

**CRITICAL ANALYSIS OF CONTRACTUAL ADDENDUM IN
PUBLIC SERVICES**

**UMA ANÁLISE CRÍTICA DE ADITIVOS CONTRATUAIS
EM OBRAS PÚBLICAS**

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Abstract: *In the execution of public services, the incidence of contractual terms and value additions is a strong indication of failures in the execution of the planning phase by the public management. This work aims to investigate the existence of flaws in the public contracting process, in the period from 2009 to 2011, as well as the main causes of discrepancies, with values and deadlines, from those foreseen when the bidding process took place. We conducted a case study based on the Mineiro Triangulum Federal Institute (IFMT). The results confirmed the existence of a critical problem by revealing that 100% of the services analyzed presented an addendum for deadline extension and value increase of the total project. On average, the execution time of the analyzed works was 6.5 (six and a half) times longer, as well as the final cost was 23% higher than planned. The results obtained demonstrated that the main factors causing contractual amendments are time and value. We also identified that the conception and preparation of basic projects represent the main problems in the construction services provided by public management in the studied case.*

Keywords: *Public Services, Public Construction; Time Addendum; Price Addendum; Process-Based Management; Public Bids.*

Resumo: Na execução de obras públicas a incidência de aditivos contratuais de prazo e valor é um forte indício de falhas de execução da fase de planejamento das obras pela Administração Pública. Este trabalho tem como objetivo investigar a existência de falhas no processo de contratação de obras públicas, no período de 2009 a 2011, bem como, as principais causas de obras, com valores e prazos, divergentes dos previstos quando da realização do certame licitatório. Para investigação dos dados coletados foi realizado um estudo de caso com base na coleta de documentos e entrevistas Instituto Federal do Triângulo Mineiro -IFMT. Os resultados confirmaram a existência de um problema crítico ao revelar que 100% das obras analisadas apresentaram aditivos de prazo, valor ou os dois simultaneamente. Em média, o prazo de execução das obras analisadas foram 6,5 (seis

e meio) vezes maior, assim como o custo final foi 23% maior que o planejado. Os resultados obtidos demonstraram que os principais fatores causadores de aditivos contratuais, de prazo ou valor, na referida escola federal estão diretamente relacionados a falhas na concepção e elaboração dos projetos básicos.

Palavras-chave: Obras Públicas; Construção Pública; Aditivos De Prazo; Aditivos De Valor; Gestão Por Processos; Licitações.

1 INTRODUCTION

The Brazil has experienced significant difficulties completing buildings of different sizes and complexities, such as building kindergartens, schools, hospitals, sports courts, basic sanitation systems, roads, ports, and airports (CERQUEIRA; VACOVSKI, 2017).

In recent years, Brazil has experienced a new phase regarding the expansion of higher, technical, and vocational education networks (CARVALHAES; MEDEIROS; SANTOS, 2022), and its principal characteristic is the substantial geographical expansion of the number of academic units through the construction of new buildings, reforms, and extensions of existing campuses. Still, from 1909 to 2002, there were only 140 technical schools in the country, and this number more than tripled (500 new units) between 2003 and 2016 (BRAZIL, 2022).

However, this significant presence of the public sector in civil construction and the consequent management practices of these buildings do not correspond to the peculiarities of such enterprises, which are constantly marked by low quality, constant delays, inflated costs, and lacking compliance with users' requirements (SANTOS; STARLING; ANDERY, 2014).

The execution of public buildings often presents irregularities and flaws during the stages of the project's life cycle, from its technical feasibility study to the completion of the execution upon definite receipt term (ARAÚJO, 2012). Also, failures during their realization result in contractual additions that allow for the diversion of funds, or even make it impossible to complete and deliver the object

(FONSECA, 2016).

According to the FISCOBRAS¹ report, indications of irregularities found during the supervision of public buildings by the TCU (Federal Court of Accounts) are, among others: irregular bidding; restriction to competitiveness; deficient or absent basic/executive projects, and overcharging (FISCOBRAS, 2021).

In this sense, to make it possible to complete the building without abusing public funds with interruptions and consequent delays in execution, Brazilian legislation determines that public institutions can unilaterally change contracts concluded with winners of biddings. When duly justified, these changes can occur to obtain a better technical adaptation to their objectives (BRAZIL, 1993). While drafting an administrative contract, failures and gaps in the building management procedures tend to happen. Alternative decisions arise, and the manager is responsible for making choices that bring the best results. In the case of a public institution, it should also meet the principles of public administration combined with technically pertinent legal matters (ARAUJO, 2012).

Given the current situation, Process-based management is one of the tools that can help in the quest for efficiency in public administration (SYED et al., 2018). That is because it consists of a methodology for the continuous application of evaluation and analysis of internal operations that significantly impact process performance and customer satisfaction by avoiding the use of isolated procedures (CARVALHO; PALADINI, 2012;), and achievement of societal objectives (SYED et al., 2018).

The originality of this article is investigating flaws in the public works contracting process and the main causes of contractual amendments affecting costs and delivery deadlines within the context of the IFTM between 2009 and 2011.

¹ Fiscobras is an audit program of the Federal Audit Court (TCU), designed to monitor the execution of public works and engineering services with federal resources, ensuring efficiency, economy, and compliance with legislation.

This focus distinguishes itself by exploring a critical period of expansion in technical and

higher education in Brazil, marked by a significant increase in the construction of new academic units, renovations, and extensions and analysis of bidding modalities - Invitation Letter, Price Quotation, and Competitive Bidding - and their respective contractual modifications, offering insights into the impacts of these changes on project costs and timelines. Furthermore, the application of process-based management as a tool for efficiency in public administration is the innovative contribution of the study towards improving public works management.

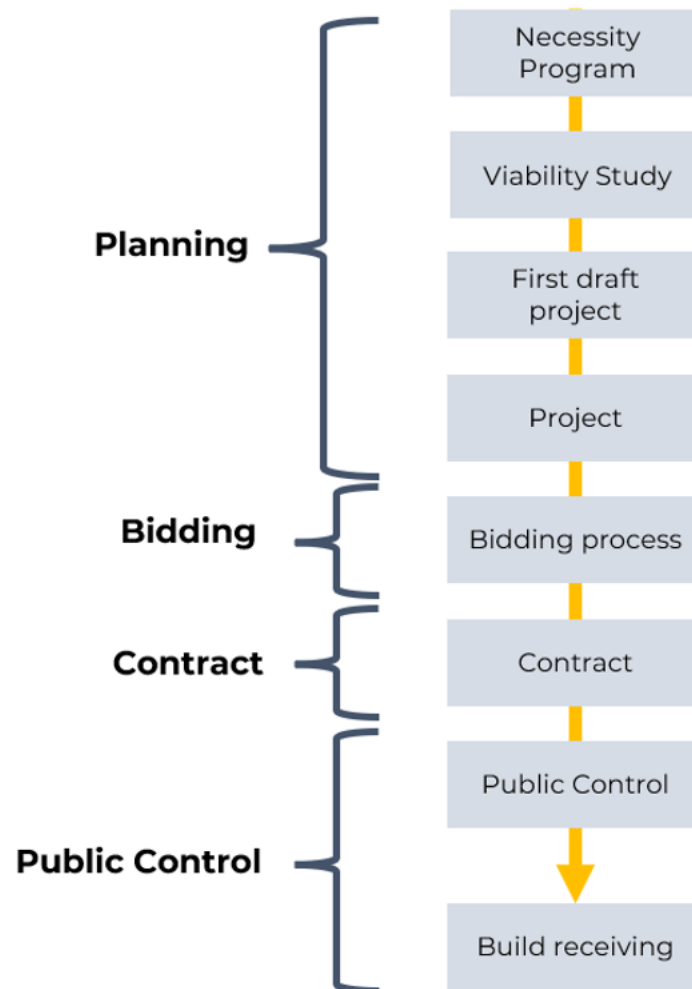
The results obtained with the evaluation may provide the points to which public buildings management, as referenced above, needs to devote more attention when resolving conflicts and managing flaws. Through this analysis, we can map out possible improvement strategies and thus achieve the desired changes for the sectors here analysed, contributing to advances in the management of processes and public buildings, and consequently in the results for the community benefited by the proposed services.

2 THEORETICAL BACKGROUND

2.1 Planning, Contracting and Execution of Public buildings

According to the TCU (2010a), the materialisation of a public building begins with a survey of its main characteristics, defining, therefore, through this study, the set of actions for the realisation of technical and financial feasibility studies of the enterprise. In this sense, the stage of collecting initial information about the enterprise is defined as Requirements Plan. Then, the administration needs to establish the essential characteristics of each enterprise to detail in the best possible way the object about to be contracted (TCU, 2010a). In a simplified way, Figure 1 (next page) shows a flowchart with the sequence of steps for contracting public buildings.

Figure 1 - Steps of the administrative bidding procedure



Source: Adapted from TCU (2010a)

In this sense, having defined the Requirements Plan of the enterprise, it is necessary to evaluate the enterprise's design options and respective feasibility studies to select the alternative that best meets the public interest. Each of these alternatives requires establishing the average costs, time of execution and benefits of the implementation so that the administration reaches the most viable option for execution of the work (ALTOUNIAN, 2012).

After the technical and financial feasibility studies, the preliminary design is drawn up, which is a technical representation of the approved solution, and must include the design of the structure and facilities in general and the main components of the architectural project. The preliminary project consists of the technical graphic representation of the approved option during the survey for the requirements plan and feasibility study. Despite presenting the main elements – such as floor plans, cuts, and facades – of architecture, structure, and facilities in general, in addition to determining the standard of finishing and the average cost of the enterprise, the preliminary draft is not yet sufficient to bid work because it does not have the elements necessary for a perfect characterisation (TCU, 2010a).

With the managers' preliminary draft prepared and approved, the next step is contracting the basic and executive project to execute the work. Law 8,666/1993 (BRAZIL, 1993) determines

that tenders for the execution of works for the provision of services must follow this sequence: execution of the primary project, execution of the executive project and consequent execution of works and services. However, it is allowed to bid or contract works or services that include the elaboration of an executive project charged by the contractor or at a price previously fixed by the administration.

Therefore, after defining the project's guidelines with a survey of the Requirements Plan, feasibility studies, preparation of the preliminary project and preparation of the primary project, it is necessary to begin preparations for contracting the work, which usually must occur through bidding (TCU, 2010a).

2.2 Tenders: Legislation Applicable to the Contracting of Public Buildings

The Federal Constitution of 1988 (BRAZIL, 1988) mentions its scope in art. 37, XXI, the obligation of tenders for contracts of works, services, purchases, and divestments. Still, the text of Law n° 8,666/93 (BRAZIL, 1993), in art. 2° strongly determines that tenders should take place regarding works, and services, including advertising, purchases, divestitures, concessions, permits and leases.

In Brazil, law 8,666/1993 (BRAZIL, 1993) establishes general rules on tenders and administrative contract relevant to works, services and even advertising, purchases, divestitures and leases within the Union's powers, the Federal District, and municipalities. In addition to direct administration bodies, special funds, municipalities, public foundations, public companies, mixed economy companies and other entities controlled directly or indirectly by the Union, the states, the Federal District, and municipalities are subordinated to this regime law (FONSECA, 2016).

Tenders are the formal administrative procedure in which the public administration calls, through conditions established in its act (notice or invitation), companies interested in submitting proposals for the offer of goods and services (TCU, 2010a, p.19).

The bidding consists of stages, where each stage depends on the predecessor to have legitimacy (TCU, 2010a). It should be noted that public tenders (licitações públicas) have the purpose of finding the most advantageous proposal for the public administration, seeking the promotion of sustainable national development (proposed by law n° 12,349/2010), to ensure equal opportunities for all interested parties, enabling the participation and competitive bidding of the most significant possible number of contestants (FONSECA, 2016).

Any contracting process involving public resources must be conducted per the principles of the relevant legislation, so conductors of the process must be attentive to them. Additionally, there are the steps that give direction to each modality and that must be followed for a better selection of participants and better use of the available options, obeying the laws that govern the whole of the bidding process (BRAZIL, 1988). The legal provisions that guide a public tender for contracting public buildings are not limited only to Law n° 8,666/93. For a public building to be carried out, it is necessary to predict budgetary resources that ensure payment of obligations arising in the current financial year, as well as the observance of rules and procedures that meet the guiding principles of public tenders (ALTOUNIAN, 2012).

2.3 Faults Detected in Public buildings Management Processes

In Brazilian civil construction, we attribute the high rates of execution flaws to public buildings to the low quantity and quality of details and the lack of compatibility between the architectural project and its complements. With that in mind, to minimise these problems, caution and attention are necessary for all stages that make up the enterprise, from its conception to the execution, completion and use by the administration (FONTES, 2012).

Control bodies' deficiencies can sometimes be attributed to planning flaws and the precariousness and insufficiency of human,

material, and technological resources. Sometimes even to inadequacies of organisational structures within the bodies and entities responsible for contracting and executing public buildings (RIBEIRO, 2012).

Table 1 - Percentage of significant irregularities indicated by TCU

Irregularity	2009	2010	2011
Overpricing/overpricing (superfaturamento) results from excessive prices compared to the market.	11.52%	21.66%	29.34%
Poor or outdated basic/executive design.	5.93%	16.36%	20.03%
Deficient or omitted supervision	7.26%	6.68%	6.00%

Source: TCU, adapted by the authors.

As visualized in Table 1, the base plan is the most flawed or omitted element in the works audited by TCU between the years 2009 and 2011, followed by overpricing/overbilling of budget sheets and failures of inspection of work execution. One thing to notice is that flaws in the definition or constitution of work are the base/executive plan can hinder achieving the results desired by the administration. According to Ribeiro (2012), in addition to abundant reports of contracting and execution of works with outdated or deficient base and executive plans, it is also verifiably frequent to find failures such as significant disparities in the average prices in the cost sheets; overpricing; overbilling; lack of supervision; lack of technological tools that help control and evaluation, lack of trained personnel to perform services, among others, thus ratifying the findings of the audits.

Some authors have researched research management of public construction works concerning additional services. Better quality can be obtained in public buildings with better projects and efficient coordination (LIMA; JORGE, 2000).

Therefore, the fragility and susceptibility to errors are evident in these processes that make up the contracting and execution of the public building. Although the TCU adopts the policy of avoiding mistakes rather than repairing them, we can verify in the audit reports from the years 2009 to 2011 that the number of works with indications of serious irregularities presented the same flaws in their processes, proving the extreme need for improvement in the process of planning, contracting and execution of public buildings.

Looking at the findings of the annual audit reports, we can affirm that contracts for public buildings need urgent improvements to avoid losses to the Treasury with unfinished works or with failures of execution that compromise their use.

2.4 Process Management

In Brazil, one of the complex problems to solve is the predominance of management based on structures with excessive hierarchical levels and departments that generate administrative slowness, formal, bureaucratic communication, and services and products that do not satisfy the population. Against this problem, modern management suggests process management. This management approach argues that the organisation must change its thinking, abandon the vision of a departmentalised structure and focus on processes (DANTAS et al., 2010).

Process-based management, however, presupposes a commitment from employees and employers, as decisions would be taken within the scope of processes, and the organisational structure would assume a more matrix form in which departments could persist. Still, processes would gain greater importance in this environment. In other words, process-oriented organisations are more flexible, and the organisational structure approaches a horizontal model, where work is organised around the processes and the people who perform them (MARQUES, 2015).

The proposed solution to public management problems, brought by the Business Process Management (BPM) technique (SYED et al., 2018), gives structuring to organizations, and attracts more and more followers. Its actions focus on the main element of its existence, and for those who generate its values: the customer. The customer in this approach is the most important element in defining the process, he is not concerned with the internal organizational structure and management philosophies of the company, but with the products and services offered by it. The customer pays attention to what is delivered. It is a set of activities with one or more types of input that creates an output of value for the customer (HAMMER; CHAMPY, 2009) and to create social value.

Dantas, et al., (2010), also emphasizes that, in a generic way, it can be said that the public sector in Brazil has been experiencing a continuous process of reformatting and redefining its environment and practices for some time. Universities and Federal Institutes become one of the main sources for the economic and social development of the country, and the limit to their growth is closely related to the investments made in this sector (CARVALHAES; MEDEIROS; SANTOS, 2022).

The evolution and diffusion of management by processes bring the perspective of organizations as a set of internal and external processes that must be understood and mapped, so that tasks are not defined according to the function of organizational departments, but according to with activities that will provide greater added value to the organization and to the products/services offered. Thus, contemporary work rationalization begins to interpret organizational activities in a broad and cross-functional way, so that a process can cross departments and request different services, focusing on the activity that must be performed (BALDAM; VALLE; ROZENFELD, 2007).

Pradella, Furtado and Kipper (2012, p.6) conceptualize management by processes as a “systemic approach of designing and continuously improving organizational processes, by properly trained people working

as a team, uniting technological and innovative capabilities, with the objective of adding value to the customer”.

In the Process Management Manual of the Federal Public Ministry (BRAZIL, 2013), process management is a conceptual orientation that visualizes the functions of an organization based on the sequences of its activities, unlike the traditional functional approach, in which organizations they are separated by area of activity, highly bureaucratized and without a systemic view of the work they do. Carvalho and Paladini (2012) reports that critical success factors are related to changes in attitude and perspectives of people in evaluating the performance of organizational processes.

Therefore, with the implementation of process management in public buildings contracts under the IFTM, the aim is to continuously improve the analysis, definition, execution, monitoring and administration process, including support for the interaction between people and various computerized applications, enabling the standardization of the processes for contracting public buildings of the aforementioned Institute, seeking greater efficiency and effectiveness in the management of public buildings, avoiding losses to the treasury.

3 METHODOLOGY

To diagnose the main causes of contractual alterations in time and value in the constructions of the Federal Institute of the Triângulo Mineiro (IFTM) between 2009 and 2011, an exploratory research approach was applied to provide greater familiarity with the problem and make it more explicit. According to Zanella (2009), exploratory research aims to expand knowledge about a given phenomenon by exploring reality in search of deeper knowledge. The approach of this research can be classified as qualitative, as it allows for expanding the researcher’s understanding from the analysis of a complex phenomenon (CORBIN; STRAUSS, 2007; FLICK, 2009).

A case study was used as a research type.

The case study refers to an in-depth investigation of a specific case in all its aspects; however, it is limited, as it is restricted to one point and does not allow generalizations (YIN, 2005). The main objective of this type of research is to provide an overview of the theme addressed.

3.1 Data Triangulation

For data collection, techniques we adopted include:

- Online documentary research on the IFTM web site, focusing on open bidding notices that contain the numbers of each bidding for the years 2009, 2010, and 2011, covering modalities such as Invitation Letter, Price quotation, and Competitive Bidding.
- Documentary research in classified files and on the Comprasnet site to confirm the signing of contracts and amendments between the IFTM and the contractors, since publication in the Official Gazette is mandatory.
- Structured interviews with engineers who were part of the IFTM technical staff during the selected period for the preparation of this research.

3.2 Detailing the Interviews

We conducted structured interviews with engineers responsible for supervising the IFTM constructions, using the following questionnaire without changes:

1. How many works have you supervised approximately in the last 8 years at IFTM?
2. Were there any time and/or value additions in the works where you acted as a supervisor during the aforementioned period?
() Yes () No
3. Do you find the “lowest price” contracting type effective in terms of public works contracting?
4. Mention the main causes of value addendums in public works and the impact of each on the final value and delivery time of the building.
5. What are the causes of time

addendums in public works?

6. Are you regularly trained by the institution to satisfactorily perform your duties?

7. Do you feel fully secure and supported by your immediate supervisor to carry out your contract supervision duties in IFTM’s works?

8. In your understanding, is there any action that could improve public works contracting at IFTM, in terms of reducing or even extinguishing recurrent addendums, whether in value or time?

The interviews were conducted via the WhatsApp application and later fully transcribed for analysis. This procedure, including the use of WhatsApp and the transcription of the interviews, was detailed according to the evaluator’s criticisms, aiming to clarify how the study was conducted.

3.3 Data Analysis

For the analysis of the data collected in the interviews, we used the IRAMUTEQ software, which allows for the processing and statistical analysis of the produced texts. The software IRAMUTEQ allowed for a look at the collected material, qualifying the categorization process and, consequently, the study results, enhancing the qualitative research (KAMI, 2016). Several scientific studies have already used the IRAMUTEQ, in which we can mention the research carried out by Ribeiro and Souza (2024), the article showed, through the aforementioned system, that strategic management of MSW collection, restructuring of traditional management processes and the implementation of a municipal MSW management consortium are necessary to increase electricity generation.

The study by Pellizzon et al. (2024) through IRAMUTEQ together with content analysis, was fundamental to conclude that the climate of frustration among employees in São Paulo accounting offices is due to limited growth prospects and pessimism regarding the future of the business.

In this sense, within IRAMUTEQ it was chosen the “word cloud” methodology given its ability to provide an immediate and

intuitive visualization of the frequency of terms used by the interviewees, highlighting the most mentioned concepts and, consequently, the most relevant themes discussed during the interviews. This method fits the present research given its qualitative analysis and data triangulation by correlating the emerging themes with the evidence found in documentary research.

3.4 IFTM Structure Description

The Federal Institute of Education, Science and Technology of the Triângulo Mineiro (IFTM), by Law No. 11,892 of December 29, 2008, was created using integration of the former Federal Centers for Technological Education, Technical Schools and Agrotechnics and is defined as an “institution of higher, basic and professional education, multi-curricular and multicampus” (BRAZIL, 2008). It has an autonomous nature, administrative, patrimonial, financial, didactic-pedagogical and disciplinary. Like the other Federal Institutes of Technological Education, it offers education at different levels of education and modality of courses, allowing the student to enter from high school to the lato sensu (specialization) and stricto sensu (master’s and doctorate). Its organisational structure is currently composed of the Ituiutaba, Paracatu, Patos de Minas, Sponsorship, Uberaba, Uberlândia, Uberlândia Centro, Uberaba Technological Park and Campina Verde Advanced campuses and also the Rectory. Located in Uberaba, the Rectory is responsible for ensuring the institutional unit and for managing resources and planning, as well as being at the forefront of all educational interests, and economic and cultural aspects of the institution; its administrative structure is formed by the advisory office and has, as decision-making support bodies, the Pro-Rectories of Institutional, Teaching, Extension, Research and Graduate Development and Management.

In this chapter, the results and discussions obtained from the analysis of construction execution processes initiated between 2009 and 2011 at IFTM will be presented. The chapter structure is divided into four main subsections which are:

1. Main Characteristics of the Buildings Under Study: The selection of buildings that fit the research criteria will be discussed, along with a summary of their attributes;

2. Intensity of Time and Cost Extrapolations: This section will reveal the prevalence of delays and cost increases in the buildings studied, analyzing the causes and implications of these extrapolations;

3. Analysis of Interviews with Engineers from the IFTM Technical Staff: The professionals’ perceptions of the challenges faced in the management of public works are presented, with an emphasis on the role of basic projects and the execution of work;

4. Analysis of Results from a Process Management Perspective: Finally, we will discuss how process management can be applied to mitigate the identified problems, focusing on robust planning, effective communication and continuous monitoring.

4.1 Main Features of the Buildings under Scrutiny

After analysing the execution processes of buildings started between 2009 and 2011 within IFTM, we found 13 buildings fitting the parameters established for the present research (i.e, having been started from 2009 to 2011 and having been contracted via Competitive Bidding, Invitation Letter or Price quotation) as demonstrated in Table 2 (next page).

4 RESULTS AND DISCUSSION

Table 2 - Summary of the main attributes

of the buildings under study

Item	Building	Contracting modality	Renovation/expansion or new building?	Initial Value	Contract Time Addendum?	Price Addendum?
1.	Construction of the New Rectory Headquarters	Competitive bidding	New building	R\$ 3,731,142.54	Yes. 19.	Yes. 06.
2.	Qualicentro Renovation.	Competitive bidding	Renovation/expansion	R\$ 3,446,567.82	Yes. 20.	Yes. 02.
3.	Construction of seven classrooms.	Competitive bidding	New building	R\$ 481,580.50	Yes. 07.	Yes. 01.
4.	Construction of the fence, lighting and support rooms Soccer field.	Competitive bidding	New building	R\$ 196,462.80	Yes. 07.	Yes. 01.
5.	Construction of 5 classrooms, cafeteria and external lighting.	Competitive bidding	New building	R\$ 727,966.13	Yes. 02.	No.
6.	Expansion of the cafeteria	Competitive bidding	Renovation/expansion	R\$ 227,827.73	Yes. 08.	Yes. 01.
7.	Construction of Integrated Laboratories II	Competitive bidding	New building	R\$ 986,033.44	Yes. 06.	Yes. 03.
8.	Construction of entry areas.	Price quotation	New building	R\$ 190,160.35	Yes. 03.	Yes. 01.
9.	Construction of block G.	Price quotation	New building	R\$ 604,850.00	Yes. 02.	No.
10.	Adaptation of the multimedia room.	Price quotation	Renovation/expansion	R\$ 55,890.00	Yes. 01.	No.
11.	Construction of three storage rooms.	Price quotation	New building	R\$ 13,950.00	Yes. 01.	No.
12.	Pig farming reform	Price quotation	Renovation/expansion	R\$ 64,756.20	Yes. 03.	No.
13.	Renovation of the Administrative Block	Price quotation	Renovation/expansion	R\$ 676,097.90	Yes. 05.	Yes. 01.

Source: Dean Office of Administration (Buildings Process)

Eight of the 13 buildings studied were new, and 5 were renovations and expansions, as described in Table 3.

Table 3 - Types of execution of the buildings being studied

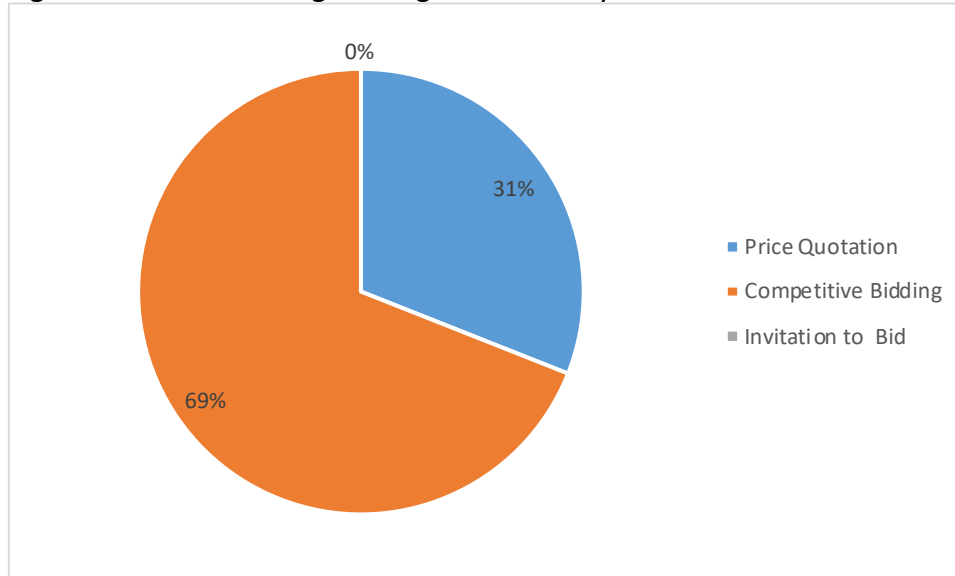
Item	Building Type	Renovation/expansion or new building?
01.	Construction of the New Rectory Headquarters	New building
02.	Qualicentro Renovation.	Renovation/expansion
03.	Construction of seven classrooms.	New building
04.	Construction of the fence, lighting and support rooms Soccer field.	New building
05.	Construction of 5 classrooms, cafeteria and external lighting.	New building
06.	Expansion of the cafeteria	Renovation/expansion
07.	Construction of Integrated Laboratories II	New building
08.	Construction of entry areas.	New building
09.	Construction of block G.	New building
10.	Adaptation of the multimedia room.	Renovation/expansion
11.	Construction of three storage rooms.	New building
12.	Pig farming reform	Renovation/expansion
13.	Renovation of the Administrative Block	Renovation/expansion

Source: Dean Office of Administration (Buildings Process)

The base projects that subsidised the contracting of the buildings, the object of this study, were carried out using another bidding process, whose criterion for contracting was the “lowest price”. The law of Public Bids and Contracts allows for contracting of buildings and services based on different criteria, other than the lowest price, such as best technique, technique and price, and higher bid or offer (Art. 45). Notwithstanding, what is usually observed is almost exclusively the “lowest price” criterion, justified by the simplicity of judging the best cost in a bidding process, which does not require further explanation to competitors, to TCU (if there is an appeal), and to the public. The least-compromising bidding method for managers is the ethics of choosing the winner. However, most of the time, it does not prove to be the best alternative in the absence of more specific technical criteria for the selection, even in the face of technical capacity supported by documentation.

Among the buildings under study, six were tendered through the Price quotation modality (buildings of bidding value under 1.5 million), and the others were tendered through Public Competitive bidding. No contracting happened via the Invitation Letter modality, as shown in Figure 2 (next page).

Figure 2 - Public Building bidding modalities by IFTM - 2009 to 2011



Source: Dean office of Administration (Buildings Process).

Among the buildings surveyed, we found that the contracting, be it for renovations or new buildings, happened entirely using a lump sum. The lump sum contract (contrato de soma fixa) regime materialises based on well-elaborated base projects, sufficient for the complete characterisation of the object. It is a low-risk and easy management by the administration (CROCE; MELO; AZEVEDO, 2008).

In this sense, the lump sum contract fully discloses the final value of the enterprise and the payment per stage of the completed building. In contrast, unit price contract regimes (regimes de contrato por preço unitário) allow for some variation of the price foreseen initially in case of changes in the amounts necessary during the contractual execution, measured in surveys of the quantities executed (CROCE; MELO; AZEVEDO, 2008).

4.2 Intensity of time and price overrun within IFTM from 2009 to 2011

The results also reveal that the 13 buildings simultaneously had a price, time, or both types of overrun. In the 13 buildings analysed here, we verified 100 addendum terms, 16 of which were price-related and 84 were overrun concerning time limits.

Therefore, after analysing the data collected, we found that the 13 buildings, the object of this study, cost 23% more than the amount predicted by the administration, in addition to extrapolating the Physical Schedule (execution time) predicted 6.5 times over. This data demonstrates a severe problem regarding compliance with the Physical Schedule of the building since delays in public buildings inevitably turn into losses to public coffers.

The critical information is that 56 of the 84 overruns associated with time and dates were the product of faults in either the budget of the bid/the contract/incomplete or inadequate overrun, 21 were due to flawed base projects, 3 to contractual changes and 4 to unpredictable factors, making up 67%, 25%, 3% and 5%, respectively. Regarding price overrun, 100% of the addendum terms signed were due to flaws or omissions in the base project that composed the tender.

From the analysis of these results, we can assess that the leading cause of the non-conformities detected in the formulation of contractual overrun is closely linked to the fragility of the tendered projects (flawed base project), as well as failures in the planning process (notice/contract/incomplete or inadequate overrun). TCU has stressed that public administrations generally do not have sufficient

human and material resources to carry out the planning and management of buildings, nor are they self-reliant to elaborate projects and monitor and supervise the execution of the contracted buildings. To address these shortcomings, they resort to the private market of consulting engineering (LOPES, 2017).

In this sense, Lopes (2017) also reports summary 261 issued by the Court, which confronts the need for adequate elaboration of base projects, establishing as illegal practice the revision of said project that transfigures the object originally contracted into another of different nature and purpose (BRAZIL, 2010).

Another aspect we examine is the intensity factor of cost overruns, checking if overruns are more “common” in new constructions or in renovation and expansion projects.

The result is surprising since, due to their level of complexity and susceptibility to unforeseen events during execution, reforms and expansions supposedly should have the highest rates of price overrun, which did not happen in the buildings studied here. Price overruns were requested in 75% of new buildings and only 25% of renovations and extensions.

Analysing audit reports issued by the TCU, FISCOBRAS from the same period this research focuses on (buildings started between 2009 to 2011), we conclude that most overruns, whether of cost or time, originated from overprice/overbilling, substandard or outdated base/executive projects, restriction to the competitive character of the tender (through requirements of operational, technical certificates, certificate of technical acquies equal to or greater than the tendered, etc.) and from the budget of the bid.

Looking at the 13 buildings under analysis, we found that from 2009 to 2011, the causes for price and time overrun were exclusively incomplete or inadequate budgets/notices or incomplete or inadequate base/executive projects. That is, exclusively flaws in the planning stage of the building.

In the period from 2012 onwards (up to the completion of the buildings under study), it was again detected that the main leading causes of overrun, be them of time or

value, were failures in the planning phase of the building since the highest error rates that generated overrun were, again, incomplete or inadequate budgets/notices, or incomplete and inadequate base or executive projects. With the results obtained, we can verify the relationship between the causes of contractual overrun for buildings within the IFTM in the period studied and the findings of audits carried out by the TCU in the same period.

Making decisions during the execution of the building is incompatible with a well-crafted construction plan. The lack of planning in the execution of a building can be verified when the building is carried out without knowing what will be built, without knowing the time necessary for the execution and, especially, the cost for the execution of the building. Without planning, there is no chance of productivity gains. From this perspective, design and execution cannot be dissociated. One depends on the other. The base project only makes sense when it offers total subsidies for execution. The building can only be built from a complete basic project (VARVAKIS, 2005).

In general, the buildings under study here reveal the incidence of subsequent contractual overrun, particularly time overrun and price overrun, on a smaller scale but no less critical. These requests for additions to the contract occurred through partial requests. Bachmann (2017) points out that partial requests suggest that a particular addition is requested due to problems at the time (planning flaws) and subsequent problems, leading to successive reprogramming of the execution schedule and costs of the building.

Our documentary research shows that the IFTM contracted, in the period 2009 to 2011, mostly building with flawed or inadequate projects and inadequate or outdated budgets that seriously impacted the final cost of the building since, in the 13 buildings we study, 100 contractual addendum terms were signed, 16 of which were price overrun and 84 were overrun of time. Meaning these buildings cost public coffers 23% more than planned and took, on average, 6,5 times longer to be finalised

than expected in the execution schedule of the building.

These additions directly harmed the population the buildings would attend to due to delays in the deliveries as well as unforeseen “costs”, such as extended rental contracts, realignment of contracts due to subsequent overruns regarding time limits and dates, and considerable stretches in the execution schedule of the building, inevitably causing losses to public coffers.

What makes the data we collected more impactful is verifying that time and price overrun surveyed within the IFTM, as well as nationally, through the findings of the TCU, originate from faults in the planning phase of the construction, which is unacceptable.

Another factor that strikes as strange is that all the bids analysed were contracted by the “lower price” criterion, whose premise is to be carried out with a well-elaborated basic/executive project, sufficient for the complete characterisation of the object. It is the criterion of lowest risk and most accessible management for the administration, which did not happen, as demonstrated by the high number of time and price overruns whose causes were exclusively flawed or outdated base projects and faulty budgets/notices/contracts.

4.3 Analysis of the interviews with the engineers who were part of the IFTM technical staff between 2009 and 2011.

For this study, after the processing steps, the meanings of words in the speeches of professionals were interpreted. So, the word “project” was cited on several occasions for its importance in the execution of public buildings.

[...] The causes are shortcomings of the base project and the addition of services, among which are technical improvements. (A1)

[...] Causes for overrun are mostly related to design faults or omissions. (A2).

[...] Errors or omissions from the parts involved in the bidding process, especially concerning budgets and base and executive projects, are substandard, causing costly (price overrun) alterations for continuing the execution

of buildings. In addition to this fact, delays in deliveries of buildings are also an issue due to project modifications that imply overrun regarding schedule and time limits. (A3)

[...]Each contract has its peculiarities; for that reason, it is often not described in the original spreadsheet of the call for bids all the necessary items to execute the building. It is also customary to modify some details in the project to better suit the functionality of the building. It may occur that, between the period of the adequacy of the project and the beginning of construction, the project may be altered, so the addendum is necessary for the contract. It will be impacted both on the final cost and delivery times. (A4).

Interviewees considered errors and omissions on base projects the determining factor for price and time overrun in public buildings. Findings of audits in public buildings carried out by the TCU in the same period of this research confirm the interviewees’ understanding.

In their research, Cerqueira and Varcovski (2017) point out that audits of buildings inspected in 2011 reveal that indications of irregularities involving public tenders, base/executive projects, and building budgets (overpricing/overbilling) were quite recurrent (TCU, 2010b). Detecting problems in the base/executive projects seems to be quite common, the second most recurrent finding of possible irregularities.

Poor engineering design is one of the biggest obstacles for the public administration in executing its buildings. The figures that Fiscobras found between 2011 and 2014 show that the finding Basic and Executive Project with alleged irregularity always presents itself as one of the three most significant findings surveyed by the TCU (CERQUEIRA; VARCOSVKI,2017).

A project can be considered successful when it manages to achieve its previously instituted goals and objectives through a requirements plan. That means fulfilling the technical performance assigned, keeping the expected Physical Schedule, and staying within the initially budgeted cost (FRIMPONG; OLUWOYE; CRAWFORD, 2003). However, this is not what we usually observe in Brazilian public buildings and with the object of this study, which

had all their buildings added in time, value or both.

[...] Improvements on the base project tendered and the technical unit price contract. (A1)

[...] Changes to the base and executive projects; buildings tendered without the proper approval of the projects from competent bodies; increase in the amounts of services initially provided for in the contract; the advent of unusual or unpredictable facts. (A3).

Although some words often appear in the word cloud, the interviews' content confirmed the interviewees' understanding, who pointed out that the most significant cause of price and time overrun are the incomplete or flawed base projects. On a smaller scale, other causes include the lack of training for contract auditors and support from the immediate leadership. The survey showed that, in the perspective of the professionals interviewed, incomplete or flawed base projects are the leading cause of the time and price overrun in public buildings improvements in their elaboration.

4.4 Analysis of the results found from the perspective of process management

The analysis of the data collected revealed a significant disparity between the initially foreseen deadlines and costs and the final results, with an average increase of 23% in costs and an extension of the execution period by 6.5 times the forecast. This scenario points to an urgent need to reevaluate project planning and execution processes.

The first consideration is the importance of a robust initial planning process, which incorporates detailed risk assessments and establishes the basis for the basic project. Process Management, with its focus on continuous improvement and optimization of workflows, offers a theoretical and practical framework for overcoming these challenges. The adoption of practices such as process mapping, critical analysis of stages, and the implementation of constant improvements could mitigate the risks of contractual amendments by term and value, ensuring the execution of works more in line with initial forecasts.

Furthermore, effective communication between everyone involved in the project - from the conception phase to execution - is essential. Process Management promotes a holistic approach that facilitates integration among different teams, enhancing transparency and alignment of expectations.

In addition to local findings, international studies on public works management, such as the one conducted by Munga and Mwiya (2024) in Zambia, highlight the effectiveness of contract management frameworks in reducing contractual amendments and promoting project efficiency. This global perspective reaffirms the importance of adapting process-based management practices, as suggested by Gheidar-Kheljani and Jahedi (2024), who propose a meta-synthesis approach to identify critical success and failure factors of mega-projects.

Furthermore, the implementation of a continuous monitoring system, another cornerstone of Process Management, would enable the Federal Institute of Triângulo Mineiro to closely monitor the progress of works, identifying deviations early and allowing for agile interventions to correct the course. This constant feedback system, combined with an organizational culture that values learning and continuous improvement, could transform the challenges encountered into opportunities for improvement and innovation.

Regarding analysis of interviews with engineers who were part of the IFTM technical team between 2009 and 2011, they revealed perceptions about the challenges faced in the management of public works. Interviewees emphasized the inadequacy of basic projects as the main cause of contractual amendments, both in terms of deadline and value. This observation aligns with the principles of Process Management, which highlights the importance of robust planning and design at the beginning of any project. The recurrence of this problem suggests a critical gap in the initial planning process, where the lack of detail and accuracy of basic designs can lead to misinterpretations, re-work, and consequently, delays and additional costs.

From a Process Management point of view, the solution to this problem lies in implementing an integrated and iterative approach to project planning and execution. This involves detailed mapping of all processes involved, from conception to final delivery, ensuring that all stages are appropriately reviewed and validated by all interested parties.

Furthermore, the reports of the interviewees, as well as observed in the analyzed data, highlight the need for a continuous monitoring and feedback system, another central pillar of Process Management. The implementation of a periodic review system during the execution of works would allow deviations from the original plan to be identified proactively, enabling timely corrections. This approach not only ensures adherence to the planned schedule and budget but also contributes to the continuous improvement of public works management processes.

5. CONCLUDING REMARKS

This study sought to address the question of amendments to contracts, specifically focusing on cost and time overruns in public buildings within the context of the Federal Institute of Triângulo Mineiro (IFTM) during the period from 2009 to 2011. The findings revealed a consistent pattern of issues predominantly originating from flawed or incomplete basic/executive projects.

The most striking revelation was the significant impact of these inadequacies on the timeline of project completion. Despite the substantial percentage of cost amendments observed in the analyzed buildings, it became evident that the more critical concern lay in time overruns, reaching an average extension of 6.5 times the initially estimated completion period. This not only translated into financial burdens resulting from amendments to the values of services not included in the initial bidding but also led to successive delays, rework to correct errors, and an overall inefficient utilization of crucial time for project execution and completion. In other words, wasting essential

time for executing and completing the project.

It is crucial to underline that these challenges were identified not in the execution and completion phases but primarily during the planning phase, particularly in the contracting of basic/executive projects. Addressing the root causes of these issues requires a comprehensive examination of the bidding modalities, contracting criteria, and potential pitfalls in the process from contracting to project completion.

As a limitation of this study, we acknowledge that the separate bidding process for project contracting, due to its complexity, was not thoroughly examined. Future research endeavors at the national level should, therefore, delve into the planning phase of public buildings, shedding light on the intricacies of contracting basic/executive projects.

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