MANAGEMENT OF UNIVERSITY INFRASTRUCTURE PROJECTS BASED ON MULTIMETHODOLOGY PSM

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ABSTRACT

Organizational resources are key aspects to be captured, maintained and efficiently managed to promote the sustainable growth and technological advance of the University environment. However, this scenario is highly complex, especially regarding the management of infrastructure projects. Considering this context, the objective of this paper is to develop a framework for structuring the problem of managing infrastructure projects in a Brazilian Public University, by using a multi methodological approach based on two Problem Structuring Methods (SSM and SODA). Results showed that the proposed framework was able to clarify the main stakeholders involved in the problem situation, and highlight three main strategic options that should be analyzed to improve the management of infrastructure projects in the University environment.

KEYWORDS. SODA. SSM. University.

1. Introduction

The capture, maintenance and management of organizational resources are essential spheres of actions to promote sustainable growth as well as technological progress of an University environment [Oliveira et al. 2019]. Nevertheless, an inherent complexity surrounds this domain, especially regarding the management of infrastructure projects. This complexity is mostly explained by aspects such as the existence of conflicting interests among different parties (such as directors and professors), an unstructured decision making process without clear workflows and goals, legal limitations, and severe resource availability [Esteves 2013] [Oliveira et al. 2019].

Considering this context, evaluating strategies to structure the problem of managing infrastructure projects in Brazilian public universities is a logical proposal to promote a healthier, up to date, and more appropriate environment for its members. The management of public projects in the university environment is a present topic in the literature [Esteves 2013] [Bittencourt et al. 2017] [Oliveira et al. 2019], however, the implementation of problem structuring methods (PSMs) for this purpose is little explored. Given this scenario, this work aims at structuring the problem of managing infrastructure projects in a Brazilian Public University.

2. Literature Review

Soft Operational Research encompassess the application of Problem Structuring Methods (PSM), defined as a class of qualitative approaches created to provide analytical assistance in complex contexts, characterized by factors such as partially conflicting interests, perplexing uncertainties, and the existence of multiple actors [Ackermann 2012] [Rosenhead 2006] [Smith and Shaw 2019].

Among the problem structuring methods available in the literature, Strategic Options Development and Analysis (SODA) and Soft Systems Methodology (SSM) present a generality of application [Belton and Stewart 2010]. SODA was firstly developed by Colin Eden and colleagues, and is based on a cognitive mapping approach, which can be defined as a graphical representation of a problem, in a map format, used to express unseen aspects of a problem, exploring options to achieve goals or objectives [Abuabara and Paucar-Caceres 2021] [Ackermann 2012] [Georgiou 2010].

Different contexts where SODA was applied include, e.g. Sao Paulo state's disaster management system mapping [Manso et al. 2015], electronic waste reverse logistics decisions analysis [Guarnieri et al. 2016], and railway development prospects mapping [Georgiou 2009]. In all cited examples, SODA was a feasible method to highlight key aspects that should be treated to improve the problem situation.

Regarding SSM, developed by Checkland, a mixed approach of literary background of social theory and real-world problem situations is the base of its approach, which can be summarized by seven steps, described as follows: (1) Unstructured problem situation; (2) Problem situation expressed; (3) Root definition; (4) Conceptual model; (5) Comparison; (6) Debate about changes, and (7) Action to improve situation [Checkland and Winter, 2006] [Neves et al. 2004].

The system world can be noticed at steps 3 and 4, while the real world encompasses steps 1,2,5,6, and 7. It is important to highlight that the CATWOE mnemonic can be applied to the third step, aiming to delineate the root definition with completeness by presenting the following elements: Customers (C) - the ones who benefit or are victims of the system; Actors (A) - the ones who will perform the activity to be modeled, known as Transformation process (T); Weltanschauung (W) - worldview/beliefs that evoque meaning to T; Owner (O) - the ones who could stop T; and Environmental constraints (E) - elements outside the system which it takes as given [Bergvall-Kåreborn et. al, 2004] [Checkland & Tsouvalis, 1997].

Different contexts where SSM was applied include, e.g. energy efficiency analysis [Neves et al. 2004], and urban energy planning [Coelho et al., 2010]. In both examples, SSM was able to highlight the main stakeholders, their relations and perspectives towards the problem.

3. Methodology

Given the opportunity to explore the application of PSMs, the present work structured the problem of managing infrastructure projects in a Brazilian Public University, based on a set of data collected in a previous analysis to present the perspective of key stakeholders, in a similar approach to Georgiou [Georgiou 2009]. A multi-methodology was applied, based on SODA and SSM, as described by Figure 2.

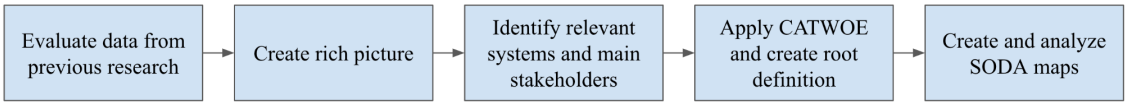


Figure 2 - Methodological framework

The data from previous research consisted of 150 processual documents from seven infrastructure projects of different departments and/or campi from the same university. In addition, meetings with its main stakeholders were also conducted. For this analysis, eight stakeholders were involved, being: Projects Department, Campus Town Hall, Central Administrative Department, Economic and Financial Planning Department, Language Studies Institute, Arts Institute, University Technical College, as well as a projects company.

4. Results

After a closer look at the data cited in the previous section, the rich picture was created as shown in Figure 3. Even though it provided a clear view of three relevant systems, only one (the decision-making process) was selected to test the methodological framework, as to reduce the inherent high complexity of the problem situation. This relevant system presented three main stakeholder groups: the applicants, the management, and the executive bodies, each of them with a different degree of power and influence.

The CATWOE was applied to create the root definition, summarized as follows: "a structured, efficient and optimized decision-making process for executive bodies to manage infrastructure projects in the university environment, in accordance with the rectory guidelines, and available budget."

The SODA aggregated map was able to define 10 constructs, and three strategic options, being: define strategic, urgent and necessary projects to the institution.

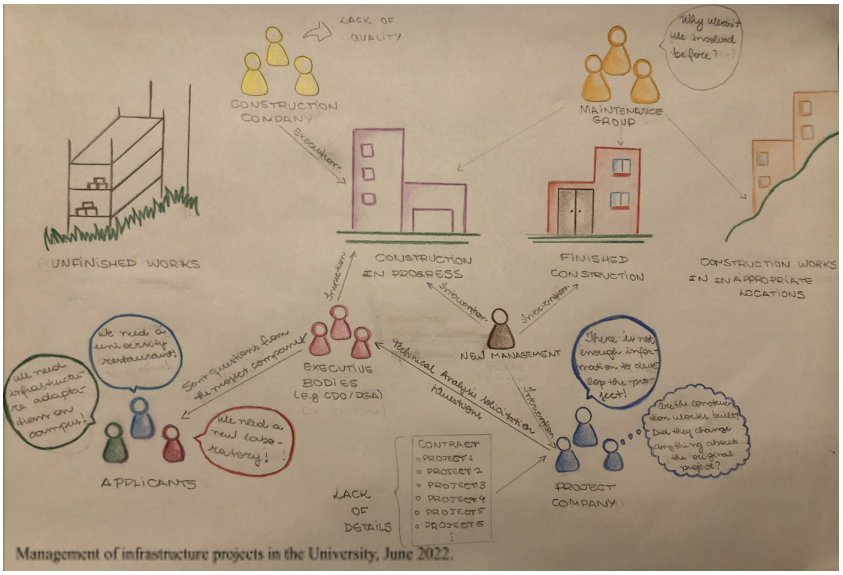


Figure 3 - Rich Picture

5. Conclusion

The proposed framework was feasible to provide the understanding of both the relevant systems and the main stakeholders involved in the problem situation, specially by means of previous research data analysis and rich picture evaluation. In addition, it presented a clear view

of the main gaps of the current process, such as the lack of a clear workflow with defined roles and responsibilities for a project approval.

Moreover, the strategic options outlined by the SODA map highlighted the main spheres of action to improve the management of infrastructure projects in the University environment, which could be done e.g. by applying Multicriteria Decision Aiding/Analysis methods to define a set of analysis criteria and further select the projects that fulfill the requirements of strategy, urgency and necessity.

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