


Research Article

Material Requirement Planning and Project Success of Civil Engineering Companies in Abuja, Federal Capital Territory (FCT)

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Abstract

Purpose - The majority of the issues surrounding material requirement planning and the effects they have on the project success of the civil engineering sector have not been examined in detail. Thus, the point of departure of the researchers is to explore the relationship between materials requirement planning and the project success of civil engineering firms in Abuja, FCT.

Methodology - The study adopted the cross-sectional survey as its research design. The study population consists of twenty- four (24) civil engineering companies operating in Abuja FCT. The study took a census. Three (3) respondents were drawn from each of the companies, making a total of seventy- two (72) respondents to whom copies of structured questionnaires were administered. However, sixty- seven (67) respondents were retrieved and used for analysis. The hypotheses were tested using the Pearson Product-Moment Correlation with the aid of the Statistical Package for the Social Sciences (SPSS) version 25.0.

Findings - The study's findings revealed that there is a positive and statistically significant relationship between practices of materials requirement planning and project success of civil engineering companies in Abuja, Federal Capital Territory (FCT).

Implications and Value - This research offers a reflection on the efforts that managers can make to enhance the efficiency of their material management strategies by placing special attention on material requirement planning to achieve project success and harmonization of such projects. It also provides a roadmap for how civil engineering companies in Abuja FCT could focus on establishing structures and developing infrastructural frameworks that accommodate the diverse material requirement planning processes and activities of civil engineering companies.

Keywords: material requirement planning, project cost reduction, project time reduction, project quality, project success.

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1. Introduction

The adoption of efficient and effective material management systems by organizations increases productivity while justifying the substantial investment risk due to the potential for great returns. The sustainability of the organization relies on the capacity of managers to manage its material resources effectively, and the universally applicable technique is material requirement planning (MRP). Hasanati et al. (2019) define materials requirement planning as a method for determining the amount and timing of purchases for dependent demand items necessary to fulfill the Master Production Schedule (MPS) requirements. The formulation of a master production schedule for each final product, specifying delivery timelines and order quantities anchored on anticipated demand, is what material requirement planning is all about. The triggering of a replenishment process through either procurement or manufacturing is made possible when inventory levels fall below established thresholds (Segerstedt, 2006). The overall objective of MRP is to get the appropriate raw materials to improve the satisfaction of the customer at the optimal time and location (ke et al., 2022). For Kithure and Pual (2022), the ultimate purpose of material requirement planning is to guarantee the availability of production materials as well as products for delivery to customers, reducing inventory levels of materials and products, and planning purchasing as well as delivery in a strategic manner, and also manufacturing activities to attain performance of sustained operations.

Ensuring that raw materials, components, and sub-assemblies are available in the appropriate quantities and at the correct time, as well as the effective scheduling of production needs, commands facilitation by material requirement planning (MRP). MRP outlines an all-encompassing plan of energy and resources necessary to fulfill the requirements of the production schedule. It guarantees the timely receipt of commodities by speeding up the management of inventories and also the statistical forecasting of product components. It determines production priorities in procurement in an effective manner based on expected orders for product parts and components (Adiele & Ihunwo, 2022). According to Kithure and Pual (2022), the optimization of operational performance is crucial for the efficacy of an MRP. In order to mitigate the adverse impacts of unforeseen disruptions or uncertainties in production, such as unexpected spikes in demand, failures of equipment, the introduction of new products to the markets, delays arising from the delivery of raw material, and a high rate of rejection, the MRP system must be modified to modify the production plan (Chadwick, 2013). The utilization of a material demand planning system is an enabler for organizations to enhance performance in the long term by forecasting their product delivery to consumers more correctly. Improvement in competitiveness and efficiency hinges on the effective utilization of MRP, which in turn leads to cost reduction and an enhancement in consumers' quality of life (Hasanati et al., 2019).

The review of the empirical literature shows a missing link between civil engineering companies' project success and materials requirement planning. Inadequacies in investigations mostly center on features that are different from those used in the current investigation. For instance, Adiele and Ihunwo (2022) focused on how supply chain performance relates to material planning requirements. The subject of study by Kithure and Paul (2022) was on material requirements planning and its effect on operational performance. Also, to determine how e-inventory management affects the efficiency of businesses that make food and drink, Gicheru and Ngugi (2023) conducted a study. Therefore, the objective of this research was to enhance the literature by investigating the correlation between material

requirement planning and the success of civil engineering projects in the Abuja Federal Capital Territory (FCT).

1.1 Material Requirement Planning

Materials Requirement Planning (MRP) determines how much and when to purchase dependent demand items in a bid to consolidate the demands of the Master Production Schedule (MPS). As articulated by Bag et al. (2020), material requirement planning includes functions associated with resource and capacity planning movements. As a contemporary application used since 1970, material requirement planning is an inventory management instrument. Material requirements planning (MRP) seeks to reveal the right amount and timing of raw materials, components, and subassemblies to be available for the purposes of production scheduling optimality. It is associated with the success of operations because it enhances material flow, customer satisfaction, and product quality at the same time, decreasing inventory obsolescence, stockouts, and surplus stock levels (Oztemel & Gursev, 2020; Musi, Mukulu & Oloko, 2018; Katuu, 2020). The knowledge of MRP makes it easier to comprehend the functions of materials and components, and the evaluation of their demand. Therefore, Material Requirement Planning is one approach to determining what materials are required. This process involves the compilation of bills of materials, inventory levels, estimated receipts, and the master production plan. Inputs needed to apply the MRP approach properly are; the Master Production Schedule (MPS), Bill of Materials (BOM), inventory data, purchase orders, and established lead times. The MRP system parameter is crucial for optimal system performance (Putri & Nurcaya, 2020). The primary objective of MRP is to guarantee the availability of materials for production and products for customer delivery, while minimizing material and product inventory levels, and effectively planning manufacturing operations, delivery timelines, and procurement activities to enhance long-term operational performance.

Each final product has a master production plan that establishes the delivery dates and order quantities depending on projected demand. In an event where the inventory level of the item decreases to less than a specified threshold, a new replenishment process is launched through purchasing or production (Segerstedt, 2006). The necessity for innovative solutions that at the same time can serve the planning needs of materials and capacities takes into account the numerous uncertainties of all the planning stages as a result of the complex and dynamic interactions among many supply chain actors. Using the MRP system can help the organization give more accurate forecasts regarding the delivery timeline of products to customers, thereby improving the performance of the company (Imansuri et al., 2025). Unanticipated demand spikes, equipment breakdowns, new product launches, raw material supply delays, and high rejection rates are all examples of production uncertainties that an MRP system may face, and in order to adapt production plans accordingly, it is necessary to do so (Chadwick, 2013). According to Kithure and Paul (2022), material requirements planning has been gaining importance in several fields. By using management tactics that boost efficiency and competitiveness, material requirements planning systems help companies optimize production and distribution processes, utilizing the same resources. A part of the supply chain process, the material requirements planning system coordinates the storage and distribution of products, services, and relevant data from production to final consumption in order to meet consumer demand. An important factor in the MRP system's performance is the accuracy of the input. Once all the necessary data are available, the next

step is to calculate the total demand and net material need. When it comes to inventory management, material demand planning techniques have been shown to be useful in meeting production demands, such as dependability, speed, and flexibility (Kallunki, Laitinen & Silvola, 2011; Banerjee, 2018).

Project Success

Venczel et al. (2021) defined project success as the pinnacle achieved at any specific assessment moment, irrespective of performance at subordinate levels. The PMBOK Guide (2013) defines project success as the quality of the product and project, timely completion, adherence to budget, and customer satisfaction. The notion of project success is contingent upon the views and beliefs of many stakeholders on the achievement of potential goals. Success is interpreted variably by many parties. The concept of success is broad to the extent that it is interpreted differently in the various fields of science. This means that success cannot be easily achieved, defined, or measured. The ultimate goal of any project is success and the outcome of skillful leadership that supports knowledge work. Results may also be measured as success in performing better than would be expected. A project is considered to be a success when it is completed on time, within the stipulated budget, and is satisfactory to the stakeholders. As explained in Iriarte and Bayona (2020), project success is a key component of project management and is intricately related to project management effectiveness and also to successful project outcomes. Project success is defined by the fulfillment of technical performance criteria and the satisfaction of all stakeholders, including the achievement of project goals, stakeholder contentment with outcomes, adherence to project scope, timely completion, budget compliance, and customer happiness. The project is portrayed as achieving its goals under budget and on time.

A project's success may be defined in both the short and long term. Project management success is measured in terms of efficiency, according to Joslin and Müller (2015), whereas project success is measured in terms of effectiveness and impact, and is considered a long-term statistic. The project's success criteria are its success aspects. A project that achieves its objectives punctually and within financial constraints has traditionally been deemed successful. The conventional cost-time-quality triangle is included in every project specification. Project managers fundamentally see these as success criteria. The dimensions of time, money, and quality are often used to assess project performance, known as The Iron Triangle (Atkinson, 1999). A different method to categorize project success criteria is to differentiate between hard and soft criteria. Hard criteria are quantifiable and readily measurable. The stringent success criteria of the project include time, budget, performance indicators, financial success, and quality. The subjective criteria include several human elements, making them difficult to quantify. All criteria, whether quantitative or qualitative, must be meticulously established and given varying weightings for the assessment of the project's performance. The success of a construction project is often assessed based on its performance on the three criteria of time, cost, and quality (Lamprou et al., 2018). This study assessed project success based on cost, time, and quality, consistent with prior research by Rodrigues et al. (2014), Frefer et al. (2018), and Lamprou and Vagiona (2018).

1.2 Project Cost Reduction

As cited in Akeem (2017), Lucey (1996) defines cost reduction as a tactic used to lower expenditures from an established norm or standard while keeping the effectiveness or performance of the project or services. Strategies meant to lower the overall cost of a building

project or keep the project under financial control are cost-cutting techniques (Beste & Klakegg, 2022). According to Asaolu and Nassar (2007), cost-cutting is a proactive, intentional tool meant to improve effectiveness. It might be seen in numerous respects, including waste elimination and production augmentation. Reducing costs means reaching a real and long-lasting drop in the unit cost of goods or services given without sacrificing their intended usage or lowering of product quality. The objective of cost reduction is to determine the potential for savings in expenses related to materials, labor, and overhead.

Reduction of cost involves retaining the basic features and quality of the product or project, and requiring a concentration on sustainable and genuine savings in production, management, delivery, and total costs attained by the elimination of unnecessary and non-essential elements of the relevant methods and practices. According to Isoghom and Worgu (2025), reducing costs will directly affect profitability because profitability is a common metric to determine the efficacy and effectiveness of a firm. Cost is defined as the spending involved in the materials utilized in the manufacturing process or project, which should be controlled to guarantee sustainability. Unreasonable costs will lead to a reduction in profitability, making a company incapacitated in terms of competition. Cost reduction involves a real and permanent reduction in the unit cost of created products, without undermining their intended purpose. A cost saving can be obtained through reducing the expected level of cost to a level that is lower than the current budgeted or standard level through the acquisition of new equipment or a change of operational procedures, among other strategies.

1.3 Project Time Reduction

The characteristics of a successful project include timely completion, adherence to budget, compliance with specifications, and fulfillment of stakeholder satisfaction (Johnson & Babu, 2018). Companies are becoming increasingly dependent on time, as it often serves as one of the key determinants for the measurement of the success of the projects and the effectiveness of the project organization. Time is a critical criterion for the success of every enterprise. Time has been found to be a variable for measuring a project's level of success. It is one of the major limitations of the construction works because any delay can be detrimental to cost, scope, and quality. Project lead time is the time interval between the start of a project as a raw material or component and its full completion as a part of the finished product; therefore, any reduction in its control indicates an improvement in the efficiency of the company in terms of productivity and process.

Reducing the average levels of inventory can be achieved through lead time reduction. The length of a project is a highly critical factor in its achievement, and the reduction of the time required to accomplish it may potentially present barriers such as possible tradeoffs in quality, scope, and cost. Project time reduction relates to the management of time strategically and according to the requirements of different tasks and activities, with the aim of achieving organizational success and the optimization of gains through efficiency by utilizing and saving time and energy (Sahito & Vaisanen, 2017). As the project advances, it is increasingly difficult to influence its duration favorably. Therefore, the timeline of the project implementation must be carefully planned beforehand. Adhering to the timeline of a construction project can be very challenging, as most of them are planned and executed manually. There must be established obligations to follow the timeline during the planning stage of the project. According to Kim et al. (2012), timely and cost-effective project completion is a key indicator of project performance. When designing a project, one will create time

estimates according to the conventional practices and resources available. Should the proposed timeline be postponed, further resources, including financial capital, personnel, and evolving technology, may be required to realign the project with its objectives.

1.4 Project Quality

Quality, according to ISO 9000 (2015), is the full set of attributes of an entity that affect its ability to meet given or inferred standards. Quality is defined as the totality of attributes required for a product or service to satisfy a given requirement; appropriateness for intended use (Parfitt & Sanvido, 1993). iSahil and Samiksha (2020) define quality as the degree to which a set of inherent attributes meets demands. According to Idoro (2010), quality is the thorough and meticulous efforts needed to provide enough confidence that a product or service will satisfy certain quality standards. Quality encompasses the aggregate of a product, process, service, or system's attributes and intrinsic or designated traits that influence its ability to fulfill expectations or meet specified demands, needs, or specifications. It is the positive value of goods and services with respect to conformity to standards, fitness for use, and even possible means to guarantee satisfaction. Project quality entails those processes and activities that determine quality, policies, objectives, and are accountable for guaranteeing that the project achieves its desired intentions. AbdulAzeez (2020) specified quality within the construction industry as that which meets the expectations of the contractor, regulatory bodies, and the owner. Project quality is a unique element of project management that functions subtly in the background.

The usual factors that could determine the success of a project are time and budget; however, there is inadequate consideration of quality, which can also cripple a project to the same extent as these two factors. Quality may also be evaluated according to the functional approach and the compliance of the project with the standard conditions. Quality involves doing what we promise and making the most out of it. To successfully achieve our purposes, the project manager must ensure that the project begins with a precise and detailed statement of requirements. Quality in the construction industry emphasizes the ability to establish standards that comply with the formulated standards of quality. The quality of the construction project, similar to its successful completion, may be specified as consistent with the project stakeholder expectations. The project will be of high quality by having accurate drawings to meet specifications, cost reasonably to complete, and be manageable, linked with efficient project management and successful outcomes of the project.

1.5 Material Requirement Planning and Project Success

Adiele and Ihunwo (2022) conducted a study on the requirements of oil and gas companies in Port Harcourt, Nigeria, with respect to the efficacy of their supply chains and material planning. In investigating the relationship between material need planning and supply chain performance metrics, this study used a correlational design. 293 oil and gas maintenance enterprises that were operating in Rivers State, as indicated by the Nigerian oil and gas industry annual report (2020) made up the sample population for the research. The study sample consisted of fifteen oil and gas enterprises located in Port Harcourt, Rivers State. To determine the sample size, the Taro Yamane formula was used. Data was analyzed using Pearson's Product-Moment Correlation statistics. The study result revealed that a positive and statistically significant relationship exists between material requirement planning and the performance of oil and gas companies in Rivers State.

Kithure and Paul (2022) examined the East African manufacturing sector in order to ascertain how material requirement planning impacted the performance of operations. Their research specifically examined ten manufacturing companies operating in the East African subregion with a track record of more than a decade in the industry. According to the study, operational performance in the East African manufacturing industry was significantly and favorably impacted by material need planning.

Similarly, the following researchers, Kaconco et al. (2023), looked at how master production scheduling affects the long-term viability of Ugandan blood banks' transfusion services. Two hundred thirteen participants were selected at random to complete a self-administered questionnaire survey. Using multiple regression analysis, the study examined the relationship between the components of master production scheduling and the sustainability of blood transfusions. The research found that master production scheduling is positively associated with the sustainability of blood transfusions in Ugandan blood banks, with a prediction rate of 0.173 at the 95% confidence level. Timely supply of blood products to healthcare institutions is achieved by master production scheduling, according to the research. This positively and significantly affects blood transfusion sustainability in Uganda.

The impact of electronic inventory management on the efficiency and productivity of Kenyan food and drink producers was studied by Gicheru and Ngugi (2023). The study's target group consisted of 97 participants who were employed by the food and beverage companies operating in Kenya. A census was used for this research. Because the population was so diverse, researchers used a stratified random sampling technique. The study indicated that material requirement planning technology significantly impacts the Kenyan food and beverage companies' performance with a β value of 0.316 and a P-value of 0.006. Given the results of prior research, the research gap that the study seeks to fill is significant. Research is required to be done on the interplay of MRP with project success. This paper, therefore, dwelt on how effective MRP can be used to control project success in the context of the civil engineering companies in Abuja, FCT.

2. Theoretical Foundation

This study was conducted in line with the resource-based perspective as its philosophy. The action of the firm to acquire a competitive advantage is the high point of the resource-based view (RBV) theory. Concentrating on internal organizational resources, the resource-based perspective offers an internally-driven approach for analyzing the success or failure of leveraging organizational resources, claims Kozlenkova et al. (2014). The resource-based approach holds that by investing in its uncommon, valuable, and necessary internal resources and competencies, a firm could, over time, acquire a competitive advantage. According to Helfat and Peteraf (2003), the RBV makes two assumptions about the link between firm-based resources and the development of a sustainable competitive advantage, as well as regarding the reasons why companies may outperform others by means of increasing competitiveness. Companies' resource sets vary first of all (Helfat & Peteraf, 2003).

In order to gain a competitive edge and create value, it is essential to manage the supply chain efficiently. Nowadays, rivalry in the corporate world is more often between supply networks than between individual enterprises. In order to remain competitive in the future, successful businesses develop unique or idiosyncratic skills that might be inferred or intangible. If a company wants to boost performance, it has to develop special talent. The theory's usefulness,

thus, is proportional to its impact on operational efficiency. So, businesses may stay ahead of the competition by constantly coming up with new uses for old resources and adapting their applications to match customer needs (Helfat & Peteraf, 2003). A common framework for understanding how material requirement planning (MRP) affects supply chain competitiveness and project success for enterprises is the resource-based view (RBV). On this basis, the hypotheses below are formulated:

- H01: There is no significant relationship between material requirement planning and project cost reduction of civil engineering companies in Abuja, Federal Capital Territory (FCT).
- H02: There is no significant relationship between material requirement planning and project time reduction of civil engineering companies in Abuja, Federal Capital Territory (FCT).
- H03: There is no significant relationship between material requirement planning and project quality of civil engineering companies in Abuja, Federal Capital Territory (FCT).

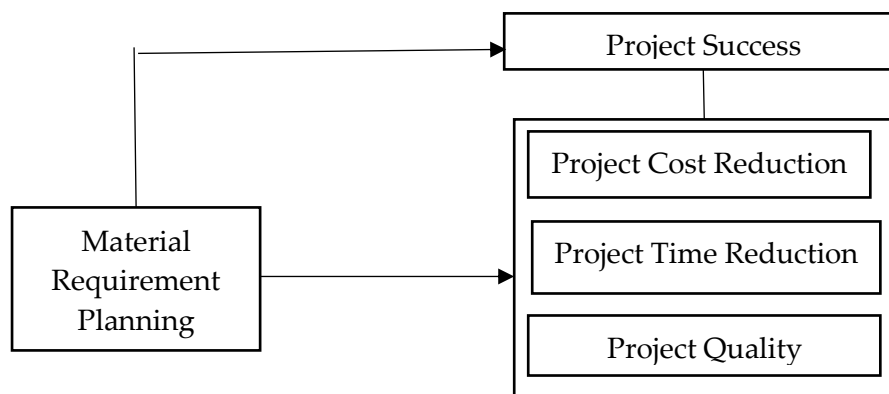


Figure 1: Conceptual framework showing the relationship between material requirement planning and project success dimensions (cost reduction, time reduction, and project quality).

3. Methodology

The study assessed the relationship between material requirement planning and the success of civil engineering projects in Abuja FCT, Nigeria, using a quantitative methodology. Twenty-four (24) civil engineering firms operating in Abuja FCT, as obtained from the business directory of the FCT Ministry of Works, constituted the population of the research. The research sample was identical to the population. A total of 72 individuals from materials management were selected from the organizations to serve as the unit of observation and provide data for the research. The primary method of data collection was used in this research investigation. The tool for data collection was the structured questionnaire. Adopted and adapted items were used in evaluating questionnaire validity, and academic experts were involved in making sure that the content was valid. In evaluating the reliability of the research instrument, the Cronbach's alpha reliability test was conducted, and a reliability criterion of 0.70, as stated by Nunally (1978), was used to assess the study instrument's dependability. The three hypotheses outlined in the research were evaluated using the Pearson Product-

Moment Correlation (PPMC) at a critical value of 0.05. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 25.0.

Limitations: There are certain factors that may restrict the applicability of this study. First, the geographical location is limited to Abuja FCT, Nigeria, which may not reflect the rest of the areas. Moreover, the research target of civil engineering firms may restrict its generalizability to other industries. The results might not apply to other companies not in the civil engineering industry. Also, the methodology and sampling frame used in the study can reduce its generalizability. Thus, care must be taken when generalizing the results of this study to other settings.

Ethical Consideration: The researchers did not engage in any activities with the participants that could be considered as deception. The researchers also avoided all types of plagiarism and data falsification. Privacy in companies with regard to liberty in defining the time, extent, and circumstances of sharing information was also observed.

4. Findings

This part presented the findings of the investigation. Out of the original distribution of 72 copies of the questionnaire, only 67 were successfully collected from the field. Consequently, the success percentage of field activities is 93%. The analysis focused on the descriptive or univariate characteristics of the variables, as well as the degree of their connection (bivariate). The study presents a stance on the associated practices and evidence of the factors, along with the effect of material requirement planning on outcomes such as cost savings, time efficiency, and project quality.

Table 1: Descriptive Analysis of the Variables

	Material Requirement Planning	Cost Reduction	Time Reduction	Project Quality
Valid (N)	67	67	67	67
Missing (N)	0	0	0	0
Mean	4.0981	4.0746	4.0789	4.194
Std. Deviation	0.97025	0.894	0.9155	0.78234
Skewness	-2.06	-2.068	-1.726	-2.065
Std. Error of Skewness	0.293	0.293	0.293	0.293
Kurtosis	2.707	2.737	1.446	3.748
Std. Error of Kurtosis	0.578	0.578	0.578	0.578

Source: Survey data (2024)

Table 1. Descriptive statistics for material requirement planning, cost reduction, time reduction, and project quality. The evidence affirms the manifestation of material requirement planning ($x = 4.0981$), cost reduction ($x = 4.0746$), time reduction ($x = 4.0789$), and project quality ($x = 4.1940$). The results identify all variables as characterizing the context of the study and, as such, demonstrate the extent to which the organizations engage in material requirement planning, and also reflect outcomes such as cost reduction, time reduction, and project quality

Table 2: Test for correlation between Material Requirement Planning and Project Success

		Material Requirement Planning	Cost Reduction	Time Reduction	Project Quality
Material Requirement Planning	Pearson Correlation	1	.957**	.897**	.630**
	Sig. (2-tailed)		.000	.000	.000
	N	67	67	67	67
Cost Reduction	Pearson Correlation	.957**	1	.908**	.690**
	Sig. (2-tailed)	.000		.000	.000
	N	67	67	67	67
Time Reduction	Pearson Correlation	.897**	.908**	1	.621**
	Sig. (2-tailed)	.000	.000		.000
	N	67	67	67	67
Project Quality	Pearson Correlation	.630**	.690**	.621**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	67	67	67	67

** Correlation is significant at the 0.01 level (2-tailed).

Source: Survey data (2024)

The Pearson Correlation coefficient of 0.957 indicates the intensity and direction of the relationship between material requirement planning and project cost reduction in civil engineering companies in Abuja FCT, as shown in Table 2. This implies that there is a robust positive correlation between the variables. In addition, the statistical significance of the relationship is demonstrated by the probability value of 0.000, which is less than the critical value of 0.01, indicating that the relationship between the variables is statistically significant. In other words, there is a statistically significant, positive, and highly significant correlation between material requirement planning and project cost reduction ($r = 0.957$, $N = 67$, $p = p0.000 < 0.01$). The null hypothesis, which stated that there is no significant relationship between material requirement planning and project cost reduction in Abuja FCT, was rejected in light of this result.

Furthermore, the Pearson Correlation coefficient of 0.897, which indicates the strength and direction of the relationship between material requirement planning and project time reduction in civil engineering companies in Abuja FCT, implies that there is a high positive correlation between the reduction of project time and the planning of material requirements in civil engineering companies in Abuja FCT. In addition, the statistical significance of the relationship is demonstrated by the probability value of 0.000, which is less than the critical value of 0.01, indicating that the relationship between the variables is statistically significant. In other words, there is a statistically significant, positive, and very strong correlation between material requirement planning and project time reduction ($r = 0.897$, $N = 67$, $p = p0.000 < 0.01$). The null hypothesis, which asserts that there is no significant relationship between material requirement planning and project time reduction in Abuja FCT, was rejected in light of this result.

The correlation between material requirement planning and the quality of projects in civil engineering companies in Abuja, FCT, generated a Pearson Correlation Coefficient of 0.630. This indicates a strong correlation between the variables. As presented, an analysis of 67 respondents was carried out. As shown in Table 2, there was a strong and positive correlation between material requirement planning and project quality within civil engineering companies in Abuja, FCT. The importance of the association is within a probability value of 0.01, which implies that the relationship between the variables is statistically significant. There

is a statistically significant correlation between material requirement planning and project quality ($r= 0.630$, $N= 67$, $p< 0.01$). Consequently, the null hypothesis that states there is no substantial relationship between material requirement planning and project quality in Abuja FCT was rejected.

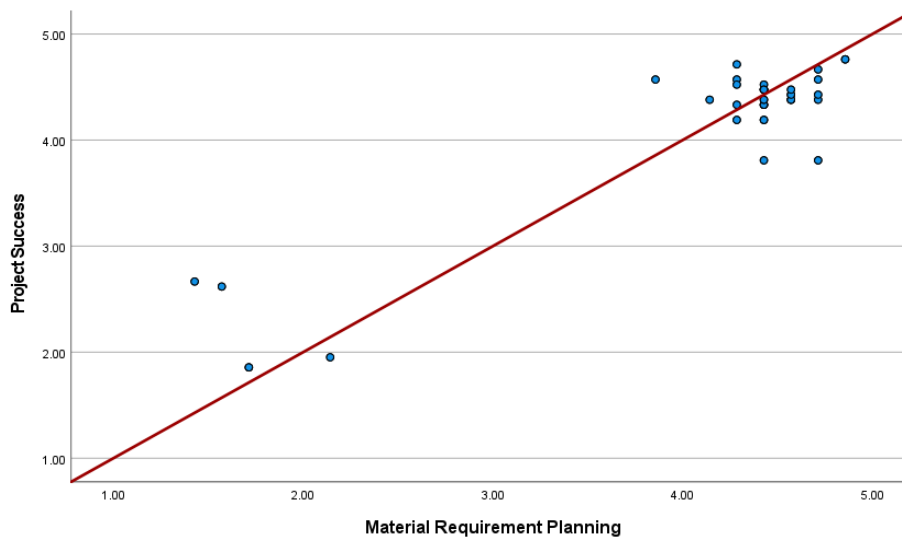


Figure 2: Scatter diagram for the relationship between material requirement planning and project success

The scatter diagram of the summary correlation for the variables, as presented in Figure 2, evidently shows that material requirement planning significantly explains the outcomes of project success for the target organizations investigated.

4. Discussion of Findings

A substantial correlation was observed between material requirement planning and project success, with material requirement planning having a significant and positive impact on all three metrics of project success: cost reduction, time reduction, and quality enhancement. The results suggested that material requirement planning is advantageous and essential in creating the conditions that enable civil engineering enterprises to compete more effectively and favorably in their market. The study's findings align with the perspective of Adiele and Ihunwo (2022), who demonstrated that material requirement planning is a positive and substantial predictor of supply chain effectiveness in terms of cost reduction. The findings of the study also corroborate the perspective that master production scheduling significantly improves the effectiveness of project delivery by reducing the project duration (Kaconco et al., 2023). The study finds that material requirement planning is positively and significantly related to civil engineering project success. According to the results of the empirical tests and the discussion of findings above, civil construction firms in Abuja FCT can benefit from MRP in three ways: time savings, improved quality, and lower overall project costs. The current study also supports the assertion that MRP relates to operational success since it can improve material flow, customer satisfaction, and quality of the product as it reduces obsolescence in inventory, surplus stock, and stockouts. (Oztemel & Gursev, 2020; Musi, Mukulu & Oloko, 2018; Katuu, 2020).

Table 3: Summary of the Results on the Hypotheses

Hypotheses	Predictor Variable	Criterion Variable	P value	R coefficient	Outcome
HO ₁	Material Requirement Planning	Project Cost Reduction	P < 0.001	R = 0.957	Very Strong relationship
HO ₂	Material Requirement Planning	Project Time Reduction	P < 0.001	R = 0.897	Very Strong relationship
HO ₃	Material Requirement Planning	Project Quality	P < 0.001	R = 0.630	Strong relationship

Source: Research Survey (2025).

5. Conclusion, Managerial Implications and Recommendations

The study concluded that material requirement planning is significantly correlated with project success in civil engineering companies, as evidenced by the empirical tests and the aforementioned discussion of findings. Civil construction companies in Abuja, FCT, will be able to enhance project quality, reduce project costs, and shorten project timelines by implementing MRP. The study implies that, to achieve successful project results, firms ought to use MRP to manage materials effectively. Managers ought to know that material requirement planning can increase the success of the project. This will enhance project outcomes, particularly in the long run. These findings also show that project goals cannot be overlooked by managers who wish to maximize overall success. Consequently, the study suggests that the managers of civil engineering companies in the FCT, Abuja, should concentrate on the establishment of frameworks and the development of infrastructure that are capable of accommodating the diverse material requirements, planning, operations, and actions of the civil engineering companies. This will ensure the delivery of successful projects and the harmonization of such projects within civil engineering companies.

Informed Consent Statement: All subjects in the study were informed of their right to provide informed consent. Participation was voluntary, data were collected anonymously, and no personal data (identifying or sensitive) was recorded.

Conflicts of Interest: The authors declare no conflicts of interest.

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