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## ANALYSIS OF THE FUNCTIONS OF PROJECT MANAGEMENT INFORMATION SYSTEMS – TRADITIONAL APPROACH

Project management information systems in enterprises help managers to manage, improve and track the progress in the implementation of projects from their conception to the achievement of results. The article reviews the literature and presents the most commonly used applications for storing, organizing and controlling project information in accordance with the traditional approach to project management. The authors analyzed the possibility of implementing the processes and achieving the results defined for them, presented in the Project Management Body of Knowledge, by means of five selected project management information systems. On the basis of the obtained results of research conducted on a group of Project Managers, conclusions were formulated, also indicating directions for further research.

**Keywords:** Project Management Information Systems, Project Management, traditional approach, analysis of the functions.

### 1. INTRODUCTION

Project management is a complex process involving activities in the field of planning, implementation, monitoring and control of implemented projects, characterized by a unique, one-off and complex set of activities with a clearly defined goal and time frame (PMI, 2017). To be successful, enterprises must deliver products, services or solutions on time, within budget, meeting established specifications while managing project risks (Raymond, Bergeron, 2008). Project management, which has long been considered an important feature of successful companies (Peters, Waterman, 1984), thanks to the use of Project Management Information Systems (PMIS), can increase the success of the project by up to 75% (Light, Rosser, Hayward, 2005). The use of PMIS, although not sufficient to ensure success, has therefore become a necessity. Project Management Information

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Systems is more than ever necessary for the efficient and effective management of projects and supporting Project Managers in making decisions (Raymond, Bergeron, 2008).

Research so far of Project Management Information Systems in a traditional approach assessed and compared tools that, according to the Project Management Software ranking, are not among the most popular solutions (Capterra). The authors analyzed, for example: Microsoft Project Server, SAP Project System, Planisware, GanttProject, ProjectLibre, Basecamp and P2ware Project Manager (Berzisa, 2009; Handzel, Terlikowska, 2016; Przewoźnik, Strojny, 2018; Kosieradzki, 2014; Bitkowska, Waszkiewicz, Cimoch, 2022; Micale, La Fata, Lombardo, La Scalia, 2021). While on choice of IT software to support project management is most influenced by mobility, i.e. the possibility of smooth use of the tool on various devices (Przewoźnik, Strojny, 2018), i.e. a feature that characterizes the most popular solutions available on the market.

The aim of the article is to analyze the possibility of implementing processes and achieving the results defined for them presented in the Project Management Body of Knowledge (PMBok) by five selected Project Management Information Systems.

## 2. TRADITIONAL PROJECT MANAGEMENT IN LITERATURE

Rapidly changing market conditions, new technologies, short product life cycles and many other social and business factors affect the way projects are managed in organizations. Different types of projects require different procedural models for successful implementation. Models organize and normalize the methods and tools used in the various phases of project implementation (Thesing, Feldmann, Burchardt, 2021). For example, R.K. Wysocki distinguishes methods that follow the traditional project management model (Traditional Project Management – TPM) and the agile model (Agile), based on an iterative process (Wysocki, Witkowska, 2013).

TPM is a universal practice that includes a set of techniques and tools used to initiate, plan, monitor and control ongoing projects in order to achieve the desired result relatively clearly defined by the client at the beginning of the project (Trocki, Wyrozębski, 2015). Traditional project management is mainly used for projects where activities are performed sequentially and there are rarely any changes. In order for the project to be implemented in a goal-oriented and time-bound manner, it is planned comprehensively from start to finish by defining a hierarchical structure of tasks over time. Execution of the plan as precisely as possible increases the likelihood of success (Thesing, Feldmann, Burchardt, 2021).

The concept of traditional project management is based on a predictable project implementation scheme. Each project has the same life cycle, regardless of the specification and type of work carried out, which is a set of five stages overlapping with varying intensity: starting, planning, implementation, monitoring, closing (Figure 1) (Kapustka, 2013).

In the professional project management environment, among the methodological standards, for many years the study *A Guide to the Project Management Body of Knowledge (PMBok Guide)* by the international association Project Management Institute (PMI) has been in the foreground. The PMBoK Guide is a set of structured and comprehensive guidelines, widely recognized as an important compendium of knowledge in the field of Project Management (Fridgeirsson, Ingason, Jonasson, Jonsdottir, 2021). From the first edition from 1986 to the seventh from 2021, it is the most recognizable and widespread set of best practices grouped into 49 processes, accompanied by an appropriate set of information, initiation documents, helpful techniques and process results

(Brzozowski, 2020). The processes in the PMBoK Guide are grouped in a two-dimensional system. In the first dimension, ten areas of knowledge were indicated: Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management, Project Stakeholder Engagement in the Project (Table 1). In the second dimension of process grouping, the idea of a five-stage project life cycle was used (PMI, 2017).

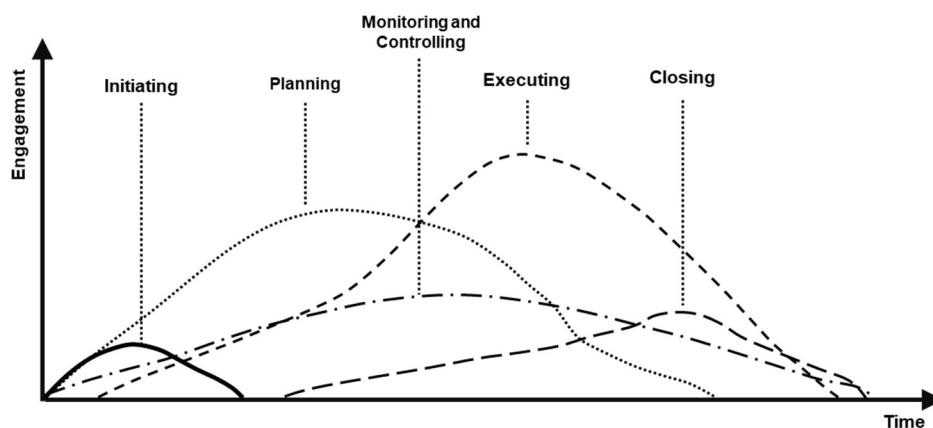


Figure 1. Project life cycle

Source: (Kapustka, 2013).

Table 1. Knowledge areas according to the PMBoK Guide

Knowledge areas	Description
1. Project Integration Management	Processes and activities related to identifying, defining, coordinating and connecting various processes and activities. In the context of a project request, integration exhibits the characteristics of unification, communication, consolidation and interdependence. These activities should be carried out from the start of the project to the end of the project. Project Integration Management includes 7 groups of processes: Develop Project Charter, Develop Project Management Plan, Direct and Manage Project Work, Manage Project Knowledge, Monitor and Control Project Work, Perform Integrated Change Control, Close Project or Phase.
2. Project Scope Management	The processes required to ensure that the project has all the necessary work to successfully complete it. Scope management focuses on defining, monitoring and controlling what is and is not included in the project. The processes of this knowledge area are Plan Scope Management, Collect Requirements, Define Scope, Create WBS, Validate Scope, Control Scope.
3. Project Schedule Management	Processes required to complete the project on time. Project Schedule Management includes Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Durations, Develop Schedule, Control Schedule.

Table 1 (cont.). Knowledge areas according to the PMBoK Guide

Knowledge areas	Description
4. Project Cost Management	Processes involving estimating, planning, budgeting, financing, managing and controlling incurred costs. The area covers the process of Plan Cost Management, Estimate Costs, Determine Budget, Control Costs.
5. Project Quality Management	The processes of applying the organizational quality policy in planning, implementing, monitoring and controlling the quality requirements of the project and product in order to achieve the objectives of the stakeholders. Activities in the field of Plan Quality Management, Manage Quality and Control Quality are implemented in this area.
6. Project Resource Management	The processes of identifying, acquiring and managing the resources necessary for the successful implementation of the project. These processes ensure that the project manager and project team have the right resources available at the right place and time. Project Resource Management processes are Plan Resource Management, Estimate Activity Resources, Acquire Resources, Develop Team, Manage Team, Control Resources.
7. Project Communications Management	Processes to meet the information needs of the project and its stakeholders by creating artifacts and carrying out activities designed to achieve an efficient flow of information. Project Communication Management consists of the process of Plan Communications Management, Manage Communications and Monitor Communications.
8. Project Risk Management	Processes involving risk management planning, identification, analysis, response planning, project risk monitoring and implementation of responses to identified opportunities and threats. The goal of project risk management is to minimize the impact of factors having a negative impact on the project in order to increase the chances of project success. The area includes Plan Risk Management, Identify Risks, Perform Qualitative Risk Analysis, Perform Quantitative Risk Analysis, Plan Risk Responses, Implement Risk Responses, Monitor Risks.
9. Project Procurement Management	The processes necessary to properly execute the purchases or acquisition of products, services, or deliverables that need to be sourced from outside the organization. The area also includes the management and control processes required to develop and administer contracts, which can be implemented by authorized members of the project team, management or purchasing department. Project Order Management processes include Plan Procurement Management, Conduct Procurements, Control Procurements.
10. Project Stakeholder Engagement	The processes necessary to identify individuals, groups or organizations that may affect or be affected by the project, to analyze their impact and expectations, and to develop appropriate strategies for effective stakeholder engagement in project and implementation decisions. The processes of Stakeholder Engagement Management in the Project are Identifying Stakeholders, Plan Stakeholder Engagement, Manage Stakeholder Engagement, Monitor Stakeholder Engagement.

Source: (PMI, 2017; Fridgeirsson, Ingason, Jonasson, Jonsdottir, 2021; Imran, Soomro, 2022).

### 3. REVIEW OF PROJECT MANAGEMENT INFORMATION SYSTEMS

Project Management Information Systems consist of tools and techniques used by Project Managers and members of project teams to create, collect, merge and transfer the

results of project management processes. They are used to support all aspects of implemented projects from the beginning to their completion. PMIS is one of the environmental factors of the conducted activity and enables access to automated tools such as software supporting scheduling, communication, collection and distribution of information used as part of the project management and management process (PMI, 2017).

The PMIS industry is now dominated by leading software vendors such as Microsoft, Oracle and Metier Management Systems (formerly Lockheed) and a number of small independent companies. IT tools provided by these entities are evolving towards more integrated project lifecycle management, their wider use in organizations or cloud computing (Braglia, Frosolini, 2014).

The authors analyzed 5 tools that meet all 18 characteristics of PMIS: Traditional Methodologies; Time & Expense Tracking; Task Management; Resource Management; Reporting/Project Tracking; Project Planning/Scheduling; Prioritization; Milestone Tracking; Kanban Board; Issue Management; Idea Management; Gantt/Timeline View; Customizable Templates; Cost-To-Completion Tracking; Collaboration Tools; Client Portal; Billing & Invoicing and Agile Methodologies (Captterra).

### **3.1. Trello – an example of a tool based on a Kanban board**

An online collaboration, project management and task organization tool available in four editions: Free, Standard, Premium and Enterprise. Premium and Enterprise editions offer users an extended set of features. Trello is an intuitive application that allows you to complete any type of project and task. Teams using Trello can easily organize their work and deliver projects from initiation to completion by creating and managing kanban boards, managing deadlines, attaching files, creating checklists, and more. With over 100 integrations with other key tools such as Google Drive, Slack, Jira, and more, Trello is an organization's design hub for cross-team collaboration (Trello).

### **3.2. ClickUp – an advanced system to project management**

A comprehensive platform that allows users to use a wide range of features to help and support them in project management. ClickUp is the hub where teams come together to plan, organize and collaborate on tasks using features like Tasks, Docs, Chat, Goals and Whiteboards. The platform also enables integration with over 1,000 other applications, enabling teams of all types and sizes to perform their tasks more efficiently, replacing inflexible and overlapping tools. ClickUp is available in five editions Free, Unlimited, Business, Business Plus and Enterprise (ClickUp).

### **3.3. Monday.com – system for IT management, including project management**

Customizable, web-based and mobile cloud-based work management platform. Designed to help teams and organizations increase operational efficiency by tracking projects, tasks and workflows, data visualization and team collaboration. It includes automation, centralization and real-time integration with other applications used in the implementation of projects. Monday.com adapts to the way you work, allowing for more efficient and effective management and tracking of work progress, helping you organize projects and follow the plan. The platform is available in one of five versions: Individual, Basic, Standard, Pro and Enterprise (Monday.com).

### 3.4. Smartsheet – modern work management solutions

An online platform that allows project teams to plan, track, automate and report on their work. Smartsheet is used for collaboration, project management, scheduling, assigning tasks and tracking progress in ongoing projects, sharing documents, managing calendars and work using a tabular layout. The tool is distinguished by an easy-to-use interface, functional dashboards and work automation functions. Smartsheet can import data from Microsoft Office or Google applications and integrate with other tools. The platform is available in three variants: Pro, Business or Enterprise on a subscription basis with no free tiers (Smartsheet).

### 3.5. Wrike – a comprehensive project management tool

Project management software that gives teams the ability to manage and track work progress. It enables users to collaborate with each other, streamlining the flow of information, allowing companies to focus on their core tasks. Wrike allows you to divide projects into management stages, assign tasks to individual team members, visualize the progress of their implementation using Gantt charts and Kanban boards, allocate resources and forecast their use. Automation and artificial intelligence features eliminate time-consuming administrative tasks, streamlining the work of project teams. Wrike comes in five editions: Free, Team, Business, Enterprise and Pinnacle (Wrike).

## 4. METHODOLOGICAL ASSUMPTIONS OF THE RESEARCH

The aim of the article is to analyze the possibility of implementing the processes defined by the Project Management Institute and achieving the results specified for them by five selected IT tools supporting project management. It is a response to the identified practical problem related to the methodical implementation of modern projects with the support of popular systems. At the same time, the article is an attempt to fill the theoretical and empirical gap in the field of management and quality sciences, which lacks positions developing the PMIS issue. This justifies undertaking empirical research and answering: To what extent do popular and commonly used tools supporting project management allow achieving the results defined for individual 49 processes specified in the PMBoK Guide?

The authors, based on the identification and analysis of 49 processes proposed by the Project Management Institute, listed 24 factors that are a direct effect of the implementation of processes grouped within 10 areas of knowledge indicated in the PMBoK Guide.

The study was conducted in February 2023 by a group of 10 certified project management practitioners working in the field of IT, marketing and economic consulting. Participants expressed their willingness and consent to take part in the study, during which they became acquainted with the functions offered by Trello, ClickUp, Monday.com, Smartsheet and Wrike and assessed the possibility of implementing processes and achieving the results defined for them on a five-point scale. Evaluation structure:

- Value 1 – The indicated result cannot be achieved.
- Value 2 – Achieving the result possible to a limited extent through integration with other systems and tools.
- Value 3 – No integration possible.
- Value 4 – Achieving the result possible to the full extent through integration with other systems and tools.
- Value 5 – Full ability to achieve the indicated result by using the offered functions.

## 5. RESEARCH RESULTS

On the basis of a study conducted on a group of certified project management experts, using an online Microsoft Forms form, a list was prepared presenting a list of factors assessed from the perspective of the possibility of their achievement and the results in the form of an arithmetic mean. The values obtained are shown in Table 2 as integers.

Table 2. Test results

No.	Factor	Trello	ClickUp	Monday.com	Smartsheet	Wrike
1	1.1. Project Charter	2	4	2	2	2
	1.2. Issue Log	2	4	2	2	2
	1.3. Final Report	2	4	2	4	2
2	2.1. Requirements Documentation	2	4	2	2	2
	2.2. Project Scope Statement	2	4	2	2	2
	2.3. Scope Baseline	4	2	5	5	2
3	3.1. Activity List	5	5	5	5	5
	3.2. Milestone Lis	3	3	3	2	1
	3.3. Project Schedule Network Diagram	1	1	4	1	1
	3.4. Schedule Baseline	2	2	5	4	4
	3.5. Project Schedule	4	5	5	5	5
4	4.1. Cost Baseline	1	1	1	5	1
5	5.1. Quality Metrics	2	4	2	2	2
	5.2. Quality Report	2	4	2	2	2
	5.3. Quality Control Measurements	2	4	2	2	2
6	6.1. Team Charter	2	2	2	3	1
	6.2. Resource Breakdown Structure	1	1	1	1	1
	6.3. Assignment of Physical Resources	1	1	1	1	1
	6.4. Design Team Assignment	5	5	5	5	5
	6.5. Resource Calendar	1	2	1	1	1
7	7.1. Communication in the Project	4	4	4	1	1
8	8.1. Risk Register	2	4	2	5	2
9	9.1. Bid Documents	1	1	5	1	1
10	10.1. Stakeholder Register	2	4	2	5	2
<b>Summary</b>		<b>55</b>	<b>75</b>	<b>67</b>	<b>68</b>	<b>50</b>

Source: own study.

The conducted research indicates the partial possibility of implementing the processes and the results defined for them presented in the Project Management Body of Knowledge by five selected IT tools supporting project management. Trello, ClickUp, Monday.com,

Smartsheet and Wrike allow the greatest extent to carry out activities in the area of project scope and schedule management, i.e. processes carried out at the stage of project initiation and planning. IT systems also allow for the assignment of a project team to individual tasks, without allowing them to manage material and financial resources.

According to experts, the IT tool supporting the implementation of projects, which to the greatest extent allows the achievement of results defined for individual project management processes, is ClickUp. The tool, thanks to numerous integrations, allows to a large extent to implement the project based on the traditional project management model. The remaining systems subject to the study, to a much lesser extent, allow their practical use in the implementation of projects assuming the fulfillment of assumptions regarding the full use of 10 areas of knowledge indicated in the standard developed and published by the Project Management Institute.

## 6. SUMMARY

The article is a verification of the possibility of using selected tools to implement the project in accordance with the traditional project management model. The study was a pilot study, which was carried out in a small group of experts. Further, extended analyzes of IT tools are necessary, taking into account systems dedicated to the classical approach and quantitative empirical research, which will illustrate the selection of tools used by project organizations to manage integration, scope, schedule, costs, quality, resources, communication, risk, procurement and involvement of stakeholders in the project. In addition, in further research, selected tools supporting project management should be compared to the ClickUp system, in terms of the functions offered.

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