types of operationalization of CFTs with regard to team formation and integrative efforts toward reaching innovation. Considering this as a research gap, the following research question is proposed:

RQ1. How can the CFT be applied to encourage innovation in the public sector?

The objective of this research is to characterize how innovations in processes and products occur through the support of CFT in a public sector organization. A framework is proposed to explore points of contact between these two themes and to provide explanations of the functioning of this mechanism in the management of innovation in the public sector. To address this issue in greater depth, this unique case study was performed in the State Treasury Office (STO) of Minas Gerais, Brazil. This organization is relevant to the research objective, as it has made efforts to promote product and process innovations using various CFT. Moreover, its practices have been adopted in several public organizations in different states.

2. Literature review

In face of the increasing complexity of the environment, governments around the world have faced pressure to respond to the demands of their citizens (Alberti and Bertucci, 2006). To create solutions for new emerging problems, the “New Public Administration” is appearing. Public management is going through a phase in which it must innovate to meet social demands (Alberti and Bertucci, 2006; Brandão and de Fátima Bruno-Faria, 2013). Thus, this topic has become an important focus of governments (Brandão and de Fátima Bruno-Faria, 2013). The literature about cross-functional integration has mentioned a managerial tool that can provide an adequate atmosphere for innovation: CFT (Rho *et al.*, 1994; Katzenbach and Smith, 1993; Pimenta *et al.*, 2014).

CFTs are groups of people who apply different skills, with a high degree of interdependence, aimed at reaching a common organizational goal (Holland *et al.*, 2000). CFTs are characterized by diverse expertise provided by different functions that work together to establish collaborative behavior (Pagell, 2004).

CFT are composed of individuals with varied skill levels and experience and different academic backgrounds, knowledge, disciplines, occupations or professions, who are members of different functional areas, such as engineering, production or marketing, and who gather to solve a problem or perform a task (Edmondson and Nembhard, 2009; Feng *et al.*, 2010). The adoption of CFT improves innovative performance and product development (Leenders and Wierenga, 2002; Jugend *et al.*, 2015). These teams can have a long-term focus, acting on permanent processes, although there may also be temporary project teams (Edmondson and Nembhard, 2009; Oliveira *et al.*, 2016).

Anthony *et al.* (2013) demonstrated that CFT, by nature, capture the features of several departments or organizational functions in carrying out their work. These authors claimed that cross-functional collaboration ensures the generation, collection, dissemination, protection and disposition of the project information in a timely manner.

It is widely reported that CFT can generate a positive impact on the performance of different organizational processes, such as increased individual involvement, better problem-solving, creative solutions and effective implementation of decisions (Donnellon, 1993; Webber, 2002; Jugend *et al.*, 2015). As the information and research developed by the team are shared, decisions tend to be more accurate and easier to implement (Brettel *et al.*, 2011). Feng *et al.* (2010) added that CFT provide improved coordination and functional integration in reaching organizational borders, which has an impact on improving the time involved in the evolution of technology and on reducing the levels of uncertainty.

Thus, we highlight the factors influencing cross-functional cooperation, such as the superordinate objectives, physical proximity and project team rules and procedures, which have a significant direct and/or indirect effect on the results of the project (Pinto *et al.*, 1993; Lichtenstein *et al.*, 2004). Anthony *et al.* (2013) added that the performance of the team can be composed of many factors, such as achieving the goal, team satisfaction and project efficiency.

2.1 The proposed framework

Figure 1 presents the three main constructs of the framework, as well as its components. Each construct is explained, in the following paragraphs, according to the studied literature. These constructs were chosen due to their capacity to explain the different possibilities of the characteristics of CFTs and their respective influence on the innovation processes. Moreover, these innovation processes may generate several types of impact in the public sector due to the adoption of CFTs in decision-making, process management, project management and new product/service development.

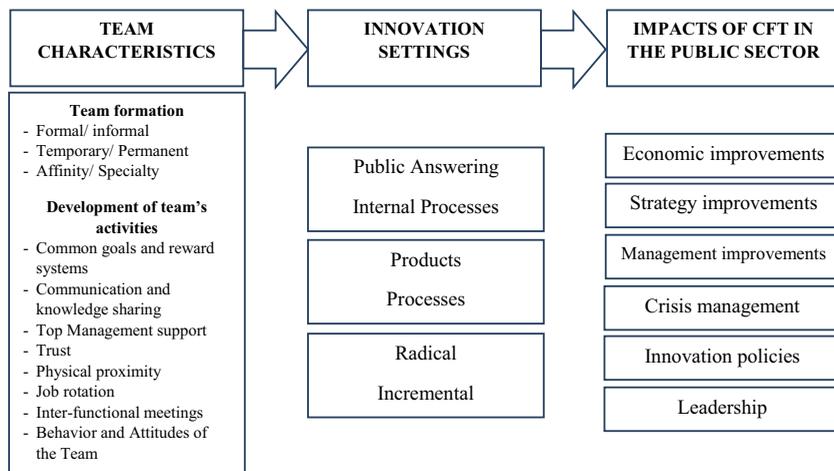


Figure 1.
Constructs of the proposed framework

2.1.1 Team characteristics. The first component of this construct is the Team Formation that brings about the configuration of the CFT. CFTs are managerial mechanisms that integrate people from different areas through formal and informal processes, i.e. the interaction processes of formal communication and/or collaboration processes based on the existence of trust, mutual understanding and group spirit among the members (Kahn and Mentzer, 1998; Pimenta *et al.*, 2016).

Oliveira *et al.* (2016) stated that CFTs may be diverse in terms of their constitution. These authors argued that these teams have a higher capacity to perform the demanded tasks if they have senior members. The CFTs can be either permanent ones that deal with regular processes or temporary teams that perform a task force activity (Wang and He, 2008; Edmondson and Nembhard, 2009). The members of the CFT can be selected by their specialty, with regard to the nature of the process, or based on the affinity among the members (Sarin and Mahajan, 2001, Lichtenstein *et al.*, 2004, Feng *et al.*, 2010, Hsieh, 2010).

The second component of this construct is the Development of the team's activities, which brings about the integration mechanisms existing within the team. Integration can occur through several mechanisms, such as the establishment of common goals, adequate communication and top management support (Pimenta *et al.*, 2014). Several types of integration mechanisms may exist within CFTs to improve innovation, achieve cohesiveness among the members and integrate the departments involved with the project tasks, as indicated in Table I.

2.1.2 Innovation settings. The main idea of the proposed framework is to analyze how CFTs, considering their diversity of settings, can stimulate innovation. Innovation occurs in several forms. This particular construct brings about different settings of innovation: radical/incremental, products/processes, public answering/internal processes.

The Project MEPIN (Measuring Public Innovation in the Nordic Countries) from the Danish Agency for Science, Technology and Innovation and the Innovation Indicators Project in the Australian public sector (APSII) define innovation as the implementation of a significant change in the way the organization operates or in its products. Innovation implies new or significant changes to services and goods, processes, methods or answers for users (Australian Government, 2011).

Integration mechanism	Description	Authors
Non-conflicting goals	Alignment among the CFT, the departments involved with the project and the organizational as a whole, in terms of objectives	McDonough III (2000), Pinto <i>et al.</i> (1993), Pimenta <i>et al.</i> (2014)
Top management support	Recognition and support from senior managers to avoid conflicts and facilitate the flow of the processes conducted by the CFT	McDonough III (2000), Holland <i>et al.</i> (2000)
Trust	Mutual confidence among members of the team that helps to deal with personal differences	McDonough III (2000)
Reward systems based on team indicators	Personal yield indicators based or linked to collective goals	Hauptman and Hirji, 1999; Proehl (1997)
Physical proximity	The infrastructure of the buildings facilitates the contact between areas	Pinto <i>et al.</i> (1993)
Job rotation	Changing team members to another function, either temporarily or permanently	Jugend and Silva (2012)
Inter-functional meetings	Meetings that involve people from different functions. It helps to accelerate processes and to accomplish activities according to the scheduled timeframe	Jugend and Silva (2012)
Adequate communication	Management facilitates communication between functional teams through technologies. In addition, there is frequent interpersonal communication irrespective of the formal requirement	Pimenta <i>et al.</i> (2016)
Behavior and attitudes of the team	Relate to the informal characteristics of the relationships between people that contribute to the integration of internal areas, i.e. the initiative to help each other to reach the organization's goals	Oliveira <i>et al.</i> (2016)

Table I.
Integration mechanisms in CFTs

Source: Prepared by the authors from the theoretical review

To eliminate policies and implement Schumpeter's "creative destruction", the public sector should act upon previously tested knowledge and scientific methods and not imitate other public practices or import models from the private sector (Potts and Kastle, 2010). In the Public Sector Innovation Project (PUBLIN), a number of ways in which innovation can occur, either in public answering or internal processes, were identified (Røste, 2004).

Innovation in the public sector does not always result in new public services but may be linked to institutional renewal, new forms of governance, process innovation, digitalizing or organizational improvements (for example, changes in management techniques, the introduction of performance management or strategic planning), which are not always labeled as "innovations" (Cummingham and Karakasidou, 2009).

With regard to products and processes, innovations are considered incremental or radical (Christensen and Raynor, 2002). Radical innovations are associated with organizations that have an experimental culture, business climate, decentralized structure, flexible work procedures, informal structures, heterogeneous human resources and strong technical skills. Incremental innovation depends on more traditional structures (Tushman and Smith, 2002).

Based on the definitions thus submitted (Tushman and Smith, 2002; OECD, 2005), the authors of this study define innovation as any change in the organization noticeable to individuals, such as communication, services or procedures, implemented radically or incrementally, resulting in improvements and advantages for the institution.

2.1.3 *Impacts of cross-functional teams in the public sector.* Several authors identified in [Table II](#) mentioned the influence of CFTs in the performance of public organizations in terms of their capacity to innovate. [Table II](#) presents these impacts and the respective areas of improvement.

3. Research method

A case study was conducted in the STO ([STO, 2014](#)) of Minas Gerais, Brazil, which is a public administration organization that formulates economic, financial, fiscal and tax policies and consistently seeks modernization. In spite of being a single case-study, employees from 16 different cities were investigated, i.e. 16 different regional units of the STO. This organization allowed the main issues related to the theme of this paper to be addressed because it is involved in actions that aim to promote incremental and radical innovation, both in products and processes. In addition, exploratory checks with the managers verified that these processes of innovation are managed with various CFT. Thus, we can confirm that the case studied allows the analysis of the key elements of this paper.

3.1 *Data: collection sources and analysis types*

The data collection occurred from in-depth interviews, document analysis and personal visits to the departments. To select people who were effectively involved with the proposed theme, two procedures were adopted:

- (1) Initial interviews with senior managers were conducted to identify CFT that dealt with innovation processes; and
- (2) After identifying the CFTs, an effort was conducted to select the members who have had contact with the innovation processes within these teams.

Area	Impact	Authors
Economy	Improvement in the responsiveness of Governments to social needs in the face of market dynamics	Barrows and Mcinerney (2002)
Strategy	Facilitate faster responses, coordination and availability of data	Wong et al. (2009)
Management	Increase departmental effectiveness Help in organizational learning, innovation and building a shared culture Increase in job satisfaction of public employees and as a result facilitate an effective and efficient management system Facilitate an effective and efficient management system Increase the efficiency and effectiveness of a process	Barrows and Mcinerney (2002) , Too (2012)
Crisis management	Mobilization of resources from different departments within the seat of the municipality	Wilkinson (2015)
Innovation policies	Financial investment initiatives of Government and establishment of development systems to boost innovation in the country, region or industrial segment	Barrows and Mcinerney (2002) , Zheng and Zheng (2013)
Leadership	Ineffective leadership in cross-functional teams inhibits collaboration, causing the members not to recognize the importance of achieving results	Henderson et al. (2013)

Table II.
Main relationships between cross-functional teams and public service

Source: Prepared by the authors from the theoretical review

After these initial procedures, 60 members from 11 CFTs were selected and invited by email. In all, 25 of them agreed to participate in the interviews. All of them participated in CFT during the field research period.

Table III shows the respondents and the characteristics of their jobs, the length of their public service and their work unit. The “Acronym” field corresponds to the identification of the respondents.

The study approached 11 teams with the following objectives:

- (1) building a tool for data analysis;
- (2) building a road map for the application of digital auditing;
- (3) building a tax audit system;
- (4) building *software* for registration management;
- (5) creating routines and assessing the management of the units;
- (6) creating routines for fiscal search and seizure;
- (7) forming and deploying a “tax education” project at the regional teaching superintendence;
- (8) deploying electronic processes;
- (9) improving the organizational climate;
- (10) tax collection procedures; and

Acronym	Position	Work unit
RESP 1	Tax Auditor	Transit Tax Precinct
RESP 2	Tax Auditor	Supervision Superintendence
RESP 3	Treasury Office Manager	Regional Superintendence
RESP 4	Tax Auditor	Fiscal Precinct
RESP 5	Tax Auditor	Criminal Tracking Core
RESP 6	Tax Auditor	Fiscal Precinct
RESP 7	Tax Auditor	Transit Tax Precinct
RESP 8	Tax Auditor	Fiscal Precinct
RESP 9	Tax Auditor	Criminal Tracking Core
RESP 10	Tax Auditor	Fiscal Precinct
RESP 11	Tax Auditor	Fiscal Precinct
RESP 12	Treasury Department Manager	Treasury Administration
RESP 13	Treasury Department Manager	Treasury Administration
RESP 14	Tax Auditor	Supervision Superintendence
RESP 15	Treasury Department Manager	Regional Superintendence
RESP 16	Treasury Department Manager	Treasury Administration
RESP 17	Tax Auditor	Regional Superintendence
RESP 18	Tax Auditor	Regional Superintendence
RESP 19	Treasury Department Manager	Treasury Administration
RESP 20	Tax Auditor	Fiscal Precinct
RESP 21	Treasury Department Manager	Supervision Superintendence
RESP 22	Tax Auditor	Transit Tax Precinct
RESP 23	Tax Auditor	Supervision of Collection
RESP 24	Treasury Department Manager	Supervision of Taxation
RESP 25	Treasury Department Manager	Treasury Administration

Table III.
Characteristics of the
respondents

Source: Elaborated by the authors

-
- (11) resolution of problems regarding the interpretation and application of the legal standards in accounting audit jobs.

The interviews were audio-recorded with the proper authorization of the respondents and had an average duration of 55 minutes each, totaling 15 h.

We used a questionnaire with open-ended questions from the literature on innovation-related and CFT. It is important to highlight that the questionnaire was developed with the objective to characterize the constructs that informed the research framework shown in [Figure 1](#) (team characteristics, innovation settings, impacts of CFT). The questions, their respective categories and the support from the literature are presented in [Table IV](#).

3.2 Content analysis and research quality

To identify the registration units about how the CFTs operate and their relationship with different types of innovation, the interviews were transcribed and subjected to the content analysis technique. These registration units were categorized according to the three constructs defined in [Table IV](#): *Team characteristics*, *Development of the activities of the CFT and Innovation*. Based on the guidelines of [Bauer and Gaskell \(2002\)](#), the following steps were adopted:

- pre-analysis of transcripts: quick read, prior identification;
- in-depth analysis;
- description of the units of registration: the particular meaning of each element is displayed in frames; and
- categorization: registration units are grouped into categories defined in the literature or observed in the context of the object of study.

The following five procedures were adopted to improve research quality:

- *Pretest*: The questionnaire was previously submitted to four specialists (two academics and two practitioners) to evaluate its capacity to collect the necessary data.
- *Number of coders*: The coding process was performed by two researchers to obtain a consensus in the data analysis.
- *Confirmation of results with respondents*: After coding and categorization, the elements were sent to the interviewees to confirm their meaning.
- *Content saturation checking*: New interviews were conducted until new codes stopped emerging from the data analysis or become redundant.
- *Confirmation of the categories' reliability*: Categories and codes were sent to two specialists for evaluations of the set of information obtained from the analysis.
- *Audio recording*: The interviews were audio-recorded for later transcription to ensure the accuracy of the information obtained in the interviews.

4. Results

For a greater understanding of the CFTs of the STO, it is important to outline the profile of the employees. It is not necessary to have graduated from a specific course to assume the position of Tax Auditor, Treasury Manager or Treasury Technician; rather, any graduation in higher education is sufficient. In this way, there are civil servants trained

Vision	Research issues	Author
Team characteristics	Why was the cross-functional team necessary?	Athanasaw (2003), Denison <i>et al.</i> (1996), Feng <i>et al.</i> (2010), Gopal <i>et al.</i> (2004), Pimenta <i>et al.</i> (2014) Denison <i>et al.</i> (1996)
	Was the team formed by directors (formal or informal)?	
	Is the team permanent or temporary?	Edmondson and Nembhard (2009), Wang and He (2008)
	Are there temporary members on the team?	Feng <i>et al.</i> (2010), Hsieh (2010), Lichtenstein <i>et al.</i> (2004), Sarin and Mahajan (2001)
	What is the function of each member?	
	What is reason for the selection of these functions to achieve the purpose of the team?	
	What is the selection process of the members of the team?	
	What motivates the member to join the team?	
	Is there a manager to control the activities of the team?	Daspit <i>et al.</i> (2013), Donnellon (1993), Edmondson and Nembhard (2009), Proehl (1997), Wang and He (2008), Webber (2002)
	Is the management formal, informal or neutral?	
Development of the activities of the CFT	Are the goals shared by all the members of the team or are they individual?	Athanasaw (2003), Brettel <i>et al.</i> (2011), Daspit <i>et al.</i> (2013), Donnellon (1993), Katzenbach and Smith (1993), Pinto <i>et al.</i> (1993), Proehl (1997), Athanasaw (2003), Edmondson and Nembhard (2009), Kotlarsky <i>et al.</i> (2012), Majchrzak <i>et al.</i> (2012)
	How is communication between the members?	
	How are the clashes and obstructions solved between divergent ideas?	
	Does the collaboration among the members occur naturally or is it stimulated?	Donnellon (1993), Pinto <i>et al.</i> (1993), Edmondson and Nembhard (2009), Ghobadi and D'ambra (2012), Lichtenstein <i>et al.</i> (2004)
	Is there competition between the members of the teams?	Ghobadi and D'ambra (2012), Majchrzak <i>et al.</i> (2012)
	Is there sharing of knowledge? How does it occur?	Donnellon (1993), Proehl (1997), Jugend <i>et al.</i> (2015)
	Is there top management support?	Anthony <i>et al.</i> (2013), Sarin and Mahajan (2001), Wang and He (2008)
	How is the team assessment performed?	Bessant <i>et al.</i> (1994), Brandão and Bruno-Faria (2013), Christensen and Raynor (2002), Leifer (2000), Oecd (2005), Potts (2010), Potts and Kastle (2010), Sartori (2011), Tushman and Smith (2002)
	Did this process emerge as a search for constant and gradual improvement (incremental innovation) or did it occur through the rupture and breaking of paradigms (radical innovation)?	Sartori (2011), Tushman and Smith (2002)
	Did the implementation allow initial design changes (flexible) or were changes and adjustments not permitted (rigid)?	
Innovation	Did innovation occur in the public answering with new features or designs of products and production processes provide services or interact with users or the resolution of tasks?	Røste (2004)

Table IV.
Research issues to characterize functional teams and typify the innovation

(continued)

Vision	Research issues	Author
	Did innovation occur at the internal processes level with new or changed ways to organize or administrate activities, ways to interact with other organizations or systems of beliefs, missions and strategies? Do revolutionary advances characterize the implementation of innovation? Alternatively, did it occur gradually through a process of trial, error and learning?	Potts (2009), Potts and Kastle (2010), Sanger and Levin (1992)
	Does the responsibility of the innovation process come from top-down or bottom-up?	Borins (2002)
	Was there a plan for the implementation of innovation or was it conducted intuitively and informally?	Golden (1990)
	What was the degree of education of the manager responsible for innovation? Does the person responsible for innovation take risks? Is he/she aware of the bureaucratic and political obstacles that innovations face?	Damanpour and Schneider (2009), Kearney <i>et al.</i> (2000), Sanger and Levin (1992), Schwella (2014), Vigoda-Gadot <i>et al.</i> , (2008)
	Was there any gain with the delivery of the innovation?	Brito <i>et al.</i> (2009), Crespi and Zuñiga (2012), Dosi (1988), Freeman (1984), Ganotakis and Love (2010)

Source: Prepared by the authors based on the indicated literature

Table IV.

in various courses like administration, law, accounting, psychology, veterinary medicine and dentistry, among others.

[. . .] The experience that each one has, that each one carries out just contributes to the process as a whole. Teams are formed by various people, from various areas of work with different academic formations, with different values and cultures, which does not produce uniformity of thought; there is not a single line of thought. There are the guidelines of the institution, but that does not mean that there is an automatic alignment of the way of thinking of the servers. (RESP 18)

Therefore, because of the very nature of the public servant in the organization, the results of the teams are a hodge-podge of various skills, which seems to contribute to both the creation of CFT and to the innovation process. In the following paragraphs, each item of the proposed framework is explained according to the characteristics of the case study.

4.1 Characteristics of the surveyed cross-functional teams

Despite the predominance of formal teams in the study conducted (72.73 per cent), informal teams produced entirely new systems and scripts in the organization. These systems have been fully adopted and implemented throughout the institution. There is even a case of a tax audit system cited by RESP 2. In that case, the new product was implemented by other States, which

broke paradigms, with new systems and processes being installed. We observe, therefore, that informal teams develop around product innovation projects or previously unknown processes.

The temporary CFTs disband as soon as the work they proposed to do is completed, but in some cases, they re-form, in view of the affinity of the members, generating new innovative processes.

[...] Nearly all teams, after their purpose is fulfilled and when there is no more formal obligation to work together, fall apart. However, there is an extremely durable case; they have already worked for almost 10 years together in partnership. (RESP 2)

Among the seven permanent teams (57.14 per cent), six are formal and one is informal, and four of them have temporary members. In the temporary teams, the temporary member index is 80 per cent. When we analyzed by type of team, we realized that the number of temporary members on formal teams (62.50 per cent) approximated that found on the informal teams (67.67 per cent).

[...] The result meant that the work was increasing and I began to feel the need to put someone else on the team (formal and permanent), and then invited X to work, because he is a psychoanalyst and helps with the focus on this activity (temporary). (RESP 13)

The specialty of the person developing the work was the determining factor in the composition of the six teams studied, demonstrating a search for complementary skills. This factor is reinforced when we analyze by the type of team because only 33.34 per cent of them are formed by affinity, and all the others were formed by work specialty.

Personal will was the motivation factor for 9.09 per cent of the members of the teams. On this type of team, the obligation toward work as a motivation factor prevails, unlike the informal teams, where innovating, facilitating the work of the institution and developing new techniques for work motivates 100 per cent of the interviewed employees.

[...] Believe, right? People believe that the work will pay off and they get involved. (RESP 3).

[...] The motivation is to serve, collaboration [...] contributing toward others having their workload reduced should always be more important than building something alone, it could never be personal satisfaction, but rather the satisfaction of others. (RESP 4).

[...] The greatest motivation was the complexity of the matter and the innovation of the work. (RESP 6).

[...] In face of the difficulties of other colleagues, the members of the team and I sat down and said: "we're going to develop this roadmap to help our colleagues" (RESP 11).

Temporary teams produce 56.57 per cent of product innovation. These CFTs have innovated products or products and processes together. We found that only the formal teams exclusively introduced process innovation, as shown in [Figure 2](#).

A direct relationship was noted between the type of team (formal/informal) and the responsibility for the innovation process, i.e. in formal CFTs, the responsibility for innovation is from the top down, whereas in informal CFTs, it occurs from the bottom up.

[...] The person who's coordinating has to be in control so there is no conflict, as these are actions under extreme stress, so that conflict is dangerous! (RESP 10) [...]. As much as we have another understanding, the final word of any action in this regard is from the boss! (RESP 17).

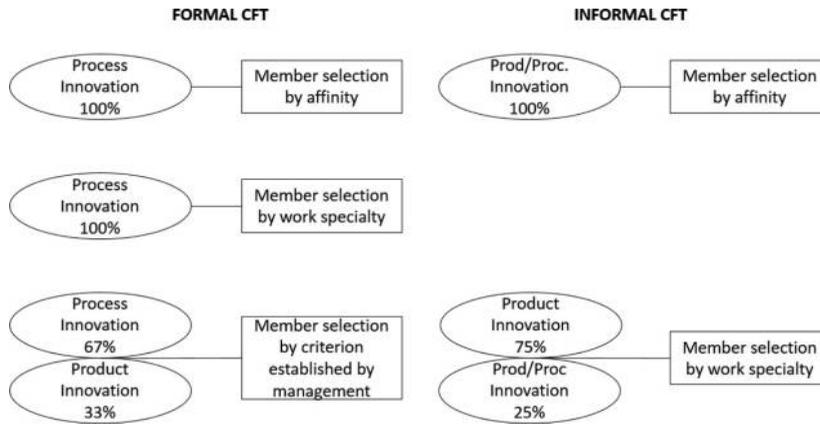


Figure 2. Team × member selection process × innovation

4.2 Innovation settings in the surveyed cross-functional teams

The surveyed CFTs have helped in the development and implementation of innovations in processes (46 per cent), in products (27 per cent) and products and processes merged (27 per cent).

From the point of view of this organization, product and process innovation together is technically something very new, not just an upgrade or improvement of what already existed. On the other hand, process innovation alone comes from improvements. In relation to innovative product analysis, it was found that two computer systems generated by the CFTs analyzed in this study were awarded by the government of Minas Gerais in a contest for innovative public management. This fact certifies that these products did not previously exist in the public administration of that State.

Of the five teams that performed processes of innovation, two of them generated entirely new processes for the institution. The others contributed to the quest for constant and gradual improvement.

Of the six teams that contributed product innovation or processes that were previously unknown by the organization, it was noticed that after the implementation of the product or process, new waves of innovation occurred. However, they stemmed from improvements, that is, incremental innovation. This data show that the innovations produced are mostly flexible (81.82 per cent), i.e. liable to change.

This first version [of the software] broke the paradigm; from then on, we were adding content and tools, and by this, I mean that innovation is a ladder with some jumps (RESP 4).

Innovation can affect organizations at the internal processes level with new ways to organize or manage activities, interact with other organizations, as well as generate new systems of beliefs, missions and strategies (Røste, 2004). In this study, we found a balance in the CFTs analyzed, as five innovations caused an impact on internal processes, another five caused an impact on public answering, and one led to an impact on both internal processes and public answering.

4.3 Discussion of the impact of cross-functional teams as a driver for innovation

This topic discusses the relationships between the basic elements of the proposed framework: team characteristics, innovation settings and impacts. Each type of surveyed CFT results in a type of impact (internal processes, public answering or public answering/

internal processes) according to the innovation produced. Figures 3, 4, 5 and 6 present cause-and-effect diagrams in which they identify the relationships between the characteristics of the CFT, the type of innovation that was generated and the impact for each type of innovation.

4.3.1 Permanent formal cross-functional team. This is the only type of CFT that included the three types of member selection (affinity, specialty or by management) in their formation. Those formed by affinity generated only incremental process innovation with an impact on internal processes. Member selection by specialty produced something new in products and processes jointly, which was previously unknown and produced effects on public answering. Finally, the CFTs formed by the management influenced both public answering and internal processes through the innovation of processes that were previously unknown by the organization.

We have a broad variety of types of companies, and each place that we conduct search and seizure, we find a different story. So, we created auditory manuals with standards to continuously improve the procedures (RESP 1).

4.3.2 Permanent informal cross-functional team. These teams worked only with product and process innovation together and produced an impact on both public answering and internal processes. They work basically with formal meetings, but there is an informal atmosphere of trust and mutual understanding among the members. The selection of its members was according to the specialty of each in relation to the work done.

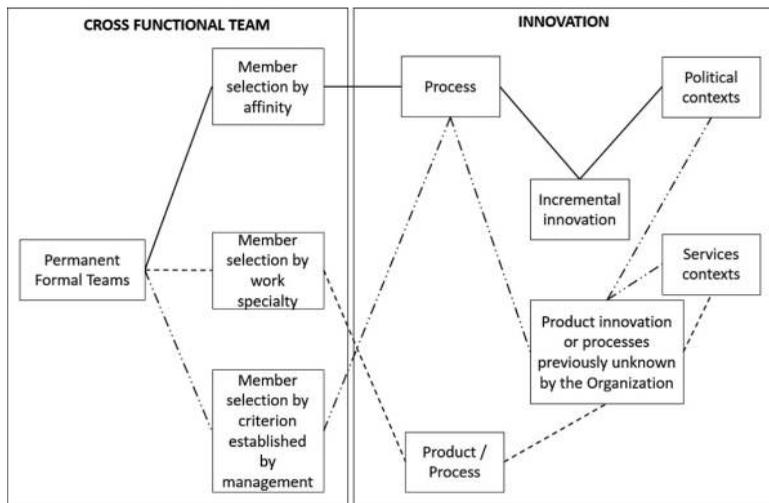


Figure 3.
Permanent formal
CFT × impacts
generated

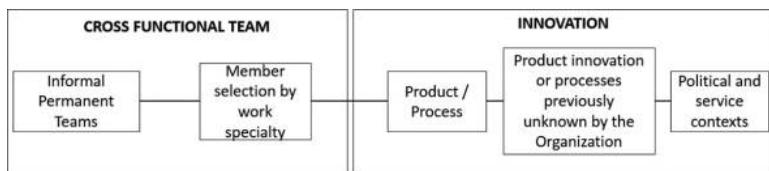
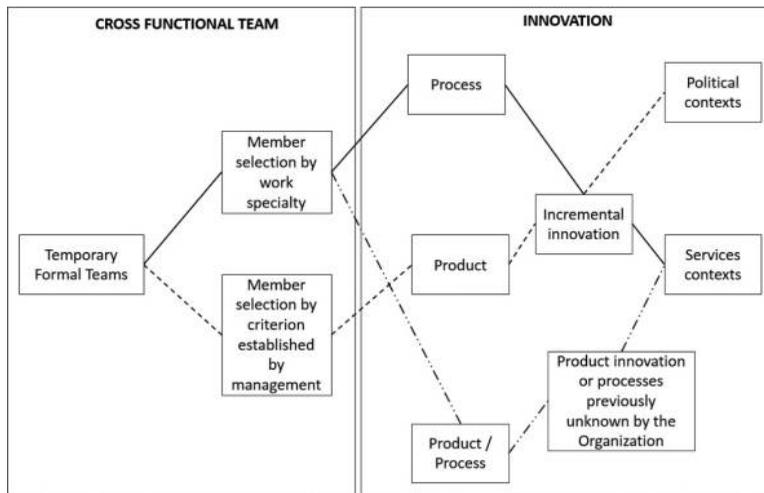


Figure 4.
Informal permanent
CFT × impacts
generated



Innovation and
cross-
functional
teams

97

Figure 5.
Temporary formal
CFT × impacts
generated

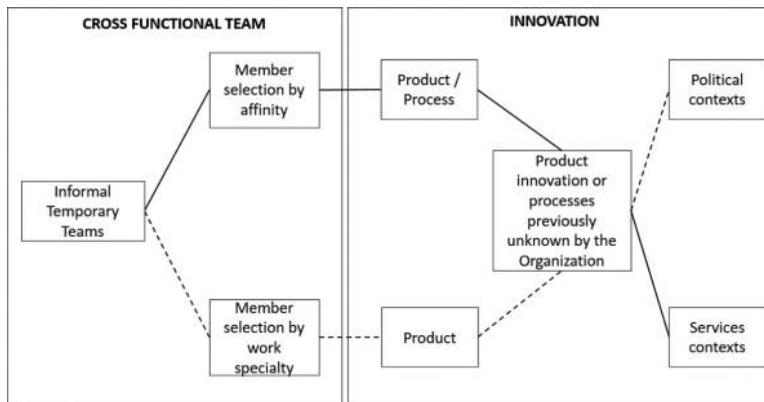


Figure 6.
Informal temporary
CFT × impacts
generated

[...] In the teams assembled by the formality of public service work, the job is executed, but for the longer-lasting jobs, of which I'm most proud, the formation of the group was informal, by the identification of members (RESP 2). [...] These also led to longer-lasting jobs. (RESP 2)

These concepts from the case support *PI*:

PI. Informal permanent teams show a greater capacity to generate innovations with an impact on the scope of internal processes and public answering jointly (Respondents 1, 2, 4 and 18).

4.3.3 Temporary formal cross-functional teams. The temporary formal CFTs, which were formed based on the specialty of each member, produced two types of innovation. One innovated process incrementally, whereas the other worked with products and processes together, which were unknown previously. When the member selection was done by the

management, the products were incrementally innovated with an impact on internal processes.

Between 2001 and 2002, the Organization advanced through a modernization of several processes to create a system to reduce bureaucracy. We improved a software in order to simplify the internal work. The system facilitates the performance of the work (Resp12).

These concepts from the case support *P2*:

P2. Formal temporary teams show a greater capacity to generate incremental innovations of products (Respondents 1, 5, 7, 9, 10 and 12).

4.3.4 Temporary informal cross-functional teams. The innovations produced by these teams were simply because the products or processes they created were previously unknown (Figure 6).

When a person with technical knowledge joined the team, we started to have the possibility to create a new tool. The decision was ours; there was no determination from the Organization or from the management. It was an initiative of two colleagues. It was a new product, not an improved one. Such a creation was a paradigm break, and since its implementation, we have been adding content (RESP 4).

These concepts from the case support *P3*:

P3. Product-only innovations can be reached by formal or informal temporary teams (Respondents 1, 2, 4, 5, 6, 7, 8, 9, 10, 11 and 12).

Moreover, in the studied case, the innovation of processes does not seem to be generated in a specific context in terms of formality/informality and duration. These concepts support *P4*:

P4. Process-only innovations can be reached either by formal (permanent or temporary) or informal teams (Respondents 1, 2, 8, 9, 10, 13, 14 and 15).

In the studied case, the teams formed by member affinity innovated products together with processes and had an impact on public answering. The CFT, in which the expertise of the people was the member selection criterion, had a level impact on internal processes through product innovation. This concept from the case supports *P5*:

P5. Joint product and process innovations occur when the members are organized by affinity or specialty when the teams are not formed by management (Respondents 2, 4, 12 and 14).

5. Conclusions

The present study sought to broaden the discussion about CFTs and innovation in the public administration scenario. An understanding of these aspects can contribute to a more coordinated management of CFTs and, primarily, are a means to encourage innovation in the public sector.

The predominant type of CFTs in the public organization studied is a formal team with a permanent duration and the participation of non-permanent members in the development of the project. When formed based on affinity among members, the teams only generated incremental process innovation with an impact on internal processes, i.e. they changed the way they organize or manage their activities. When the member selection criterion was by specialty, they produced something new in products and processes jointly that was previously unknown and had effects on public answering, which changed the way they

interact with customers or accomplish tasks, e.g. the development of software to improve answering for people. Finally, when the management carried out the selection of the members, the teams influenced both public answering and internal processes through processes that were previously unknown by the organization.

The literature review phase showed the shortage of research involving the three themes together: public administration, innovation and CFT. In the works cited and taken as references for innovation in the public sector, we noticed a certain reluctance in the Brazilian academic research concerning this topic. With respect to our exploration of the concept of CFT and the impact generated in this context, it can be said that the subject is singular if not unique in the level of studies of public administration in Brazil.

Through the interpretation of the collected data, we see that products such as computer programs and projects with other public and private entities are created and implemented by CFT formed in the public organization. Two computer programs generated by CFTs received awards by the government of Minas Gerais in a contest for innovative public management. In addition, it was also verified that there is a national digital tax audit system in most Brazilian States whose initial project was generated by an informal CFT from the Treasury Office of Minas Gerais.

The analysis of the results of the research also showed that in the CFTs formed in the public institution analyzed, the predominant type is formal with a permanent duration and in which non-permanent members participated in the development of the project. The work specialty is the main criterion in the selection of members. This topic presented relationships with the innovation produced, as further explained below.

As for the motivational aspect, the most considered factor on formal teams is the obligation to work, whereas on informal teams, it is the development of new work techniques. We found a direct relationship between the type of team (formal/informal) and the responsibility for the innovation process, i.e. in formal CFTs, the responsibility for innovation is from the top down, whereas in informal CFTs, it occurs from the bottom up.

5.1 Managerial implications

The theoretical development of this research, which is summarized in [Figure 1](#) and [Table I](#), indicates some practices that can help managers, not only in the public sector but also in private organizations to improve their managerial activities toward innovation. Moreover, it was possible to outline the effects of innovation in the public sector on internal and external structures. The main points of impact from innovation are the productivity gains, cost reductions and economic results. The improvement in productivity was noted in all the CFTs studied. One of the studied teams created a data analysis tool that resulted in a time reduction for the analysis and verification of taxpayers in debt to the State.

Regarding the efficiency of processes, CFTs were responsible for the computerization of documents, petitions and papers, decreasing the time to answer the taxpayer from 30 to 3 days. Other respondents were responsible for the creation of computer programs that are currently used at the national level. The other gains, cost reductions and economic results, despite being noticeable, are difficult to measure because the entity studied is a non-profit and its costs are predominantly for the maintenance of the structure.

5.2 Theoretical contributions

The categories that emerged from the field research related to CFTs and Innovation were based on the literature used for the definition of the questionnaire. From the application in the field, it was possible to identify practical features for each of these categories and

relationships between the categories of CFTs and the types of actions and results related to innovation.

These relationships constitute the main contribution of this research. The literature shows that the use of CFTs in the public sector tends to stimulate innovation (Barrows and McNerney, 2002; Wong *et al.*, 2009; Zheng and Zheng, 2013; Wilkinson, 2015). However, these studies do not show how these teams must be configured and managed to generate an impact on innovation. This study contributes to the improvement of this relationship because it:

- confirms the constructs in literature (Edmondson and Nembhard, 2009; Feng *et al.*, 2010; Ghobadi and D'ambra, 2012; Anthony *et al.*, 2013; Daspit *et al.*, 2013; Pimenta *et al.*, 2014) about CFTs and features the perspective of a case studied in the public sector;
- confirms the constructs in the literature (Røste, 2004) on innovation by establishing a relationship between the types of innovations and their effects on the generation of products/services and the ways in which this can occur; and
- examines the perceptions of the respondents regarding the CFT characteristics that can lead to specific types of innovation (Potts and Kastle, 2010; Sartori, 2011), as well as the types of products or services that can be generated by these processes.

On the relationship between the CFT constructs and innovation present in Figures 2, 3, 4 and 5, we can highlight the following propositions and the respondents who perceived them:

- *P1*. Informal permanent teams show a greater capacity to generate innovation with an impact on the scopes of internal processes and public answering jointly (Respondents 1, 2, 4 and 18).
- *P2*. Formal temporary teams show a greater capacity to generate incremental innovations of products (Respondents 1, 5, 7, 9, 10 and 12).
- *P3*. Product-only innovations can be reached by formal or informal temporary teams (Respondents 1, 2, 5, 6, 7, 8, 9, 10, 11 and 12).
- *P4*. Process-only innovations can be reached by formal (permanent or temporary) or informal teams (Respondents 1, 2, 8, 9, 10, 13, 14 and 15).
- *P5*. Joint product and process innovation occurs when the members are organized by affinity or specialty when the teams are not formed by the management. (Respondents 2, 4, 12 and 14).

These propositions are exploratory and originated from the perceptions of the respondents in the case studied. Future surveys should be carried out to verify their validity in other public organizations in different contexts.

5.3 Limitations and suggestions for future research

The limitations of this research relate to the fact that this is a single case study, and although it is an important case to examine innovation and CFTs, by its very nature, it is not possible to extend and generalize the obtained data to other organizations. We also did not analyze the potential influence of other team characteristics on innovation, such as age, education, sex, number of members, tasks and responsibilities. Future research could analyze the present theme based on a deeper view of these elements of team composition.

The lack of measurement of innovation was another limiting aspect of this research. The inquiry about innovation in the case was grounded in the questionnaire of the Innovation

Survey (Pintec), conducted by the Brazilian Institute of Geography and Statistics (Ibge), the Oslo Manual (OECD, 2005) and in the Community Innovation Survey – CIS version 2008, proposed by Eurostat (Statistical Office of the European Community). However, the evaluation of this construct was merely qualitative, and future research is needed to validate its characteristics.

Future studies in other organizations can be conducted with comparative and complementary purposes to analyze the innovations promoted by CFTs. We also suggest extending the study to involve people from other organizations who also participate in these CFTs to examine the process of CFT integration in different organizations and the reach of the innovations implemented. The propositions above can also be used in quantitative research to statistically validate their cause-and-effect relationships.

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