

USE OF DEVELOPMENT METHODOLOGY IN ORGANIZATIONS: CHALLENGES AND RECOMMENDATIONS

Lenira Ribeiro de Pina¹; Bruno Miguel Ferreira Gonçalves²

¹ Universidade Jean Piaget de Cabo Verde - UniPiaget, Praia, Cabo Verde

² Universidade Politécnica de Bragança (UPB), Bragança, Distrito de
Bragança, Portugal

Autor Correspondente: ribeirolenira@gmail.com

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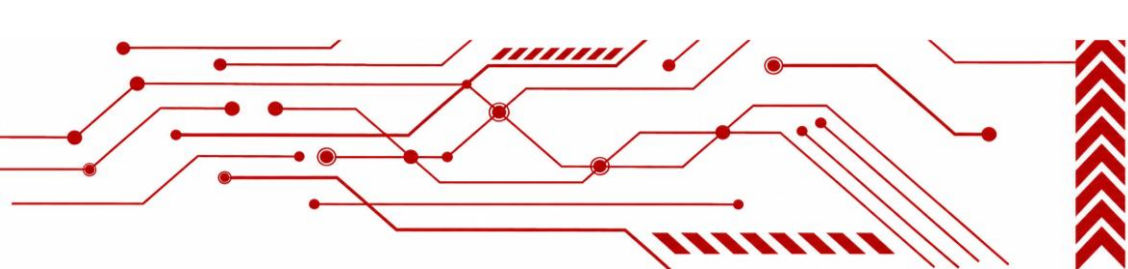
ABSTRACT

Software development companies in Cape Verde face various challenges, many of which stem from the insufficient use of software development methodologies. This study aims to analyze the practice of project management in software development in Cape Verde, based on investigations conducted in several public, private, and non-governmental institutions. The research combines quantitative and qualitative approaches, utilizing a mixed-methods approach to verify a set of propositions related to the research question. To validate the research questions, a questionnaire was administered to 21 organizations, representing 42.9% of the private sector and 57.1% of the public sector. The results show that 57.1% of the organizations have teams dedicated to project management, while the remaining do not have such teams. Despite the increasing adoption of software development methodologies, companies still face significant resistance, primarily due to cultural barriers within their organizations.

Keywords: Cape Verde, development methodologies, project management, software.

RESUMO

As empresas de desenvolvimento de software em Cabo Verde enfrentam diversos desafios, muitos dos quais decorrem da utilização insuficiente de



metodologias de desenvolvimento de software. Este estudo tem como objetivo analisar as práticas de gestão de projetos no desenvolvimento de software em Cabo Verde, com base em investigações realizadas em diversas instituições públicas, privadas e não governamentais. A pesquisa combina abordagens quantitativa e qualitativa, adotando métodos mistos para verificar um conjunto de proposições relacionadas à questão de pesquisa. Para a validação das questões de pesquisa, foi aplicado um questionário a 21 organizações, das quais 42,9% pertencem ao setor privado e 57,1% ao setor público. Os resultados mostram que 57,1% das organizações possuem equipes dedicadas à gestão de projetos, enquanto as demais não dispõem dessas equipes. Apesar da crescente adoção de metodologias de desenvolvimento de software, as organizações ainda enfrentam resistência significativa à sua implementação, principalmente em razão de barreiras culturais internas.

Palavras-chave: Cabo Verde; metodologias de desenvolvimento; gestão de projetos; software.

1 INTRODUCTION

In today's software development landscape, the adoption of structured project management methodologies plays a crucial role in ensuring the efficiency and quality of the products delivered. In Cape Verde, organizations face significant challenges related to implementing these methodologies, which can directly impact project success. Cultural resistance, the lack of teams dedicated to project management, and difficulty interpreting processes are some of the obstacles that hinder the adoption of effective practices.

Given this context, this study aims to analyze the practice of project management in software development in Cape Verde, assessing the level of adoption of development methodologies, the challenges faced by companies, and the measures that can be taken to improve efficiency in project execution.

To achieve this goal, the research adopted a mixed approach, combining quantitative and qualitative methods. Questionnaires were administered to 21 organizations in the public and private sectors, allowing for an in-depth analysis of the reality of project management in the country. Based on the data collected, common difficulties faced by companies were identified, as well as good practices and recommendations for more effective implementation of development methodologies.

The article is structured as follows: the next section presents the theoretical framework for the information society in Cape Verde and the importance of project management. Next, the methodology adopted in the research is detailed, highlighting the methods used for data collection and analysis. The results obtained are then presented and discussed, followed by recommendations and measures to optimize the adoption of development methodologies. Finally, the study's conclusions are presented, highlighting the main contributions and implications for the software development sector in the country.



2 LITERATURE REVIEW

2.1 Information Society in Cape Verde

According to e-Gov (2021), the evolution of digital governance in Cape Verde has been a successful journey, based on national determination. It is a narrative of resilience focused on the growth of an integrated and inclusive plan, capable of progressively making available, through various access channels, an increasing number of quality public services with an effective impact on the lives of citizens and the country's economy.

The Information Society, given its cross-cutting perspective, offers a contribution and an opportunity to promote and develop Cape Verde's capacities, providing support for overcoming national challenges. The strategic planning of the Information Society cannot be seen in isolation but must be integrated into the country's strategic development planning process (NOSI, 2005b).

According to e-Gov (2021), computerization, along with training and organizational development, is recognized as one of the fundamental pillars of the ongoing reform program. Over time, the UC_RAFE - State Administrative and Financial Reform Coordination Unit has adopted various organizations to better meet its objectives. This unit has focused its activities on three main areas:

- **Legislative Revision:** the UC_RAFE works on revising laws to ensure that they are aligned with the objectives of financial reform and the country's development. This includes modernizing existing laws and creating new legislation that supports a more efficient and transparent financial system;
- **Computerization:** this is seen as the basis for an integrated information system, essential for the country's economic, fiscal, and financial management. UC_RAFE has focused on implementing ICT that enables more efficient management of financial resources and data, providing greater control and transparency;
- **Institutional Training:** this is aimed at improving the skills and knowledge of civil servants, to offer a quality service to the public. This involves ongoing training and development programs to ensure that officials can implement and sustain ongoing reforms.

Still citing e-Gov (2021), at the end of the century, the country was already equipped with relevant legal instruments, especially for the protection of personal data (Decree-Law 133/VI/2001, of January 22), which would help support the various systems for recording and automatically handling data that were subsequently implemented.

2.2 Project management

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Project management is a set of knowledge, skills, tools, and techniques used to plan, execute, and control a project PMI 5th (2013).

For Turner (1994), project management is a process by which a project is conducted to its conclusion. It encompasses three dimensions: objectives (scope, organization, quality, cost, and deadline); management process (planning, organization, execution, and control); and levels (integration, strategic, and tactical).

According to Camargo (2018), project management deals with the administration of tasks that do not fall within the regular operations or routine activities of a company. It involves coordinating actions with a clearly defined beginning, middle, and end.

According to Espinha (2018), many people often confuse a project with its management. Project management is directly related to the execution and control of the project, change management, and changes in scope, among other aspects. Thus, the function of project management is to ensure that the project is completed within the planned resources or as close as possible to the original planning.

Project management is the combination of knowledge, techniques, methodologies, and skills used to ensure the achievement of an objective or goal as planned.

Still quoting Espinha (2018), from the author's analysis, when talking about "managing", the term is not limited to just leading and distributing tasks to the members of the project team. It involves leading the project to deliver a viable result for the stakeholders.

2.3 Importance of project management

Today, project management is a fundamental tool to help companies and institutions identify, sustain, and increase their competitive advantages.

Project management is also a tool that makes it possible to achieve objectives with greater quality, reducing unforeseen events and dealing better with risks.

It can be seen that project management is essential in any undertaking, especially in software development, where complexity and dynamics are high.

According to the Project Management Institute (PMI), project management is defined as “the application of knowledge, skills, tools and techniques to project activities to meet project requirements” (Project Management Institute, 2017). In this sense, various approaches and methodologies have been developed and improved over time to assist in the effective management of software projects.

According to the Project Management Institute (2017), project management enables organizations to execute effectively and efficiently. A successful project helps individuals, groups and public and private organizations achieve business objectives, meet stakeholder expectations, be more predictable, increase the likelihood of success, and deliver the right products at the right time; etc.

Poorly managed projects or lack of project management can lead to delays in deadlines, budget overruns, inferior quality, loss of credibility for the organization, and failure to achieve objectives.

In addition, effective project management involves the application of planning, cost control, risk management, communication, and leadership techniques (Kerzner, 2017).

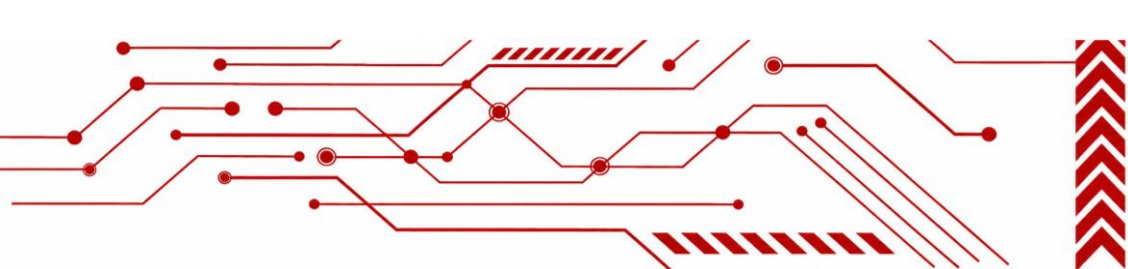
The integration of these practices provides a holistic view of the project, ensuring its viability, quality, and success. Therefore, investing in project management skills and tools is essential for software development companies, contributing to their competitiveness and long-term sustainability.

3 METHODOLOGY

To answer the research question, a case study was adopted as it was considered the most appropriate methodology for understanding the impact and challenges of this research. This methodology aims to explain whether there are teams dedicated to project management in Cape Verdean organizations, identify the methodologies used, determine how often the methodologies are followed, and the difficulties faced.

For a more in-depth understanding of the assumptions of the case study methodology, it is crucial to highlight several characteristics, including the nature of case study research, its holistic approach, which depends on the context and its relationship to the study, the ability to make generalizations, the relevance of a prior theoretical basis and its continuous interpretation.

This research makes use of quantitative and qualitative research techniques, to see both as complementary and not as opposites since the quantitative method is seen as, “a research approach that relies on the collection and analysis of numerical data to explain phenomena, identify patterns and test hypotheses” Creswell (2014). A questionnaire is used as a data collection tool. In quantitative techniques, surveys with closed questions are used as data collection instruments, and the frequency of responses to each question is



calculated. On the other hand, in qualitative techniques, the meaning of the answers is interpreted, providing a deeper understanding of the data.

According to Creswell (2007, p. 27), mixed methods research is a research approach that reconciles or combines qualitative and quantitative methods. Although these approaches have antagonistic characteristics, they can complement each other, resulting in a more comprehensive and richer analysis.

According to Bergman, quoted by Astrogildo (2013, p. 1151), it is foreseen that the two methods, quantitative and qualitative, are incompatible in the way they are presented, and it is stated that a third movement based on these references is problematic.

According to the concepts presented here, it can be seen that certain authors have conflicting opinions about the combination of quantitative and qualitative methods:

- Quantitative and qualitative data can have different results if these same data are analyzed simultaneously;
- Research-based on a mixed standard can lead to conflicting information;
- Qualitative and quantitative results are divergent.

Let's learn a little about quantitative and qualitative methods, as well as the types of data collection instruments used for each. Below is a summary.

Creswell (2017) states that the quantitative method is used when it is necessary to collect measurable data on variables. In addition, this method looks for the frequency of occurrence to measure the veracity or otherwise of a phenomenon. Questionnaires with multiple-choice questions and statistical procedures are used as instruments for this measurement.

The concepts of quantitative data collection instruments according to Creswell (2014) are described below:

- Structured nature: refers to quantitative questions that are generally structured and closed, seeking specific answers that can be easily quantified;
- Numerical or categorized responses: allow statistical analysis of the data collected. The results are presented in numbers, showing how many times each methodology was used;
- Statistical analysis: data analysis involves statistical techniques such as averages, percentages, correlations, and hypothesis testing. In this case, comparisons were made between the methodologies to identify patterns and trends in the use of different methodologies.

About the qualitative method, according to the author Creswell (2007, p. 26), qualitative research is explained as a means of researching and understanding the meaning that subjects or groups attribute to a social or human problem.

In this research, we opted to collect data using both quantitative and qualitative methods. Authors such as Creswell (2010) point out that the use of mixed methods is linked to the constant evolution of the field of research, as well as being an approach that seeks to use the strengths of both methodologies (quantitative and qualitative). Thus, it is hoped to follow a methodology that not only responds to complex problems but also reconciles the preferences of researchers. The instrument adopted in this research is the questionnaire survey.

The survey was carried out online using Google Forms and sent by e-mail. Before applying the questionnaire to the target audience, a pilot version was carried out and sent to some professionals to assess the difficulty of the questions and identify possible inconsistencies (questionnaire validation). The feedback received was very positive, allowing some adjustments to be made to the questionnaire, which was then sent to software development organizations. The main objective of the work is to assess the habit of using software project management methodology in organizations.

The questionnaire was sent by email to 25 companies. The aim was to obtain as many responses as possible. Of the 25 companies, 21 answered the questionnaire, and all the answers were considered valid for the sample.

With the results obtained from each questionnaire, the aim is to identify whether the institutions are using software project management methodologies, to specify what these methodologies are, the tools applied, the difficulties faced, the impact observed, and, finally, to propose suggestions for improvement for the organization. The analysis and interpretation of the data were carried out in stages, according to the structure of the questionnaire, and will be presented in the next section. It should be noted that the sample was taken in 2021.

With this objective in mind, a questionnaire was drawn up with fourteen questions, divided into three parts:

- In the 1st part: three questions were asked about the organization: type of organization, name, and the existence of teams dedicated to project management;
- In the 2nd part: there are four questions aimed directly at the respondent's experience;
- In the 3rd part: there are seven questions investigating the use, advantages, disadvantages, and types of software project management methodologies in the organization. These questions will make it possible to answer the research question and the specific objectives.

4 RESULTS

4.1 Challenges faced by companies in using methodologies

Table 1 – Challenges in using methodologies

Organizational culture
People's resistance to change
Resistance to change by the communication team with other sectors
Difficulty in understanding the need for fundamental processes in the methodology
Difficulty in interpreting roles within the methodology

The quantitative analysis revealed a set of difficulties faced by companies in using the methodology, namely:

Organizational culture (42.9%): this was identified as one of the main hindering factors. The current organizational culture may not be favorable to the adoption of new methodologies, creating significant barriers to implementation.

People's resistance to change (42.9%): general resistance to change is another major challenge. Employees' reluctance to adopt new practices hinders the transition to innovative and efficient methodologies.

Resistance to change by the communication team with other departments (38.1%): this specific resistance suggests problems in interdepartmental communication. The lack of effective communication between departments can hinder the understanding and cooperation necessary to implement new methodologies.

Difficulty in understanding the need for fundamental processes in the methodology (28.6%): many respondents pointed out the difficulty in understanding the importance of fundamental processes. This lack of understanding can lead to incorrect or incomplete application of methodologies, affecting the effectiveness of projects.

Difficulty in interpreting roles within the methodology (28.6%): confusion about roles and responsibilities was mentioned by a significant portion of respondents. A lack of clarity in roles can result in overlaps or gaps in responsibilities, affecting coordination and project success.

4.2 Challenges faced by companies in using methodologies

For proposition 2, the quantitative analysis reveals the main measures suggested to improve software project management in organizations, classifying the frequency of participants' responses. Based on the data collected, it is essential to adopt a series of measures that address both the specific challenges identified and the best project management practices.

Table 2 – Measures to better manage projects

Some suggested measures:
Continuous Training and Training
Improved Communication
Resource Management
Risk Management
Clearly Defining Scope
Planning and Monitoring Schedules
Focus on Quality
Financial Management
Encouraging Innovation
Changes in Organizational Culture and Mentality

Training and ongoing education: Investing in ongoing training and development of employees to ensure that they have the skills and knowledge needed to manage projects effectively. Promoting courses and workshops on agile methodologies (Scrum, Kanban, etc.) for managers and development teams and encouraging them to obtain internationally recognized certifications, such as PMP (Project Management Professional) and Certified Scrum Master (CSM) are two examples of investing in training.

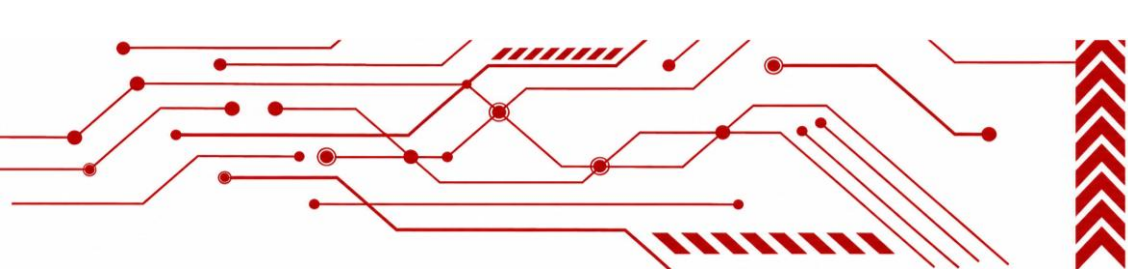
Improved Communication: According to the data collected in the question “How often do you face the following difficulties in software projects?” One of the difficulties highlighted is “Project communication”. Through the data collection, it can be seen that the frequency of difficulties in project communication is low to moderate, with most responses focusing on “sometimes” (9) and “rarely” (7). This suggests that communication is an occasional challenge, but generally manageable. Measures that can be adopted to improve communication are:

- **Cooperation tools:** implement effective communication and cooperation tools, such as Microsoft Teams and Trello. According to the data collected in the question “How often do you use software project management software in your organization?” Trello and Redmine are frequently used, with a significant presence in the highest usage categories. Redmine: Redmine software is used more frequently, with a relatively balanced distribution between the categories “Rarely”, “Sometimes”, “Frequently” and “Very Frequent”. Trello: is used frequently, especially in the “Frequently” and “Very Frequent” categories, with some responses in the “Rarely” and “Sometimes” categories.
- **Regular meetings:** establish regular follow-up meetings such as daily meetings, reviews, planning, and retrospectives. According to the data collected, around 38.1% of respondents show resistance to changes on the part of the communication team with other sectors.
- **Training in effective communication:** promote training to improve communication skills among team members. Based on the data collected, 38.1% of the team members show resistance to change and lack of communication with other sectors of the company, so that they understand the planning and execution cycles.
- **Clarification of roles and responsibilities:** ensure that all team members clearly understand their roles and responsibilities to avoid misunderstandings and improve coordination. According to the data collected, 28.6% of participants point to “difficulty in interpreting roles within the methodology”.
- **Detailed documentation:** maintain detailed and accessible documentation of all important project decisions and processes to facilitate consultation and communication among team members.

Resource management: According to the data collected in the question “How often do you face the following difficulties in software projects?” One of the difficulties identified is “Project resources” where the difficulties are moderate, with most responses indicating that they occur “sometimes” (10). This indicates that resource management is a common challenge, but rarely critical. To improve the allocation and use of human and material resources, it is essential to use resource management tools.

Risk Management: according to the data collected in the question “How often do you face the following difficulties in software projects?” one of the difficulties identified is “Project risk” where the difficulties are moderate, with responses distributed between “sometimes”, “rarely” and “frequently”. This indicates variability in the perception of project risk but with a tendency to face risk difficulties moderately.

Clear definition of scope According to the data collected in the question “How often do you face the following difficulties in software projects?” one of the difficulties identified is “Defining the project scope” where the difficulties are of low to moderate frequency, with most responses indicating that they occur



“sometimes” or “rarely”. This suggests that defining the scope of the project is an occasional but not predominant challenge. In this sense, detailed requirements and project specification documents should be drawn up, ensuring that all stakeholders agree with the defined scope.

5 CONCLUSIONS

The quantitative analysis revealed the main challenges faced by companies in using project management methodologies, such as organizational culture, people’s resistance to change, team resistance to communication with other sectors, difficulty in understanding the need for fundamental processes in the methodologies, and difficulties in interpreting roles within the methodologies are the main obstacles identified. Overcoming these challenges requires a concerted effort to promote an organizational culture conducive to innovation, improve internal communication, provide adequate training, and clarify roles and responsibilities. By addressing these critical points, companies can improve the effectiveness of implementing project management methodologies, resulting in better execution and success of their projects. Based on the analysis of the data, several measures were identified that cover capacity building, communication, resource management, risk management, scope definition, planning and monitoring of schedules, focus on quality, financial management, encouragement of innovation, and changes in mindset and organizational culture. Adopting these measures will help Cape Verdean companies overcome the challenges in managing software projects, resulting in greater efficiency, quality, and success in projects. Implementing these improvements requires a continuous and committed effort from leaders and teams, fostering an organizational culture that values innovation and excellence.

In summary, the adoption of software development methodologies has led to notable improvements in efficiency, quality, and project management. However, to maximize these benefits, it is essential to invest in continuous training, foster an organizational culture that is conducive to innovation, and ensure the appropriate allocation of resources. These measures not only reduce the likelihood of failures and bugs but also ensure that projects are delivered with high quality and within the expected deadlines and budgets.

The successful implementation of these measures requires a profound change in mindsets, behaviors, and actions within the organization. It is crucial to promote greater employee engagement and foster a cultural change that promotes the implementation of project management practices. This can be achieved through continuous training for all involved, ensuring that they have the necessary skills to execute quality projects, as well as making sufficient financial resources available to support these initiatives.



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