



## Evaluation of Microsoft Project and Supply Chain Model for Effective Resource Optimization in Multiple Project Management

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### KEY WORDS

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Multi-Project  
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ERP  
AI Integration

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### ABSTRACT

This research evaluates the integration of Microsoft Project (MSP) with supply chain models (SCM) to optimize multi-project resource allocation. MSP provides scheduling, while systems like Dynamics 365 enhance inventory, material, and workforce coordination. Experimental simulations across over 20 infrastructure, residential, and manufacturing scenarios demonstrated significant benefits. In mega-infrastructure projects, the integrated system yielded a 30% efficiency improvement, 25% fewer delays, and 12% cost savings. Residential productivity increased by 22%, and manufacturing profit margins rose by 5.3%, aided by advanced ERP and AI analytics. However, challenges like data silos and interoperability were noted. The study concludes that while integration improves coordination, leveraging AI and IoT is essential for managing future uncertainties in scheduling and supply chains. It also highlights the need for industrial frameworks to guide digital integration, with specific civil engineering contexts like heavy machinery shaping its application.

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### 14. INTRODUCTION

The construction industry, a vital economic contributor, faces significant challenges in managing multiple, simultaneous projects like highways and bridges. Traditional management strategies are often inadequate for these complex, multi-project environments. Digital tools, especially Microsoft Project (MSP), have emerged to improve scheduling, budgeting, and resource optimization (Wajantri and Kelkar, 2017).

Integrating MSP with supply chain models (SCM) is key to streamlining materials, services, and workforce coordination, thereby reducing delays, costs, and waste. This integration is particularly crucial in civil engineering, which deals with unique challenges such as scheduling specialized equipment like cranes, managing bulk material deliveries, and ensuring site safety. Research, including a study in Kuwait, confirms that using MSP enhances efficiency by syncing scheduling and resource allocation (Beibin *et al*, 2023). Modern SCM tools are now incorporating AI and Large Language Models for advanced decision support.

Despite technological advancements, a gap remains between theoretical models and practical multi-project management, often leading to poor outcomes. To manage resource conflicts, techniques like the heuristic resource-leveling function within MSP are widely used, making it a preferred tool

alongside Primavera for achieving feasible resource allocation across multiple projects (Microsoft, 2022).



**Figure 1:** Components of Supply Chain Modeling

## 2.0 Materials and Methods

The present study therefore involved the use of mixed methods approach to research in order to assess the use of Microsoft Project software and supply chain models in optimizing resource distribution and scheduling more than one project. The purpose of the methodology was to obtain an extensive insight into the procedures, issues and performance of individual projects related to resource optimization in project management. The study managed to reach the four objectives because both qualitative and quantitative data were gathered and analyzed.

Well known project management software used, Microsoft Project has been utilized to investigate its capabilities and applicability in handling projects simultaneously. The available version to be used was identified depending on the data availability and compatibility. Literature review, case studies and structured interviews with experts who have a prior experience of resource allocation and scheduling using the software were employed in studying the features of the software. The particular practice allowed the research to gain a profound perspective on best practices and constraints in practice.

The researched gathered project data, pertinent to various industries with specific reference to allotment of resources materials, devise of schedules, budgets, and performance. Past records have been analyzed to determine the trends and consequences of a resource adjustment exercise. This enabled it to evaluate the extent to which the optimization strategies have contributed to the major performance indicators like cost, delivery schedules and quality benchmarks.

Primary data was collected using questionnaires and surveys which were very vital. They were meant to retrieve qualitative and quantitative data pointing out those stakeholders who were actively involved in managing several projects. The surveys were aimed towards the project managers, the supply chain specialists and the other related staff to get their experience in the area of resource optimization across the board and the perceived outcomes of the projects. The obtained data underwent analyses performed through available statistical tools that presented the relevant correlation between the effective resource optimization and the project performance indicators.

In Objective 1 the study examined how Microsoft Project was used in resource management through an elaborate literature review and the study of resource management case studies related to the use of Microsoft Project. One further method included structured interviews to professionals of the project in order to acquire pragmatic information. Objective 2 entailed conduct of statistical analysis of the data about the performance of the project to examine the connection of resource optimization with such aspects as cost, time or quality. Objective 3 used a literature review and field surveys in studying the effectiveness of different supply chain models in the allocation of resources in multi-projects. Objective 4 took a comparative design in which the results of this study were cross-checked it with other models of project management using some statistical tests such as chi-square tests and t-tests.

Descriptive statistics were done with Statistical Package for Social Sciences (SPSS) version 17 through coding, cleaning and analyzing the quantitative data. Data in the form of qualitative information, such as the transcripts of interviews as well as open-ended responses to surveys were analyzed with NVivo software. The triangulation of findings was made possible through this dual tool of analysis, and it resulted in an increase in the quality and certainty of the data on the best source allocation tools and techniques in project management.

### 3.0 Results

The data collected in the present study were presented in the Table 1-7 and Figure 2-6 below:

#### 3.1 Socio-demographic Characteristics

**Table 1:** Distributions of Role of the Respondents

<b>Role of the respondents</b>	<b>Frequency (N=150)</b>	<b>Percentage (%)</b>
Admin Personnel	1	0.7
Agricultural & Civil Engineer	1	0.7
Engineer	29*	19.3
Builder	24*	16.0
Builder officer	5	3.3
Building Inspector	3	2.0
CEO	2	1.3
Chief engineer	2	1.3
Civil Engineer	5	3.3
Construction Engineer	1	0.7
Construction Manager	8	5.3
Consultant	3	2.0
Contractor	1	0.7
COO	1	0.7
Designer	2	1.3
Executive Director	1	0.7
Project manager	34*	22.7
Head Operations/Contract and Procurement	3	2.0
MAINTENANCE AND PROJECT	1	0.7
Principal Partner	1	0.7
Principal Technical Officer	1	0.7
Site manager	7	4.7
Supervisor	8	5.3
Student	1	0.7
Technologist	5	3.3
<b>Total</b>	<b>150</b>	<b>100</b>

\* Significance difference at  $P < 0.05$ .

**Table 2:** Distribution of Departments of the respondents

<b>Department of the respondents</b>	<b>Frequency (N=150)</b>	<b>Percentage (%)</b>
Admin	2	1.3
Architecture	2	1.3
Building	17*	11.3
Civil engineering	22*	14.7
Construction	61*	40.7
Engineering	4	2.7
General Operations	5	3.3
Geotechnical and laboratory testing	1	0.7
Inspection	2	1.3

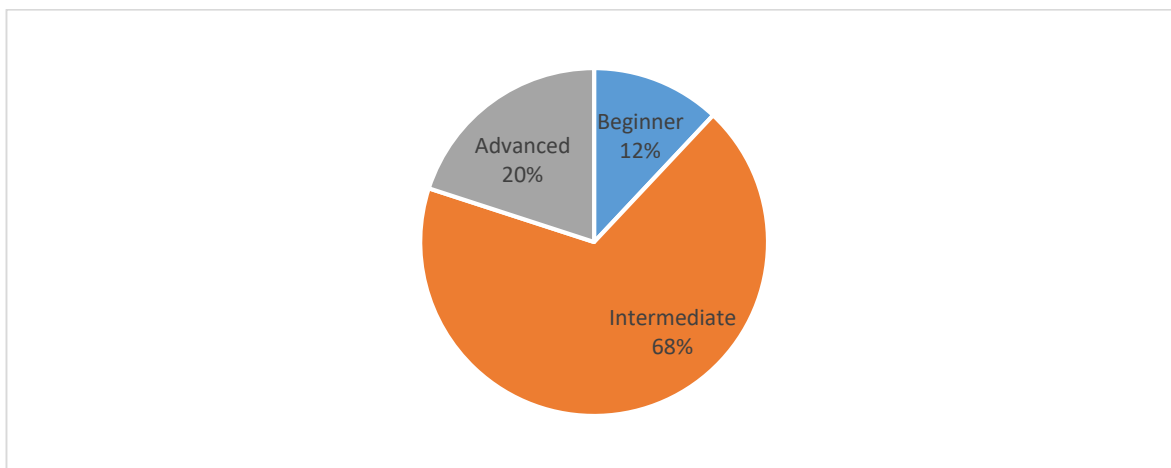
Management	2	1.3
Mechanical	1	0.7
Planning	2	1.3
Procurement	1	0.7
Production	1	0.7
Project	8	5.3
Real estate	3	2
Sales	1	0.7
Structure	1	0.7
Supervisor	1	0.7
Technical	3	2
Works	10	6.7
<b>Total</b>	<b>150</b>	<b>100</b>

\* Significance difference at  $P < 0.05$

### 3.2 Microsoft Project

**Table 3:** Use of Microsoft Project by the Respondents

Variables	Frequency (N=150)	Percentage (%)
<b>Number of Projects Managed Simultaneously</b>		
3-6 years	113	75.3
7-10	37	24.7
<b>Use of Microsoft Project for managing projects</b>		
Yes	123	82.0
No	27	18.0
<b>If yes, how long have you been using Microsoft Project?</b>		
1-3 years	67	44.7
4 and above years	56	37.3
<b>Which features of Microsoft Project do you utilize the most?</b>		
Task Scheduling	62	41.3
Gantt Charts	71	47.3
Cost Management	5	3.3
Excel	1	0.7
Reporting and Analytics	4	2.7
Resource	3	2.0
<b>The effectiveness of Microsoft Project in managing multiple projects</b>		
Very Effective	61	40.7
Effective	50	33.3
Neutral	21	14
Ineffective	9	6
Very Ineffective	9	6
<b>Integration of Microsoft Project with other tools or software for project management</b>		
Yes	45	30.0
No	105	70.0
<b>If yes, please specify the tools/software (N=45)</b>		
BIM , MS Project, CPM	2	4.4
Excel	31	68.9
Orion 18	2	4.4
Power point	4	8.9
Primavera	2	4.4
Procure, REVIT, Smartsheet, Asana app	4	8.9



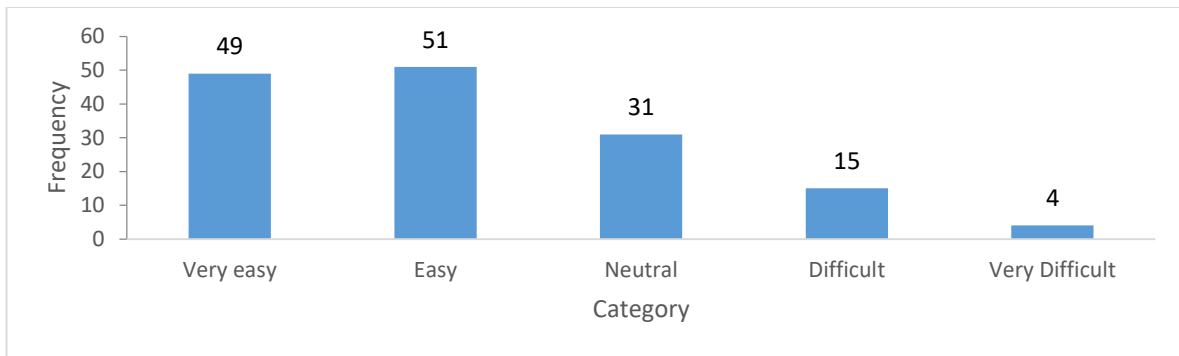
**Figure 2:** Proficiency with Microsoft Project

**Figure 3:** Use Microsoft Project for Managing Multiple Projects

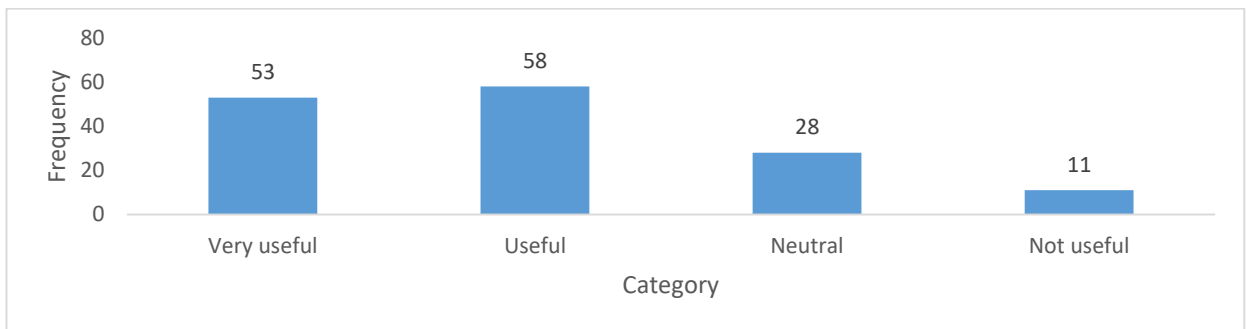
### 3.2.1 Resource Optimization in Microsoft Project

**Table 4: Resource Optimization in Microsoft Project**

Variables	Frequency (N=150)	Percentage (%)
<b>Management of resource allocation across multiple projects</b>		
Asana app	1	0.7
Hybrid approach	8	5.3
Manual methods	81	54.0
Microsoft project	60	40.0
<b>How does Microsoft Project assist in resource optimization?</b>		
Capacity planning	22	14.7
Monitoring Resource Utilization	22	14.7
Resource Leveling	50	33.3
Workload analysis	56	37.3
<b>Implementation of custom strategies or methods for resource optimization in projects</b>		
Yes	18	12.0
No	132	88.0
<b>Use of the resource leveling feature in Microsoft Project</b>		
Frequently	34	22.7
Never	20	13.3
Occasionally	60	40.0
Rarely	36	24.0
<b>Microsoft Project handle scheduling tasks across multiple projects</b>		
Very Well	50	33.3
Good	53	35.3
Neutral	37	24.7
Poor	10	6.7



**Figure 4:** User-friendliness of Microsoft Project



**Figure 5:** Baseline Comparison Feature in Evaluating Project Performance and Resource

### 3.2.2 Evaluation and Improvement of Microsoft Project Features

**Table 5: Evaluation and Improvement of Microsoft Project Features**

Variables	Frequency (N=150)	Percentage (%)
<b>Satisfaction with the reporting features of Microsoft Project in terms of resource optimization</b>		
Very Satisfied	51	34.0
Satisfied	67	44.7
Neutral	23	15.3
Unsatisfied	9	6.0
<b>Challenges face when using Microsoft Project for resource optimization in multiple projects</b>		
Analysis	2	1.3
Conversion to PDF	9	6.0
Cost management	1	0.7
Delay	2	1.3
Interface	4	2.7
Upgrading issues	28	18.7
None	104	69.3
<b>Alignment of project schedules with supply chain timelines</b>		
Integrated Software Solutions	55	36.7
Manual tracking	43	28.7
Regular Coordination Meetings	52	34.7
<b>Main challenges in integrating supply chain management with project management</b>		
Communication and Coordination Issues	66	44.0
Data Synchronization Challenges	59	39.3
Delayed Deliveries	12	8.0

Inventory Management Issues	13	8.7
<b>Effectiveness of integration of Microsoft Project and supply chain management for resource optimization</b>		
Very effective	44	29.3
Effective	61	40.7
Neutral	35	23.3
Ineffective	6	4.0
Very Ineffective	4	2.7
<b>Recommendations for better resource optimization using Microsoft Project</b>		
Better Integration with Supply Chain Tools	49	32.7
Enhanced Reporting and Analytics	68	45.3
Improved Resource Allocation Features	14	9.3
More Training and Support	19	12.7

### 3.3 Supply Chain Management

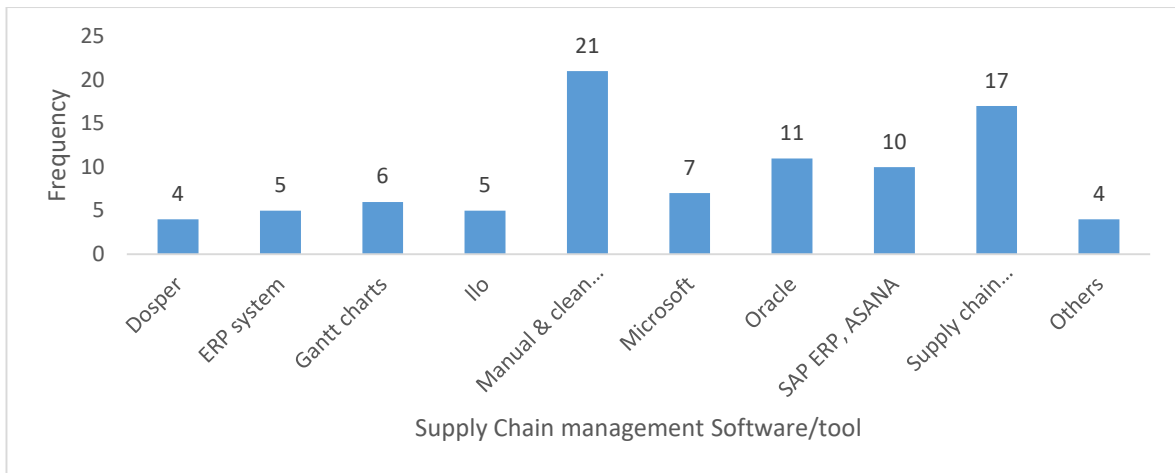
**Table 6: General Understanding of Supply Chain Management by the Respondents**

Variables	Frequency (n=150)	Percentage (%)
<b>Integration of supply chain management with project management practices</b>		
Yes	83	55.3
No	67	44.7
<b>If yes, which supply chain management tools or systems do you use? (N=83)</b>		
Asana	1	1.2
BIM	7	8.4
ERP system	25	30.1
Inventory Management Systems	20	28.9
Manual Methods	1	1.2
Supply Chain Management Software	29	34.9
None	2	2.4
<b>Visibility into supply chain for tracking resource availability and utilization</b>		
Complete visibility	25	16.7
High Visibility	59	39.3
Low visibility	9	6.0
Moderate visibility	55	36.7
No visibility	2	1.3
<b>Overall impact of supply chain management on the success of project management</b>		
Very high	56	37.3
High	62	41.3
Neutral	24	16.0
Low	7	4.7
Very low	1	0.7

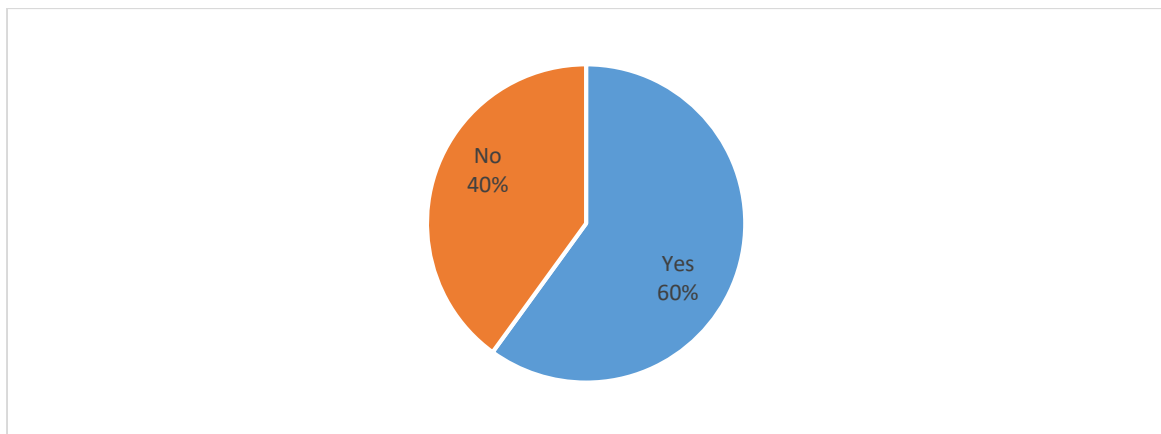
### 3.3.1 Resource Optimization in Supply Chain Management

**Table 7: Resource Optimization in Supply Chain Management**

<b>Variables</b>	<b>Frequency (N=150)</b>	<b>Percentage (%)</b>
<b>Effectiveness of supply chain management process help in identifying risks related to resource allocation in multiple projects</b>		
Very Effective	51	34.0
Effective	57	38.0
Neutral	24	16.0
Ineffective	11	7.3
Very ineffective	7	4.7
<b>Risk mitigation strategies within supply chain to avoid resource bottlenecks</b>	57	38.0
Frequently	4	2.7
Never	70	46.7
Occasionally	19	12.7
Rarely		
<b>How effective is your approach to managing supplier risks in ensuring consistent resource availability?</b>		
Very Effective	57	38.0
Effective	55	36.7
Neutral	24	16.0
Ineffective	8	5.3
Very ineffective	6	4.0
<b>Effectiveness of communication with suppliers for ensuring timely resource delivery across multiple projects</b>		
Very Effective	64	42.7
Effective	60	40.0
Neutral	17	11.3
Ineffective	3	2.0
Very ineffective	6	4.0
<b>How often do you monitor supply chain activities in real-time to adjust resource allocation as needed?</b>		
Frequently	63	42.0
Never	2	1.3
Occasionally	76	50.7
Rarely	9	6.0
<b>What challenges do you face in using supply chain management for resource optimization in multiple projects?</b>		
Coordinating challenges	9	6.0
Cost control and unexpected delays	26	17.3
Poor communication	37	24.7
Poor timing	3	2.0
None	75	50.0



**Figure 6:** Supply Chain Management Tools or Software Use for Resource Optimization in Projects



**Figure 7:** Need of Additional Training in Microsoft Project and Supply Chain Management

#### 4.0 Discussion

According to the study, Microsoft Project is also massively used by its users with 82.0 percent utilizing it actively to undertake projects especially in the scheduling of tasks and tabular charting of progress which is done through Gantt charts. The vast majority of users have 1-3 years of experience as it corresponds with the study of Irfan et al, (2021) which stated that, the better individuals know the tool, the more efficiently they can use it during their careers. Even though 68.0 percent of users consider themselves to be in the intermediate category, 40.7 percent of them feel that Microsoft Project is well suited to managing several projects all at once-corroborating the conclusion presented by Fedyk *et al.* (2022). Nevertheless, 30.0% of them combine it with other tools, and it could be improved with the help of system integration to become even more efficient in the workflow. The fact of the weekly use of the software by more than half of the respondents indicates its systematic use through which collaboration and a positive change in outcomes have been identified (Hamada, 2023).

Regardless of the resource management capabilities of the software, manual tools are the approach of half of the respondents, which means that they fail to take advantage of Microsoft Project characteristics. Such resource optimization features: workload analysis (37.3%) and resource leveling (33.3 %) are utilized and only 22.7 % use resource leveling most often. Besides, only 12.0 percent of the users use personalized optimization methods and the default features are their friends heavily. However, 66.7 percent of respondents share the opinion of overall ease to use, which is

consistent with Mao *et al.*, (2021) and 68.6 percent and 74.0 percent share the view of the scheduling features and the ability to compare the baseline results, respectively.

It is also significant that supply chain management (SCM) practices are also incorporated with project management and 55.3% of them utilize SCM tools which include ERP systems to enhance transparency and synchronization. Oversight of the supply chain had a high to moderate level of visibility and was reported by 76.0% which is an important aspect in tracking the resources (Huang *et al.*, 2023). Most respondents have a well-managed risk mitigation and supplier communications, and 42.0% track supply chain activities in real-time-because of these practices, the respondents are able to allocate resources in an agile and efficient way (Unhelkar *et al.*, 2022). On the one hand, 60.0% of the interviewees experience that additional training in Microsoft Project and SCM would help optimize the modeling, whereas on the other hand, there are such challenges as inefficient communication (24.7%) and cost management (17.3%). However, half of them state that they have no difficulties, accentuating the increased capability to combine SCM and project management with better results (Juhara, 2024).

## 5.0 Conclusion

1. By the analysis of questionnaire participants (N=150), project managers (22.7%), engineers (19.3%), and builders (16.0%) constitute the highest proportion of roles represented, with site supervisors and site managers each representing 5.3%.
2. It was found that 82.0 percent of the respondents are active users of Microsoft Project with 44.7 percent having between three and one years of experience.
3. According to the number of Gantt Research studies that have used it, resource optimization in Microsoft Project can be achieved largely through workload analysis (37.3%), and resource leveling (33.3%).
4. The assessment on the features of Microsoft Project has shown that a huge percentage of respondents were very satisfied and satisfied with the rate of resource optimization 34.0% and 44.7%, respectively.

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