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Theoretical and experimental research on the active management of project portfolios

SUMMARY

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Contents

1. INTRODUCTION

The topic of the doctoral thesis entitled "Theoretical and Experimental Research on Active Project Portfolio Management" falls within the field of Engineering and Management, being of contemporary relevance and of significant importance. In the dynamic and complex context of the current business environment, research in project portfolio management is essential to ensure the efficiency and effectiveness of organizational processes.

This thesis aimed to explore both the theoretical and experimental aspects of active project portfolio management, providing an in-depth analysis of the strategies and methodologies that could be applied to optimize project performance. From an engineering perspective, the thesis examined innovative techniques and tools that can support active portfolio management, including the use of advanced technologies and integrated information systems.

From a management perspective, the thesis addressed aspects related to strategic planning, resource allocation, and risk assessment, all of which are essential to meet the challenges posed by a constantly changing business environment. Additionally, the interdependence between individual projects and their impact on long-term organizational objectives was analyzed.

By investigating these themes, the thesis contributed to the development of a solid theoretical framework and practical solutions applicable in the field of active project portfolio management, thus providing valuable support for professionals in engineering and management facing the challenges of the contemporary business environment.

In this context, the present doctoral dissertation aimed to explore and analyze the essential aspects of project portfolio management, identifying approaches, models, and tools that can contribute to improving practices in this field. Through rigorous research and relevant case studies, the work developed a deep understanding of the complexities of project portfolio management and proposed recommendations for their efficient management.

1.1. Justification of the Approach to the Topic in the Current Context in the Era of Globalization and Digital Transformations: Arguments and Preliminaries

The doctoral thesis titled "Theoretical and Experimental Research on Active Project Portfolio Management" aims to frame the research within the broader context of project management and highlight the strategic importance of efficient project portfolio management. In the era of globalization and digital transformations, organizations are under continuous pressure for innovation and adaptability, making project portfolio management a vital area for long-term success. According to previous studies, such as those from the Project Management Institute

and other prestigious academic journals, efficient portfolio management can significantly contribute to aligning corporate strategies with project execution.

However, the specialized literature often indicates gaps in existing methodologies and practical applications of portfolio management. Many traditional techniques are criticized for their rigidity and inability to adapt to rapid changes in the business environment. For example, recent works highlight a tension between the need for flexibility in portfolio management and the strict methodological requirements of approaches like PMBOK or PRINCE2.

This thesis will explore areas where existing research is contradictory or insufficient, such as the integration of new digital technologies in project portfolio management and the adaptation of methodologies to agile projects or projects with a high degree of uncertainty. Emphasis will be placed on the theoretical and experimental development and testing of new models and tools for portfolio performance evaluation, aiming to provide greater flexibility and better alignment with strategic objectives.

Therefore, this research will not only contribute to a deeper understanding of the dynamics of project portfolio management in the current business conditions but will also propose innovative models that can be tested and validated in various organizational contexts. This endeavor is essential for the continuous improvement of practices in the field and for supporting strategic decisions in organizations. Thus, the work positions itself in a critical and promising niche, contributing to the evolution of knowledge in project portfolio management and the development of new adaptable and efficient approaches.

1.2. Delimitation of the Topic and Scope of the Research Project

A portfolio represents a collection of projects grouped to achieve strategic objectives. Project portfolio management involves the centralized management of these collections to ensure alignment with organizational goals and efficiency in project execution. Portfolios can have hierarchical structures and complex interactions, facilitating coordination between different levels of projects and programs. This management allows for resource prioritization and improved communication between the involved teams, thus contributing to the optimization of resource utilization and better coordination of organizational efforts.

Project portfolio management provides managers and organizations with the ability to see the big picture, ensuring that executives, project managers, team members, and stakeholders have access to updated and relevant information. Research in this field focuses on developing and validating conceptual frameworks and theoretical models that facilitate strategic and operational decision-making. Theoretical approaches review existing literature and develop frameworks, while experimental research tests these theories through empirical studies, evaluating the impact of variables on portfolio performance.

By combining theoretical and experimental research, the field of project portfolio management aims to improve management practices and develop guides and tools for decision-making. These efforts contribute to increased efficiency and success in portfolio management, supporting organizations in achieving their strategic objectives and optimizing performance across various industries.

1.3. The Importance and Relevance of the Research Topic for Optimizing Organizational Competitiveness in the Contemporary Economic Landscape

The topic "Theoretical and Experimental Research on Active Project Portfolio Management" constitutes an essential and highly relevant subject of analysis in both academic and professional spheres. It addresses the increasingly complex requirements of modern entities to optimize the efficiency of managing multiple simultaneous projects, a vital necessity for ensuring organizational competitiveness and sustainability in the current economic landscape.
The theoretical component of this research focuses on the systematic and in-depth exploration of existing and emerging methodologies in the field of portfolio management. The importance of this theoretical exploration lies in the aspiration to establish a robust foundation for formulating new strategies and approaches. A detailed analysis of the specialized literature is essential to discern the effectiveness of various theoretical frameworks, identifying superior practices that can efficiently manage the complexity and interdependence of projects aggregated under a common portfolio umbrella.
Complementarily, the experimental segment of the research is dedicated to validating the practice of these theories within an authentic organizational framework. By implementing and evaluating the proposed methodologies in concrete organizational environments, this component allows for testing the viability and performance of portfolio management strategies in diverse operational contexts. This empirical approach is indispensable as it provides the opportunity to adapt academic theories to the real specifics and demands of the industry, thereby validating their practical applicability and relevance.
The synergistic integration of theoretical and empirical findings promotes the development of a holistic, adaptable reference framework that can be adopted by organizations to refine and excel in project portfolio management. This research not only advances the academic discourse in the field of project management but also significantly contributes to improving practical efficiency in managing projects at the organizational level.
In essence, the research "Theoretical and Experimental Research on Active Project Portfolio Management" makes a valuable and indispensable contribution to the existing literature, offering new perspectives and applicable solutions that address the complex challenges of managing project portfolios in the dynamic context of global business. This dual investigation is necessary for the formation and development of project managers equipped to face and optimize portfolio strategies in the face of contemporary economic changes and uncertainties.

1.4. The contemporary scientific context of complex project portfolio management in the dynamic and globalized business environment

The management of complex project portfolios is essential for the success of organizations in a dynamic and competitive business environment, characterized by multiple interactions, interconnected objectives, and high uncertainty. Globalization and technological advancement necessitate the efficient management of complex project portfolios, which involve multiple disciplines and geographically distributed teams. Addressing these challenges requires leadership skills, communication abilities, and a deep understanding of success in managing complex project portfolios. The doctoral thesis analyzes key aspects of this management, providing approaches, models, and tools for improving practices and proposing recommendations for the efficient management of project portfolios.

1.5. Justification of the choice of the thesis title and formulation of the proposed objectives in relation to the current stage and the need for research

The main purpose of this doctoral thesis is to explore, develop, and validate new theoretical paradigms, models, and methodologies for project portfolio management, with the objective of optimizing practices and improving organizational outcomes. The title of the work, "Theoretical and Experimental Research on Active Project Portfolio Management," aptly reflects the current state of knowledge and the need for in-depth research in this field.

The current research context faces significant challenges, such as increasing project complexity, the rapid evolution of management technologies and methodologies, and the lack of studies dedicated to active portfolio management. This research aims to reassess existing theories and practices, contributing to the updating and expansion of knowledge in the field. It also focuses on continuous adaptability and real-time resource optimization, which are essential for contemporary businesses.

The expected contributions of the thesis include the development of a theoretical model for active project portfolio management, based on the analysis of literature and current trends, and its experimental validation. The results obtained will provide innovative and applicable solutions in practice, improving the performance of organizations in managing project portfolios. Thus, the title of the work is well-chosen to address the current and future needs in the field of project portfolio management, significantly contributing to the advancement of knowledge and practices.

The structure of the work is designed to address the following specific objectives:

OS1.1: Conducting an exhaustive analysis of the existing specialized literature in the field.

OS1.2: Understanding the current context in which project portfolio management is situated.

OS2.1: Classifying project management methodologies according to various relevant criteria.

OS2.2: Identifying the specific organizational needs and challenges of portfolio management.

OS3.1: Recognizing associated risks and conducting a comparative study of risk management processes as described in recent specialized literature.
OS3.2: Analyzing risk management and monitoring mechanisms.
OS3.3: Defining risk response strategies through adapted theoretical and practical approaches.
OS4.1: Examining project team formation processes and their impact on achieving project objectives.
OS4.2: Establishing key elements for project success.
OS5.1: Identifying efficient management, coordination, and reporting methodologies within projects.
The dissemination objective is:
OD: Developing and implementing a dissemination and valorization plan for the results obtained from the research.

In conclusion, this thesis aims to investigate, develop, and validate new theories, models, and methods in the field of project portfolio management, with the goal of facilitating continuous improvement of organizational practices and performance.

1.6. Research methodology and development of thesis architecture

The research methodologies used to examine theoretical and experimental studies in the field of project portfolio management vary considerably, reflecting the specific objectives of the study and the nature of the available data. In the context of this analysis, various approaches were adopted depending on the specifics of the data and research objectives.
Qualitative Research Methodology: This methodology was used for the collection and analysis of unstructured or semi-structured data. Tools used include detailed interviews, case studies, and direct observations. In the field of portfolio management, qualitative research is essential for gaining a deep understanding of portfolio managers' perceptions and experiences, providing valuable insights into ways to manage financial assets. This approach allows for a detailed exploration of managerial behaviors and strategies that are not always visible in quantitative data.
Quantitative Research Methodology: This was adopted due to the availability of a significant volume of numerical data in the case study of a specific project portfolio. Quantitative analysis facilitated a rigorous understanding of portfolio performance and the determining factors influencing these performances. This methodology relies on statistics and mathematical models to evaluate precise hypotheses and to measure variables of interest in an objective manner.
Experimental Methodology: Used for conducting controlled experiments aimed at evaluating the impact of different portfolio management strategies. A concrete example could be comparing the performance of a passively managed portfolio with that of an actively managed

portfolio in a controlled environment. This approach allows for testing the effects of specific interventions under standardized conditions, thus providing relevant data for existing theories or models.
Comparative Research Methodology: Adopted to analyze and compare the effectiveness of traditional methodologies versus agile ones in managing project portfolios. This methodology involves systematically comparing different management practices to identify the most effective and suitable ones for specific contexts or objectives. This type of research is significant for highlighting the advantages and limitations of various approaches, contributing to the development of optimized practices.

2. THEORETICAL FOUNDATIONS OF PROJECT PORTFOLIO MANAGEMENT

Chapter Two, titled "Theoretical Foundations of Project Portfolio Management," focused on the strategic management of projects, programs, and portfolios, highlighting methods of selection, prioritization, and efficient management. Initially, integrated methodological strategies were explored, emphasizing the evaluation and application of traditional and agile approaches, and conducting a comparative analysis of these approaches. The importance of flexibility, collaboration, and iterative development in agile and adaptive approaches was discussed. The chapter also examined the integration of traditional and agile methodologies into hybrid approaches. Additionally, it addressed the management of change and complexity, analyzing change paradigms, the determinants of complexity, and their implications for management. The final part of the chapter presented a case study on IT transformation in the BAM portfolio, detailing the strategy, implementation, and change management, highlighting the results and lessons learned.

2.1. Strategic management of projects, programs and portfolios: theoretical and experimental analyses on the methods of selection, prioritization and effective management in organizations

Project portfolio management represents a strategic approach for the selection, prioritization, and efficient management of projects within an organization. Theoretical and experimental research in this field has developed models and methodologies for decision-making and effective project implementation, emphasizing alignment with strategic objectives, project evaluation and selection, resource, and risk management, as well as performance monitoring and control.
Integrated methodological approaches for managing complex portfolios combine traditional methodologies (e.g., Waterfall) with agile methodologies (e.g., Scrum, Kanban). Traditional methodologies are rigid and detailed, suitable for projects with stable requirements. Agile methodologies are flexible, adaptable to changes, and allow continuous delivery of products, making them ideal for projects with volatile requirements.

Risk management is crucial in complex portfolios, involving the identification, evaluation, and proactive management of risks. Effective communication and collaboration are essential, and the use of collaboration platforms and regular meetings contribute to project success.
Resource management includes the planning, allocation, and efficient monitoring of resources to ensure their optimal use. Constant monitoring and reporting of project progress, using key performance indicators (KPIs) and generating periodic reports, are essential for project success.
Change management involves assessing the impact of changes and adapting plans accordingly. Continuous evaluation and improvement are based on post-mortem project analysis and the application of lessons learned to improve future processes.
The evaluation of traditional and agile methodologies shows that the Waterfall methodology is sequential and linear, suitable for projects with fixed requirements, while the Agile methodology is iterative and adaptable, suitable for projects with changing requirements.
Agile and adaptive approaches in managing complex portfolios emphasize flexibility, collaboration, and iterative development, offering value under conditions of uncertainty. Integrating traditional and agile methodologies into a hybrid approach allows for balancing long-term planning with short-term adaptability.
Researchers and practitioners in the field, such as Dr. David J. Anderson, Dr. Alistair Cockburn, Dr. Jeffrey Pinto, Dr. Rita McGrath, and Dr. Robert K. Wysocki, have emphasized the importance of adopting a hybrid approach, combining the strengths of traditional and agile methodologies to address the challenges of complex projects and ensure their success.
In conclusion, the management of complex project portfolios requires a flexible integration of traditional and agile methodologies, efficient risk and resource management, effective communication, and collaboration, as well as continuous evaluation and improvement to maximize added value and achieve the organization's strategic objectives.

2.2. Change management in project portfolio management. Dealing with complexity

This subchapter explores the fundamental principles of change in project portfolio management, focusing on integrating agility, adaptability, and scalability to ensure efficiency in dynamic environments. Agility involves the ability of organizations to respond quickly and effectively to changes through methods such as Scrum and Kanban, facilitating iterative planning and incremental delivery. Adaptability refers to the ability to thrive in variable circumstances through a learning culture, flexible governance, and risk management. Scalability enables the management of increasing demand without compromising performance, involving extensible technologies and infrastructures. These interdependent paradigms allow organizations to navigate changes, remain resilient, and leverage growth opportunities, thereby achieving a sustainable competitive advantage.
2.3 Applied Analysis of IT Transformation in the BAM Portfolio: Strategy, Implementation, and Change Management - Case Study.

2.3.1 Introduction

In the current context, large corporations focus on optimizing processes and expanding into new markets to attract more consumers by developing products and solutions that quickly and efficiently meet customer needs. The presented case study examines the complete restructuring of the IT infrastructure of a large company, involving simultaneous changes in work procedures and organizational structure. These flexible methodologies can be applied in various projects to minimize implementation time and costs, addressing challenges such as employee resistance to change and the need to replace old systems with new, complex solutions.

Business Agile Management (BAM) facilitates the development of products, services, and solutions for multinational companies by integrating independent applications. This program indicates a substantial transformation within companies, requiring a recalibration of the organizational structure in the medium and long term. The effective implementation of project management brings numerous benefits, including optimized resource utilization, improved product quality and customer relationships, shortened development cycles, and increased productivity. A significant obstacle in adopting new methodologies has been employee resistance to change, a problem addressed through the appropriate use of project management methodologies.

2.3.2 Project management standards and methodologies

Portfolios, programs, and projects are aligned with organizational strategies but differ in complexity and objectives. A portfolio consists of a series of programs, and a program is made up of multiple projects. BAM is an example of a program, as it includes multiple integrated projects that were implemented over approximately two years.

Project management refers to the coordination and implementation of a project to achieve established objectives, within the allocated timeframes and budget. A project is defined, according to the specialized literature, as a temporary endeavor undertaken to create a unique product, service, or result.

There are several applicable project management standards, adaptable to the specifics of each project to achieve desired outcomes. The most recognized standards are Prince2, PMP, and more recently, Agile, which is extremely popular in software projects. The first two are centered on the traditional waterfall approach, while Agile is a generic term encompassing several methodological frameworks, such as Scrum, Kanban, Extreme Programming, and Scaled Agile Framework (SAFe).

Depending on the standard or approach applied to projects, the activities carried out are different.

Educational Approach to the BAM Project

This case study examines the implementation of an IT Transformation Program, which took two years to be fully realized. The management of this project was oriented towards two fundamental elements: the main program plan and the specific plans of each individual project. The main plan, or program plan, was structured into several essential phases: planning, analysis, development or realization, technical testing, User Acceptance Testing (UAT), training, and finally, delivery or launch. This comprehensive scheme included all applications addressed within the program.

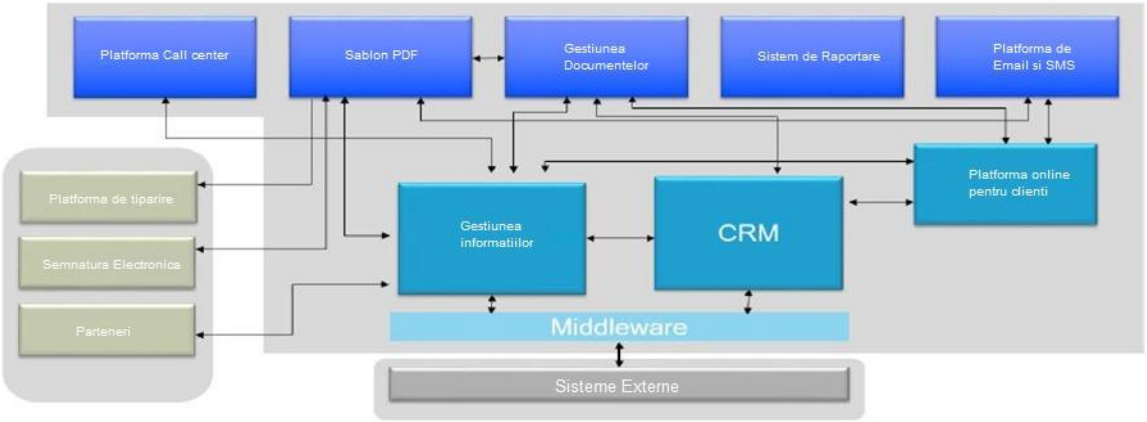

Figure 2- Application map

This case study details the involvement of approximately 100 people in thirteen distinct projects, under the coordination of the Program Management Office (PMO), which consolidated independent teams into a single program team using Waterfall and Agile methodologies. Major challenges included the diversity of team members' perceptions, experiences, and behaviors, as well as their loyalty to their initial employers. In addition to economic and operational benefits, the project also has an important educational dimension, providing students with opportunities to learn and apply project management concepts in various situations.

2.3.3 Results

The results obtained from applying the standards and methodologies described in the BAM project were notably positive. These include the reduction of human operators' working time through process optimization, cost reduction through the development of new efficient processes adapted to the existing market, and increased revenue through the introduction of processes for new market segments.

During the implementation of the Program, various tools were developed by the Project Management Office (PMO) to monitor project progress. Additionally, technical tests were categorized into groups from 1 to 5 based on the area of impact and planned accordingly.

	PG1	PG2	PG3	PG4	PG5	Total
Total number of cases	35	42	21	99	95	292
Cases impacted by change requests	21	36	11	68	34	170
Cases not impacted by change requests	14	6	10	31	61	122

The User Acceptance Testing (UAT) stage was rigorously organized throughout the implementation of the project. The total number of UAT tests was structured and distributed over a period of nine weeks, being classified according to the specific impact area of each test. This planning allowed for a systematic and efficient evaluation, ensuring that each component of the project met the requirements and expectations of the end users. Through this approach, the project team was able to identify and address issues early, thereby optimizing the project completion process.

Table 2 – UAT – Status

	TOTAL	Sapt. 1	Sapt. 2	Sapt. 3	Sapt. 4	Sapt. 5	Sapt. 6	Sapt. 7	Sapt. 8	Sapt. 9
Total number of cases/cases - testing / planned	**646**	100	166	43	69	30	50	66	50	32
Total number of cases/cases planned to start testing	**602**	95	165	43	62	21	50	51	43	32
Planned to be closed / week	**602**	95	165	43	62	21	50	51	43	32
Total to be closed per week	**602**	95	165	43	62	21	50	51	43	32
Total cases/cases initiated - started	**602**	95	165	43	62	21	50	51	43	32
Total uninitiated cases/cases - planned to start	**41**	0	0	0	0	0	0	0	41	0
Closed	**576**	**95**	**165**	**43**	**61**	**21**	**47**	**51**	**42**	11
In progress for the current week	**26**	0	0	0	1	0	3	0	1	21
Cases with errors	**7**	0	0	0	1	0	1	0	0	5
Progress in business	**3**	0	0	0	0	0	2	0	1	0
Technical Testing / Acceptance Testing	**16**									16

2.3.4 Case study conclusions:

In a dynamic and constantly evolving business environment, it is essential for project managers to adopt Agile frameworks, which offer flexibility and adaptability in the face of frequent changes in stakeholder requirements. Implementing Agile in projects facilitates a

higher success rate because it allows for the integration of changes in a smooth and progressive manner, ensuring that previous progress is not compromised. This framework promotes an iterative and incremental approach, enabling teams to respond efficiently to changes and continuously optimize project processes.

In addition to adopting an agile method, another decisive element in the success of projects is cohesion and effective communication within the team. The project manager plays a pivotal role in forming and maintaining a united, cooperative, and confident team. It is their responsibility not only to manage the technical aspects of the project but also to motivate team members to achieve the established objectives. Creating a positive work environment and encouraging team spirit are essential for mobilizing human resources towards achieving common goals.

Finally, achieving project objectives can significantly influence operational efficiency and budget management within large companies. A motivated and well-directed team can bring notable improvements in productivity, which translates into more efficient use of time and resources. Thus, the role of the project manager becomes crucial in aligning individual aspirations with the strategic objectives of the organization, leading to a positive impact on the overall performance of the company.

3. ADVANCED RISK MANAGEMENT STRATEGIES IN PROJECT PORTFOLIOS: IDENTIFICATION, EVALUATION AND CONTROL FOR ORGANIZATIONAL SUCCESS

Risks within a project portfolio represent uncertain situations or events that, if materialized, can negatively affect the objectives, timelines, costs, or outcomes of projects. These risks can lead to delays, budget overruns, or even failure to meet objectives. Risk management involves a comprehensive process of identifying, analyzing, and managing risks associated with a group of projects, thus ensuring the achievement of strategic objectives despite uncertainties.

The risk management process includes five essential steps: risk identification, evaluation to determine probability and impact, prioritization based on severity and probability, development of management strategies, and continuous monitoring of risks throughout the project. Management strategies can range from risk avoidance and mitigation to acceptance or transfer. Continuous monitoring and adjustment of these strategies are crucial to dealing with risks as they change, or new ones emerge.

Risk management within a project is an ongoing process and involves a proactive approach to identify, evaluate, and respond to potential risks. By anticipating and adequately managing risks, the chances of successfully delivering the project according to established objectives are improved. This holistic approach helps balance risk and return, ensuring that portfolio objectives are achieved in a controlled and predictable manner. Effective risk management in the project portfolio not only minimizes potential losses but also provides a structured approach to identifying and exploiting opportunities arising from uncertainty.

Figure 3 presents a series of elements of risk management within projects and project portfolios that must be considered to achieve final objectives and ensure project success.

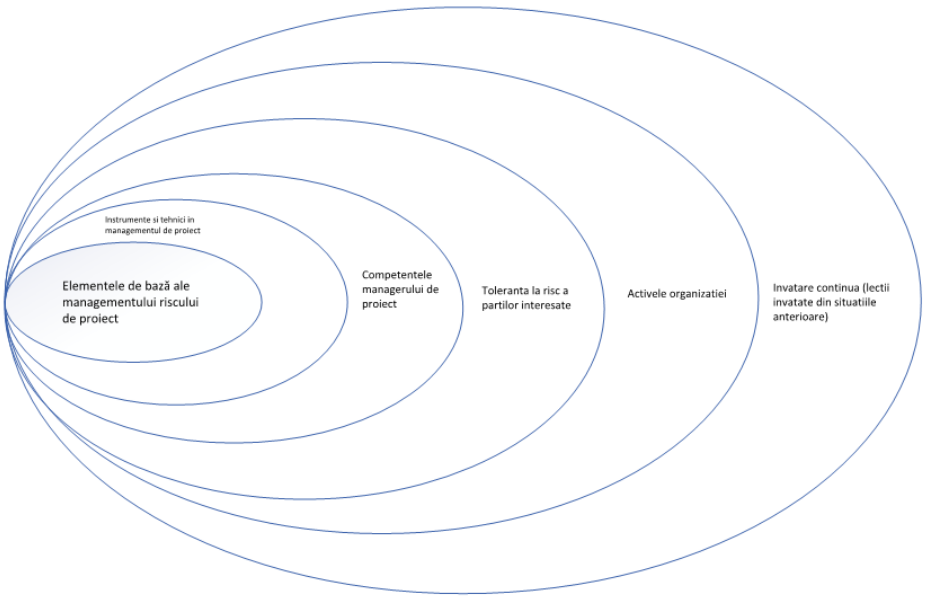

Figure 1- Elements of Project and Project Portfolio Risk Management

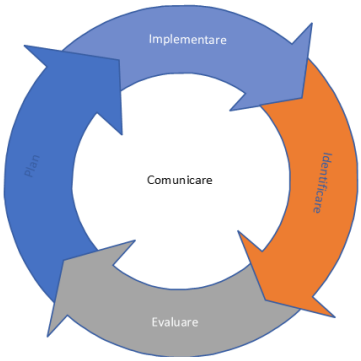

Figure 2 - Prince2 - Risk Management Procedure

According to the previous figure Prince2 – Risk Management Procedure, "the first four steps are sequential, with the 'Communication' step running in parallel, as the conclusions of any of the other steps may need to be communicated before the overall process is completed. All steps are iterative in nature, in that when additional information becomes available, it is often necessary to revisit and redo previous steps to achieve the most effective outcome."
The diagram presents the elements of the risk management procedure, which are described in sections covering: Communication -> Identification (context, risks, registers) -> Assessment (Estimation, Evaluation) -> Planning -> Implementation -> Communication.

Identification and assessment of risks specific to project portfolios

3.1. Identification and Advanced Risk Assessment in Project Portfolios: Theoretical Perspectives and Applied Methodologies

The identification and evaluation of specific risks in a project portfolio involve a systematic process of recognizing potential risks and assessing their impact on the overall portfolio. This process is important for effective risk management and the success of the portfolio.
Risk management standards, guides, and methodologies define risk in many ways. Some include the possibility of positive risks or opportunities.

3.1.1 Conceptualization and definition of risk in project management: international approaches and standards

In project management, risk is defined by PMI in the PMBOK® Guide as an uncertain event or condition that, if it occurs, can have a positive or negative effect on project objectives such as scope, schedule, cost, and quality. This definition emphasizes the uncertainty of risk, highlighting that it can represent both threats (negative impact) and opportunities (positive impact). The widely used PRINCE2 methodology defines risk similarly, as an uncertain event or set of events that affects the achievement of project objectives, combining the probability of occurrence with the magnitude of impact on objectives. SWOT analysis can be used to identify these risks.

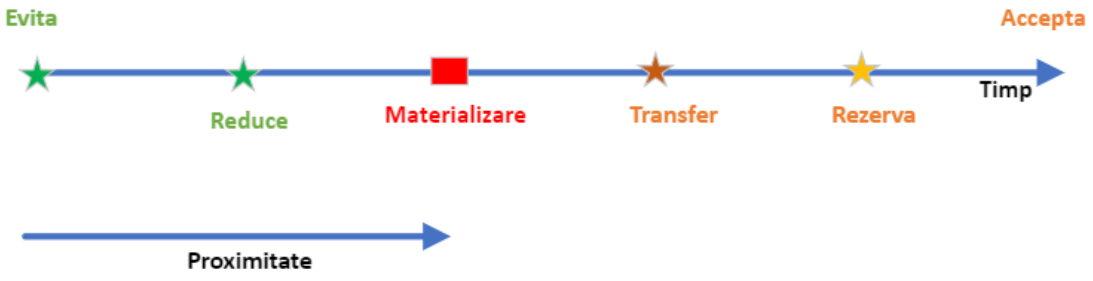

Figure 3 - Types of Risk Responses

Avoid – the risk will never happen/occur again;
Reduce – the effects of the possible impact are diminished.
Materialize – the risk has happened/materialized; it has become a problem.
Transfer – consider transferring the materialized risk through insurance with a third party or by contractual agreement.
Reserve – consider reducing the impact of the materialized risk.
Accept – the risk is accepted and must be managed accordingly to reduce its impact.

Agile methodologies, such as Scrum, manage risks through an iterative and incremental approach, using regular team meetings to discuss and mitigate potential issues. Various project management standards and methodologies, such as APM, IPMA, M_o_R, and ISO 31000, define risk as an uncertainty that can affect project objectives and emphasize structured risk management. Each methodology highlights the importance of identifying, assessing, and controlling risks to achieve project objectives, despite differences in the specific processes and techniques used.

Project risks can be caused by external factors, such as political or economic issues, and internal factors, such as restructurings or staff health problems. It is crucial for project managers to identify and mitigate potential risks early on, take preventive measures, and develop risk management plans to minimize their impact on project timelines, budgets, and outcomes.

3.1.2 Advanced methodologies for identifying and assessing risks in project portfolios

Identifying risks in a project is essential for its success and is accomplished through various methods, including understanding the project context, brainstorming sessions with the team, analyzing documentation and historical data, using analysis techniques such as SWOT and PESTLE, consulting with experts and stakeholders, reviewing the external environment, continuously assessing risks, documenting and prioritizing them based on impact and probability, using technology for predictive analysis, and implementing a permanent feedback mechanism. These practices help anticipate and manage risks effectively throughout the project's evolution.

According to Michael M Bissolete in his book, he mentions that “a distinction must be made in defining risk concerning the difference between a ‘cause’ and a ‘risk’. A good method of making this distinction is by using a ‘risk language’. This statement is a generic sentence structure created to allow the insertion of words or phrases to form a competitive thought.” An example of metalanguage structure is provided below:

As a result of <CAUSE>, <RISK> may occur, which will lead to <EFFECT>

As a result of more UAT tests failing than expected, additional testing phases must be planned, leading to project delays, extended timelines, and increased costs.

It is important to note that not all risks can be anticipated, and project management often involves addressing issues as they arise. However, thorough risk identification can significantly reduce the negative impact on the project by identifying them early, allowing for efficient management and mitigation.

An in-depth analysis of identified risks can be done using:

1. Risk Breakdown Structure (RBS): a. Developing an RBS, which is similar to a Work Breakdown Structure (WBS), to classify and break down risks into manageable components.

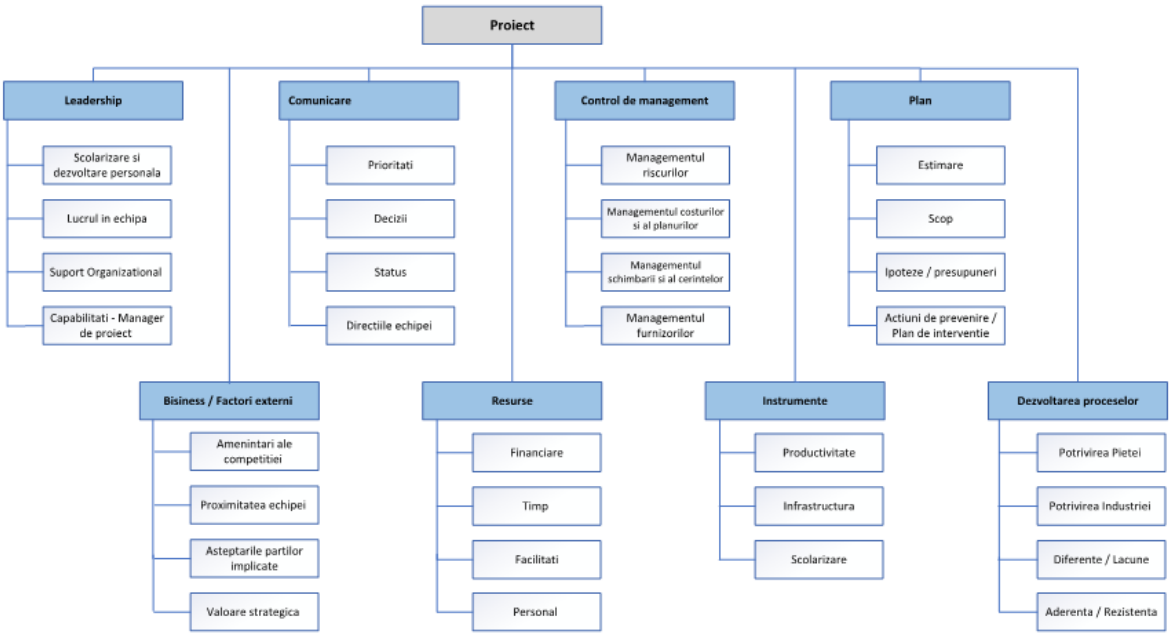

Figure 4 - Risk Breakdown Structure (RBS)

According to the Project Risk Management guide, "from a practical perspective, a generic RBS can be created once and can become an organizational asset for all projects to use—either as is or adapted to the specific needs of the project. The figure provides an example. RBSs are usually organized hierarchically. They show the sources of project risk by category and facilitate the grouping of risks by specific causes of project failure. An RBS can also be converted into a checklist."

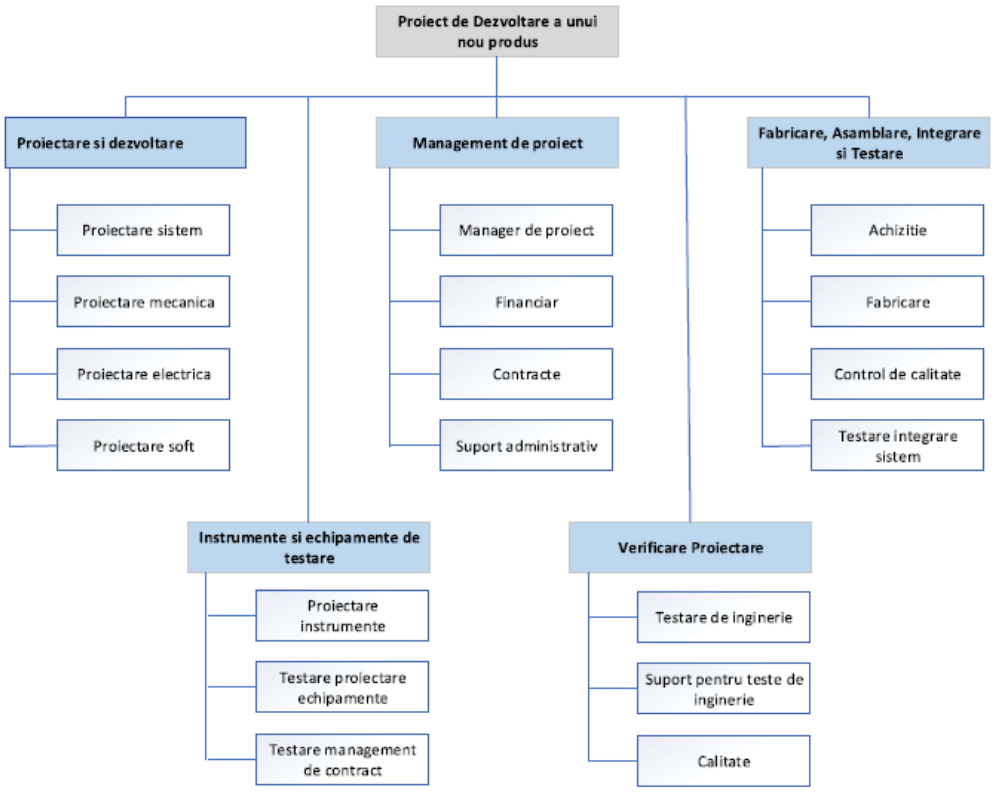

Figure 5 - Work Breakdown Structure – Example

The Work Breakdown Structure – highlighted in figure 7 "if available and well-constructed, a work breakdown structure can be a very useful tool for grouping project risks. It is organized hierarchically. Since the work breakdown structure is related to separate work packages, the risks within them are usually separable. As a result, the potential impact on the main objectives of the project can be theoretically determined for each element in the structure and then potentially combined to generate an overall risk assessment for the project." - according to the Project Risk Management guide.

Delving deeper into the identification and evaluation of risks in a project portfolio requires a more nuanced understanding of the methods and strategies used at each stage.

3.2. Planning, Monitoring, and Implementing Risk Management Measures in Project Portfolios and Mitigating of these risks.

After the stages of risk identification and evaluation, the next steps are risk planning and monitoring.
Risk Response Planning: In this step, action plans are developed for each identified risk. These plans may include avoiding the risk, reducing its impact or probability, transferring the risk (e.g., through insurance), or accepting the risk if it is minor and manageable.
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Table 1- Risk response

<table>
<tr><th>Răspunsuri la amenintari</th><th>Răspunsuri la oportunitati</th></tr>
<tr><td>Evita</td><td>Exploreaza</td></tr>
<tr><td>Reduce
(probabilitatea sau/si impactul)

Rezerva
(a reduce doar impactul)

Transfera
(a reduce doar impactul ,
si deseori doar impactul
financiar)</td><td>Dezvolta</td></tr>
<tr><td colspan="2">Imparte</td></tr>
<tr><td>Accepta</td><td>Respinge</td></tr>
</table>

Implementing risk management plans involves forming the team, allocating resources, and communicating the plans to stakeholders. It is a continuous process that requires periodic monitoring and review to ensure relevance and effectiveness. Constant communication about risks and management plans with all stakeholders, regular assessments, defining key risk indicators (KRI), and monitoring warning signs are essential. Documenting risks in risk

registers and regularly reporting them, considering interdependencies and resource allocation, aligning with the organization's risk appetite, and actively involving participants are key factors. Continuous improvement based on lessons learned and post-project evaluations ensures the adaptation and success of risk management strategies.

4. LEADERSHIP AND TEAMS

The role of human resources in the implementation and management of project portfolios is crucial, as individuals bring the expertise and skills necessary for the execution and coordination of projects. Each team member contributes their knowledge and competencies, which are essential for the success of the projects and, implicitly, the portfolio. Individuals facilitate the implementation and monitoring of projects, resource and risk management, and ensure project delivery according to specifications. Leadership skills and the ability to make quick decisions are vital in maintaining coherence and alignment between portfolio objectives and organizational strategy.

IPMA ICB® (International Project Management Association Individual Competence Baseline) is an international standard that promotes individual competencies in project, program, and portfolio management. It provides a detailed framework for assessing and developing competencies, helping practitioners to improve their weaknesses and maximize their potential. IPMA ICB is a dynamic tool, periodically updated to reflect innovations in the field, and plays an essential role in developing a skilled and adaptable workforce. By promoting competence and professionalism, IPMA ICB contributes to success in managing projects and complex initiatives. According to IPMA ICB, "Individual competence represents the application of knowledge, skills, and abilities to achieve the desired results."

Knowledge is constituted by an accumulation of information and experience that an individual possesses. For example, understanding the concept of a Gantt chart can be interpreted as part of one's knowledge.

Skills represent specific technical aptitudes that enable a person to perform a particular task. For example, the ability to construct a Gantt chart can be considered a skill.

Ability consists of the effective application of knowledge and skills in a specific context. For example, the capacity to successfully develop and implement the management of a project schedule can be considered an ability.

These three terms are interconnected in that possessing a skill requires certain relevant knowledge. Additionally, having an ability involves both skills and relevant knowledge, as well as the correct and timely application of these in practice.

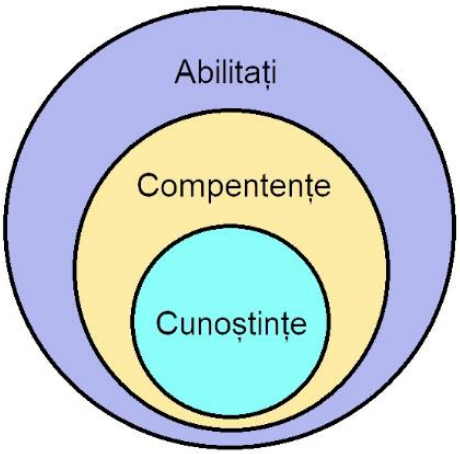


Figure 2- Competences IPMA ICB

In conclusion, experience in project coordination is essential for the efficient management of project portfolios, contributing to risk reduction, performance improvement, and the achievement of the organization's strategic objectives.

Figure 3- The standard of individual competencies - The Eye of Competence

According to the conceptualization, "the eye of competence" constitutes a paradigm of the skills necessary for the efficient management of projects, programs, and portfolios. These competencies are organized into three main domains: perspective, people, and practices. The competency domains focus on essential aspects of the skills required, thereby contributing to the development of a professional and balanced individual in the field of project management.

Figure 4 – Domains of competence

4.1. The role of the leader in project portfolio management

Leadership in project portfolio management involves strategically coordinating multiple projects to align them with the overall objectives of the organization. This requires a broader perspective than managing a single project, involving strategic skills and a deep understanding of the organization's vision and goals. Key aspects include strategic alignment of projects, allocation and optimization of resources, risk management, stakeholder engagement, making

informed decisions, and ensuring compliance with organizational policies. Leaders must establish performance indicators, monitor progress, and manage changes to avoid negative impacts on other projects.
The role of a project portfolio leader is crucial for the organization's success, requiring strategic vision, data-driven decision-making, effective communication and collaboration, adaptability, and team development. Leaders need to efficiently manage resources, focus on achieving tangible outcomes, and promote a culture of continuous improvement. Essentially, they ensure alignment of projects with the organization's strategy and contribute to its success and growth by managing complexity and change.

4.2. Strategic approaches for forming and managing project teams within a complex portfolio: the perspective of leadership.

Forming and managing a project team within a project portfolio requires a strategic approach, starting with understanding the portfolio context and prioritizing projects. It is essential to assess the necessary skills and resource availability, select cross-functional teams, and balance them to avoid overallocation. Clearly defining roles and responsibilities, along with establishing a communication plan and utilizing collaboration tools, are crucial for success. Monitoring performance, supporting teams, and managing risks are ongoing tasks, and leaders must remain flexible and encourage continuous improvement and recognition of achievements.

4.3. Advanced Strategies for Effective Communication and Collaboration in Project Management: A Multicultural and Technological Perspective

Effective communication and collaboration are essential for the success of any project. Defining clear objectives and roles, using management and collaboration tools such as Trello, Jira, Slack, or Microsoft Teams, and scheduling regular meetings are crucial to keeping the team aligned. Meetings should follow a structured agenda, and project documentation should be accessible and updated in real time. Encouraging open and honest communication, resolving conflicts quickly and constructively, and cultural sensitivity in global teams are critical. Implementing a regular feedback mechanism and providing training and support ensure that the team has the resources needed to succeed. Recognizing achievements and celebrating project milestones motivate and strengthen team cohesion.

4.4. Solving strategic issues - the role of leadership in developing and implementing specific strategies in project portfolios

Leadership plays a crucial role in organizational success through the development and implementation of strategies within project portfolios. A program leader must provide clear

vision and direction, aligning project strategies with organizational objectives. This involves managing priorities, motivating the team, handling risks and opportunities, and ensuring adequate resources. Additionally, effective communication and adaptability to changes are essential for maintaining competitiveness. In conclusion, effective leadership ensures the achievement of strategic objectives, thereby contributing to the overall success of the organization.

4.5. Advanced Leadership Models for Organizational Effectiveness: From Pipeline Leadership to Corporate Culture Transformation

Implementing effective leadership involves adopting adaptable strategies and methods tailored to the organization's specific needs and team dynamics. Among these methods are the Leadership Pipeline Model, Management by Objectives (MBO), coaching and mentoring, situational leadership model, 360-degree assessments, and transformative leadership.

The Leadership Pipeline Model, developed by Charan, Drotter, and Noel, identifies critical transitions in leaders' development at various organizational levels, ensuring success through periodic evaluations and continuous feedback. Management by Objectives, promoted by Peter Drucker, aligns individual goals with organizational objectives, enhancing performance through clear SMART goal setting and regular reviews.

Coaching and mentoring are essential for developing individual skills and leadership, providing personalized guidance and continuous support. The situational leadership model, proposed by Hersey and Blanchard, suggests adapting leadership style based on team competence and commitment levels. 360-degree assessments provide multidimensional feedback for developing self-awareness and interpersonal skills.

Transformative leadership, developed by Burns and extended by Bass, promotes profound organizational changes by inspiring and motivating employees through personal example and higher ethical values. These methods contribute to creating a strong organizational culture based on continuous development and adaptability.

4.6. Conclusions - The importance of personal contributions in leadership and team management

These methods are just a few of the approaches through which organizations can cultivate and implement effective leadership, adapted to the specific requirements and challenges of the contemporary business environment. Their implementation requires sustained commitment and a strategic approach to ensure the continuous development of leadership competencies within the organization.

The success of a project portfolio depends largely on the effectiveness of the team that manages it. The focus should be on building a team with the right mix of skills, fostering a collaborative environment, and aligning their efforts with the strategic goals of the portfolio.
Team leadership and management are essential areas in business literature and organizational psychology, having profound implications for both the success of organizations and the individual well-being of employees. Studies show that effective leaders are those who combine strong interpersonal skills with a clear vision, the ability to motivate and inspire, but also the flexibility to adapt to changes in the dynamic business environment. They play a decisive role in shaping organizational culture, promoting innovation and navigating complex challenges.
On the other hand, the dynamics of effective teams are significantly influenced by leadership. Group cohesion, effective communication, and collaboration are essential for team performance. Leaders need to be aware of the diversity of styles, skills, and personalities in their teams and use this diversity as a competitive advantage.
In conclusion, effective leadership is not only about leading people towards achieving organizational goals, but also about creating an environment where team members feel valued, understood, and motivated to contribute at the highest level. Success in this direction can turn a good team into an exceptional one, marking the difference between a mediocre organization and a top one.

5. CASE STUDIES ON THE IMPLEMENTATION OF PROJECT PORTFOLIOS - Research presentation

The management of a complex project is an exciting andmultidimensional challenge, which requires a strategicandadaptable approach. At the heart of this discipline is the effective coordination of resources, time, and people to achieve the set goals. A complex project is characterized by numerous variables, interdependenciesandpotential risks, so planning, organization and coordination-leadership skills are essential.
The introduction to the management of such a project begins with the clear definition of the purpose and objectives. This includes establishing well-defined milestones, identifying key stakeholders, and understanding their expectations. Risk management becomes a central component, involving the identification, analysis and mitigation of potential problems that could disturb the course of the project.
Effective communication is also vital. Ensuring a constant exchange of information between team members and other stakeholders helps to align objectives and preventmisunderstandings. Additionally, using project management tools can make it easier to monitor progress and manage resources.
Finally, flexibility and adaptability are the key to success in managing complex projects. The ability torespond quickly to unexpected changes and adjust plans accordingly can be the

difference between success and failure. Thus, an effective project manager not only plans meticulously, but is also prepared to navigate an ever-changing environment.

5.1. Digitization and Information Transformation – Case Study

The case study presented illustrates the implementation of a complex project at national level, part of the national digital transformation program. The main objective of the project was to design and implement a CRM system using the Salesforce.com platform, to meet the specific needs of the Romanian market and align with national regulations. This involved adapting the global CRM system, already functional at group level, to create a replicable and scalable model in other subsidiaries of the group.

The project was structured in four distinct work packages, each managed by teams of experts, facilitating a modular and efficient approach. The project management adopted two methodologies: Waterfall for well-defined processes and Hybrid-Agile for those that required continuous adjustments. This combination allowed for rapid and adaptable progress, while maintaining a high level of quality and consistency in implementation.

The communication plan was detailed, including daily, bimonthly, and six-week meetings to ensure transparency and coordination between all parties involved. The tools used for planning and monitoring, such as SharePoint, JIRA, and Microsoft Project, have facilitated the effective management of project resources and activities. Official documentation and communication were handled in English, with versions translated into Romanian to facilitate local understanding.

The project team included various roles, from the steering committee to the data migration teams, each with clear responsibilities in ensuring the success of the implementation. The detailed structure and rigorous planning have contributed to effective management and the achievement of set objectives, highlighting the importance of collaboration and a well-defined strategy in digital transformation projects.

The need to adapt and change is crucial in a dynamic business environment, especially in the field of sales, where market and customer requirements are constantly evolving. The IT department plays a key role in providing innovative solutions to meet these requirements, helping to maintain competitiveness and personalize offers. Close collaboration between sales and IT departments is essential to identify and implement the right solutions, thus ensuring the success of digital transformation initiatives.

The digital transformation project involved more than the implementation of new technologies; It was a profound change in the mentality and organizational culture. Emphasis was placed on the training and development of human resources, the adaptation of organizational structures and the redefinition of the way of decision-making. Innovation was central, creating an environment where creativity and courage were encouraged and appreciated, and new ideas were promoted and implemented.

The collaboration between technical departments and business units was crucial for defining, designing, developing and implementing digital solutions. Mixed teams, made up of local and international experts, worked together to configure, monitor and improve IT platforms, ensuring cybersecurity and compliance with local regulations. Effective communication and end-user involvement at all stages of the project were critical to the successful implementation.

The COVID-19 pandemic has brought significant challenges to the project, requiring rapid adaptation of plans and working methods. The management team had to reorganize activities, facilitate remote collaboration, and maintain team morale and efficiency in the face of uncertainty. The impact of the pandemic has highlighted the importance of flexibility and resilience in the management of complex projects and highlighted the need for transparent communication and constant involvement of all stakeholders.

5.2. Methods of evaluation and motivation of employees both within a project and within an organization

In recent years, organizations have focused on turning business ideas into value-adding projects. The increasing complexity of the business environment has required the use of specialized and interdisciplinary work teams to offer competitive products. Modern project management, through its techniques, brings advantages such as the efficient use of resources, improved product quality and customer relations, reduced development times and increased productivity, thus contributing to the progress of society.

For knowledge management and project research, methodologies such as data analysis, forecasting, observation, and validation were used. The project defined and implemented an algorithm for evaluating and assigning the members of the organization to projects, considering their skills and motivation. Thus, the aim is to improve productivity and motivate employees through efficient management of human resources, continuous monitoring of performance and implementation of motivation strategies, including non-financial ones.

A brainstorming session was organized to evaluate the performance criteria of the employees. The participants actively contributed, and the ideas were documented by a designated secretary. The importance of an unfettered working environment, which encourages the free expression of ideas and the postponement of judgment, thus facilitating creativity and effective collaboration, was emphasized. The team consisted of seven members with various specializations.

The theme of the meeting was the evaluation of employees, including criteria such as professional competence, adaptability, collaboration, initiative, alignment with organizational values, responsibility and results obtained. Implementing a well-structured system of evaluation and periodic feedback is essential to align individual performance with organizational goals, ensuring professional development and the achievement of long-term goals.

Following the brainstorming session, several evaluation criteria were proposed and analyzed, selecting the seven most promising for a thorough evaluation through advanced multi-criteria analysis. This process integrates quantitative and qualitative criteria, weighted according to their relative importance, to provide an objective and transparent assessment. The selected criteria include planning, accountability, team development, communication, accountability, efficiency, and team motivation.

The final results of the multi-criteria analysis highlighted the individual performance of employees, facilitating informed decision-making for promotions, rewards and professional development. The evaluation process was detailed, providing a clear basis for management in recognizing merits and aligning human resources with the organization's strategic objectives.

5.3. Theoretical and experimental research on the active management of IT project portfolios – Case study

Purpose of the project: The project aims to streamline the process of allocating human resources within an IT organization, by defining and implementing procedures for the allocation and evaluation of members, in order to increase labor productivity and achieve competitive results.

Project objectives:

A. Specific objectives:

1. Evaluation of the current state of research in the field of human resources management.
2. Designing and modeling procedures for allocating and evaluating IT project members.
3. Implementation and validation of these procedures on a sample of 45 people in the second year of the project.

B. Support objectives:

1. Project management.
2. Capitalizing on the results and disseminating information by publishing at least two scientific papers and participating in two national conferences.

Project Activity Plan:

Year 1:

1. Creating a database with existing solutions and analyzing methods for evaluating and motivating employees.
2. Creating a database with information about the typologies of project managers and carrying out allocation and evaluation procedures.
3. Project management, including risk analysis, equipment procurement and annual reporting.
4. Dissemination of results by creating a website and publishing scientific articles.

Year 2:

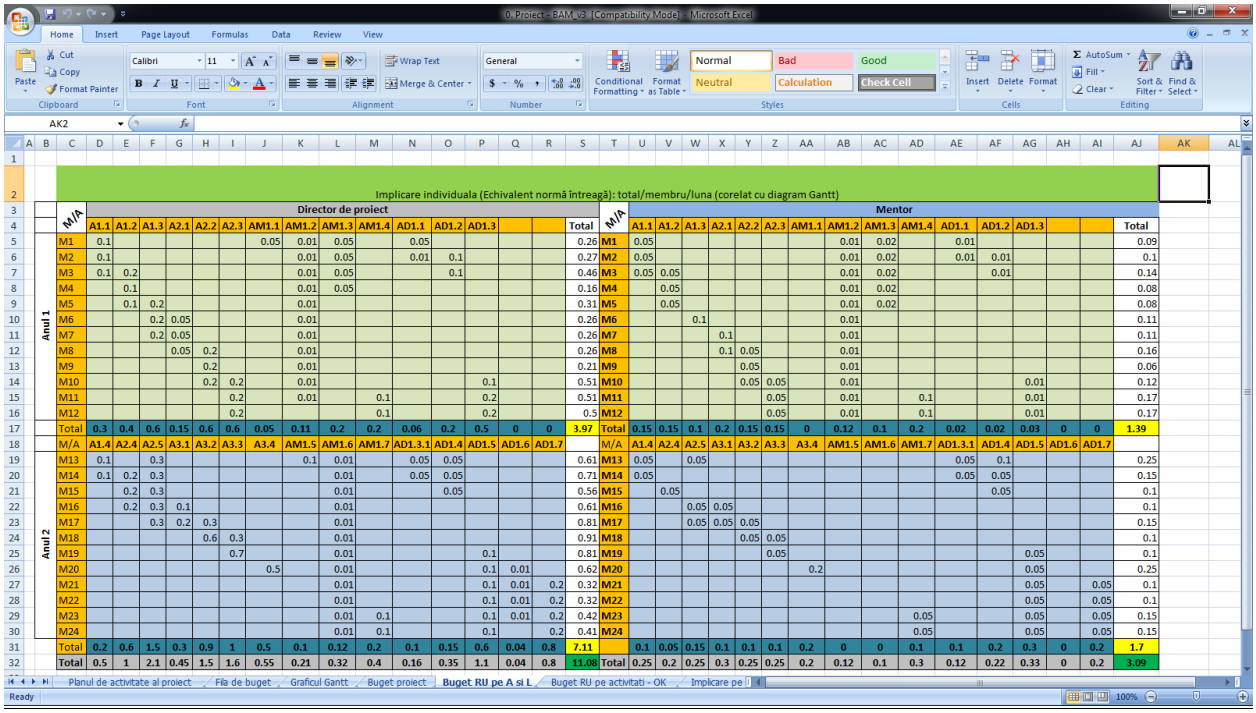
1. Continuation of research activities and updating of the database.

2. Finalization and implementation of allocation and evaluation procedures.
3. Validating the procedures by applying them on a sample of 45 people and adjusting them based on feedback.
4. Continuation of project management and dissemination of results by attending conferences and writing the doctoral thesis.

Gantt chart and HR involvement: The detailed business plan and Gantt chart illustrate the duration and monthly distribution of activities over the two years of implementation. The involvement of human resources is detailed, highlighting the number of hours allocated by the project manager and mentor for each activity.

Project budget: The total budget of the project is RON 208,796.07, distributed on personnel expenses, logistics, mobility, and indirect expenses. Expenses are detailed for each activity, including salary costs and logistical expenses, such as equipment purchases and conference fees.

Individual involvement - full-time equivalent



Implicare individuala (Echivalent normă întreagă): total/membru/luna (corelat cu diagram Gantt)

		Director de proiect																Mentor															
	M/A	A1.1	A1.2	A1.3	A2.1	A2.2	A2.3	AM1.1	AM1.2	AM1.3	AM1.4	AD1.1	AD1.2	AD1.3			Total	M/A	A1.1	A1.2	A1.3	A2.1	A2.2	A2.3	AM1.1	AM1.2	AM1.3	AM1.4	AD1.1	AD1.2	AD1.3			Total
Anul 1	M1	0.1						0.05	0.01	0.05		0.05					0.26	M1	0.05							0.01	0.02		0.01					0.09
	M2	0.1							0.01	0.05		0.01	0.1				0.27	M2	0.05							0.01	0.02		0.01	0.01				0.1
	M3	0.1	0.2						0.01	0.05			0.1				0.46	M3	0.05	0.05						0.01	0.02			0.01				0.14
	M4		0.1						0.01	0.05							0.16	M4		0.05						0.01	0.02							0.08
	M5		0.1	0.2					0.01								0.31	M5		0.05						0.01	0.02							0.08
	M6			0.2	0.05				0.01								0.26	M6			0.1					0.01								0.11
	M7			0.2	0.05				0.01								0.26	M7				0.1				0.01								0.11
	M8				0.05	0.2			0.01								0.26	M8				0.1	0.05			0.01								0.16
	M9					0.2			0.01								0.21	M9					0.05			0.01								0.06
	M10					0.2	0.2		0.01					0.1			0.51	M10					0.05	0.05		0.01					0.01			0.12
	M11						0.2		0.01		0.1			0.2			0.51	M11						0.05		0.01				0.1	0.01			0.17
	M12						0.2				0.1			0.2			0.5	M12						0.05		0.01				0.1	0.01			0.17
	Total	0.3	0.4	0.6	0.15	0.6	0.6	0.05	0.11	0.2	0.2	0.06	0.2	0.5	0	0	3.97	Total	0.15	0.15	0.1	0.2	0.15	0.15	0	0.12	0.1	0.2	0.02	0.02	0.03	0	0	1.39
	M/A	A1.4	A2.4	A2.5	A3.1	A3.2	A3.3	A3.4	AM1.5	AM1.6	AM1.7	AD1.3.1	AD1.4	AD1.5	AD1.6	AD1.7		M/A	A1.4	A2.4	A2.5	A3.1	A3.2	A3.3	A3.4	AM1.5	AM1.6	AM1.7	AD1.3.1	AD1.4	AD1.5	AD1.6	AD1.7	
Anul 2	M13	0.1		0.3					0.1	0.01		0.05	0.05				0.61	M13	0.05		0.05										0.05	0.1			0.25
	M14	0.1	0.2	0.3						0.01		0.05	0.05				0.71	M14	0.05												0.05	0.05			0.15
	M15		0.2	0.3						0.01			0.05				0.56	M15		0.05												0.05			0.1
	M16		0.2	0.3	0.1					0.01							0.61	M16			0.05	0.05													0.1
	M17			0.3	0.2	0.3				0.01							0.81	M17			0.05	0.05	0.05												0.15
	M18					0.6	0.3			0.01							0.91	M18					0.05	0.05											0.1
	M19					0.7				0.01				0.1			0.81	M19						0.05								0.05			0.1
	M20							0.5		0.01				0.1	0.01		0.62	M20								0.2						0.05			0.25
	M21									0.01				0.1	0.01	0.2	0.32	M21														0.05		0.05	0.1
	M22									0.01				0.1	0.01	0.2	0.32	M22														0.05		0.05	0.1
	M23									0.01	0.1			0.1	0.01	0.2	0.42	M23													0.05			0.05	0.15
	M24									0.01	0.1			0.1		0.2	0.41	M24													0.05			0.05	0.15
	Total	0.2	0.6	1.5	0.3	0.9	1	0.5	0.1	0.12	0.2	0.1	0.15	0.6	0.04	0.8	7.11		0.1	0.05	0.15	0.1	0.1	0.1	0.2	0	0	0.1	0.1	0.2	0.3	0	0.2	1.7
	Total	0.5	1	2.1	0.45	1.5	1.6	0.55	0.21	0.32	0.4	0.16	0.35	1.1	0.04	0.8	11.08	Total	0.25	0.2	0.25	0.3	0.25	0.25	0.2	0.12	0.1	0.3	0.12	0.22	0.33	0	0.2	3.09

6. Final conclusions, original contributions, dissemination of results, future directions, managerial implications

6.1. Conclusions

In the current context, theoretical and experimental research on the active management of project portfolios reveals several critical aspects and emerging trends. They underline the need for an adaptive and flexible approach to portfolio management, given the dynamism and complexity of the contemporary business environment.

The main conclusions of this thesis can be summarized as follows:

- The importance of flexibility and adaptability: In a world characterized by rapid and unpredictable changes, the ability to adapt the project portfolio to new market conditions becomes essential. Flexibility in resource allocation and prioritization of projects according to current circumstances contribute to organizational resilience and the achievement of strategic objectives.
- The Role of Technology in Portfolio Management: Technological advancements have a significant impact on the active management of project portfolios. The use of data analysis and automation tools facilitates the process of monitoring and evaluating project performance, allowing for better decision-making based on concrete and current data.
- Integrating sustainability considerations: Global trends towards sustainability and social responsibility influence the way project portfolios are managed. The organization and selection of projects increasingly take into account the impact on the environment and social benefits, thus promoting responsible and ethical management.
- Importance of skills and leadership: Effective project portfolio management requires advanced skills and leadership skills. The continuous training and development of project managers, together with the promotion of a collaborative and innovation-oriented leadership style, are determining factors for the success of the portfolio.
- Collaboration and effective communication: Project portfolio management involves multiple stakeholders, both internal and external. Close collaboration and clear communication between these parties are essential to ensure alignment of objectives and maximise synergies between projects.
- Advanced methodological approaches: Agile and hybrid methodologies, which combine traditional and innovative elements, have demonstrated efficiency in project portfolio management. These approaches allow for more dynamic and adaptive management, better responding to the current needs of organizations.

Through these conclusions, it is highlighted that the active management of project portfolios requires a holistic and integrated approach, which capitalizes on modern technologies, promotes sustainability and develops the necessary skills among managers. In an ever-

changing business environment, the ability to adapt and innovate is the key to long-term success.

The topicality of the topic "**Theoretical and experimental research on the active management of project portfolios**" is evident in the dynamic and complex context of the contemporary business environment, marked by rapid technological changes, economic uncertainties and a strong orientation towards sustainability. Advances in information technology, such as artificial intelligence and big data, enable the efficient optimization and monitoring of project portfolios, ensuring informed decision-making and rapid adaptation to new market conditions. Agile and adaptive methodologies respond to the need for flexibility, while globalization and the diversity of project teams require collaboration and effective communication. The integration of environmental, social and governance considerations becomes indispensable to align with current requirements, and the continuous development of leadership skills is vital for the successful management of project portfolios. Thus, this research topic is essential to address modern challenges and ensure long-term organizational performance and sustainability.

Chapter 1 of the doctoral thesis is entitled "**Justification of the approach to the topic in the current context in the era of globalization and digital transformations**". This research highlights the need for effective project portfolio management in a globalized and dynamic business environment, highlighting the strategic importance of active management for organizations under constant pressure for innovation and adaptability. Literature reveals the shortcomings of traditional methodologies, criticized for their rigidity and inability to adapt quickly to change. In this context, the thesis proposes the theoretical and experimental analysis of new digital technologies and agile methodologies to develop innovative models and tools, providing greater flexibility and strategic alignment.

The chapter details the complexity of project portfolio management, highlighting the hierarchical interactions between the different levels of portfolios and projects, and highlights the essential role of portfolio management in optimizing the use of resources and improving communication between stakeholders. The theoretical research provides a solid basis for understanding the complexity of portfolio management, and the experimental approach validates the proposed practices in concrete organizational environments, assessing the impact of different factors on performance. The synergistic integration of theoretical and empirical findings promotes the development of a holistic and adaptable framework for project portfolio management, contributing to the evolution of knowledge and the development of new effective approaches in this field.
Thus, the doctoral thesis "Theoretical and experimental research on active project portfolio management" brings a valuable and indispensable contribution to the existing literature,

offering new perspectives and applicative solutions for the complex challenges of project portfolio management in the dynamic context of global business.

Chapter 2 of the PhD thesis, entitled "**Theoretical Foundations of Project Portfolio Management**", explores in depth the essential principles and methodologies for the effective selection, prioritization and management of project portfolios in organizations. In the current dynamic context, where globalization and digital transformations prevail, the strategic management of project portfolios becomes critical for aligning organizational objectives with the execution of individual projects.

The chapter makes a comparative evaluation of Waterfall and Agile methodologies, emphasizing that Waterfall is more suitable for projects with stable and well-defined requirements, while Agile offers advantages in the context of changing requirements and the need for constant feedback. Agile and adaptive approaches are explored in depth, with an emphasis on flexibility, collaboration and iterative development, essential aspects for the success of projects in volatile and uncertain business environments.

The chapter concludes with the presentation of a hybrid approach, which integrates traditional and agile methodologies to efficiently manage complex project portfolios. This integration allows organizations to benefit from the structure and predictability of traditional methodologies, while embracing the flexibility and adaptability of agile methodologies.

Chapter 2.2 analyzes change management and complexity in project portfolio management, identifying critical factors and their implications. It underlines the importance of a proactive approach in risk and turbulence management, as well as the use of adaptive strategies to ensure the success of projects in dynamic environments.

The applied case study presented in chapter 2.3 highlights the transformation of IT into a multinational company, using mixed methodologies to overcome resistance to change and optimize organizational processes. The results obtained demonstrated the efficiency of the methodologies applied in reducing working time, reducing costs and increasing revenues.

In conclusion, Chapter 2 highlights the importance of adopting strategic project portfolio management, integrating traditional and agile methodologies to meet the challenges of the contemporary business environment.

Chapter 3 focuses on risk management in project portfolios, addressing the complex process of identifying, assessing and controlling risks to ensure organisational success. Risk management is essential for achieving strategic objectives, minimizing potential losses, and maximizing opportunities.

Identifying risks is a necessary process, which involves documenting the potential risks associated with the projects in the portfolio. These risks include internal issues, such as the allocation of resources and team skills, and external issues, such as market fluctuations and legislative changes. The techniques used include brainstorming, reviewing documentation, and consulting with experts.

Risk assessment involves determining their likelihood and impact, using qualitative and quantitative methods to classify and prioritise risks. Risk management strategies include avoidance, reduction of likelihood or impact, transfer through insurance or contracts, and acceptance of minor risks, along with the development of contingency plans. Continuous risk monitoring ensures that management strategies are quickly identified and adjusted as the project progresses.

International standards and methodologies, such as PMBOK, PRINCE2 and SWOT analysis, provide structured frameworks for risk management, each bringing a unique perspective. Advanced techniques such as PESTLE analysis and Monte Carlo simulations allow for detailed risk assessment and the development of more effective strategies. Risk response planning involves concrete actions, resource allocation and effective communication of plans, with regular monitoring and constant feedback for continuous improvement of risk management.

Effective risk analysis and management within the CRM-RO project involved the use of advanced methodologies and structured practices to ensure the success of the project. Personal contributions have been instrumental in defining and implementing a robust risk register, using PESTLE and SWOT analysis, and clarifying roles and responsibilities through the RACI matrix. These practices allowed for effective risk management and the achievement of the set objectives, despite the challenges and uncertainties in the external environment.

In conclusion, advanced risk management in project portfolios is essential for organizational success. The use of appropriate methodologies and techniques, continuous monitoring and the active involvement of stakeholders ensure a proactive and effective approach to risks, leading to better results and the achievement of strategic objectives.

Chapter 4 is dedicated to leadership and team management and emphasizes the essential importance of human resources in the success of project portfolio management. Individuals bring varied and valuable skills that are essential for effectively coordinating projects and ensuring that organizational goals are achieved. Through their expertise and skills, team members contribute to the optimal use of resources, effective collaboration and informed decision-making.

Leadership is essential for strategically aligning projects with organizational goals, optimizing resources, managing risk, and ensuring compliance. Effective leaders coordinate daily activities, inspire and motivate teams, creating an environment conducive to performance and innovation. Advanced leadership methods, such as the Pipeline model, MBO, coaching, mentoring, situational leadership, and 360-degree assessments, provide structures for developing competencies and promoting collaboration and adaptability. Transformative leadership stimulates employees to prioritize common goals and promotes an innovative and ethical work environment, adaptable to rapid changes in society and business.

In conclusion, the role of individuals and leadership in managing project portfolios is fundamental to organizational success. By developing and implementing effective leadership and team management strategies, organizations can ensure the achievement of strategic

objectives and create a motivating and high-performance work environment capable of adapting and thriving in the face of modern challenges.

Chapter 5 presents a detailed and structured study of the active management of IT project portfolios, highlighting both theoretical and experimental aspects. The research aims to streamline the human resources allocation process by implementing well-defined procedures for the evaluation and allocation of team members in IT projects, with the ultimate goal of increasing the productivity and competitiveness of organizations.
The main objective of the project is to develop and validate innovative procedures for allocating and evaluating human resources in the context of IT projects. This is achieved through a phased approach with specific objectives, such as analysing the current state of research, modelling and implementing allocation and evaluation procedures, and testing them on a representative sample.
The project is structured over two years, with detailed activities at each stage, including the creation of databases, the analysis of existing evaluation and motivation methods, and the development of specific allocation procedures. The implementation of these procedures and their validation by application on a sample of 45 people is the culmination of experimental research.
The balanced distribution of human resources involvement and rigorous budget allocation are fundamental to the success of the project. The constant involvement of the project director and mentors, together with the careful management of logistics and mobility resources, ensures an optimal framework for conducting research and implementing the proposed solutions.
Expected results include the development of a comprehensive database, detailed analysis reports, and completed procedures for allocating and evaluating IT project team members. They will contribute to increasing the productivity and competitiveness of organizations through more efficient management of human resources.
The impact of the project is amplified by disseminating information through scientific articles and participation in national and international conferences. Thus, the theoretical and practical contributions of the project will be recognized and integrated into the management practice of IT project portfolios, bringing significant benefits to the organizations involved.

In conclusion, chapter 5 demonstrates a systematic and well-founded approach in the research and implementation of active management of IT project portfolios, offering practical solutions to the current challenges in the field. These efforts support the continuous development and adaptation of organizations to the dynamics of the IT market by optimizing the use of human resources.

The achievement of the objectives sought to be achieved through this work was achieved through their harmony with the proposed research methodology and through the personal contributions that were brought to this work. Thus::

- 01.1 Analysis of the literature - the literature was reviewed, the academic sources were analyzed in order to update the existing information on the active management of project portfolios. Also, a series of materials prepared within active portfolios of projects under implementation were consulted and the specialized literature was consulted and participated in national and international conferences.
- 0 1.2 Understanding the current context – consists of analysing and evaluating the current situation by identifying existing trends, problems and opportunities, in order to provide a solid knowledge base to support subsequent decisions and strategic planning.
- 0 2.1 Classification of project methodologies – involved identifying and organizing the different methodologies used in project management, according to relevant criteria, in order to facilitate the choice of the most appropriate approaches according to the specifics and requirements of each project.
- 0 2.2 Identification of organisational needs and challenges in portfolio management - the aim was to determine why effective portfolio management is important and the main difficulties that organisations face in this process were identified, in order to improve performance and strategic alignment.
- 0 3.1 Identification of risks and comparative study of the risk process from the current literature – aimed at recognizing and cataloguing the main risks associated with a certain field or project, as well as conducting a comparative analysis of how they are managed according to recent literature, in order to identify best practices and methodologies. The types of risk were identified and analyzed.
- 0 3.2 Risk analysis and monitoring - consisted of the detailed assessment of the risks associated with a project or area and the development of effective continuous monitoring procedures, in order to ensure the prompt identification and adequate management of risks, minimizing the negative impact on organizational objectives (risk registers).
- 0 3.3 Definition of the risk treatment method – the aim was to establish specific strategies and methodologies for addressing and managing the identified risks, aiming to minimize their impact and ensure the continuity and success of projects or organizational activities.
- 0 4.1 Analysis of the way the project team was formed and the impact it can have on achieving the project objectives - consisted of evaluating the process of selecting and setting up the project team, as well as examining the influence that the team structure and dynamics have on the effective achievement of the set objectives. A change management questionnaire was also developed applied to all the people actively involved in the company's transformation process.

- O 4.2 Defining the main elements for the success of a complex project – this objective aimed to identify and describe the essential factors, such as strategic planning, resource management, team coordination, effective communication and risk management, which contribute decisively to the successful implementation of large-scale and complex projects.
- O 5.1 Identification of effective management methods - this objective aimed to discover and describe the management techniques and practices that have proven to be most effective in improving organizational performance, optimizing resources and achieving strategic objectives, coordination and reporting based on practical experience.

In conclusion, it can be said that the methodology has been effectively aligned with the objectives of the research, ensuring a comprehensive and precise approach for each objective. Thus, the scientific objectives proposed at the beginning of the doctoral program were successfully met.

6.2. Contributions

The personal contribution of this thesis is manifested by the development and validation of innovative models, by the integration of existing theories and new technologies, and by the proposal of practical solutions to improve the management of project portfolios in the current context. These contributions bring value both theoretically and practically, with the potential to positively influence both the literature and organizational practices.

This thesis aims to make a significant contribution to its field of study through multiple initiatives and projects, highlighting the deep commitment to advancing knowledge and practices in project management.

First, one of the most relevant contributions of this work consists in the publication of thirteen articles in internationally recognized journals. This publishing effort not only increases the visibility of the research, but also emphasizes the importance and applicability of the results obtained in professional and academic practice. Publication in various specialized journals ensures the dissemination of knowledge to a wide and diverse audience, thus facilitating transdisciplinary and intercultural dialogue about the topics addressed.

Participation in international conferences is another central dimension of personal contribution. Presenting papers that align with the central theme of the thesis not only demonstrates the relevance and applicability of the research, but also allows for the exchange of ideas and direct feedback from other experts in the field. This is decisive for the continuous validation and refinement of research results.

The coordination of projects at a global level, using innovative portfolio management methodologies, demonstrates the practical applicability of the theory in varied and complex contexts. This direct experience in project management highlights not only personal skills in leadership and strategic management, but also the effectiveness of the methodologies

proposed in the thesis. Through these projects, a bridge is created between academic theory and professional practice, demonstrating how theories can be adapted and implemented to maximize the success of projects in various cultural and organizational environments.
The uniqueness of this contribution lies in my active professional involvement in global project portfolios, which allowed me access to great resources and information. This involvement not only enriched the theoretical and practical knowledge gained during the doctoral studies, but also facilitated the development of innovative and pragmatic perspectives in the field of research. Through these project portfolios, I had the opportunity to collaborate with international teams and interact with various communities and environments. This global exposure was essential to understand the complexity and diversity of current challenges, while also providing the opportunity to test and validate the theories and methods studied in a real and dynamic context. Thus, my contributions extended beyond the theoretical limits, having a significant and tangible impact on the implemented projects.
The case study analyzed in this paper is a complex and multidimensional one, offering a different perspective from the previous approaches. This complexity is reflected in the diversity of variables and contexts analysed, as well as in the innovative methods used to address the problems identified. The case study demonstrates the applicability and relevance of the proposed theories, while highlighting the need for continuous adaptation and flexibility in the face of emerging challenges.
In conclusion, this doctoral thesis stands out for the harmonious integration of theory with practice, contributing to the advancement of knowledge and the development of innovative and effective solutions. Involvement in large-scale global projects has provided a valuable platform for applying theoretical knowledge and generating new and relevant perspectives. The complex case study analyzed is an eloquent example of how academic research can positively influence current and future practices, highlighting the importance of an integrated and interdisciplinary approach in solving contemporary problems.
The analysis of the current state of research in the paper provides an exhaustive perspective on the current evolution and trends in project management. This section not only reflects a deep understanding of the literature, but also identifies knowledge gaps that can be explored in future research. Thus, the thesis contributes to the solid theoretical foundation of the field and to the anticipation of future development directions.

Also, another significant contribution was the translation of the PMBOK7 guide into Romanian and represents a commitment to adapting and customizing project management resources for the Romanian community. This initiative not only improves access to quality learning materials, but also stimulates the continuous professional development of project managers in Romania. Through this effort, the thesis engages in the creation of resources that are directly relevant and utilitarian for local professionals.
Below was made the mapping between the objectives of the work and the personal contributions made to achieve them.

- C1.1 – Analysis of the literature and identification of relevant works with specific applicability for the selected research topic. Identification of the real need for the elaboration of the doctoral thesis. This very important contribution is represented both by the analysis of the specialized literature and implicitly by identifying the works with specific applicability to the chosen research topic and by identifying the areas not covered by the existing literature so far. The Web of Science and Scopus tools were used in the analysis. The results of this investigation were materialized by categorizing the techniques and models used, as well as by identifying prominent authors in this field. This contribution demonstrates the achievement of **O1.1.**

- C1.2 – Current status. In order to contribute to the understanding of the current context, a theoretical research was carried out where reliable sources were identified and data were gathered. We also monitored, tracked and interpreted the events that occurred during the doctoral study to see the impact of the events they may have on the project portfolios (e.g. COVID-19). This contribution demonstrates the achievement of the **O2.1 target.**

- C2.1 – Identification in different contexts of the use of traditional methodologies. Theoretical contribution: a synergy was achieved between traditional methodologies and agile approaches. A detailed review of the literature was carried out, highlighting the convergence between traditional methodologies (PMBOK, PRINCE2) and agile approaches. A hybrid model was proposed that optimizes the advantages of each methodology, providing solutions for the gaps identified in previous research. This contribution demonstrates the achievement of objective O2.1, regarding the classification of project methodologies.
- C2.2 – Identification of adaptable agile models and techniques in complex projects – we contributed to managerial practices and the development of practical tools by actively participating in the translation of the PMBoK 7 guide from English into Romanian. Through this contribution, a working material easily accessible to the community of project managers in Romania was created, translating an international guide. These tools help managers navigate the complexity and uncertainty associated with managing project portfolios. This contribution demonstrates the achievement of the **O2.2 target.**

- C3.1 – Comparative risk analysis – A complex and innovative board has been defined in order to record, monitor and prioritize the treatment of risk reduction and mitigation actions. In Chapter 3, an innovative and integrated approach to identifying and assessing risks in project portfolios was introduced, combining elements from PMBOK, PRINCE2 and Agile. The definition of risk has been customised and advanced

identification methods have been implemented, such as structured brainstorming and extensive consultations with experts. Dynamic risk matrices and detailed sensitivity analyses have been developed. Response and integrative management strategies were proposed, aligning risk management processes with the organization's strategic objectives and implementing a continuous system of learning and improvement, thus ensuring efficient and proactive risk management. The proposed model for the risk register can be consulted in Annex 3.1 - Risk register. This contribution demonstrates the achievement of the objective O3.1 Risk identification and comparative study of the risk process in the current literature.

- C3.2 – Risk monitoring – In the context of planning and managing risks in project portfolios, it is essential to adopt a proactive and systematic approach. Following the risk identification and assessment stages, action plans are developed that may include avoiding, reducing, transferring, accepting, sharing or exploiting risks. The implementation of these plans involves allocating resources and communicating clearly with all stakeholders. Risk monitoring is an ongoing process, which includes regular assessments, defining and monitoring key risk indicators, and identifying early warning signs. It is important to document the status of risks and report regularly to facilitate informed decision-making. Key considerations in risk management include interdependencies between projects, resource allocation, the organization's risk appetite, active participant involvement, continuous improvement through lessons learned, and adapting strategies based on feedback and changing conditions. It ensures the success and stability of projects and organizations. In the case of the present paper, a matrix was proposed for monitoring and approaching the risk according to the impact it may have on the project portfolio. This contribution demonstrates the achievement of objective O 3.2 Risk analysis and how to monitor them.

- C3.3 – Risk response – During the period of doctoral studies, detailed and coherent structures for the risk register were continuously defined and developed, which included the definition of each risk, potential impact, probability of occurrence and associated consequences. Also, through continuous and constant monitoring and updating of the risk register according to changes in the project environment, a quick and efficient reaction to the occurrence of risks was ensured. Through quantitative and qualitative analysis, the risk exposure matrix model was tested and it was found that a clear and concise definition can reduce or even eliminate the possibility of risk materialization, so that the impact it can have on the implementation of the project is diminished or even canceled. Clear responsibilities were designated for risk management and deadlines for the implementation of corrective measures, which allowed for effective coordination and a significant reduction in the negative impact of risks. These personal contributions were essential for the success of the CRM-RO

project, ensuring rigorous and proactive risk management and facilitating the achievement of the project's objectives despite the challenges encountered. This contribution demonstrates the achievement of objective O 3.3 Defining how to deal with risk.

- **C4.1** – Organizational structure of the project – During the active implementation of the project portfolios, it resulted in the need to organize and empower the project team in a very clear and precise manner. Thus, models of organizational structures to be used within the project portfolios were defined. These are included in the Annexes: Annex 5.2 - Overview of the organization of the team at the program level, Annex 5.1 - Organizational structure of the team and Annex 5.2 - Overview of the organization of the team at the program level. This contribution demonstrates the achievement of the objective O4.1 Analysis of the way the project team is formed and the impact it can have in achieving the project objectives.

- **C4.2** – Monitoring and reporting scheme. As a result of the experience of implementing complex projects, monitoring reports have been defined that help project and/or program managers to follow in a real and accurate way the evolution of the stages of the activities they have in implementation. Based on these dashboards, it is very easy to follow the evolution of the programs and decisions can be made so that the risks of failure or negative impact on them are reduced and / or even eliminated. Some defined models can be consulted for use in Chapter 5. This contribution demonstrates the achievement of objective O 4.2 Defining the main elements for the success of a complex project.

- **C5.1** – Methodological innovations and new models. We have developed an integrated model for project portfolio management. Theoretical and experimental validation was carried out for the models proposed in the case study. Through the case studies presented and the controlled experiments, we validated the effectiveness of the integrated model and the portfolio performance evaluation framework in various organizational contexts. The results obtained demonstrate the viability and benefits of applying these models in practice. Also, in the context of my research, I created an integrated model that combines traditional methodologies with agile approaches, adapting them to the specific needs of modern organizations. This model offers increased flexibility and adaptability, essential in the era of globalization and digital transformations. (Annex 5.0.1 and Annex 5.0.2). This contribution demonstrates the achievement of objective O5.1 - Identification of effective methods of project portfolio management.

- The dissemination of the results obtained from the research activity carried out during the doctoral studies was achieved by participating in international conferences and publishing scientific articles in various specialized journals. (Chapter 6, item 6.3). This contribution demonstrates the achievement of the DO objective **:** Development and implementation of the plan for dissemination and capitalization of the results obtained from the research.

Through all these contributions, the thesis demonstrates a successful integration of theory with practice, emphasizing the applicative value and impact of research in the field of project management.

6.3. Dissemination of results

The results of my research carried out during the doctoral program were disseminated through participation in international academic conferences and by publishing scientific articles. These activities facilitated the communication and sharing of my findings with the scientific community, thus contributing to the advancement of knowledge in the field of study and to the strengthening of a collaborative network with other researchers and specialists. These can be found in the **List of published publications.**

6.4. Advantages and limitations of the proposed research. Formulating future directions

Advantages of theoretical research:
Exploration of fundamental concepts: Theoretical research allows for the exploration and clear definition of fundamental concepts and principles in the field of project portfolio management. These can include concepts such as project selectionand prioritization, alignment with organizational objectives, evaluation, and monitoring of portfolio performance, etc.
Analysis of the existing literature: Theoretical research involves an exhaustive analysis of the existing literature in the field. This analysis makes it possible to identify trends, research gaps and best practices in project portfolio management.
Generation of models and theories: Based on the analysis of the literature and a deep understanding of concepts, theoretical research can generate models and theories that can then be tested empirically in experimental research. These models can provide a deeper understanding of the processes and relationships within portfolio management.
Identification of key issues: Theoretical research can identify and clarify key issues and challenges faced by practitioners in project portfolio management, providing a basis for addressing these issues in further research.
Limits of theoretical research:
Conceptual limitation: Theoretical research focuses mainly on the development of concepts and theories, without providing empirical validation of them. Thus, there is a risk of remaining

at the abstract and conceptual level, without providing practical solutions to the problems in the field of project portfolio management.
Subjectivityof interpretation: The interpretation and synthesis of existing literature may be subjective and influenced by the researcher's perspectives, which may affect the objectivity of conclusions and recommendations.
Lack of direct practical applicability: Some concepts and theoretical models may have limited practical applicability or may require empirical adaptations and validations before they can be implemented in practice.

Advantages of experimental research:
Empirical validation of theories: Experimental research provides the opportunity to empirically test and validate theories and models developed in theoretical research. This helpsto increase confidence in research results and recommendations.
Variable control: Experiments allow for rigorous control of variables and examination of causal relationships between different aspects of project portfolio management. This makes it easier to identify the key factors influencing portfolio performance.
Direct applicability in practice: The results of experimental research can be directly applicable in practice, providing concrete solutions and recommendations for improving the management of project portfolios in organizations.

Limits of experimental research:
Ethical and practical constraints: Some hypotheses or experiments may be difficult to test for ethical or practical reasons, which may limit the applicability of experimental research in certain contexts.
Oversimplification: To make it easier to control variables, experiments can oversimplify situations and contexts, which can affect the applicability of results in complex real-world situations.
Costs and resources: Conducting experimental research can involve significant costs and resources, which can limit the number of studies that can be conducted and generalized.
In conclusion, by combining theoretical and experimental research in project portfolio management, researchers can gain a deeper andmore complete understanding of the field, providing relevant and applicable solutions and recommendations for practitioners.
As a researcher, the next lines of investigation that are points of interest to me are related to the impact of Artificial Intelligence in the field of project portfolio management. In this regard, I intend to explore how the implementation of Artificial Intelligence influences the processes and decisions associated with project portfolio management. This involves examining how

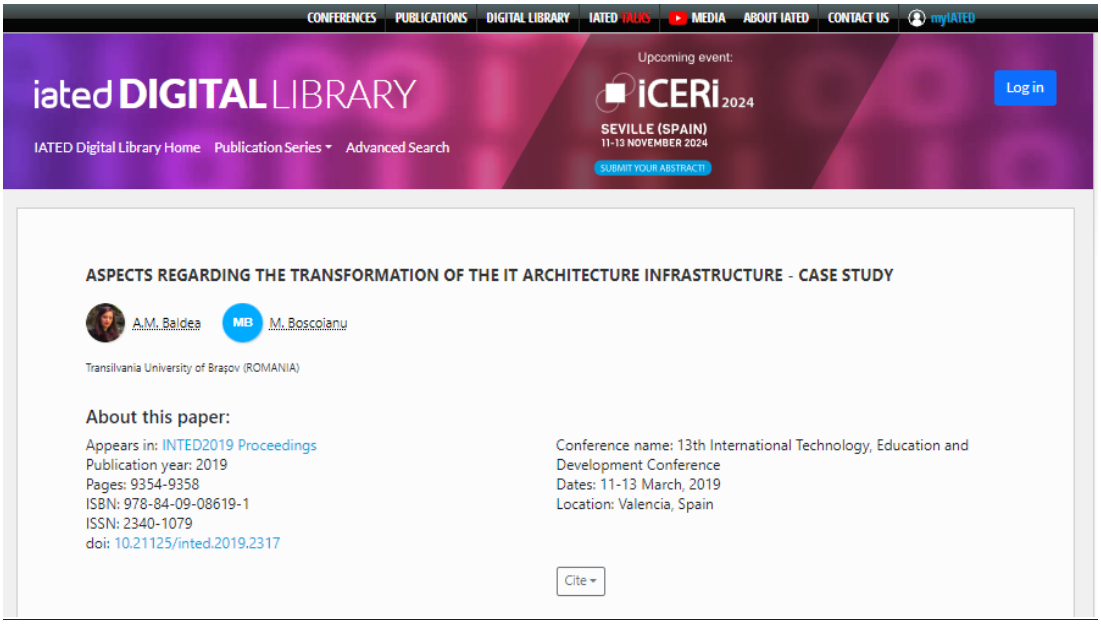
artificial intelligence algorithms can be used for resource optimization, risk assessment, and decision-making within project portfolios.
Another aspect of interest for my research refers to the impact that Artificial Intelligence has on the role of the project manager in the digital age. I intend to investigate whether project managers will be replaced by Artificial Intelligence systems in certain aspects of project management or whether they will need to acquire new skills and competencies in order to be able to collaborate effectively with these intelligent systems. This involves assessing how project managers can adapt and integrate AI technologies into their current practices to support and improve project management processes.

In addition, another research direction that I intend to explore is related to the emerging concept of "TRUST LEADERSHIP" in the context of project management. This concept focuses on the idea that leaders should direct their attention and efforts towards developing and building trust in the team, rather than strictly managing projects. In this regard, I intend to investigate how the implementation of such an approach can influence the dynamics of the project team and contribute to the achievement of better and more sustainable results within projects.

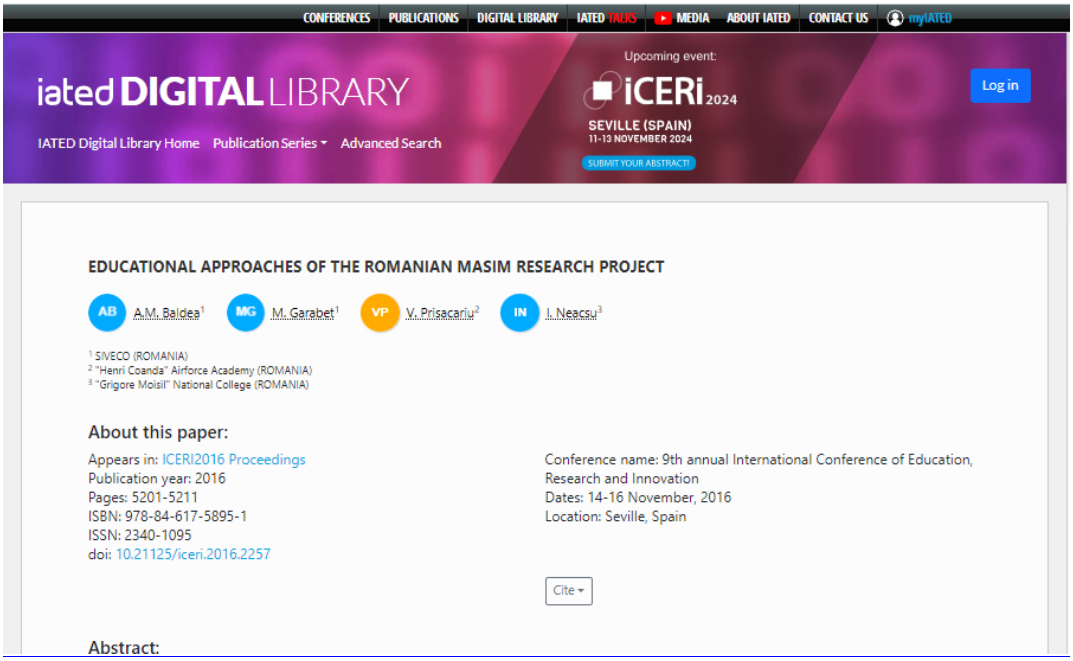
Overall, the future of AI-powered portfolio management is likely to be characterized by increased efficiency, improved decision-making capabilities, and greater customization to meet the evolving needs of investors in an increasingly complex and dynamic financial landscape. However, it's important to note that while AI offers significant potential benefits, it also presents challenges such as data privacy concerns, algorithmic bias, and regulatory considerations that need to be carefully addressed.

List of publications

1. **Baldea A.M,** Boscoianu M - "ASPECTS REGARDING THE TRANSFORMATION OF THE IT ARCHITECTURE INFRASTRUCTURE - CASE STUDY "- 13th International Technology, Education and Development Conference, 11-13 March, 2019, Valencia, Spain - INTED2019 Proceedings , Publication year: 2019, Pages: 9354-9358, ISBN: 978-84-09-08619-1, ISSN: 2340-1079, doi: 10.21125/inted.2019.2317, https://library.iated.org/view/BALDEA2019ASP



2. Garabet M, **Baldea A.M.,** Prisacariu V. - "EDUCATIONAL APPROACHES OF THE ROMANIAN MASIM RESEARCH PROJECT" - 9th annual International Conference of Education, Research and Innovation -4-16 November, 2016, Seville, Spain- ICERI2016 Proceedings, **Publication year:** 2016, **ISBN:** 978-84-617-5895-1, **ISSN:** 2340-1095, **doi:** 10.21125/iceri.2016.2257, https://library.iated.org/view/BALDEA2016EDU



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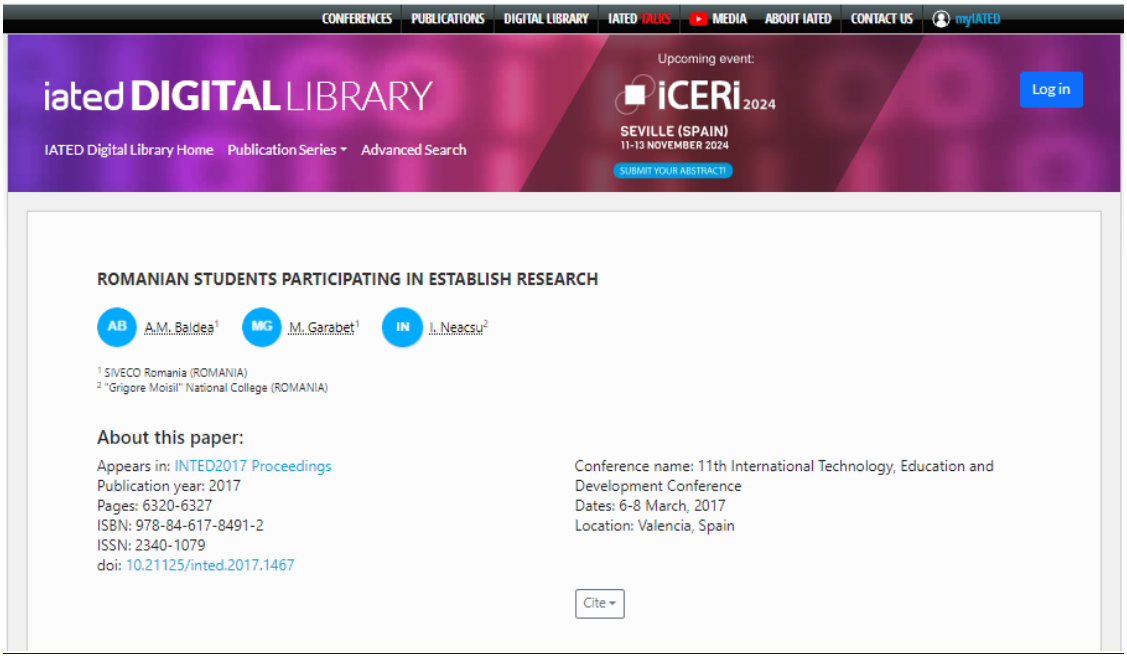

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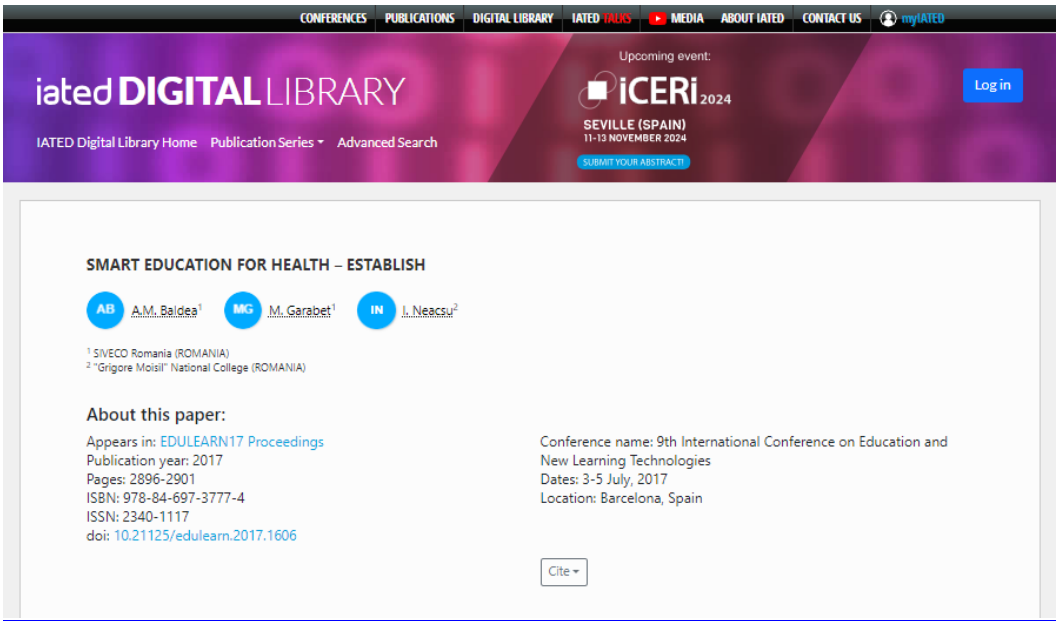

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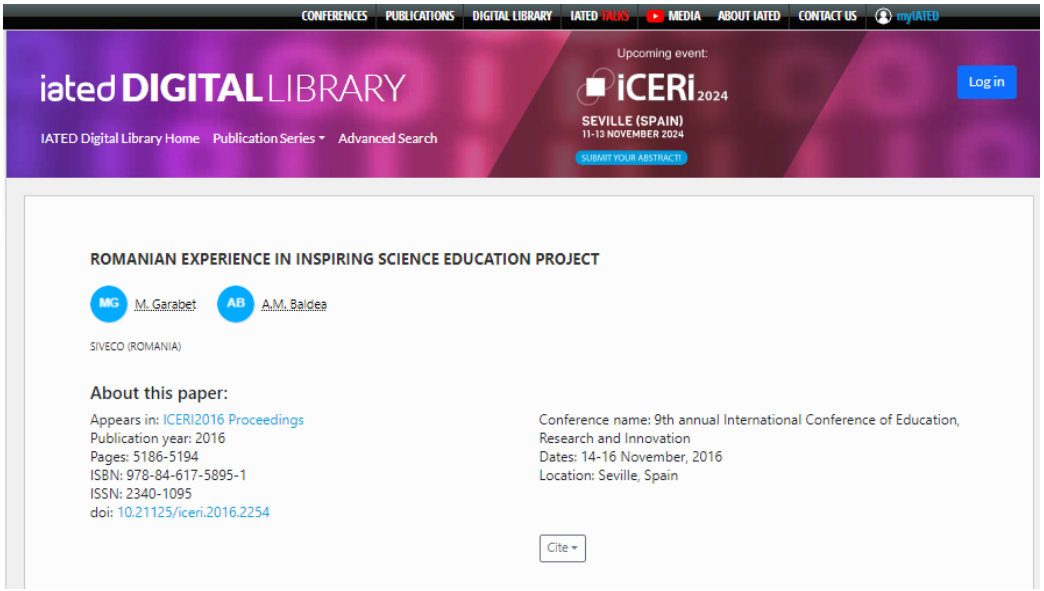

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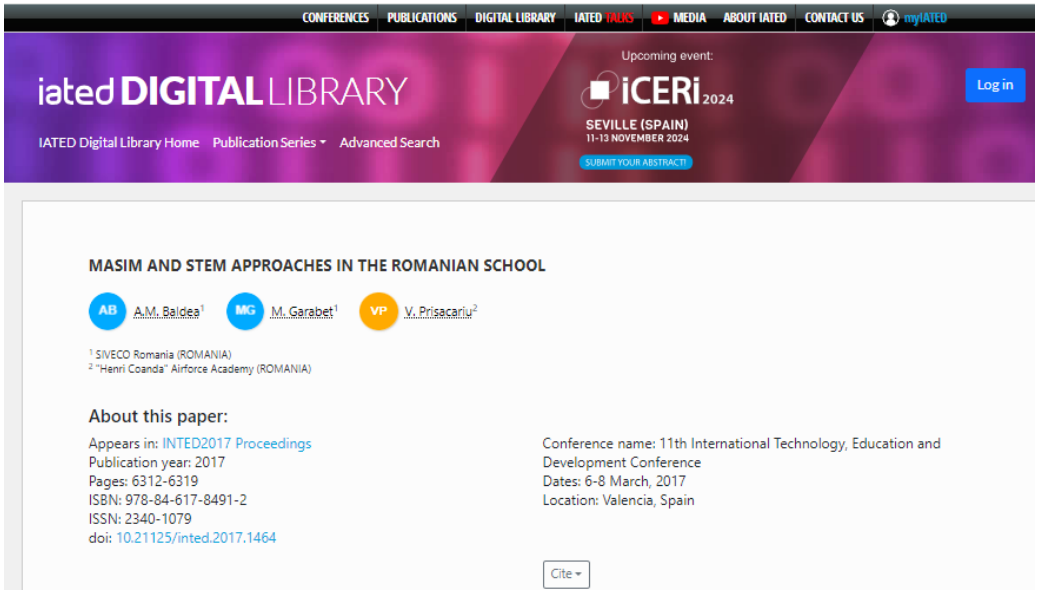

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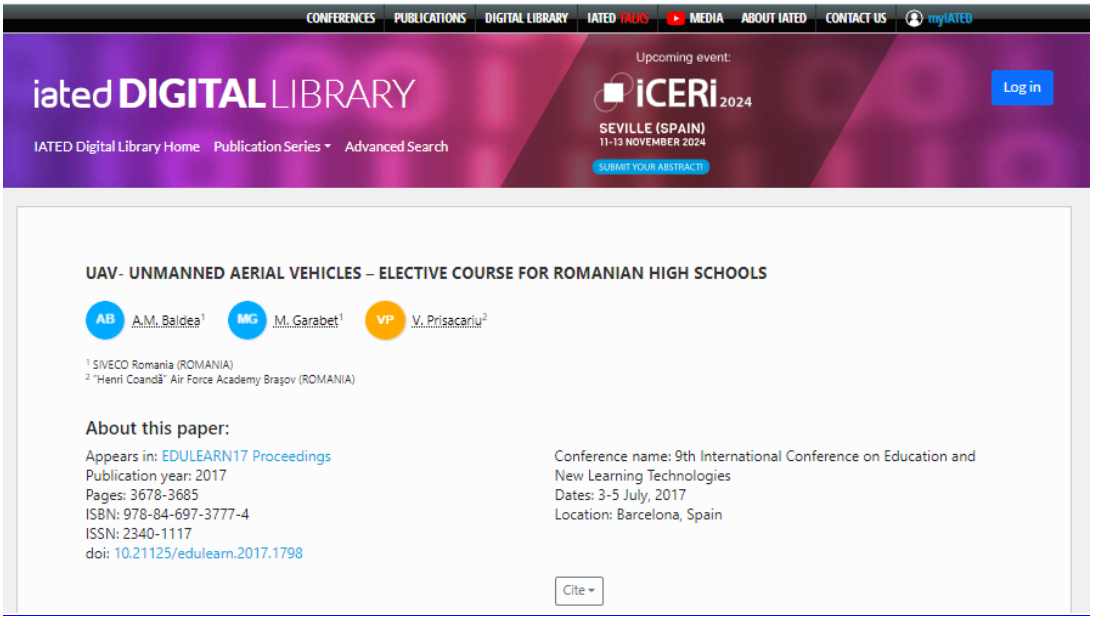

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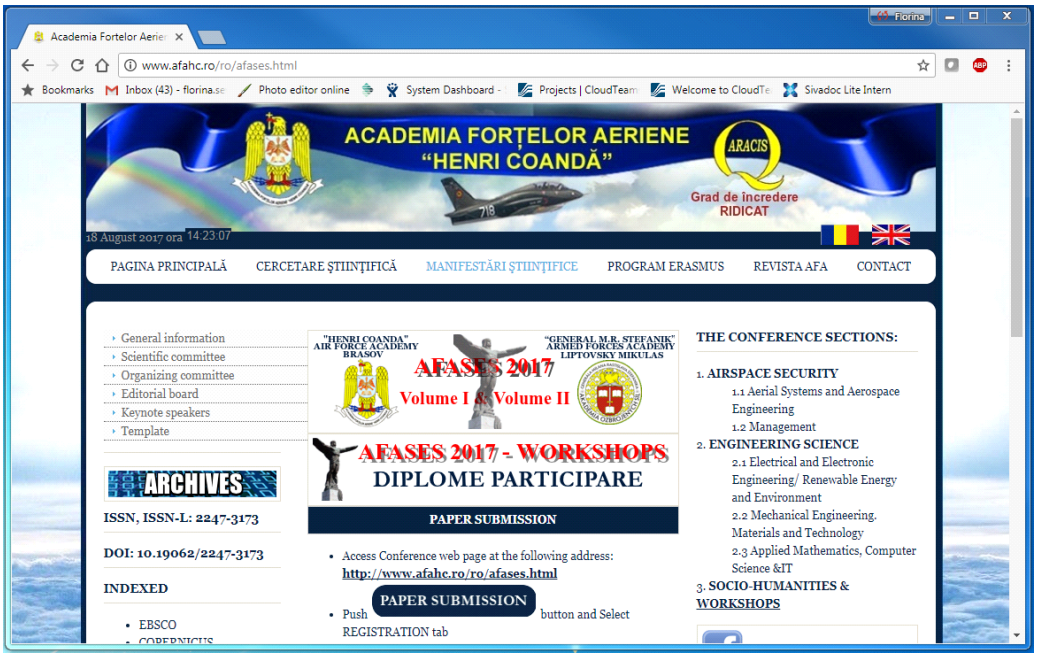

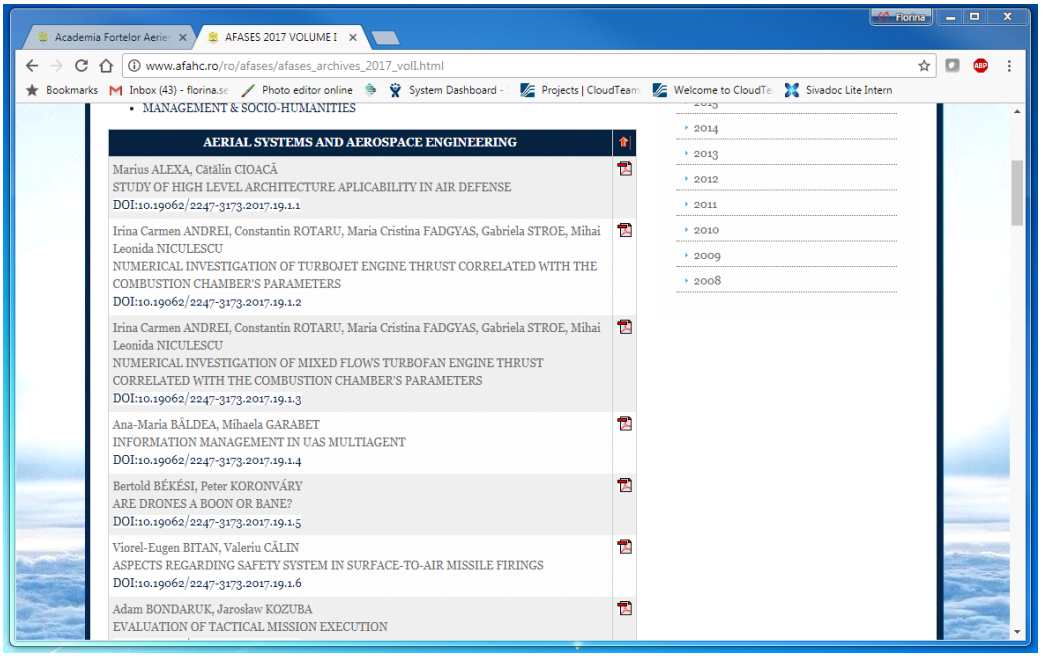

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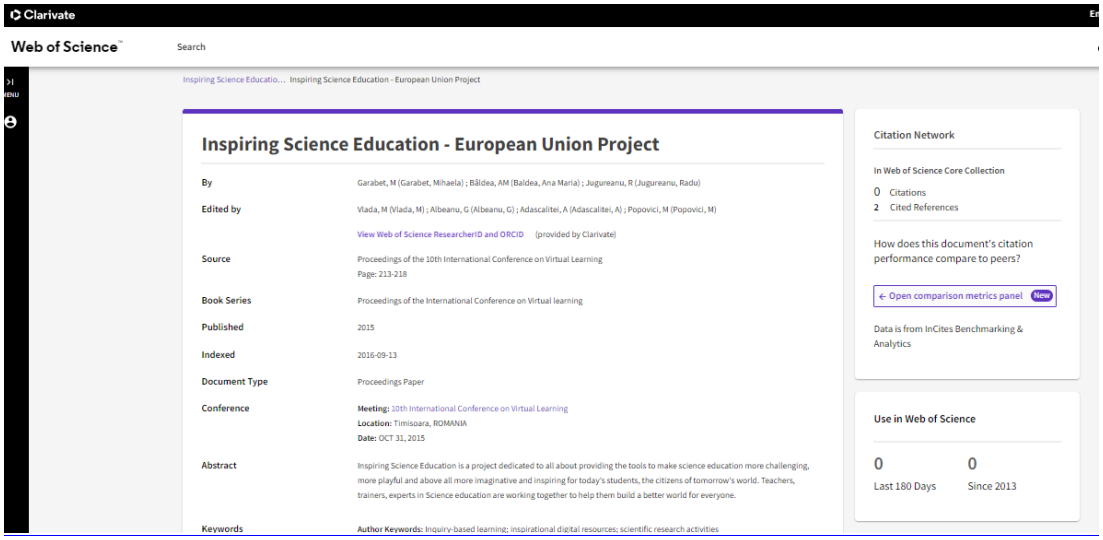

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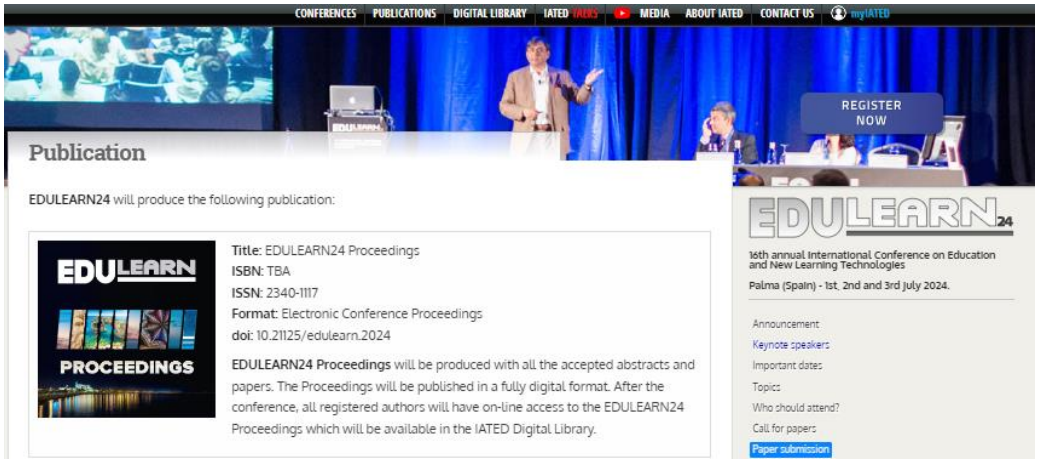

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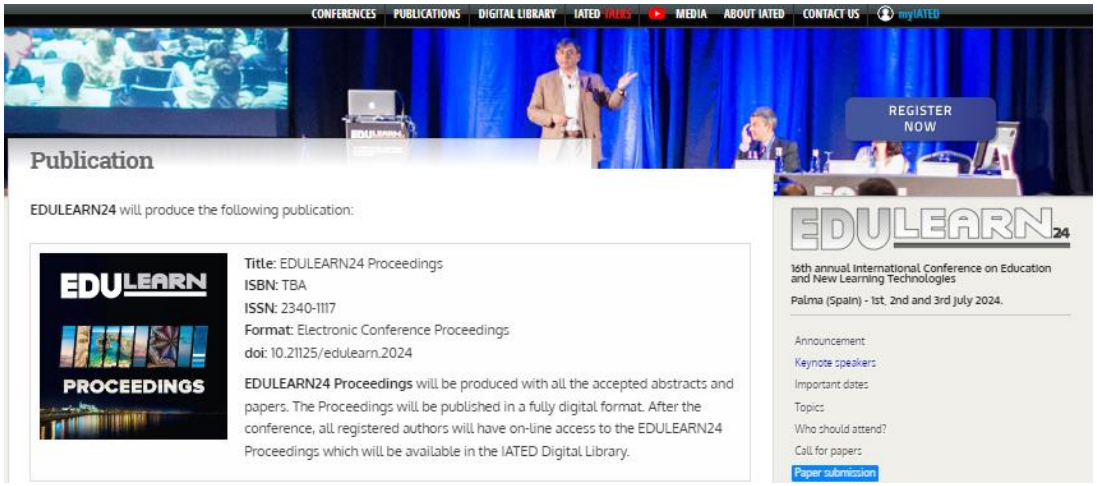
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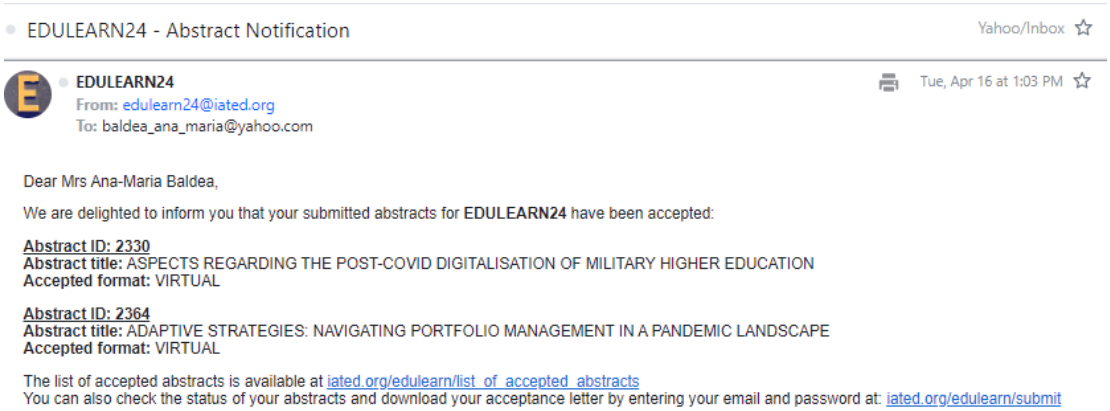
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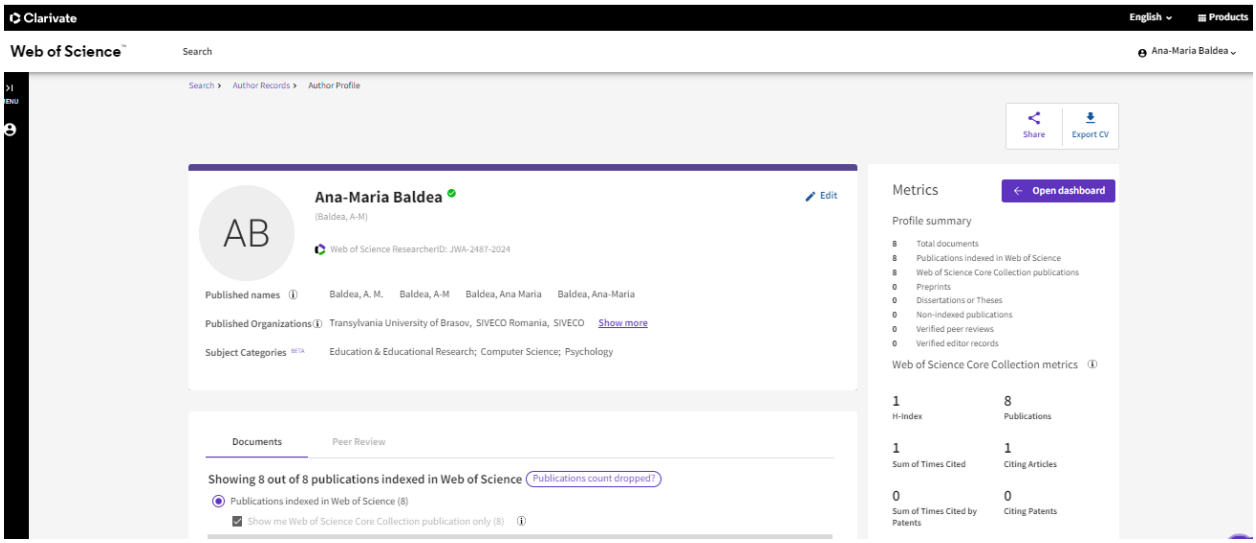
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