Comparison of Project Management Tools

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Abstract

The main goal of the paper is to identify and present the tools with which Project Managers have more opportunities to solve project-planning problems successfully. We created an overview of project management development over time and the most important key factors of successful project management activities. In addition, different project management tools were tested, examining their main advantages and disadvantages. The selected tools were analyzed based on their key functionalities, defined from literature suggestions how to solve problems successfully in the field of Planning and Management of Projects. The tools were compared and ranked according to their usability.

Keywords

Project management, Project management tools, Information Technology planning, Comparison of tools

1. Introduction

Project management in Information Technology (IT), as well as other domains, is becoming increasingly challenging, due to various external and internal factors, while the recent pandemic and work from home presented just one of several challenges. Based on own experience, as well as a literature review, companies already use different methodologies and principles to solve their issues and improve team communication and productivity. Indeed, many of them had already previously introduced remote working methods in their daily lives, where the workers use telecommunications and Information Technology to perform their work. Remote or hybrid approaches of working changed communication between employees, and, consequently, enhanced the need to develop and adopt different tools for project management. Due to the large range of solutions on the market, we identified the need to develop an approach to selecting the most usable and effective tools for specific companies' needs and clients` requirements.

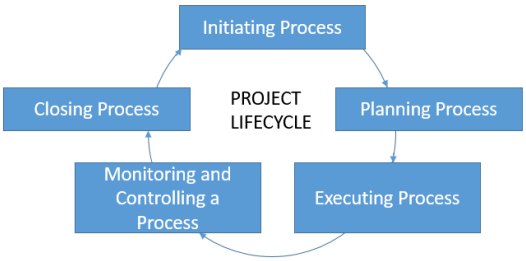

Figure 1 Project management life cycle

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The typical project management life cycle presented in Figure 1 is a five-part framework, designed to support project management activities for a successful project closing [28], all of which should, in some way, be addressed in a tool, which provides support and is useful enough for Project Managers. When analyzing the selected tools, we looked for support for all the presented steps: project initiation, project planning, project execution support, project monitoring and control, as well as supporting properties for completion of the project.

2. Motivation

The studies included in this research support the claim that companies face the challenge of completing IT projects successfully within the set time and limited funds [27], [13]. Many projects are terminated prematurely before they are completed or implemented in the desired environment, and studies reveal that project management has a positive impact on project results [25], especially in more dynamic, unpredictable and agile environments [26], where the psychological factor is crucial in determining how well teams function

Although there are many technologies and tools available to help manage simple and complex projects, according to research [1], more than half of projects fail. There are several factors which potentially affect success of projects [27]; however, typical problems are poor planning, unclear goals and objectives, changing goals during project creation, unrealistic estimates of time and resources, lack of support for employees, poor communication in the team, lack of necessary skills, poor execution, and incomplete integration.

1. Poor planning

Good planning practice includes being aware of the risks involved within the project`s activities. Every larger and more complex project has certain risks, for which it makes sense to prepare ahead of time. However, it often happens that Project Managers do not plan the project thoroughly. Usually this happens due to pressure from people in leadership positions. In such cases, employees see project management activities as a waste of time, and assess the creation of a project without a structured plan, as they perceive it as a waste of their time. This causes several problems, especially in the later phases of the project`s lifetime, since many smaller goals in the project are connected to each other, causing delays due to restrictions (for example, until one objective is solved, we cannot proceed to another objective).

Another planning mistake is making a plan which is too precise. Managers usually do not know how to estimate correctly how long a certain phase or activity of a project will take. Team members could make a plan themselves, but they lack the planning knowledge necessary, or have no authorization for the full operation, as they can only plan the amount of work for themselves [1].

2. Unclear goals and objectives

The objectives are unclear if they are not defined sufficiently at the beginning of the project, and/or misinterpretation of requirements can occur. The description of the project itself does not include the possibility of disregarding factors that are outside of the actual formation of the project, but are just as important as the functionality of the project itself. If the team members understand what functionalities the project requires, it does not mean that they take into account other demands, such as integration into a given environment, good user experience, or the creation of a transparent user interface [2].

3. Changing goals during project creation

Changing demands and technologies in the project is a potential problem when building a project, usually demonstrated as the main problems in project management:

• **scope expansion of the application field** - refers to constant changes due to uncontrolled project growth. The reason for the phenomenon is poor definition, documentation and control of the project,

and usually does not occur if good project management practices are used, such as monitoring and comparing the project scope with the original plan and managing changes [3].

• **feature proliferation or classification of functions** - refers to excessive continuous unnecessary addition of new features to a product. The result of the growth of functions is often shown by the emergence of a process of software bloat or excessive complexity of the product. Usually this happens because of a desire to make a more useful product [4].

4. Unrealistic estimates of time and resources

During project construction, there is an underestimation of the amount of time and resources used to complete the project. Project Managers must pay attention to the expected completion time of the task, taking into account that there will be obstacles in between. An additional problem is the expectation that productivity will increase linearly as the number of participants in the project increases. In practice, with each extra participant in the project, the productivity per member decreases [5].

5. Lack of support for employees

The lack of employee support and user participation is reported as the main problem in product development [1]. The Project Manager is symbolically the interface between the business and technology side of the company. Without proper communication with the executors of the project, it is difficult to coordinate the business side of the project. The customer must also participate actively in the creation of the project, as they must describe expectations for the resulting project clearly. Poor communication with the customer can contribute to the production of an unsuitable product [1], [5].

6. Poor communication in the team

Employees' lack of communication skills can lead to an unsuccessfully completed project. Because each team member is focused on their tasks and not on the bigger picture, there can be deviations from the purpose of the project, the roles of the members, and the value of their contributions to the team [1], [5].

7. Lack of necessary skills

Due to the increasingly rapid development of technology and the increase in the need for knowledge, it is difficult today to determine reliably which skills would be needed for the development of a project short-term, much less in the long-term. It is also increasingly difficult for the employer to find the right employee, as the staff must now have a wide range of knowledge [1].

8. Poor execution

Project team members are unable to complete the project on time or fail to deliver the project as envisioned based on the client's requirements, reflecting in delays, over spending and implementing an incomplete set of functional and non-functional demands [1], [5].

9. Incomplete integration

Project team members do a given project without a time or financial overrun. Although the project is completed, it does not contain all the components and functionality that the client requires. This usually happens due to poor communication between the client and the project team members [1], [5].

3. Project management tool

Each project management tool has its own features and functionalities that make it special and useful. It is not an easy task to choose the right one from the list of ever-increasing tools that provide

assistance in project management. The most important features that the tool must contain are the following [6], [7]:

- **The possibility of cooperation and communication** - one of the main functions that a project management tool must fulfill is to enable good communication with employees. A fast and efficient flow of communication enables faster sharing of information and opinions between employees, which increases efficiency. This property can be implemented in the tool as an invitation to teams, dialog boxes, the possibility of meetings, work in teams and others.
- **Planning projects and planning meetings** - with project management tools, planning projects and schedule meetings is important. Project planning helps to define the key tasks for the successful completion of the project. In this phase, responsibilities are classified among employees and milestones, as well as deadlines are determined for certain phases of the project.
- **Updating the progress of tasks** - in target-oriented companies, the ability to track product progress is necessary. In this way, team members can share their progress in a certain part of the project, which allows the participants to have a better overview of the development of the entire project [8].
- **Review of costs** - as projects regularly exceed the set target cost, a tool needs to allow an overview of all costs. If managers can predict in advance how much a part of the project will cost, we can predict the target total cost more accurately [8].
- **Reporting** - an additional advantage of the project management tool is the possibility of automatic report generation, allowing managers to have a high-level overview of the project's status. Reports are also a key part of successful project management, as they can use them to react appropriately to the information presented [8].

In organizations with many changing requirements and demands for the successful production of a product or service, it is crucial to identify the main factors that increase the possibility of a successful completion of the project. To increase the chance of project success, we aimed to define a set of characteristics the tools should include, reducing the chance of project failure. Based on a short literature review [9], [10], [11], [12], [13], the main factors that influenced project success were identified, and are presented in order of importance: communication, management practices and methodologies, relationship management, the quality of the project team's resources, collaboration and change management. Based on existing research, we conclude that the most important quality in project management is good communication in the team and a good overview of the project's status. We divided the features into 7 parts that can be identified as a functionality in the tool:

- communication and cooperation (addressing unclear goals and objectives and lack of support for employees, as well as poor communication in the team and lack of necessary skills),
- project planning and design (addressing poor planning and unrealistic estimates of time and resources),
- tracking progress (addressing poor execution),
- cost management (addressing unrealistic estimates of time and resources),
- generation of reports and analyses (addressing poor communication in the team),
- adaptation and integration (addressing changing goals during project creation and incomplete integration), and
- project views (addressing poor communication in the team).

Five tools, based on popularity in existing research, were included in the analysis: ClickUp, Wrike, Trello, Paymo and Asana, all analyzed based on the above defined features. Only free versions of the tools were analyzed in detail, while extended versions, which required payment, were not included in the study.

4. Analysis of tools

We compared the tools with each other according to the quality of the features of a good project management tool, which we identified in the sixth chapter. The features of the tools were evaluated according to the scale 1-3-5, since a more detailed comparison with the scale 1-2-3-4-5 is planned in the future and the existing scale was considered as sufficient for the preliminary research presented in this paper:

- 1. It has no properties → 1 point.
- 2. Contains the property, but with limitation → 3 points.
- 3. Contains the property → 5 points.

1. ClickUp

ClickUp is a Software as a Service (SaaS), presented as a platform that allows users to take advantage of a large set of features to help and support a project. The tool has features that help with development, project management, human resources, business operations and working from home. The platform additionally enables integration with more than 1,000 other applications.

ClickUp was founded by Zeb Evans in 2017. The company started in Silicon Valley before moving its headquarters to the city of San Diego. Over the years, the company has grown successfully, and, as a start-up, gathered a lot of financial support [14], [15], [16].

2. Wrike

Wrike is an American provider of project management applications. The company was founded by Andrew Filev in 2006. The company was initially self-funded until it received funding from other investors. In December 2006, a beta version of Wrike was launched at the Le Web3 conference in France, where the company received a B2B award for successful marketing.

During its successful operation, Wrike also received several investments from various investors. From 2012 to 2015, it received a total of $26 million in funding from various investors. In January 2021, Citrix Systems announced that it would buy the company for around $2 billion, closing the acquisition in March 2021 [17].

Wrike is a software-as-a-service that allows its users to manage and track projects and everything related to a project. It additionally enables users to communicate with each other. Wrike was initially payable, but since 2012 it also offers a free version for teams of up to 5 users [18].

3. Trello

Trello is a web-based project management application [19] developed by Trello Enterprise, a subsidiary of Atlassian. In 2011, the app got publicity from popular magazines and blogs. In 2014, the company raised $10.3 million in investments from Index Ventures and Spark Capital.

In January 2017, Atlassian announced that it would acquire Trello for $425 million. The transaction was made with $360 million in cash and $65 million in stock [20]. In December 2018, Trello announced its acquisition of Butler, a company developed by Power-Up to automate tasks. Trello announced in March 2019 that it had 35 million users, a number that grew by 15 million in seven months.

4. Paymo

Paymo is a project management and time tracking software that supports Project Managers with project delivery throughout the project management lifecycle [21].

The company was founded in 2008. It originally operated as a time tracking and invoicing application. Through years of feedback, it has evolved into a project management platform [22].

The main goal of the software is to help and support simplifying the workflow for more efficient task management.

5. Asana

Asana is a software-as-a-service web and mobile platform designed for project management. The company was founded in 2008 by Dustin Moskovitz and Justin Rosenstein, who previously created the productivity tool Tasks [23], [24].

The Asana tool was developed to improve team collaboration and project management. It allows users to manage and delegate tasks in a project. Over the years, Asana has also improved its integration with other tools and increased its functionality. The product was initially released free in November 2011, and then launched commercially in April 2012. From 2016 to 2018, Asana raised $175 million with the help of investors. In 2 years, the tool was valued at $5.5 billion.

All tools were tested with the help of an example project, focusing on communication and cooperation characteristics (Table 1), planning properties (Table 2), project progress tracking features (Table 3), cost management features (Table 4), report generation and analysis features (Table 5), customization and integration properties (Table 6), and project view properties (Table 7). We finally compared all features in Table 8 by dividing the summaries of partial features with the number of identified properties, to be able to compare tools. .

Table 1 Comparison of communication and cooperation properties

	ClickUp	Wrike	Trello	Paymo	Asana
FILE SHARING	5	5	5	3	5
CHAT ROOM	5	1	3	1	5
E-MAIL	5	5	5	1	5
MARKING	5	5	3	5	5
SUM	**20**	**16**	**16**	**10**	**20**

Within the properties of communication and cooperation, we identified four key functionalities that help and improve faster and better communication between employees. These features are: sharing files between employees, the possibility of communicating via chat rooms, send/receive and share e-mails through an integrated interface and marking of persons and tasks in integrated media (Table 1).

Table 2 Comparison of planning properties

	ClickUp	Wrike	Trello	Paymo	Asana
MANIPULATION OF TASKS	5	5	5	5	5
CLASSIFICATION OF TASKS	5	5	5	5	5
EDITING THE HIERARCHY	5	5	1	3	3
SUM	15	15	11	13	13

In the planning and design properties, we have identified three key functionalities that allow the user to plan and design the project better and more thoroughly. These properties include adding, changing and deleting any elements in the project, the possibility of assigning the importance (criticality) of elements and assigning their interconnection and changing the hierarchy, nesting elements according to a company's needs (Table 2).

Table 3 Comparison of project progress tracking properties

	ClickUp	Wrike	Trello	Paymo	Asana
MILESTONES AND GOALS	5	5	5	5	5
TIME TRACKING	5	5	5	5	5
UPDATE ORDERS	5	5	5	5	5
EVALUATION OF PROJECT PROGRESS	5	5	5	5	5
SUM	20	20	20	20	20

In the project progress tracking properties, we have identified four key functionalities that help Project Managers and investors know how much work has been done and how many resources have been used to perform tasks, so they can assess the value gained against set milestones. These properties include adding, deleting and modifying project milestones, tracking the time spent on each activity, measuring the expected time spent for each activity with the actual time and updating tasks in the project (Table 3).

Table 4 Comparison of cost management properties

	ClickUp	Wrike	Trello	Paymo	Asana
COST TRACKING	3	3	3	5	3
IMPLEMENTATION AUTOMATION OF COSTS	3	1	1	5	1
COMPARISON OF EXPECTED COSTS	5	5	1	5	5
SUM	**11**	**9**	**5**	**15**	**9**

In the cost management properties, we have identified three key functionalities that enable the tool user to manage costs in a project with an understandable user interface. These properties are: adding, deleting, changing and calculating estimated costs for a specific project, task or participant, generating and automating the issuance of costs for a specific project, task or participant and comparison of expected costs with actual costs and comparison between the cost of individual elements (Table 4).

Table 5 Comparison of report generation and analysis properties

	ClickUp	Wrike	Trello	Paymo	Asana
GENERATION OF REPORTS	5	5	5	3	5
GENERATION OF ANALYSIS	5	5	5	3	5
SUM	10	10	10	6	10

For the report and analysis generation category, we have identified two key generation options that allow the user to gain insight into the project in an orderly, transparent and structured way. The tool should enable generation of various reports and generation of various analyses (Table 5).

Table 6 Comparison of customization and integration properties

	ClickUp	Wrike	Trello	Paymo	Asana
ADJUSTMENT	5	5	3	3	5
INTEGRATION	5	5	5	3	5
SUM	10	10	8	6	10

A modern project management tool should allow customization and integration of the tool, for a better user experience and the possibility of using a larger set of functionalities (Table 6).

Table 7 Comparison of project view properties

	ClickUp	Wrike	Trello	Paymo	Asana
NUMBER OF VIEWS	11	9	1	5	6
PAID VERSION	11	9	6	5	6
SUM	5	5	1	3	3

The greater number of project views allows a better visualization of the project for those involved in the project. We separated the views, according to their availability in the paid version and the non-paid version, and compared them to each other (Table 7).

Table 8: Comparing tools by properties

	ClickUp	Wrike	Trello	Paymo	Asana
COMMUNICATION AND COLLABORATION	5,0	4,0	4,0	2,5	5,0
PLANNING AND PLANNING	5,0	5,0	3,7	4,3	4,3
PROJECT PROGRESS MONITORING	5,0	5,0	5,0	5,0	5,0
COST MANAGEMENT	3,7	3,0	1,7	5,0	3,0
GENERATION OF REPORTS AND ANALYSIS	5,0	5,0	5,0	3,0	5,0
ADAPTATION AND INTEGRATION	5,0	5,0	4,0	3,0	5,0
PROJECT VIEWS	5	5	1	3	3
SUM	33,7	32	24,4	25,5	30,3

5. Conclusion

Table 8 presents the results of comparing the tools according to their properties. Combined properties were evaluated, as well as individual key functionalities. To combine all the properties, we divided the number of points obtained in the properties by the number of key functionalities per individual property and rounded it to one digit. In the Table, we can see that the tools ClickUp and Wrike ranked best. ClickUp had the most points with 33,7 points, followed by Wrike (32 points), Asana (30,3 points), Paymo (25,5 points) and in last place was Trello (24,4 points).

Based on the results of the comparison, we concluded that the ClickUp and Wrike tools came closest to the criterion of a comprehensive tool. The tools received 3 or more points in all of the key functionalities. They got the biggest advantage over the others because of the number of views and the possibility of customization and integration with other applications. In second place in the ranking was the Asana tool. It was rated well in most of the key functionalities, but lost a lot of points due to the lack of views and lack of refined cost management features, as well as the lack of customization and integration options. Asana was followed by Paymo. Although Paymo has the most elaborate expense management functionality, most of the other features are deficient compared to other tools. Last on the list was the Trello tool. Using integrations, the tool received good marks for most features, but a complete lack of views and cost management capabilities decreased key functionalities points and landed it in last place.

Based on the comparison as defined in this research, we preferred the most generally useful tool, including as much functionality as possible. Tools that are highly advanced in only one feature and deficient in other features have proven to be less useful, however, this does not need to be true for all projects, as different organizations have different needs. Based on the results of this research we recommend to future developers of project management supporting tools to make sure there is a user-friendly interface in addition to having as much functionality as possible, so the tool suits the quality demands of potential Project Managers.

The research was conducted as a preliminary comparison of existing project management tools and has several limitations. The literature review was limited to a few papers, there was no systematic approach to gather information about different companies' project management approaches, as well as not all available tools were included in the research. The future work will include a detailed review of project management activities in companies with help of a survey, other tools will be included, and the impact of employee numbers involved in project activities will be addressed as well.

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