Chapter 33

Action research with a proposal to improve the agility of public procurement processes, through the Lean Office

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ABSTRACT
The Lean Office aims to improve the workflow and eliminate existing waste in administrative areas. In this sense, this project aims to understand the applicability of the Lean Office philosophy employed in the procurement process of a public body, answering the following question: which activities do not add value to bidding procedures? For this, action research is used as a research methodology, oriented toward solving the research problem, adopting the process mapping tool to visualize and understand the activities performed in the process. It is intended to obtain as a result the mapping of the current and future value stream and an action plan for the implementation of the future scenario, to reduce the lead time and obtain improved efficiency in the execution of the bidding processes.

Keywords: Lean, Lean Office, Public Administration, Bidding Processes

1 INTRODUCTION

In the public sector, the length of administrative processes leads to delays and waste in the provision of services; according to Pereira (2019), this inefficiency can lead to a loss of resources that could be allocated to other demands.

As reported by Tapping and Shuker (2010), the Lean Office focuses on amortizing and eliminating waste present in the value stream of processed information and providing improvement in the structure of the environment; therefore, the philosophy is conducive to the study of public procurement administrative processes, seeking alternatives that reduce and/or eliminate the slowness of these processes.

It is understood that the study will contribute to the academy, by examining the applicability of Lean tools in the public sector; with the institution, for a better understanding of the processes and systems used and survey of the difficulties and waste of time existing in the bidding processes, favoring the emergence of new proposals for improvement in the work environment.

According to Fuentes and Díaz (2012), more research is needed to evaluate and detail the application of the Lean philosophy in the context of public services. This gap is further reinforced by the literature review carried out by Danese, Manfè, and Romano (2018), where only two studies in the sample investigate the implementation of Lean in the public sector.

For all the above, it is intended to carry out the identification of waste, with the application of the lean office in bidding processes of a public university, using the Value Stream Mapping (MFV) to identify activities that do not add value to the procedure, to eliminate bottlenecks and provide greater agility to processes, pointing out possible improvement solutions, establishing the following specific objectives:

- Map the bidding process through the MFV;
- Elaborate on the future MFV for the procedure;
- Develop a plan for implementing the future MFV.

The relevance of this research is the study of improvements in the flow of bidding processes, to meet the institution's demand, and conclude contracts in the shortest possible time.

For this research, information obtained from monitoring the processes in execution was used, as well as official documents existing in the records of the procedures carried out in the year 2019.

The mapping of only one of the different contracting modalities carried out by the institution; the researcher's lack of a more direct approach with the other subjects involved in the research and the lack of studies as the object of this work, in bidding sectors of other public bodies for comparison of results, were the limitations perceived in this research.

2 THEORETICAL FOUNDATION

2.1 THE BIDDING PROCESS

According to the Federal Audit Court (TCU) (2010), “bidding is the formal administrative procedure through which the Public Administration summons, under conditions established in a specific act, companies interested in presenting proposals for the supply of goods or provision of services ” (TCU, 2010, p. 15).

The bidding processes are filed with the request of the requesting body, justification and estimate of value, approval of the competent body, and respective allocation of resources for the expense; the bidding process is also part of the public notice, a document where the body specifies all the requirements and conditions necessary for participation in the bidding process.

In Brazil, the existing bidding modalities are competition, price assessment, invitation, tender, auction, and trading session; the auction can still be traditional or price registration (BRASIL, 1993). These modalities are legal variations of the way of conducting a contracting process and can be defined as a type of bidding procedure with differentiated characteristics (JUSTEN FILHO, 2005).

According to the Ministry of Economy, the electronic auction was used by the federal government in 99.71% of the bids carried out in 2018 and, of the R$ 47.7 billion of purchases made, acquisitions via the auction corresponded to BRL 19.1 billion, representing 40.16% of acquisitions in this bidding modality (AGÊNCIA BRASIL, 2019).

Because of the above, it was decided to evaluate the trading session mode, in the Price Registration System (SRP) mode, regulated by decree 9,488/19.

The SRP is the format in which companies make goods and/or services available at prices and terms recorded in specific minutes, and hiring is done when, and only if, it suits the entities; it is mainly used as a strategic factor in institutions, considered advantages as pointed out by Paiva (2007): evolution of planning; greater efficiency and flexibility in carrying out expenses; reduction of inventories and greater possibility of meeting unpredictable demands.

It is important to point out that, despite choosing to study the situation only of the SRP processes, the changes incorporated will also lead to improvements in all the others, since there will be a change in the flow of procedures, mainly in the steps referring to the internal phase, which are identical in the others.

2.2 THE LEAN OFFICE PHILOSOPHY

The Lean Office concept comes from the Lean Manufacturing philosophy and refers to a manufacturing paradigm based on the fundamental goal of the Toyota Production System, whose premise is to continuously minimize waste to maximize flow (TAPPING; SHUKER, 2010).

Waste is any activity that consumes resources without producing any value, and it is necessary to make systematic and permanent improvements that eliminate even its sources (WOMACK; JONES, 2012).

Studies implemented by Wanderley et al. (2017) demonstrated that implementing Lean Office in public institutions improves the flow of information and reduces waste, considering a focus on activities that effectively add value.

However, Fuentes and Díaz (2012) emphasized that the adoption of Lean in public services is often inappropriately implemented, disregarding a fundamental change in the culture and organizational approach that establishes minimum conditions, such as understanding the capacity, demand, and linkage of the improvement to the strategy.

The reduction of waste in administrative activities involves a greater amount of information than on the shop floor, mainly in the public sector, due to the variable cycles of activities that are often difficult to measure; there is greater dependence on people, they usually do not have the recording of errors and standardization of tasks. (MARIZ; PICCHI, 2013).

According to Shou et al. (2017), VFM was first introduced in the Lean philosophy in 1995 and described by Hines and Rich (1997) as a technique capable of identifying waste in an individual value stream and applying appropriate direction for its elimination.

For Shou et al. (2017), waste is linked to poorly designed activity flows, poor distribution of steps in the process, and lack of employee qualifications and teamwork spirit. Therefore, by carefully analyzing the flow, through mapping it becomes possible to identify opportunities to simplify and/or eliminate steps that do not add value to the process.

In the work by Peralta et al. (2016), the current MFV made it possible to identify lead time and waste, in addition to creating an action plan and proposing feasible improvements, which led to a reduction of around 82% in the time between the initial and final stages of the process in evidence.

2.3 THEORETICAL CONTRIBUTION

The theoretical contribution of this work was evidenced through a bibliometric analysis of the theme, carried out between 09/01/2020 and 15/01/2020, revealing that few studies have addressed the adoption of mapping and identification of activities that do not add value to bidding procedures.

Data collection was carried out in the Web of Science, Scopus, Science Direct, and Informs databases using the terms " (between quotation marks), using the expression "and" as search logic, as shown in Table 1:

Table 1: Search strings

Termo	**Variações**	**Lógica da busca**
Mapeamento de Processos	*Process Mapping*	
Administração Pública	*Public Administration* *Public Service* *Government* *Government agencies* *Public Management*	*AND*
Licitações	*Bidding* *Procurement Process* *Sector of Bids*	

Source: Elaborated by the author

Initially, 343 papers were found; Duplicate works, not written in English and/or unavailable for free consultation were excluded, and the sample was reduced to 219 articles; with selective reading, excluding works that showed content misaligned with the objectives of this research, a sample of 33 scientific articles was reached, contemplating research, diagnoses and case studies carried out in various sectors of the public area.

Bibliometric analysis revealed that restructuring was the subject of 8 works that evaluated the procedures carried out, proposing improvements in the formatting of sectors or processes; the factors influencing work processes were the subject of 11 articles discussing the effect of adopted practices; the theme of management methodologies and tools was approached in 5 studies, which dealt with planning, standardization, price estimation, and systems methodology; finally, the analysis of public procurement and contracting processes was addressed in 5 surveys, only 2 works with the application of process flow mapping and the others from the perspective of quality management.

Nwanna-Nzewunwa et al. (2016), point out that process mapping, used to identify specific barriers and facilitators, is one of the likely interventions that contributed to the level of success in the processes, and, Borges, Walter, and Santos (2016), suggest as an improvement solution, the automation and acceleration of processing, indicating the theme for future studies.

3 METHODOLOGY

Action research is a qualitative method of approaching problems that cover many forms of action-oriented research (TURRIONI; MELLO, 2012).

This work is classified as applied in nature and used the action-research method, as it makes it possible to dynamically study the problems, decisions, actions, negotiations, conflicts, and awareness that occur between agents during the process of transforming the situation (THIOLLENT, 1997).

As for the objectives, the research is explanatory, participant, and field, with a qualitative approach, qualitative analysis of results with the adoption of statistical tools that point out some quantitative information.

Considering the clarity in the definition of steps, this study was based on the proposition of Costa, Politano, and Pereira (2014), who suggests a cycle of eight steps, consisting of (1) identification of the problem, (2) recognition through research in the literature, (3) planning to solve the problem, (4) implementation, (5) monitoring the effectiveness of the proposed solution, (6) evaluating the effects of the action, (7) improving the plan (if and whenever necessary) and, finally, (8) exit if the results are satisfactory.

In this work, only the first 3 stages of the cycle were carried out, leaving the others as a suggestion for future work.

In data collection, semi-structured direct observation was adopted, as consultations with documentation and existing records, and meetings with the civil servants involved.

In applying the method, we sought to combine the steps proposed by Costa, Politano, and Pereira (2014), with the five basic principles of Lean portrayed by Tapping and Shuker (2010) and the suggestion of unfolding the current value stream maps and future, established by Rother and Shook (2012).

4 ANALYSIS OF RESULTS

Currently, the SRP is the mode most used by the institution under study; in the period from 2017 to 2019, of the 116 trading sessions scheduled by the agency, 62% were SRP, with the activities summarized as follows: purchasing agents receive the demands, formalize the requisitions and send them to the sector responsible for processing the bidding processes; this sector, the central focus of this work, performs the activities of analysis of requests, formalization of administrative processes; public bidding sessions and execution of contracts.

The process consists of 42 steps, covering the activities of analysis of requests, formalization, and assessment of documents in the process, the inclusion of data, and operations of government systems for purchasing, authorizations, inspections, and disclosure.

Considering step 1 of the action-research method (Identification of the problem), the cycle time of the SRP processes was determined, based on consultations with the institution's archives and other control documents of the procedures carried out in the years 2017 to 2019, and direct observation of the work rhythm of the employees involved; next, maps of the current situation were drawn and a future scenario was proposed, carrying out a comparative analysis of the aforementioned constructed maps.

The development of the current and future MFV was carried out under the guidance of the proposal established by Rother and Shook (2012), based on the identification of the process to be mapped and the drawings of the maps themselves.

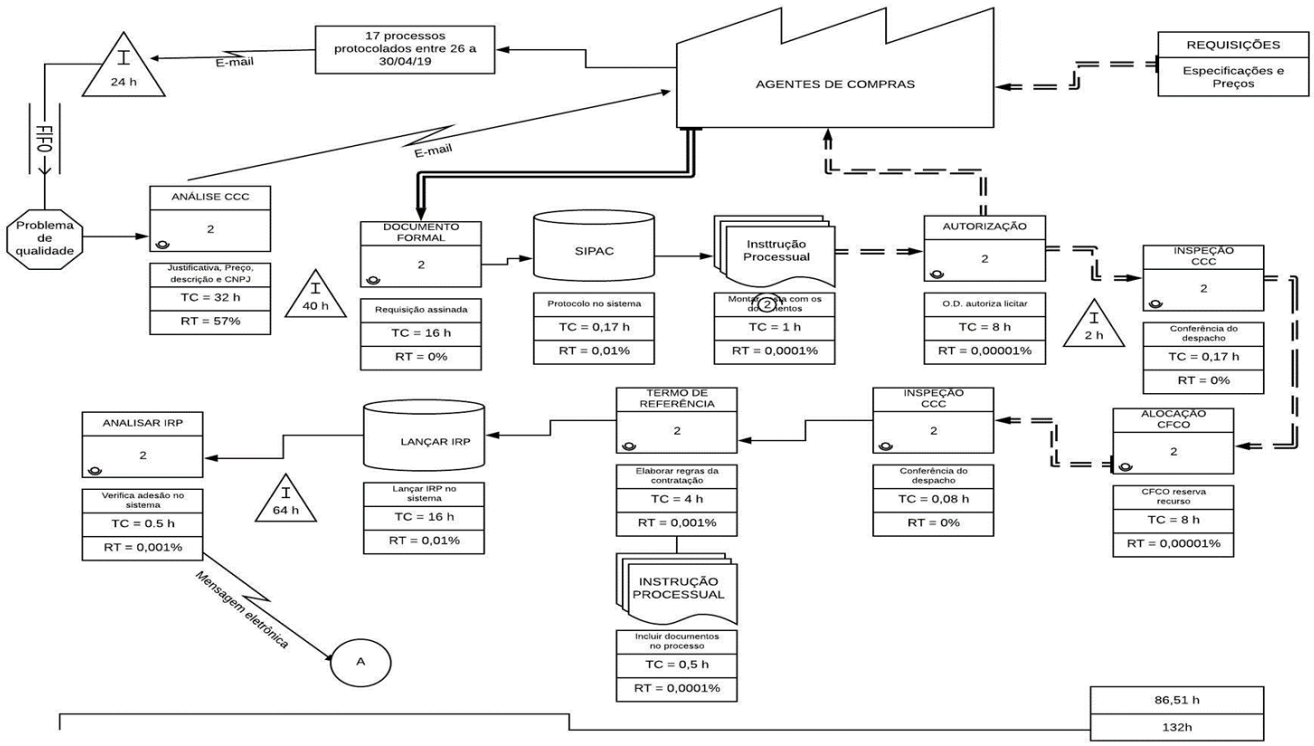
4.1 STEP 1: IDENTIFICATION OF THE PROBLEM

In this phase, the research showed that, based on the protocol in the sector, SRP requests took, on average, 40 days in the internal phase and 80 days in the external phase; some processes considerably extrapolated these deadlines, as a result of an administrative decision regarding acquisition priorities or due to occurrences such as the filing of appeals by bidders and/or detection of errors in the procedure, exceeding the general average of deadlines by 3 times presented, which would be approximately 26 days in the internal phase and 44 days in the external phase.

In this context, these processes were mapped, presenting the current flow, and seeking to identify possible existing bottlenecks and steps that do not add value to the process.

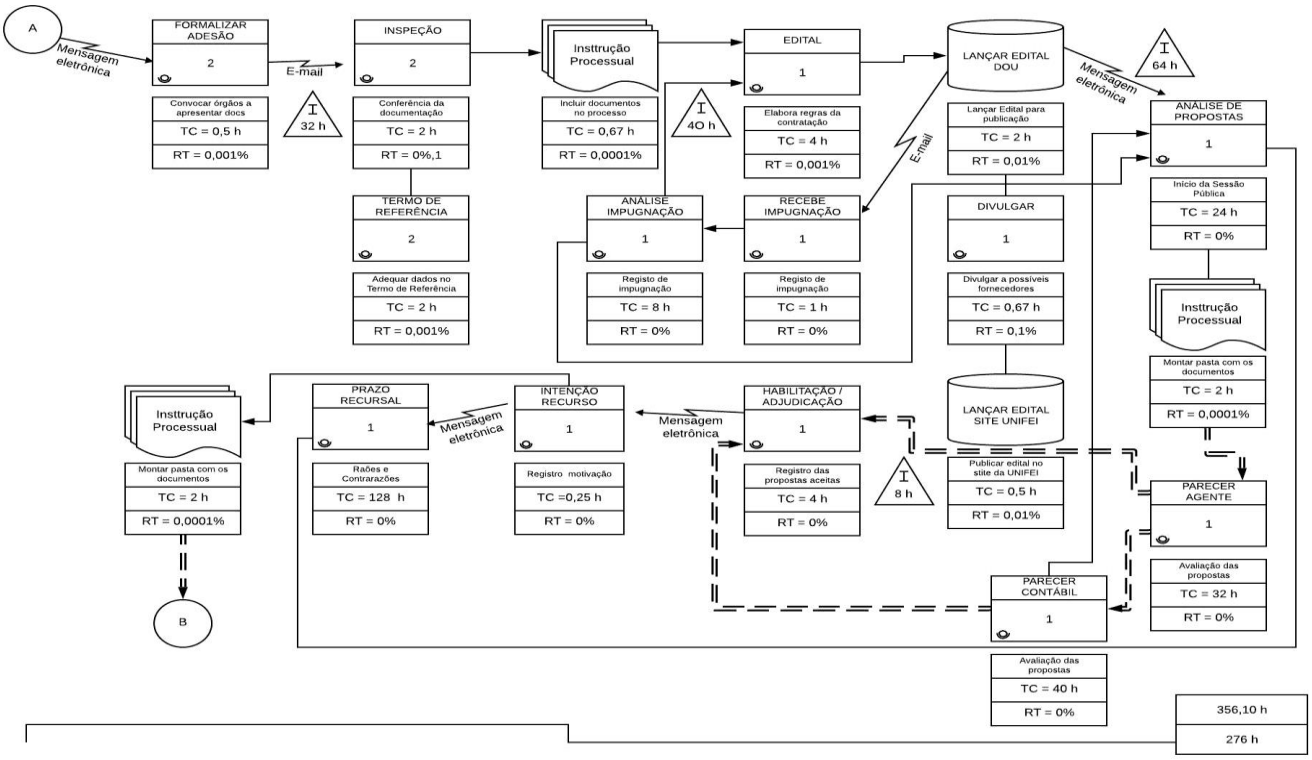
The mapping started with the delivery of the requisition, by the Purchasing Agent, to the responsible sector, via email, for analysis and review of the documents, before the official formalization, via printed document, for the procedural assessment. The complete Current Value Stream Map can be seen in Figure 1.

Figure 1: Current State MFV - SRP Procedures (Part 1)



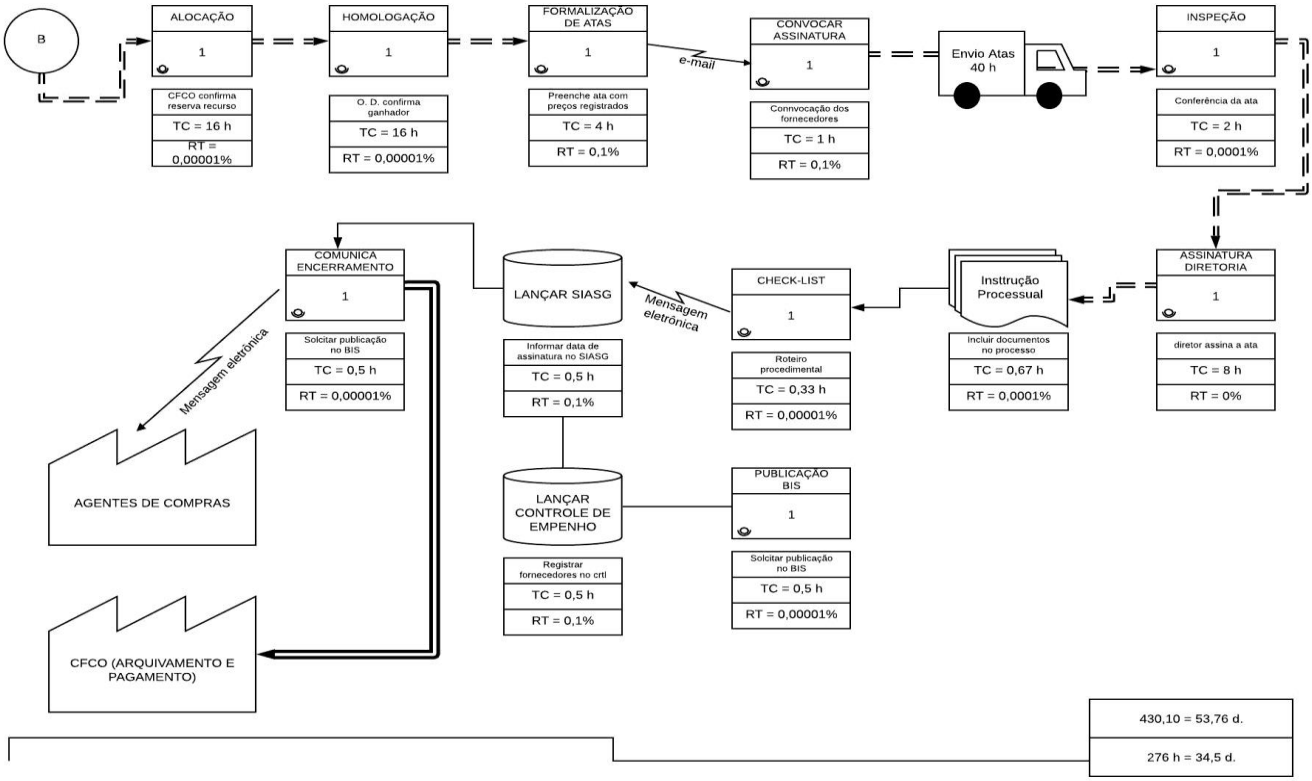
Source: Elaborated by the author

Figure 1: Current State MFV - SRP Procedures (Part 2)



Source: Elaborated by the author

Figure 1: Current State MFV - SRP Procedures (Part 3)



Source: Elaborated by the author

With the MFV shown in Figure 1, some important conclusions were drawn:

a) The beginning of the process indicates a relevant quality problem, with a 57% rework rate;

b) After analysis, the requisitions are returned to the Purchasing Agent for formalization (printing and signing of the documents) before proceeding to the next steps;

c) There is a non-value-added time of 24:00:00 hours for the organization of work;

d) The procedure has inventory times totaling 256:00:00 hours, due to legal requirements such as disclosures and appeal deadlines; making up 62% of the lead time of the process;

e) Orders are processed in a FIFO system ("First in, First out"), in which requests filed longer are dispatched first; however, sometimes senior management interferes and changes the order in which requests are processed;

f) f) Although the unit has an integrated system that proposes to computerize the flows of the entire administrative area, this is not yet applied in purchasing and contracting activities;

g) The lead time has a total time of 88 working days and an inventory time of 64%;

h) The Value Added Time of the process, calculated by dividing the process cycle time by the waiting time, is approximately 56% of the useful time;

i) Most of the activities did not require waiting time, however, some of these times are too long, such as, for example, between the sending of the analyzed request and the return of the signed documentation, and also between the procedural instruction after the elaboration of the Term of Reference and the Notice, actions 3 and 4 of Figure 1.

j) Waiting times for publishing the public notice and deadlines for appeals, are set by law as mandatory, cannot be modified, and demand a considerable amount of time for the procedure;

k) A certain complexity is observed in the procedure, considering the need for authorization from other sectors and budget release, in addition to technical and accounting opinions about the proposals classified in the bidding process.

Once the times and activities were surveyed, the degree of contribution of these stages was classified, based on the seven wastes pointed out by Tapping and Shuker (2010), in line with the mandatory documents established in the legislation, noting that 45% of the activities are obligatory, therefore necessary, and 19% are wasteful.

From this analysis, the waste was verified according to Table 2:

Table 2: Waste in SRP procedures

DESPERDÍCIO	SIGNIFICADO	IDENTIFICADOS NO SRP
Defeitos	Erros que exigem retificação; documentos ou informações equivocadas.	Ocorrência de problemas de qualidade das requisições encaminhadas no processo inicial do procedimento, em torno de 57%, gerando retrabalho.
Superprodução	Falta de coordenação entre demanda e produção, ou atividade que gera muita papelada ou informação desnecessária.	Inicialmente é gerado para o processo o documento nomeado “Requisição de Compras” e posteriormente esse documento é transcrito em um novo documento denominado “Termo de Referência”.
Espera	Ociosidade humana ou de equipamentos e tempo de espera. Processos que dependem unicamente de assinaturas de pessoas específicas.	Várias etapas do processo consomem grande tempo de espera nas fases de autorizações e assinaturas em outros departamentos. Além da ociosidade nos primeiros 4 meses do ano, por não serem protocoladas requisições neste período.
Transporte	Movimento excessivo de documentos entre departamentos gerando desperdícios de tempo.	Necessidade de transporte para retorno da Ata de Registro de Preços assinada pelos fornecedores, via Correios.
Movimentação	Movimentos desnecessários dos trabalhadores ou movimento excessivo de documentos e solicitações entre áreas.	O trâmite dos procedimentos licitatórios se dá em processos físicos, demandando o vai-e-vem do processo para assinaturas e inclusão de documentos.
Processamento inapropriado	Processamentos desnecessários e produção de itens que ninguém deseja ou processo que não necessita de análises por diversos departamentos que não agrega.	O tempo de análise das requisições poderia ser menor caso o problema de qualidade fosse sanado.
Estoque	Processos parados aguardando a liberação de autorização para serem encaminhados para a próxima etapa.	As requisições são protocoladas na CCC de uma só vez em determinado período do ano, o que acaba por gerar um tempo de espera excessivo, em que os processos ficam aguardando análise para serem liberados para a próxima etapa.

Source: Elaborated by the author

Having identified how the flow of information and the possible existing waste works, the future MFV was prepared, and adjusted for better performance of the procedure, together with the Action Plan for the implementation of the new proposed scenario.

4.2 STEP 3: ACTION PLANNING

Once steps 1 and 2 of the action research were completed, with the identification of the problem and due research in the literature on studies related to the theme, the next step was step 3, with the planning of actions for a possible solution to the identified problems.

It is noteworthy that the university has a system that computerizes the flows of the administrative area, and also performs the processing of bidding procedures in physical processes, demanding a coming and going of the process for signatures and inclusion of documents.

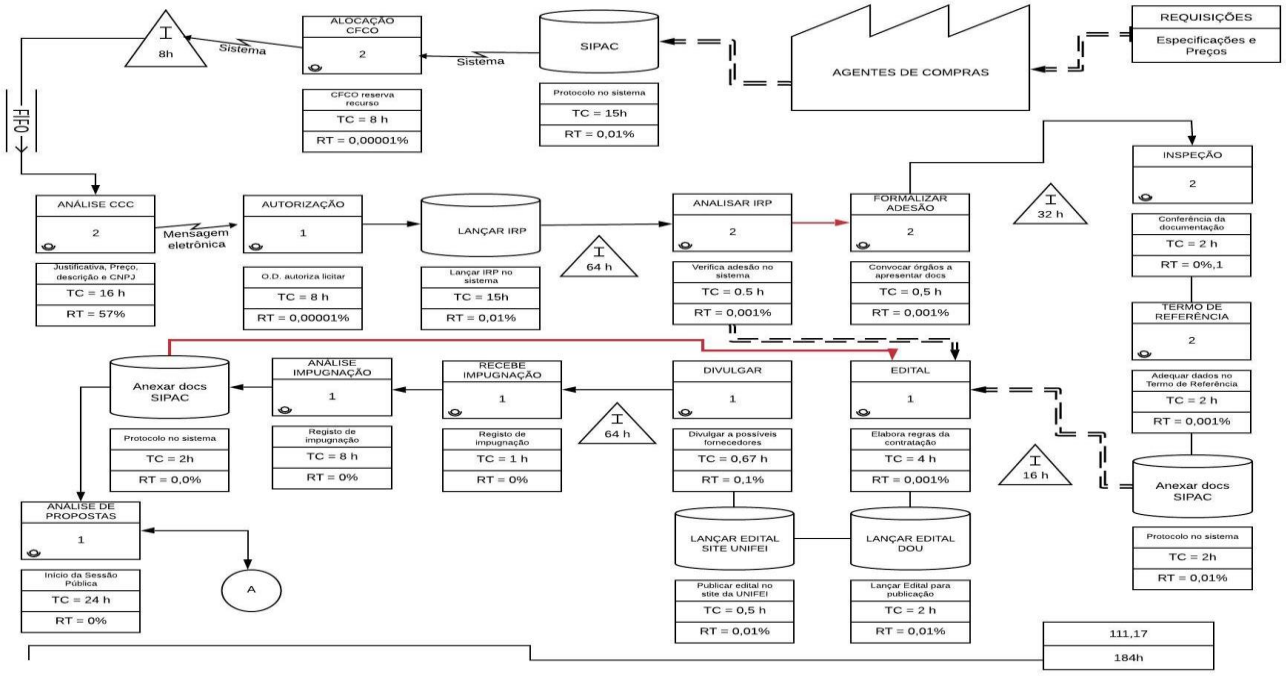
The system in question is SIPAC, which among the various modules that compose it, are the modules "Purchases" and "Bids", which offer control of the entire bidding procedure, from the preparation of requisitions to the payment of the acquisition.

In the "Purchases" module of SIPAC, a purchase is triggered from the requisitions, being carried out automatically in the system, the registration of the demands, and the processes generated from these demands; in addition, once the requests are entered into the system, it is possible to monitor, search, authorize, service and chargebacks at any time during the process (UFRN, 2018).

With the current MFV, it was possible to identify some long cycle times, possibly related to disorganization and/or poor time management in the execution of procedures that, if carried out through SIPAC, could have a lower degree of waste and an increase in the aggregation rate. of value.

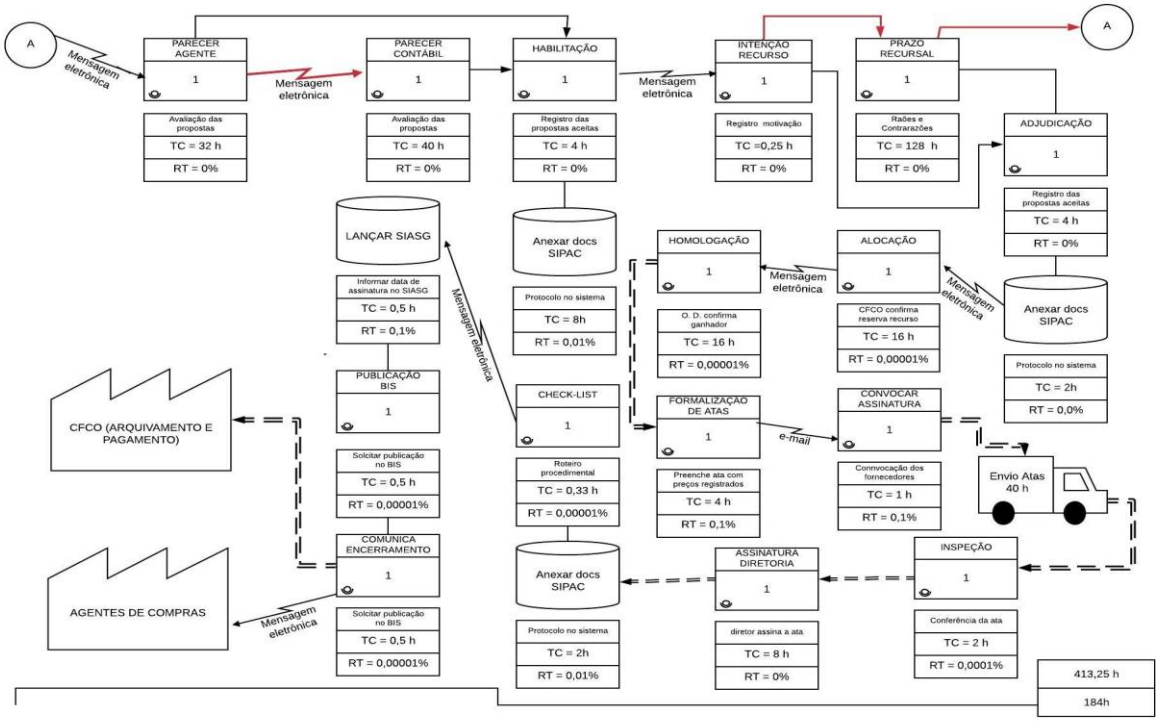
For all of the above, the future MFV is proposed, shown in Figure 2, contemplating the use of SIPAC as an opportunity for improvement to achieve higher performance in carrying out the procedures.

Figure 2: Future State MFV – SRP Procedures via SIPAC (Part 1)



Source: Elaborated by the author

Figure 2: Future State MFV – SRP Procedures via SIPAC (Part 2)



Source: Elaborated by the author

Comparing the Current and Future MFV, the following improvements stand out:

a) Centralization of information;

b) Elimination of the "Formal document" step;

c) Elimination of the 40h waiting time between "Analysis" and "Formal document";

d) Ease of monitoring processes;

e) Better stock control and standardization of items: the system displays the materials available in stock and a description of previously purchased items, reducing the analysis time of the responsible sector;

f) Elimination of "procedural instruction" times and printing costs;

g) Reduction of rework given the obligation to enter data, which is usually missing in requests sent via email, and the total value automatically generated by the system;

h) Modified processing for continuous flow activities, optimizing the procedure with uninterrupted activities.

The proposed future scenario foresees a 16% reduction in lead time, which is now approximately 80 days, and a 33% reduction in waiting time, which is now 45%.

As stated by Rother and Shook (2012), it will not always be possible to implement the future scenario at once, there is a lot to do; thus, the action phase was designed, below, as a practical contribution that the research work seeks to bring.

The Implementation Plan defines a plan to lead the implementation of the SIPAC to carry out the bidding processes. To this end, a 5W1H matrix was prepared with the actions to be implemented, as shown in Table 3:

Table 3: Action plan

PLANO DE IMPLEMENTAÇÃO MAPA DO FLUXO DE VALOR FUTURO						
Ação	**O que fazer?**	**Porque?**	**Quem fará?**	**Como?**	**Onde?**	**Quando?**
1	Levantar histórico das ocorrências de implementação do SIPAC para realização dos processos de licitatórios.	Para entender a não aplicação do módulo até o momento.	Setor responsável pelas compras e contratações.	- Consulta a documentos e registro de possíveis tentativas anteriores de implantação do sistema. - Entrevistas com o gestor de implantação do sistema na instituição.	Na própria instituição	jan./20
2	Apresentar relatório do levantamento realizado à chefia imediata.	Para conhecimento e tomada de decisão quanto à retomda de implementação do procedimento.	Setor responsável pelas compras e contratações e/ou autoridade competente.	- Reunindo-se com a chefia imediata.		
3	Verificar junto ao setor de TI posição sobre o funcionamento do SIPAC para realização dos processos de licitatórios.	Para agilizar o processo de implementação no Campus Itabira.		- Reunindo-se com o Diretor da unidade e o gestor de implantação do sistema na instituição.	Videoconferência	
4	Indicar e orientar membro da unidade de TI do Campus para trabalhar junto ao Gestor de implantação do sistema a implementação do módulo.		Setor responsável pelas compras e contratações.	- Reunindo-se com o Coordenador da Unidade e Diretor da TI.	Videoconferência	Até fev./20
5	Divulgar o mapeamento atual do procedimento	Para melhor visualização das partes envolvidas	Setor responsável pelas compras e contratações e setor de comunicação.	- Via email de divulgação e site da instituição.	Na própria instituição	Mar./20
6	Convocar todos os servidores envolvidos com os processos de compras para treinamento sobre o novo procedimento.	Para capacitar os servidores para operar os processos de compras de forma eletrônica no sistema.	Autoridade competente e setor de comunicação	- Envio de memorandos / convocação para o treinamento em datas e horários preestabelecidos.	Atividade de forma remota	
7	Treinamento dos usuário (todos os servidores envolvidos com os processos de compras).		Gestor de implantação do sistema na instituição com participação de membros do setor de compras e contratações.	- Fornecendo treinamento e capacitação adequados.	Laboratório de Informática do Campus	Abr./20
8	Determinar e divulgar data para o efetivo envio de requisições apenas por meio do sistema.	Reduzir horas de produção e iniciar a efetiva aplicação da ferramenta.	Autoridade competente, setor de comunicação e setor Responsável pelas compras e contratações	- Envio de memorandos / comunicados para os servidores envolvidos com as requisições e processos de compras.	Atividade de forma remota	
9	Avaliar o andamento do novo procedimento	Atuar corretiva e preventivamente para o bom funcionameno do sistema	Setor responsável pelas compras e contratações e gestor de implantação do sistema.	- Acompanhamento dos processos em execução. - Entrevistas com os usuários.		Até dez./20
10	Implementar ações para incentivar assinatura eletrônica pelos fornecedores.	Reduzir o tempo de espera das atas de registro de preços	Setor responsável pelas compras e contratações.	- Avaliar o procedimento e ações possíveis de implementar.	No próprio setor	Até dez./20
11	Assegurar bom funcionamento do novo procedimento.	Dar confiabilidade e constância ao processo.	Setor responsável pelas compras e contratações e gestor de implantação do sistema.	- Verificando, analisando e atuando no sistema, garantindo o fluxo contínuo.	Junto aos agentes de compras	Todo o ciclo

Source: Elaborated by the author

It should be noted that the support and action of top management are essential for this implementation, considering the process of transformation and awareness of those involved.

5 FINAL CONSIDERATIONS

This research aimed to apply the lean office in the bidding processes of a public university using the MFV tool to identify activities that do not add value to the bidding procedures, eliminate bottlenecks, and provide greater agility, pointing out possible improvement solutions.

The research brought a brief contextualization of the theme, from the theoretical foundation and bibliographic survey of works on the subject.

Adopting the action-research methodology, the proposed steps were concluded, identifying the problem, with the diagnosis of the present procedure; the design of current and future MFV maps; an indication of waste, and elaboration of the implementation plan of the actions to be adopted.

The results presented in the research demonstrate strong indications that process mapping contributes positively to the analysis and detection of improvements, resulting in considerable gains.

Finally, the research demonstrated that the use of the methodology proposed by Tapping and Shuker (2010) proves to be effective for viewing unnecessary phases in the processes, allowing the reduction of the total lead time through the elimination of waste, including in public administration; however, the public service has some minutiae and rules that generated long waiting times, making it difficult to establish a more agile pace for public purchases.

It is noteworthy that, for continuity of work, one must consider the major challenges that are faced in this process arising from external factors that heavily interfere with the productivity of the sector.

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