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*RESEARCH ARTICLE / ARAŞTIRMA MAKALESI*

# A Study on the Applicability of Project Management Tracking with the Integration of Jira, Confluence, and Trello in Construction Project Management and the Differences and Advantages of Different Planning Softwares

## İnşaat Proje Yönetiminde Jira,Confluence ve Trello Entegrasyonu ile Proje Yönetimi Takibinin Uygulanabilirlik Alanları ve Entegrasyonun Diğer Planlama Programlarından Farklı ve Avantajları Yönlerine Yönelik Çalışma

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**Abstract**

Globally, traditional project management methods are employed in the construction sector, with the utilisation of digital tools in project management remaining relatively uncommon. The utilisation of digital tools in construction project management will facilitate developments that will prove invaluable in project management tracking, coordination, communication between teams, cost analysis for future projects and risk management. The utilisation of new softwares such as Confluence, Trello and Jira tools facilitates real-time project tracking in construction project management, optimises business processes, strengthens and renders as transparent as necessary the coordination and communication between teams, provides digital project management, facilitates the follow-up of project management, identifies with greater clarity and speed the elements that impede project progress and creates analyses for future projects. This study presents illustrative examples of the usability of construction project management tracking with Jira, Confluence and Trello integration, and discusses the advantages of this approach in comparison to other project management software and project planning programs.

***Keywords:*** *Project Management,Jira, Confluence, Trello*

**Öz**

Dünyada İnşaat sektöründe proje yönetim tekniklerinde geleneksel proje yönetim metotları kullanılmakta olup dijital araçların kullanımı inşaat proje yönetiminde pek yaygın görülmemektedir. İnşaat sektörü Proje yönetiminde dijital araçların verimliliğini kullanmak, proje yönetimi takibi, ekipler arası koordinasyon iletişim ve gelecek projeler için maliyet analizleri, risk yönetimleri konularında son derece önem arz edecek gelişmelere yol açacaktır. Confluence, Trello ve Jira araçlarının kullanımı ile İnşaat projelerinin yönetiminin takibinde; gerçek zamanlı proje takibi, iş süreçlerini optimize etmek, ekipler arası koordinasyonu ve iletişimi güçlendirip şeffaflaştırmak, dijital proje yönetimi sağlamak, proje yönetiminin takibi kolaylaştırmak, proje ilerleyişini yavaşlatan unsurları daha net ve hızlı bir şekilde tespit edebilmek, gelecek projeler için birtakım analizler oluşturma konularında fayda sağlayacaktır. Bu çalışmada Jira, Confluence ve Trello entegrasyonu ile inşaat proje yönetimi takibinin kullanım alanlarına örnekler verilecek ve bu entegrasyonun diğer proje yönetim ve planlama programlarına göre avantajları ve dezavantajları üzerinde durulacaktır.

***Anahtar Kelimeler:*** *Proje Yönetimi, Jira,Confluence,Trello*

## 1. Introduction

The construction sector requires effective project management tools due to the complex structure of projects, the length of project duration, and the large number of project stakeholders. Traditional project management methods, communication and coordination problems, complexity, lack of digital tools, and lack of transparency make it difficult to keep up with developments in today's technological, dynamic, and rapidly changing world [1-2,3,4]. In this context, digital transformation and innovative software tools enable construction projects to be managed more efficiently and effectively [2-4]. Today's traditional project management programs cannot fully address these shortcomings [2-4].

In this article, we will discuss Jira, Confluence, and Trello, the Atlassian applications that we can use effectively, and discuss their advantages over traditional programs. The Atlassian applications Jira, Confluence, and Trello are widely used to optimize project management in various industries [5]. However, the use of these digital tools in Turkey's construction sector is not yet widespread. This article aims to explore the benefits of integrating Jira, Confluence, and Trello applications into construction project management and their advantages over

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other project management software and project planning programs. Jira enables project management and business plan tracking; Confluence enables documentation management and archiving at all stages of the project; and Trello enables visual organization of project management and workflow. The integrated use of these three tools can bring significant benefits to construction project management, including real-time tracking, data storage, analysis, visibility, robust communication, and project coordination [6].

The present study examines the potential of integrating tools such as Jira, Confluence, and Trello to address the limitations of existing project management tools in the construction sector and to highlight the necessity of digital transformation. The objective of this study is to investigate the potential of this integration to enhance the efficiency of project processes. The objective of this study is to investigate innovative approaches to managing the complexity and multi-stakeholder nature of construction projects through the utilization of digital solutions, with the aim of promoting the wider adoption of these tools within the industry. The study will present examples of how the integration of Jira, Confluence, and Trello can enhance performance in key areas such as project management, project tracking, work planning, inter-team communication and coordination, and risk management. Furthermore, it will address how this integration can contribute to innovation in the sector by advancing data analytics and its impact on future projects. The objective of the article is to highlight the potential for accelerating project processes, increasing efficiency, and strengthening team coordination through digital solutions [6-7].

Also, other aims of this paper are exploring the advantages of different project planning and tracking software, integration of that software to combine planning activities with documentation, resource planning, and construction tracking, and finally giving suggestions for the professionals in the Turkish construction industry.

Within the scope of our study, our main purpose is to raise awareness by mentioning the advantages of using integration. In our world where technological developments are constantly advancing, it should be among our permanent goals as sector employees to pave the way for future studies with the vision of leading to important developments on behalf of the sector by creating awareness of using digital tools in order to move the construction sector forward.

The remainder of this article will examine the ways in which these digital tools can be integrated into construction project management processes in our country, the benefits they will provide, examples of their applicability to integration into construction project management, and their advantages over other programs. It will also discuss the productivity increases that will be achieved by using Atlassian applications in the construction industry and their positive aspects in critical areas such as risk management and cost analysis in future projects.

## 2. Integration of Confluence, Jira, and Trello in Construction Project Management: Applicability Areas

The integration of Confluence, Jira, and Trello offers significant advantages for construction project management by addressing several of the industry's common challenges. These digital tools complement each other to provide a comprehensive solution for project tracking, communication, coordination, and flexibility [8]. Confluence excels in documentation management and collaboration, allowing teams to store, share, and update project documents in real-time. Jira is highly effective for task and issue tracking, offering robust features for managing workflows and business plans.[9] Trello provides a visually intuitive way to organize tasks and projects with its card-based system, making it easy for teams to track progress and prioritize work. Together, these tools streamline project management processes and enhance efficiency, transparency, and team collaboration.[8]

Compared to traditional project management software like MS Project and Primavera, the integration of Jira, Confluence, and Trello offers more dynamic and adaptable solutions tailored to the needs of modern construction projects. While MS Project and Primavera are powerful tools for project planning and scheduling, they often lack the flexibility and real-time collaboration features that are crucial in today's fast-paced construction environment. The integration of Atlassian's tools allows for real-time updates, better visibility into project status, and improved communication among stakeholders. This leads to more efficient project execution, reduced delays, and better overall project outcomes. By leveraging these digital tools, construction companies can stay ahead of the curve and manage projects more effectively in a rapidly evolving industry [8].

The utilization of digital tools can facilitate the management of construction projects by providing effective solutions to the challenges associated with project tracking and project management. Jira, Confluence, and Trello provide digital solutions that enhance project management efficiency by addressing common challenges such as coordination and flexibility [7-10]. According to research by Zou & Wang (2018), the integration of these digital tools not only improves communication among project stakeholders but also supports data-driven decision-making, which is crucial for the dynamic nature of construction projects [11]. In view of the deficiencies of conventional project management software with respect to communication, coordination and flexibility, the PMBOK Guide highlights that effective communication is key to successful project management, and digital tools can fill the gaps where traditional methods fall short [12]. Furthermore, Turner (2014) emphasizes that the adaptability of modern tools like Jira and Trello enables teams to respond quickly to changes in project scope, which is often a significant challenge in construction management [13]. This article aims to address these issues through the integration of Jira, Confluence and Trello. The objective of this integration is to promote awareness within the sector of a potential new software solution. Digital transformation in construction is reshaping project management by enabling real-time tracking and resource allocation [11]. This section of the article will initially examine the applicability of Jira, Trello, and Confluence in the context of construction project management. Subsequently, the distinctive features of these digital tools will be analyzed in comparison to traditional project management software, as conventional tools often lack the flexibility provided by newer tools like Jira, Confluence, and Trello, which are better suited for modern construction project demands, with an exposition of the advantages they offer over the aforementioned software [11].

In the context of construction project management, effective coordination and communication are of paramount importance, given the interrelated nature of work processes across different teams and departments. It is therefore essential that the teams maintain constant communication in order to prevent any disruption to the business processes. This section will examine in detail how Jira, Confluence, and Trello facilitate project management follow-up, particularly in the context of continuous communication. To illustrate these points, a sample project has been prepared. Following an examination of the usability areas and examples of Jira, Confluence, and Trello in construction

project management, we will proceed to discuss their advantages over MS Project and Primavera programs, as well as how they complement the shortcomings of the latter two programs.

### 2.1. Examples of Use of Confluence in Construction Projects

Given that we are able to integrate the documents we create in Confluence with Jira and Trello, it would be beneficial to commence with an examination of the advantages and case studies that the Confluence tool will provide us. Let us consider the potential of Confluence for collaborative work on documents, the storage of documents for the accumulation of knowledge, the updating of information in the later stages of a project, and the storage of documents for the purpose of risk management cost analysis studies in future projects. Project members are able to access past documents at any time and from any location via Confluence, update their knowledge, utilize reference information for their work, and collaborate.

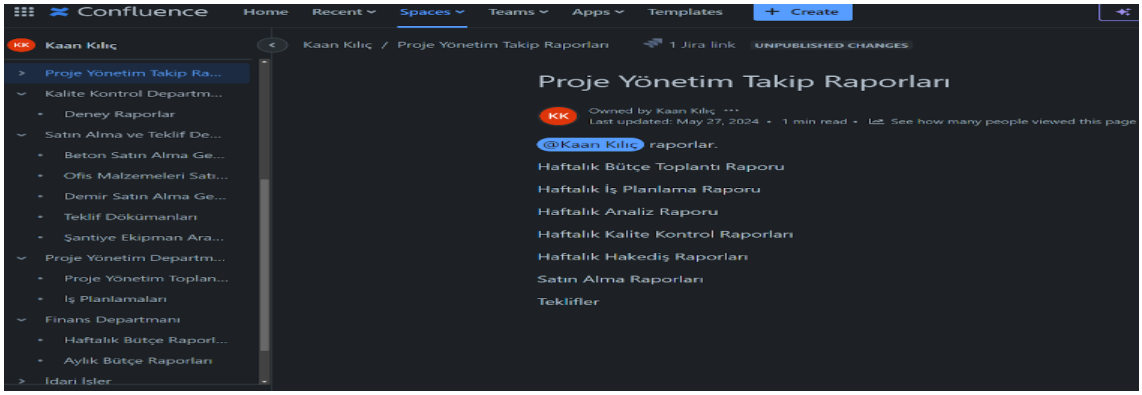



**Figure 1**. Confluence Project Management & Documentation Homepage and Department Categorization

Figure 1. shows us the main screen of Confluence Project Management and Documentation, as well as the categorization of departments. The Confluence page, which has been created for the project, allows the creation of categories on the left-hand side. Department categories can also be subdivided into subcategories. This facilitates the ability of the units to locate their documents with greater ease. As the content can be shared with specific individuals, the documents will be accessible only to authorized users, thereby ensuring privacy.


**Figure 2**. Previous Purchase and Report Sharing of the Procurement and Tendering Department

The report of the Purchasing and Bidding Department regarding the purchases made in the past period is presented in Figure 2. If we consider this report as an exemplar, then the company and unit price of the purchase are known, and the information in this report and the company will be taken as a reference when purchasing concrete in the future, thereby contributing to project management.

As can be seen in Figure 3, the purchasing report that you have examined in the previous Figure 2. indicates that a different person is working on the report in the section indicated by the orange arrow. In this way, project team members will be able to see which file each other is working on and they will be able to work together. Upon hovering over the green cursor in the section indicated by the orange arrow, the username of the individual currently working on the file is displayed, thereby allowing us to ascertain who is currently engaged in the task.

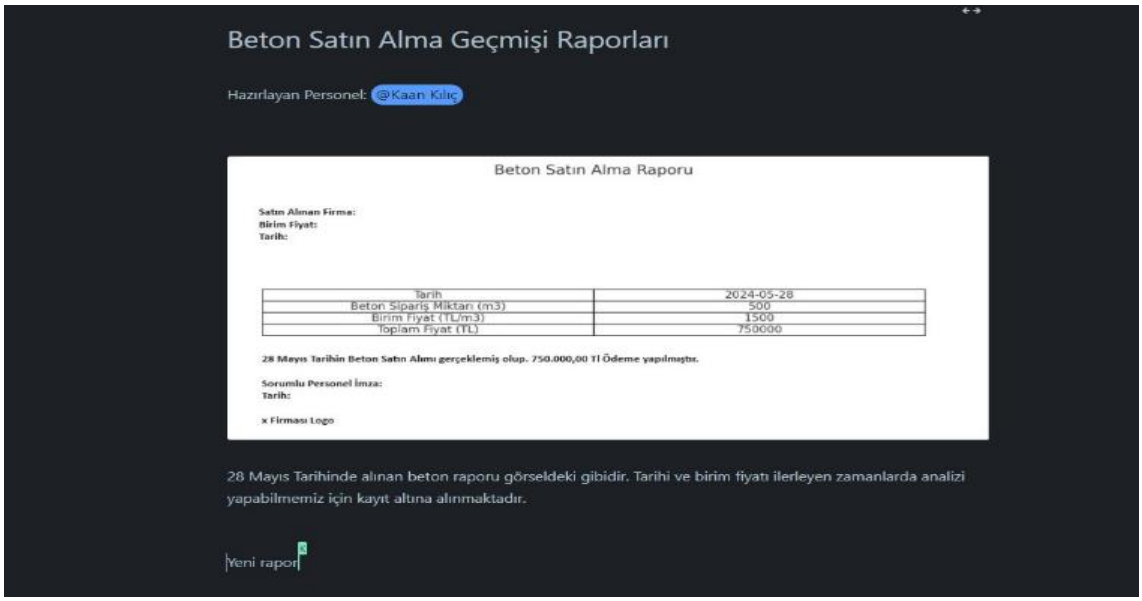



**Figure 3**. The Confluence Joint Work/ Cursor Highlighting During Collaborative File Editing

Figure 4. Below is the documentation of the experiment reports of the Quality Control Unit. The photograph of the experiment is attached, there is information about the personnel who prepared it and there are explanations about the experiment. Thanks to this documentation, the personnel who will perform the same experiment again will have information in the event of a problem in the manufacturing area in the future, since the experiment report is digitally stored, it can be checked and error detections can be made, and at the same time, the report will be a reference for us when there is a problem on the side of the consultant companies.

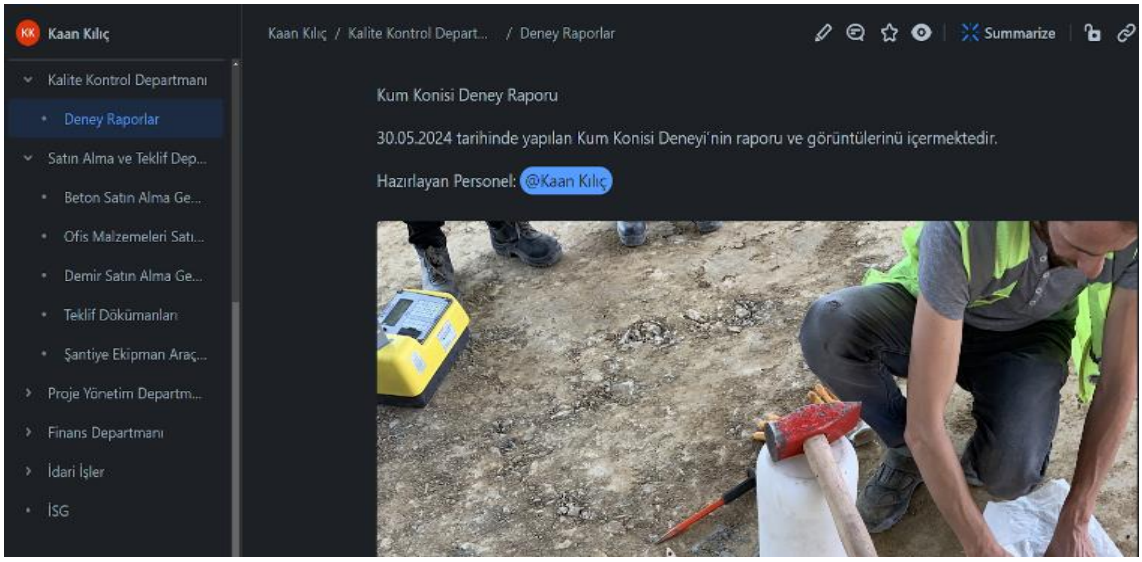



**Figure 4**. Sample Test Report of the Quality Control Department


**Figure 5**. Technical Office Department Sample Document - Progress Payment Report

Figure 5. illustrates an example in which the Technical Office unit archives the progress payment report and the information required for the next progress payment can be easily accessed again thanks to Confluence. The documentation archive serves to prevent the occurrence of file loss problems that may arise in the following processes. Furthermore, a sample template for progress reports to be generated in future projects will be retained.

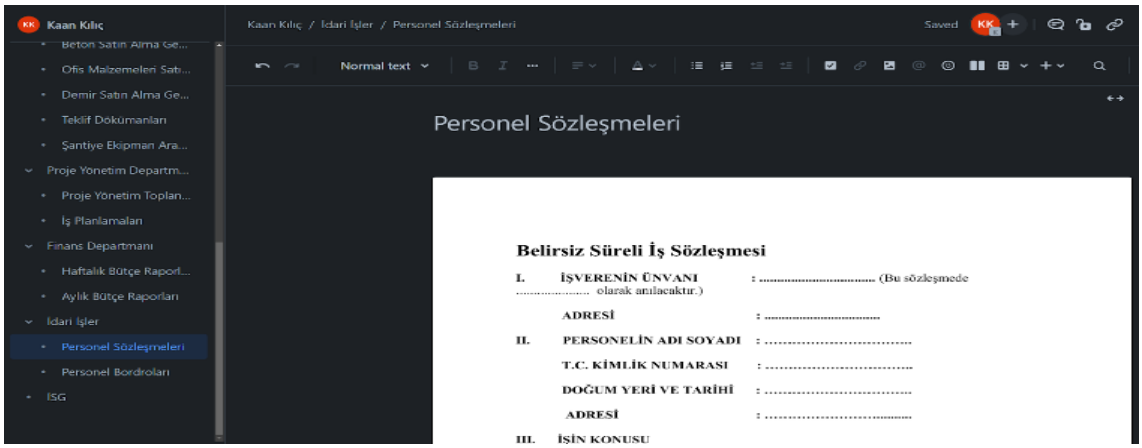



**Figure 6**. Administrative Affairs Unit/ Labour Contract Sample

Figure 6 presents the documentation of the personnel contract template of the Administrative Affairs unit. In this manner, personnel contracts will be digitally archived, thereby facilitating the availability of sample templates for the creation of new contracts.


**Figure 7**. Meeting Report of the Project Management Unit

The documentation of the Project Management meeting, as illustrated in Figure 7, will serve as a reference for future meetings and will be digitally archived. The report displayed in Figure 7. is the project progress report generated in Jira. This report will serve as a reference for future meetings, with progress percentages and work done percentages to be monitored.

The advantages of Confluence in project management are illustrated with illustrative examples. However, another

important consideration is the potential for damage, loss, or other forms of deterioration to occur to documents stored in a physical environment. Considering the difficulties that arise in cases of damage, loss, and similar situations, archiving documents in the digital Confluence environment will provide a significant benefit in this respect. .[25]

Confluence's integration with Jira and Trello affords the opportunity to associate the documents created within the Confluence environment with the tasks defined in the Jira project table or the Trello task cards. This integration enables the user to exercise control over the documents related to a given task.

### 2.2. Examples of Trello's Usage Areas in Construction Projects

This section of the article will examine the manner in which work can be distributed across Trello, with a particular focus on the Work Organization Status Distribution and Departments.

Trello provides a structured framework of the work organization for project management, enabling the clear delineation of roles and responsibilities across departments. This approach ensures transparency with regard to the division of labor among departments.

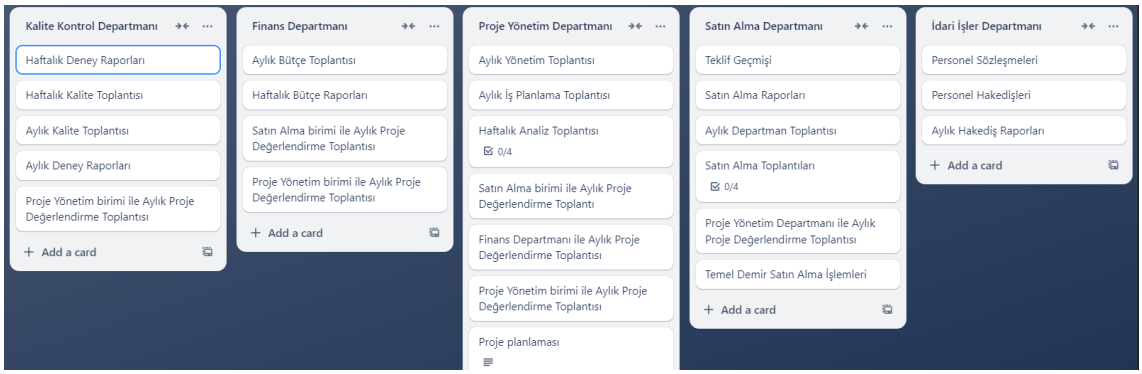



**Figure 8**. Task Cards according to Departments in Trello

In Figure 8. We can see the task assignments to departments organized on the Trello Project Management main screen. The contributions of the Quality Control, Finance, Project Management, and Administrative Affairs Departments to the project were distributed to the respective departments in the form of labels, and a system of work organization was established.

Furthermore, the distribution of tasks to the departments can be divided into different categories according to their status, thus enabling the current status of each task to be monitored.

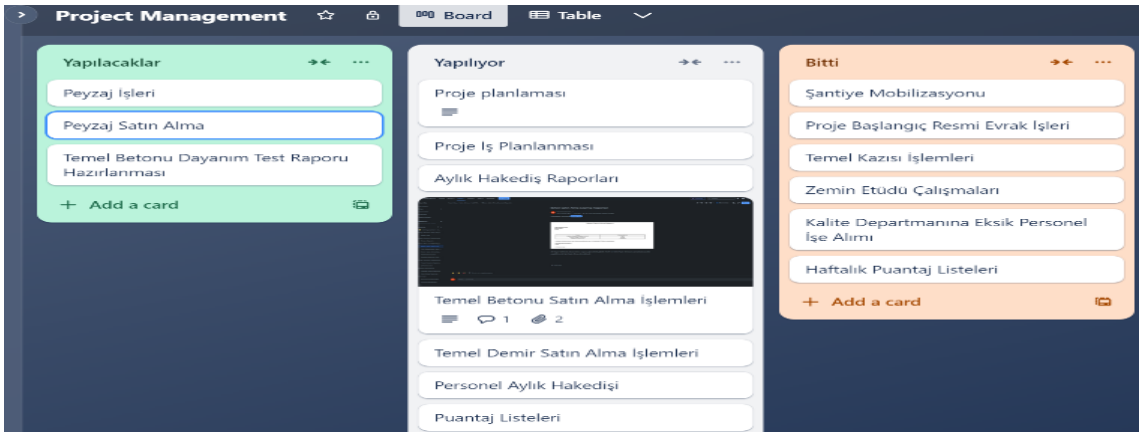



**Figure 9**. Task Categorization According to Workflow Status

As can be seen in Figure 9, the current status of the jobs that we distributed to the departments in Figure 8. It allows us to see it in the form of 'Done - In Progress - To Be Done'. In Figure 9, we can add detailed content to the tasks we have assigned as cards not only as text but also with options such as content information, deadline, notes, comments, file attachment, and photo attachment.

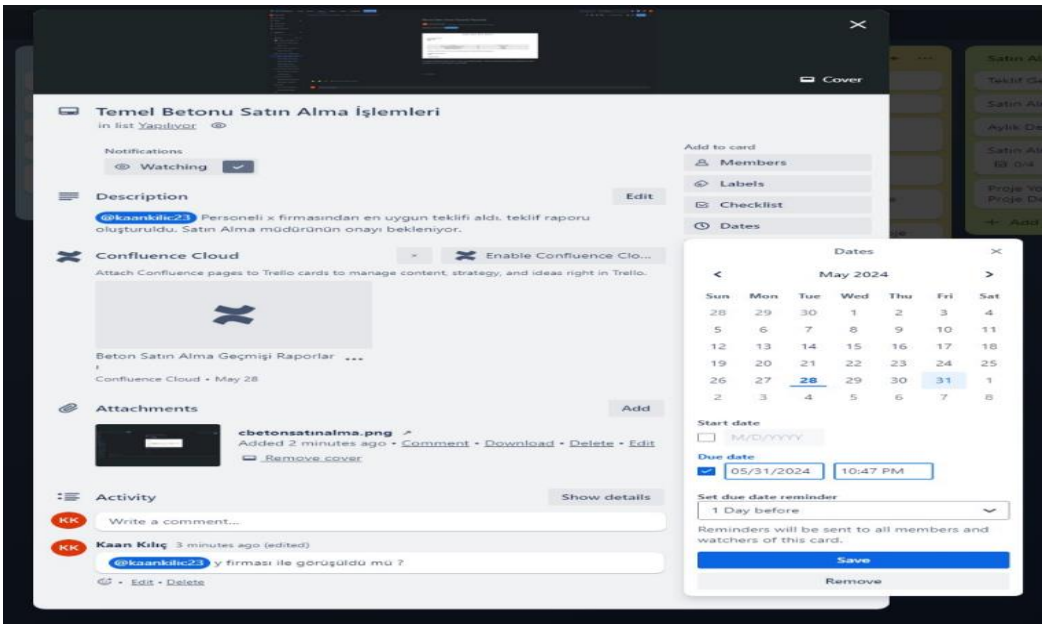



**Figure 10**. Trello Task Cards Contents

As illustrated in Figure 10, the description of the task, deadline, creation of reminders as the deadline approaches, assignment of individuals to task cards, addition of relevant files in Confluence, addition of images, and addition of comments provide access to all pertinent details related to the task. The task cards allow project managers to monitor the progress of tasks and to gain a comprehensive understanding of the details associated with each task. In addition to all these positive aspects, if a staff member leaves the project team, the replacement staff will have information about the work to be done with both Confluence files and task details in Trello.

Trello is a highly useful tool for the creation of project workflows, ensuring the organization of work between units, coordination between units, tracking of interdependent work between units, and project process management. The mobile application enables project members to access their tasks, work processes, and organizational structures from any location at any time. Furthermore, project members are able to access the Confluence files associated with their task cards via the Trello mobile application.

### 2.3. Jira Use Case in Construction Projects

Should we continue our article with the use of Jira; In Jira, there are task cards like in Trello, in addition to the detailing of task cards, there are various additional features where we can see the progress of the project, generate automatic reports of the project, add sub-task cards to the task cards, and summarize the progress of the project [14].

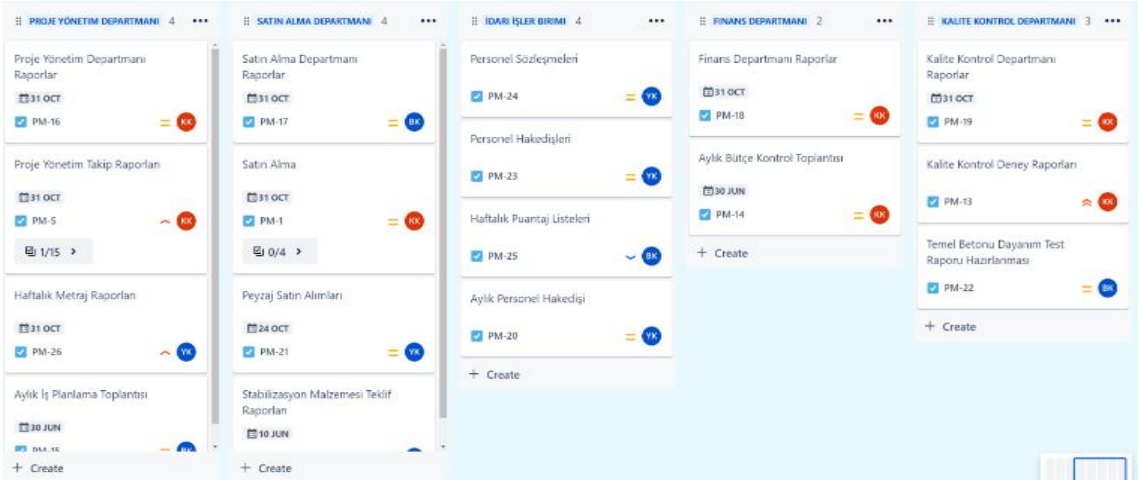
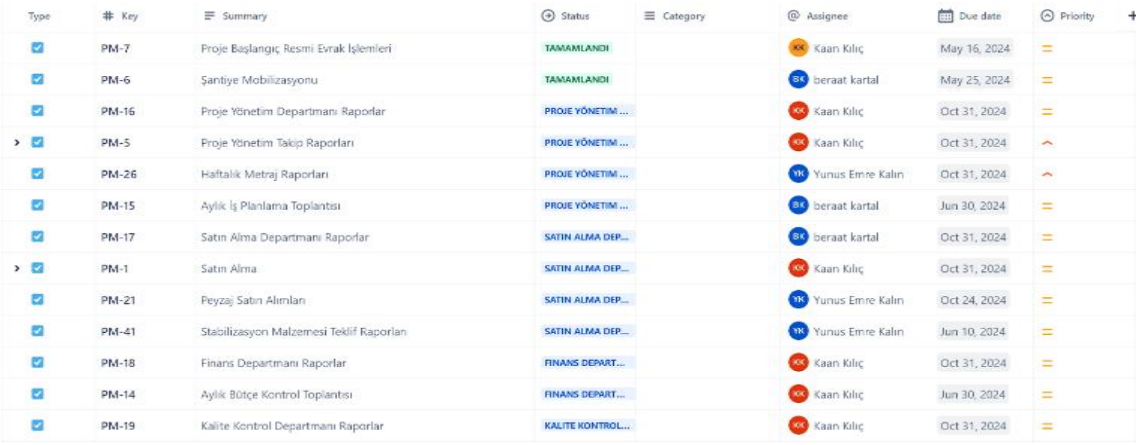



**Figure 11**. Jira Departments and Task Cards View

In Figure 11. Tasks are displayed by department on the Jira Project homepage. A Layout similar to Trello is noticeable. The most obvious difference from Trello is the presence of unique codes for the tasks. The features that differ from Trello will be explained in the next section.

Figure 12. presents the tasks in a list format, accompanied by the deadlines for their completion, the times at which they were created and updated, the individuals responsible for reporting on the task's status, the stage of completion, and their relative importance. The Jira system categorizes tasks according to their

priority status, which is defined as 'very important', 'important', 'less important', or 'unimportant'. This classification enables the project management team to assess the project's progress in accordance with the defined priorities.



| Type | Key | Summary | Status | Category | Assignee | Due date | Priority |
|---|---|---|---|---|---|---|---|
| | PM-7 | Proje Başlangıç Resmi Evrak İşlemleri | TAMAMLANDI | | Kaan Kılıç | May 16, 2024 | = |
| | PM-6 | Şantiye Mobilizasyonu | TAMAMLANDI | | beraat kartal | May 25, 2024 | = |
| | PM-16 | Proje Yönetim Departmanı Raporlar | PROJE YÖNETİM ... | | Kaan Kılıç | Oct 31, 2024 | = |
| › | PM-5 | Proje Yönetim Takip Raporları | PROJE YÖNETİM ... | | Kaan Kılıç | Oct 31, 2024 | ^ |
| | PM-26 | Haftalık Metraj Raporları | PROJE YÖNETİM ... | | Yunus Emre Kalın | Oct 31, 2024 | ^ |
| | PM-15 | Aylık İş Planlama Toplantısı | PROJE YÖNETİM ... | | beraat kartal | Jun 30, 2024 | = |
| | PM-17 | Satın Alma Departmanı Raporlar | SATIN ALMA DEP... | | beraat kartal | Oct 31, 2024 | = |
| › | PM-1 | Satın Alma | SATIN ALMA DEP... | | Kaan Kılıç | Oct 31, 2024 | = |
| | PM-21 | Peyzaj Satın Alımları | SATIN ALMA DEP... | | Yunus Emre Kalın | Oct 24, 2024 | = |
| | PM-41 | Stabilizasyon Malzemesi Teklif Raporları | SATIN ALMA DEP... | | Yunus Emre Kalın | Jun 10, 2024 | = |
| | PM-18 | Finans Departmanı Raporlar | FİNANS DEPART... | | Kaan Kılıç | Oct 31, 2024 | = |
| | PM-14 | Aylık Bütçe Kontrol Toplantısı | FİNANS DEPART... | | Kaan Kılıç | Jun 30, 2024 | = |
| | PM-19 | Kalite Kontrol Departmanı Raporlar | KALİTE KONTROL... | | Kaan Kılıç | Oct 31, 2024 | = |

**Figure 12**. List View of Jira Tasks

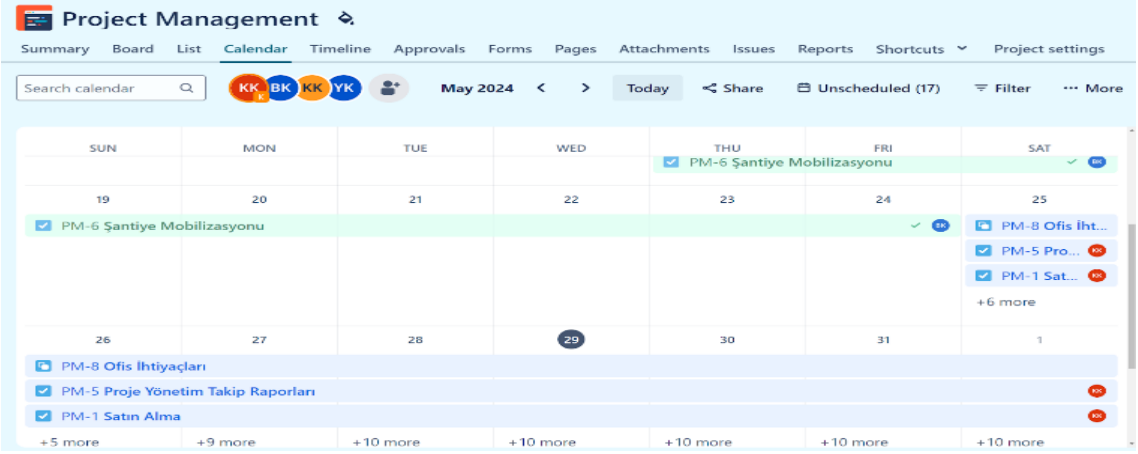



**Figure 13**. Task Scheduling in Jira Calendar View

Figure 13. illustrates the display of tasks in Jira on the calendar. The calendar view facilitates the monitoring of both daily and weekly tasks. The Jira Calendar View facilitates the monitoring of the follow-up of work completed by the project team according to the date and the work that continues to be done.

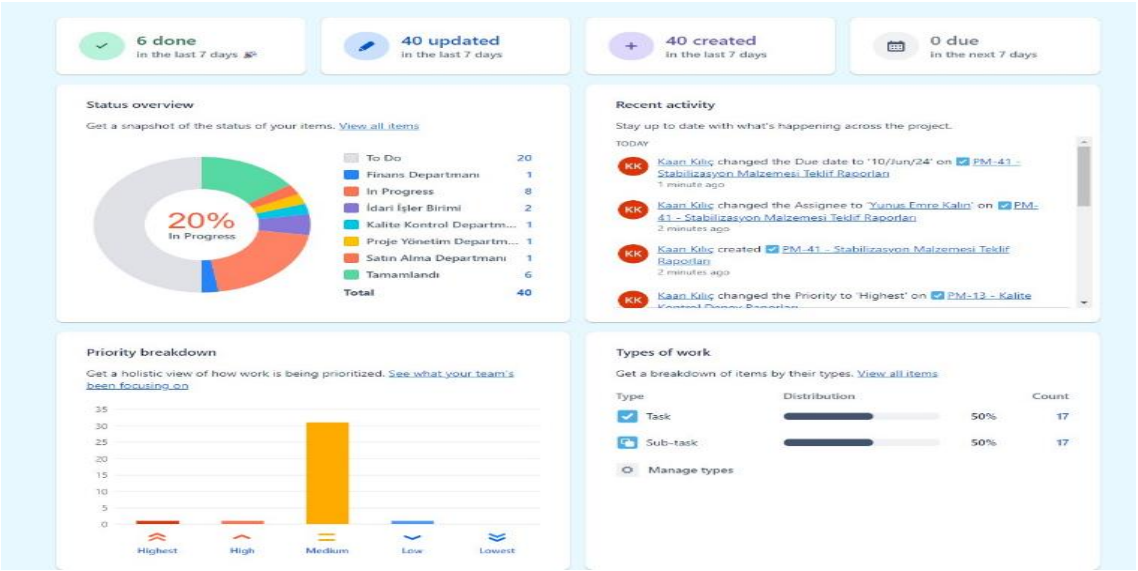



**Figure 14**. Jira Project Summary Report

Figure 14. Shows some reports in the project, past activities, and task categorization. In Jira, there is a past activities section where we can follow the activities of the project team members. The project management team can follow these updates and have information about the progress of the work and the updates of the work to be done. In the section where the project summary is automatically included, there are statistics according to the importance of the work in the project. The number of tasks and subtasks are detailed. The statistics of which departments the tasks belong to are also presented to us as a report. With this report, the project management team determines which unit has a percentage of task weight in the project, how much work the unit has completed or needs to complete, and how much work the units have to do. Thanks to this summary report, the project management team has a summary of the project, the work progress, the work to be done, the work intensity of the units, and the details of the work status.

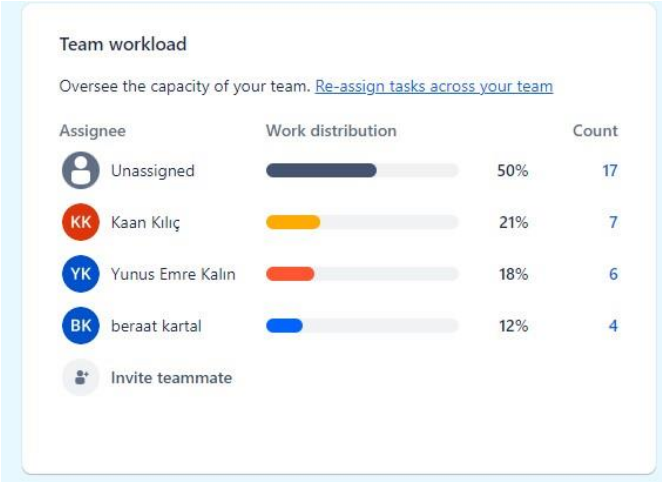



**Figure 15**. Work Sharing Statistics

Various reports can be created through Jira. If we give an example of these reports, we can see a report in Figure 15. where we can easily track how many tasks the project team members have. Various report automations can be created in Jira; Monthly Budget Reports, Work Status Statistics, Project Progress Percentage, Cost Analyses, etc. Reports such as reports are extremely important for the Project Management team to make very useful analyses.


**Figure 16**. Jira Work Planning Map and Workflow Connections

In Figure 16, we see the Jira work planning view. We see that it creates the workflow just like the planning programs used in construction projects.

We can do the interconnected works that we know from construction project planning programs and that we often define with the critical path method in Jira.

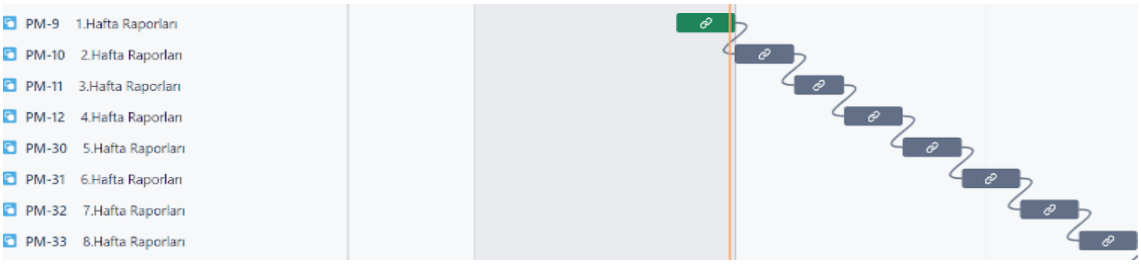



**Figure 17**. Jira Linked Work Plan and Workflow Details

In Figure 17, we observe that all of the task cards of the first 8 weeks of the Project Management Reports are linked to each other by the thread-like cursor between them. We can also define the jobs other than the task cards in the same group as interconnected jobs.

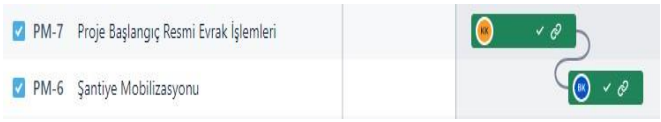



**Figure 18**. Jira Linked Work Plan: Detailed View

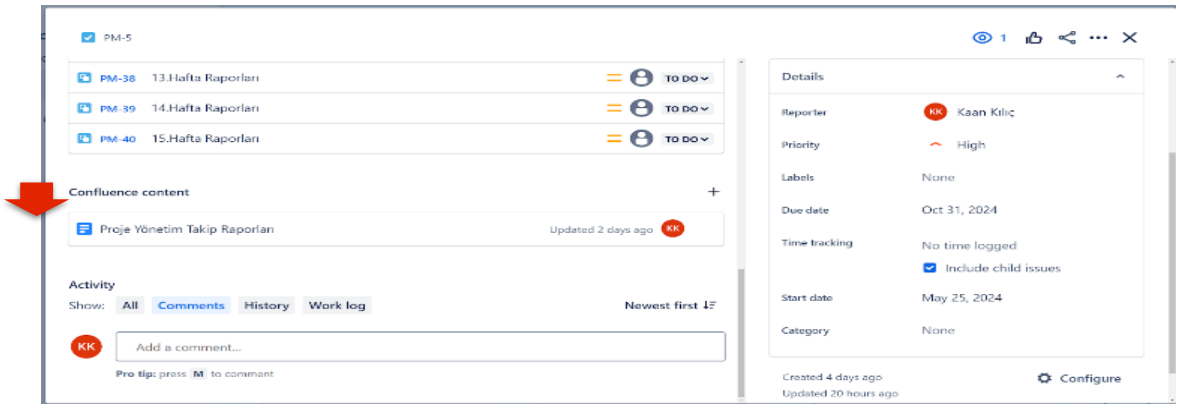



**Figure 19**. Jira Confluence Integration

As seen As Figure 19. Upon opening the task cards for the detailed examination of tasks in Jira, it becomes evident that there is a Confluence integration analogous to that observed in Trello. This integration allows for the addition of a Confluence file pertaining to the subject matter of the task. Thus, we can integrate files into our specially coded task card via Confluence contents within the task cards in Jira.

In general, we have provided examples of how we can apply Jira usage examples to projects. The use of Jira allows the Project Management team to perform all the activities required for project management under one roof. These include the progress of the tasks on the Calendar, the Progress Percentage of the Project, the Workload Statistics of the Units, the Workload Statistics of the Project Team members, the Progress of the Linked Works, the Cost and Process Analysis Reports, the status of the tasks, the documentation of the task thanks to the Jira Confluence Integration, and Business Planning. Furthermore, Jira employs a bespoke approach to project-specific problems and error detection within its automated reporting system, which also proffers suggestions for improvement to the progress of the project [6-7,15].

The utilization of Jira, Confluence, and Trello tools in construction project management will optimize project management, as it will reduce the continuous communication between teams and the complex project structure of construction projects to continuous communication and simple tracking transparency. The continuous communication facilitated by Jira, Confluence, and Trello will eliminate the potential for miscommunication and transparency issues within the project, ensuring that all parties are kept fully informed. The implementation of these tools will prevent the project management team from following the project by holding continuous meetings, while also providing access to every step of the project in a digital format. It is evident that traditional management meetings will continue to be held, yet the discussions and resolutions reached therein will be documented on Confluence, thereby enabling a management style that can be accessed from any location at any time [6-7,15].

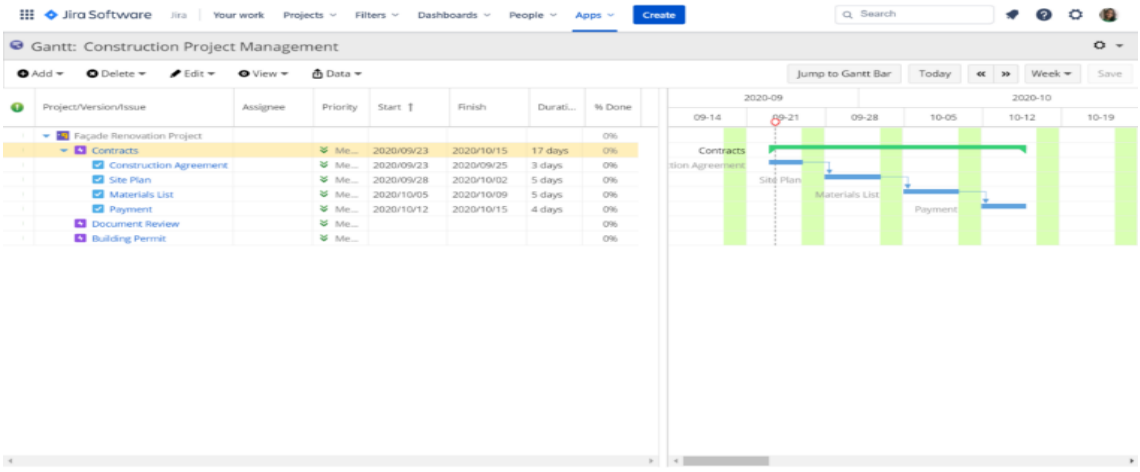



**Figure 20.** Jira's Integration with Gantt: Construction Project Management, Work Planning Plugin in International Project

As previously stated in this article, it is possible to create a business plan diagram that is similar to Jira's planning program. The Gantt Construction Project Management plugin enables the creation of detailed business plans for construction projects. It facilitates the creation of work breakdown structures, the integration of resource management and cost management with Jira, and the implementation of a more detailed approach to these processes. The project work depicted in Figure 20. is derived from a facade renovation project conducted abroad [16-17].

### 2.4. Digitalization Steps in Project Management in the Construction Sectors

In the construction industry, digital tools are of critical importance in increasing efficiency, reducing costs and shortening project delivery times. The digital transformation is radically reshaping processes from planning to execution and monitoring of projects. Advanced digital tools, including BIM (Building Information Modelling), software programs and

applications, IoT (Internet of Things), Lidar technologies and drone use, are leading to significant changes in the construction industry [23-24].

#### 2.4.1. Digitalization in Project Management in the Turkish Construction Sectors

In recent years, companies in the construction sector have also benefited from the efficiency of digital tools. Despite the construction sector's relatively low utilization of digital tools in comparison to other sectors, this is largely attributable to three key factors. Firstly, the sector suffers from a dearth of qualified personnel, which in turn limits its capacity to embrace digital technologies. Secondly, the construction sector tends to be relatively less receptive to innovation. Thirdly, field studies often struggle to keep pace with project management in certain processes, further hindering the sector's ability to fully leverage digital tools.

For digitalization to be successful in the sector, professionals must be able to adapt to these technologies. In order to expedite the digital transformation of the construction industry in Turkey, it is imperative to educate the workforce and elucidate the advantages of digital technologies to the industry. It is recommended that publicly supported training programs and digitalization strategies for the development of the sector be introduced as elective or compulsory courses in universities, in order to accelerate the digital transformation of the sector.

It is anticipated that the digitalization process in Turkey's construction sector will accelerate in the coming years. The incorporation of digital transformation instruments, including sophisticated BIM applications, artificial intelligence, digital applications (software and programs), and sensor technologies, will enhance efficiency and sustainability within the sector. Furthermore, organizations that have embraced digitalization can gain a competitive advantage in the market.

Although the digitalization process of the construction industry in Turkey is progressing with major projects and publicly supported digitalization initiatives, more strategy and financial support is needed to overcome the obstacles faced by small and medium-sized companies. Compared to global examples, although Turkey's digitalization process is gaining momentum, digital infrastructure, training and strategic investments are required for this process to become more effective in all sectors.

The Global construction industry has embraced a more innovative approach and has become more receptive to digital transformation processes on a global scale. In particular, in the context of large-scale projects, digital tools such as artificial intelligence, drone utilization and sensor technologies are increasingly integrated into construction processes. Such technologies facilitate the expeditious and error-free conclusion of projects. Furthermore, technologies such as sensors and the Internet of Things (IoT) are extensively employed to enhance efficiency on construction sites and to identify potential issues in advance. The utilization of these technologies presents a significant opportunity to enhance the construction process, optimize resource utilization and improve project safety [26,27,28,29,30-31].

#### 2.4.2. Examples of Confluence, Jira and Trello usage areas in the management of turkish construction projects of public institutions and organizations, private companies

We have given examples of how to use Atlassian applications Jira, Confluence, and Trello in the Management of Construction Projects, now let's give examples of which companies or private organizations will use these programs in which areas.

##### 2.4.2.1. Public Institutions and Organizations & Private Construction Companies and Project Management Firms

They will have the opportunity to physically archive the documents related to the projects in the archives of the Ministry, Municipality, and the archives of the municipalities on Confluence without encountering the problem of loss and damage. Tens of thousands of files are stored in the archives of most of the institutions and in some cases, the documents that need to be found are difficult to access, with the use of Confluence, such problems will be prevented.

Public Institutions can use Jira, Trello, and Confluence integrations for Project Management, Budget Management, Risk Management, Resource Management, and Job Tracking for the projects they do not tender but do themselves.

It will be useful to use Trello for unit work organizations for the institution.

The flexible structure and various integration possibilities in Jira.

Private companies can use this integration to optimize Project Management and Planning, Risk Management, Communication and Collaboration, Quality Control, Performance Analyses, Project Coordination, and all these aspects for easier digital completion of projects on time and within budget.

#### 2.4.3. Reference Companies Using Jira, Confluence and Trello Applications in Construction Projects in the World

The largest brokerage site in the United States, Redfin, and another major real estate company, Trulia, are utilising Atlassian applications with the objective of enhancing operational efficiency [18-19]. Homegate AG, the largest property portal in Switzerland, is utilising these applications to achieve improvements in security and performance, as well as resource savings [20]. While Ricksoft Inc. contributes to the development of the construction companies it consults by integrating Atlassian applications, it enhanced project tracking by utilising Jira's WBS Gantt-Chart plug-in in a façade renovation project, garnering considerable positive feedback in this regard [16-17,21]. One of the Netherlands' most prominent construction companies, Royal BAM Group, employs the use of Trello as a project management tool, with the objective of enhancing team collaboration [22]. PCL Construction, a company with operations in the Americas, has indicated a preference for customisable applications in project management, with the aim of achieving more efficient business processes [21].

## 3. Integration of Confluence, Jira, and Trello in Construction Project Management: Comparison with MS Project and Primavera Applications and Conclusion

The integration of Jira, Confluence, and Trello is an effective method for the comprehensive management of projects within the field of project management, facilitating the monitoring of project management processes. Confluence facilitates continuous access and transparency among project team members, offering a more efficient alternative to physical archives. By providing digital documentation, it ensures the permanent availability of project team members' information flows. Trello offers task management, workflow organization, and team coordination capabilities, supported by its sophisticated visual interface. The integration of Jira with Confluence and Trello makes it an invaluable tool for project business planning, budget

management, resource management (with the Gantt plug-in), project analysis, digital documentation, real-time continuous tracking, risk management, automatic project process reporting, and project coordination. Furthermore, the flexible structure of the system allows for the correction of errors without interruption to the project processes. This integration offers a powerful combination, especially for teams seeking flexibility, collaboration, and cost-effectiveness in project management. [6-7]

The complex structure of Primavera makes it a more difficult program to learn for new users due to the fact that the user interface is quite detailed. In order to use the program fully effectively, it is necessary to go through a comprehensive learning process. It has a more primitive interface for users. Due to the high license costs, the usage rate in small and medium-sized projects is very low. Additional modules and features are charged separately. Primavera business plan creates limitations in the project as it cannot provide flexibility in certain processes of the project. Since the mobile application has limited features, not all features can be accessed in the mobile application. The inability to integrate directly into the BIM program leads to a major deficiency in the management of large-scale projects.

MS Project, like Primavera, can present a significant learning curve for those new to the software. The license fee constitutes a substantial proportion of the overall cost of using the software in the industry. In order to utilize additional features and functionalities, users are required to pay supplementary fees, in a manner analogous to that observed in Primavera. In projects that require flexibility, the software may impose limitations that impede the project's progress. The mobile application persists in exhibiting an unresolved issue in each iteration, failing to provide access to certain features that are available on the computer. The software is constrained in its capacity for real-time collaboration and teamwork. There is no direct integration with the Building Information Modelling (BIM) program. There is no direct integration with ERP and SAP programs.

| Program | Usage Areas | Advantages | Disadvantages | Focal Points | Why use it? | integrations | Pricing |
|---|---|---|---|---|---|---|---|
| MS Project | Project planning, scheduling, resource management, task distribution, budget management. | Gantt charts, resource allocation, workload management, detailed work planning | Complex interface, high learning curve, costly, add-on features are paid. | Time and Resource management | Detailed Project Planning | Direct integration with Microsoft products, integration into different programs with tools | Additional pricing for subscription fees and additional features based on the number of users |
| Primavera | Planning of large-scale projects, resource management, budget planning | Detailed timelines, risk management, multi-user support | Difficult learning ability, costly, charges for additional modules | Planning of large-scale and complex projects | Detailed planning and resource management | Oracle products, Excel | High Cost pricing based on number of users |
| Jira, Confluence and Trello Integration | Project Management and Project Tracking | Real-time project management and project tracking, strong coordination and transparency between teams, uninterrupted project management, and automatic reporting to detect errors early and prevent losses.Digital documentation, uninterrupted information flow, ability of the project team to do joint live work, Workflow organizations, visual task management. | Cost increases with the increase in the number of users in large-scale projects. | Project Management | Project Management management and tracking from a single point | Slack, Microsoft Teams, Google Drive, ERP, SAP etc. It has direct integration with many applications. | Free up to a certain number of users, charged as a subscription when the number of users exceeds a certain number. You do not pay for additional features and add-ons. |

**Figure 21.** Comparison Table of Jira, Confluence and Trello Integrations with MS Project and Primavera Software

Figure 21. Shows a detailed comparison of the Jira, Confluence, and Trello integration with MS Project and Primavera software. The traditional programs used in construction project management today, namely Primavera and Microsoft Project, play an important role in the planning and follow-up of construction projects. However, they are lacking in several key areas. These include uninterrupted project tracking, continuous information flow, real-time project tracking, transparency in communication and coordination, coordination between teams, task allocation, workflow plans, project flexibility, and customizability. In the contemporary era, where digital innovations are emerging at a rapid pace, the integration of Jira, Confluence, and Trello with project management and project tracking methodologies serves to enhance the capabilities of traditional project management programs, thereby facilitating more efficient project management practices [6-7,15].

The real-time tracking of project progress and tasks, facilitated by the integration of digital tools, enables the follow-up of the project. Furthermore, data records can be kept and analysed for future projects, thus enabling the identification and resolution of problems that hinder the progress of the project in a shorter time. Additionally, losses can be prevented through the automatic reporting of problems that project team members may fail to notice. The aforementioned tools facilitate increased transparency among team members and strengthen communication. The dissemination of information via digital applications facilitates a more transparent and expedient communication process between team members, thereby enabling the expeditious formulation of project decisions. The utilization of data obtained from past projects facilitates the enhancement of risk management processes in future projects. The real-time monitoring of project progress enables the completion of the project within the allocated budget [23, 30,17]. The integration of Jira, Trello, and Confluence applications with BIM (Building Information Modelling), SAP, and ERP (Enterprise Resource Planning) systems may signal the advent of a new era for the construction project management sector.

Our integration allows us to use additional features such as Microsoft Project and Primavera without charging for them.

The effective utilization of digital tools such as Confluence, Trello, and Jira in construction projects has the potential to optimize work processes, enhance communication, and facilitate more efficient project management. Such tools can be utilized in a multitude of domains, including document organization, task management, workflows, and project progress monitoring. The efficiency and traceability afforded by digital tools can facilitate the establishment of a robust foundation for the successful completion of projects. The integration of Jira, Confluence, and Trello plays an active role in project management and project management tracking, where traditional project management

and project tracking programs such as Microsoft Project and Primavera are lacking. In an era where technology is in a state of constant evolution, the utilization of integration will facilitate a more expedient and seamless integration with future technological advancements in comparison to traditional software [6-7-15].

**The use of digital tools in construction project management differs from traditional methods in several key ways:**

Real-Time Collaboration; Digital tools like Jira, Confluence, and Trello facilitate real-time updates and collaboration among team members, allowing for immediate communication and feedback. In contrast, traditional methods often rely on scheduled meetings and physical documentation, which can lead to delays in information sharing and decision-making.

Enhanced Visibility and Tracking; Digital tools provide better visibility into project status through dashboards and visual representations of tasks and progress. This contrasts with traditional methods, which may rely on static reports and spreadsheets that can quickly become outdated.

Flexibility and Adaptability; The integration of digital tools allows for more dynamic and adaptable project management. Teams can easily adjust plans, reassign tasks, and update timelines in response to changing project conditions. Traditional methods often involve rigid planning processes that can be cumbersome to modify.

Documentation Management; Tools like Confluence enable efficient documentation management by allowing teams to store, share, and update project documents in a centralized digital space. Traditional methods often involve physical archives, which can lead to issues with document loss, damage, and accessibility.

Reduction of Miscommunication; Digital tools help eliminate potential miscommunication by providing a single source of truth for project information. This contrasts with traditional methods, where information may be scattered across various documents and platforms, increasing the risk of misunderstandings.

Streamlined Processes; The integration of digital tools streamlines project management processes by automating repetitive tasks and providing templates for common workflows. Traditional methods often involve manual processes that can be time-consuming and prone to errors.

Data-Driven Decision Making; Digital tools enable the collection and analysis of data in real-time, allowing project managers to make informed decisions based on current project metrics. Traditional methods may rely on historical data and subjective assessments, which can lead to less effective decision-making.

Overall, the adoption of digital tools in construction project management represents a shift towards more efficient, transparent, and collaborative practices compared to traditional methods [6-7,15].

The authors suggest several advantages of digital tools like Jira, Confluence, and Trello over traditional planning software such as MS Project and Primavera in the context of construction projects:

Real-Time Tracking and Updates; Digital tools facilitate real-time tracking of project progress and tasks, allowing teams to monitor developments continuously. This contrasts with traditional software, which may not provide the same level of immediacy in updates and tracking.

Improved Communication and Collaboration; The integration of digital tools enhances communication and collaboration among team members, enabling more transparent and efficient information sharing. Traditional software often lacks robust communication features, leading to potential misunderstandings and delays.

Flexibility and Customizability; Digital tools offer greater flexibility and customizability in project management processes, allowing teams to adapt workflows and task assignments as needed. Traditional software can be more rigid, making it difficult to adjust plans in response to changing project conditions.

Enhanced Documentation Management; Tools like Confluence provide effective documentation management capabilities, allowing for easy storage, sharing, and updating of project documents. Traditional software may not have integrated documentation features, leading to challenges in managing project-related information.

Streamlined Workflows; The use of digital tools can streamline workflows by automating repetitive tasks and providing templates for common processes. This can lead to increased efficiency compared to traditional software, which may require more manual input and management.

Data Analysis and Reporting; Digital tools enable the collection and analysis of data for better decision-making and future project planning. This capability is often more advanced in digital tools compared to traditional software, which may rely on static reports and historical data.

Integration with Other Systems; The ability to integrate digital tools with other systems, such as Building Information Modelling (BIM), ERP, and SAP, enhances their functionality and effectiveness in project management. Traditional software may lack such integration capabilities, limiting their utility in a modern, interconnected project environment.

Overall, the authors argue that the integration of digital tools provides significant advantages in terms of efficiency, transparency, and adaptability, making them more suitable for the dynamic nature of construction project management compared to traditional planning software [6-7,15].

## 4. Integration of Confluence, Jira, and Trello in Construction Project Management: Advantages and Differences from MS Project & Primavera Applications and Conclusions

The main findings of the study regarding the integration of Jira, Confluence, and Trello in construction project management include:

Enhanced Efficiency and Transparency; The integration of these digital tools significantly improves project management processes by facilitating real-time updates, better visibility into project status, and improved communication among stakeholders. This leads to more efficient project execution and reduced delays.

Addressing Common Challenges; The tools collectively address several common challenges in the construction industry, such as project tracking, communication, coordination, and flexibility. Confluence excels in documentation management, Jira is effective for task and issue tracking, and Trello provides a visually intuitive way to organize tasks.

Reduction of Miscommunication; The continuous communication enabled by these tools helps eliminate potential miscommunication and transparency issues within projects, ensuring that all parties are kept fully informed without the need for constant meetings.

Digital Transformation Support; The study supports the ongoing digital transformation in the construction industry by highlighting the advantages of using these integrated tools over traditional software like MS Project and Primavera, which often lack flexibility and real-time collaboration features.

Applicability in Various Sectors; The integration of these tools is applicable not only in public institutions but also in private construction companies, enhancing project management, budget management, risk management, and overall project coordination

Overall, the study advocates for the wider adoption of Jira, Confluence, and Trello as they provide a comprehensive solution for modern construction project management, leading to improved outcomes and productivity.

The advantages of this integration are as follows:

Real-Time Tracking; Real-time tracking of project progress and tasks.

Ease of Project Management Tracking; Ease of project follow-up with the integration of digital tools.

Data Recording and Analysis; Keeping data records and analyzing for future projects.

Error and Problem Tracking; It allows the problems that hinder the progress of the project to be detected and solved in a shorter time.

Coordination Between Teams; By sharing information through Confluence, it provides a more transparent and faster communication between team members, which allows project decisions to be made faster.

Transparency and Communication; Increasing transparency and strengthening communication between team members.

Risk Management; Improving risk management processes in future projects with the data obtained from past projects.

Cost analysis; The real-time monitoring of project progress enables the completion of the project within the allocated budget. The data recorded in the project documents is employed in the cost analysis of prospective projects. The utilization of digital tools within the construction industry is of significant value in the context of cost analyses and risk management for future projects. Such tools facilitate the generation of more precise cost estimates for prospective projects through the analysis of data obtained from previous projects. Concurrently, it enables the identification of potential risks at an earlier stage in the project lifecycle, thus facilitating the formulation of effective strategies to address them.

Productivity Improvements; The utilization of Trello has facilitated the assignment of tasks and monitoring of workflows, thereby enhancing collaboration and coordination amongst team members. This facilitates the timely completion of the project. The utilization of Confluence as a digital platform for project documentation facilitates expeditious access to information, thereby reducing the time required for retrieval.

Integration to Civil Engineering Software; The incorporation of Jira, Trello and Confluence applications with BIM (Building Information Modelling) and ERP (Enterprise Resource Planning) systems may herald a new era for the construction project management sector.

Reports; Jira is capable of identifying situations that are not visible to the project management team, as well as potential causes of work loss. It then offers suggestions for how to proceed with the project in order to avoid such issues in the future. The advantages offered by the integration of Atlassian applications, including efficiency, collaboration and traceability, provide a significant competitive edge for all in the industry.

The effective utilization of tools such as Confluence, Trello and Jira in construction projects has the potential to optimize work processes, reinforce communication and enhance project management efficiency. Such tools can be utilized in a multitude of domains, including document organization, task management, workflow design and project progress monitoring. The utilization of digital tools facilitates the establishment of a robust foundation for the successful completion of projects, ensuring efficiency and traceability [6-7,15].

In conclusion, the incorporation of digital tools, including Jira, Confluence, and Trello, into construction project management signifies a transformative shift that addresses the inherent challenges of traditional methods. This study emphasises the considerable benefits that these tools provide, including enhanced real-time collaboration, improved communication and streamlined workflows, which collectively contribute to greater efficiency and transparency in project execution. By capitalising on the functionalities of these digital applications, construction professionals can more effectively oversee intricate projects, mitigate potential hazards, and adapt to the ever-changing dynamics of the industry. As the construction sector continues to evolve, the adoption of these innovative solutions will be pivotal in driving productivity and ensuring successful project outcomes in an increasingly competitive landscape. Further research should investigate the wider implications of these tools across a range of sectors and their potential to significantly transform project management practices.

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