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The Generality of Procurement Risks in the Context of Project Management

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Abstract

Project management in engineering, management, and sometimes business has a considerable contribution. Also, its importance can be observable in the risks of procurement. In the current literature review, the researchers endeavor to comprehensively explain all academic and theoretical definitions, history, process, and relations of these two primary and vital variables to make them clear and practical for scholars and those interested in this field. In fact, with this information and knowledge, studying and working in the project management area can be more reasonable and suitable for all interested scholars and those who plan to perform in this area. This study likewise demonstrates the connection between procurement risks and project management and the crucial function of project management in procurement. Typically, educated individuals in this area could also demonstrate better performance and significantly increase the level of process and outcome in project management in this study considered by the researchers.

Keywords: Management, Procurement, Procurement Risks, Project Management

Introduction

Before explaining any points about project management, starting, and focusing on a project and its definition can be beneficial. With this knowledge and idea, knowing project management and the field of this topic will be more straightforward and more understandable for scholars and all those who focus on and study in this area. It is not easy to define a project precisely because it often relates to a fresh attempt with a clear goal. Here are a few definitions that are often used. A project is a short-term goal to produce an original good, service, or outcome (Farkas, 2018). The project was believed to be a special procedure made up of a series of planned and managed tasks with start and end dates to accomplish a specified task in compliance with predetermined parameters, such as time, money, and resource limitations. Additionally, we need to explain that the project usually has some characteristics that are included: being distinct, having aims to attain, requiring a set of resources, having a deadline with a real start and end; involving uncertainty and risk; requiring multidisciplinary teams and cross-functional collaboration. Also, it is necessary to explain that a project must have performance dimensions, including scope, time, and resources.

History of Project Management

Project management is an exciting topic and knowing its history can be beneficial and necessary for those who like this field and scholars. There used to be a project management institute, up-to-date information books, and project management manuals. As Seymour and Hussein (2014) noted in their study article, history provides several examples of enormous projects completed before Gantt charts were invented. The researchers clarified and cited the Coliseum with the title of Great Wall of China and the Pyramids of Giza as



outstanding examples of such undertakings and the legal history of project management. Building an atmosphere where people can cooperate to accomplish a shared goal of delivering practical projects on time and within budget is fundamental to project management. Humans have been attempting to enhance and perfect project management techniques throughout recorded history. To better comprehend the crucial function of project management, they tried to assess project management from the dawn of time till the present.

Garel (2013) further showed that describing the historical revolution of project management necessitates outlining the specifics of this event in advance. To write the history of project management, the subject of this "historicization" must be identified. According to Kwak (2005), project management has been practiced for thousands of years, dating back to the Egyptian era. However, it was not until about 50 years ago that organizations started using systematic project management tools and techniques to handle complex projects. This information runs parallel to these opinions and reports about the history of project management. The Navy used contemporary project management techniques in the Polaris project in the 1950s. The Department of Defense, NASA, and significant engineering and construction firms employed project management techniques and principles to oversee big-budget, time-sensitive projects during the 1960s and 1970s. The manufacturing and software development industries developed and implemented sophisticated project management techniques in the 1980s. By the 1990s, several companies and sectors had adopted project management ideas, methods, and technologies. Figure 1, created by Haughey (2021), depicts the timeline and history of project management in detail. For a better knowledge of project management history and procedures throughout various decades, refer to this graphic.

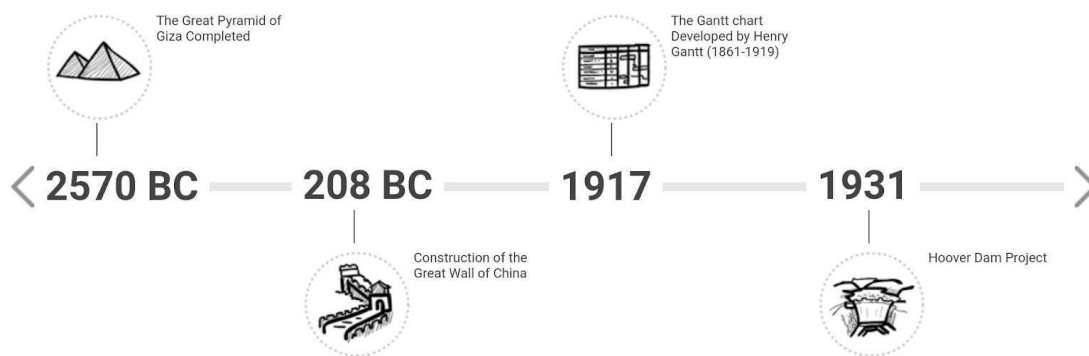


Figure 1: Timeline for Project Management (Haughey, 2021)

The 2570 BC and the Great Pyramid of Giza

There is disagreement among archaeologists over how the Pharaohs built the pyramids. Historical records state that authorities oversaw the building of all four sides of the Great Pyramid. We know that managing this project requires some level of planning, carrying out, and controlling.

The Great Wall of China's Construction

The first majesty of a unified China with the title of Qin Shi Huang, during the Qin Dynasty, subsequently built another global wonder (221 BC–206 BC). This emperor instructed millions of people to do this mission. Based on this historical information, the workforce was classified into three categories: military, normal people, and criminals.

The Gantt Chart, 1917 Henry Gantt developed (1861-1919)

Henry Gantt, a project management pioneer, is most known for inventing the Gantt chart, a self-described scheduling graphic. It was a unique concept and an essential invention worldwide in the 1920s. One of its original goals was the construction of the Hoover Dam, which began in 1931. Gantt charts are still used today and are essential to the project manager's arsenal.

American Association of Cost Engineers: AACE (1956)

Early project management practitioners and experts in fields like planning and scheduling, cost estimation, and cost and schedule control created the AACE in 1956. Since then, it has served as the industry's leading professional association for cost engineers, schedulers, project managers, and project leaders. AACE's

innovative work continued in 2006 when they published the first integrated method for portfolio, program, and project management with their comprehensive expenditure management framework.

Critical Path Method was created: CPM (1957)

To estimate project time, Dupont created the CPM method, which looks at which order of processes has the least amount of schedule unpredictability. It was developed by Dupont to manage the challenging process of stopping chemical producers while repairs are being made and then starting them back up after that. The tactic was so successful that it helped the business save \$1 million in the first year after it was implemented.

Program Evaluation Review Technique: PERT (1958)

The US Department of Defense's US Navy Special Projects Office created PERT for the United States Navy's Polaris Project during the Cold War. It is a technique for examining the activities required to complete a project, namely the amount of time required to do each activity and reasoning out the quickest way to complete the project.

Work Breakdown Structure: WBS (1962)

The WBS was developed by the U.S. Department of Defense (DoD) as a component of the Polaris mobile submarine-launched ballistic missile program. After the project was finished, the DOD made the WBS public and mandated that future projects of similar size and scope use the same approach. WBS is a thorough, hierarchical tree structure of the activities and deliverables that must be finished to complete a project. One of the most popular and valuable project management techniques is the WBS, which was later adopted by the commercial sector.

International Project Management Association: IPMA (1965)

A group of project managers established IPMA as the first project management association in the world to provide a place for networking and knowledge sharing. Over 50 national and international project management organizations are members of the group, which has its headquarters in Switzerland. Its goals are to advance project management and direct the growth of the field. Since 1965, IPMA has grown globally, and as of 2012, there were more than 120,000 members.

Project Management Institute: PMI (1969)

A non-profit professional association dedicated to promoting project management practice, science, and profession, PMI was founded by five volunteers. PMI was formally established when the Commonwealth of Pennsylvania submitted the Articles of Incorporation in 1969. The same year, 83 people attended the inaugural conference that PMI sponsored in Atlanta, Georgia. Since then, "A Guide to the Project Management Body of Knowledge (PMBOK)," considered one of the key resources in today's project management profession, has helped the PMI gain the most notoriety. PMI shows two levels of project management certification: PMP and CAPM or Certified Associate in Project Management.

PROMPT II Method (1975)

PROMPT II was developed in response to public outrage that computer projects were taking longer to complete and cost more than anticipated. Factors exceeding the initial forecasts by a factor of two, three, or even 10 were not unusual. A computer project's stage flow was attempted with PROMPT II. In 1979, the Central Computing and Telecommunications Agency (CCTA) of the U.K. government adopted the method for all information systems projects.

The Mythical Man-Month: Fred Brooks (1975)

"Adding employees to a late software project makes it later" is the central tenet of Fred Brooks' book on software engineering and project management. It has called Brooks' law. Everyone has underestimated the additional human communication needed to add a new member to a programming team. It invariably depends on the knowledge and proficiency of the human programmers involved and the caliber of the readily available documentation. Regardless of their level of expertise, when more people are added, the extra time spent discussing the work, commitments, and technical challenges, as well as analyzing the results, climbs dramatically. These observations are based on Brooks' experience managing the IBM O.S./360 development team.

Theory of Constraints: TOC (1984)

Dr. Goldratt introduced the TOC as an overarching management idea in his book "The Goal." Its purpose is to assist companies in regularly achieving their objectives. The expression refers to the idea that each controlled



system is prevented from achieving more of its objectives by several constraints, each of which always has at least one. To identify the constraint and reorganize the remaining portions of the organization, the TOC method uses five primary phases. Critical Chain Project Management is built on the foundation of TOC methodologies and algorithms.

Scrum A Project Management Methodology (1986)

Scrum is an agile software development methodology based on several small teams collaborating and working hard together. Takeuchi and Nonaka's New Product Development Game Highlighted Scrum as a project management technique (Harvard Business Review, 1986). Later, they developed it in "The Knowledge-Creating Company" (Oxford University Press, 1995). Scrum is mainly used to manage software development projects, although it may also be used for general project and program management, software oversight teams, and other situations.

Project Management Body of Knowledge: PMBOK (1987)

The PMBOK guide was an attempt to document and standardize accepted project management knowledge and practices. The PMI initially published it in 1987 as a white paper. The First Edition was published in 1996, followed by the Second and Third Editions in 2000 and 2004. The manual has evolved into the global standard for project management and is one of its most important tools.

Earned Value Management: EVM (1989)

The 1987 PMBOK Guide provides a foundation for Earned Value Management (EVM), which is then expanded upon in later revisions. Although the concept of earned value has been applied on factory floors since the early 1900s, it wasn't until the late 1980s and early 1990s that it gained widespread recognition as a project management technique. In 1989, the Undersecretary of Defense for Acquisition promoted EVM leadership, making EVM a crucial part of program management and procurement. The Navy A-12 Avenger II Program was canceled in 1991 because of performance flaws discovered by EVM, according to Secretary of Defense Dick Cheney.

PROMPT II: PRINCE Method (1989)

The U.K. adopted Projects in Controlled Environments (PRINCE), released by the U.K. government agency CCTA, as the benchmark for all projects using government information systems. An innovative feature of the original approach that was absent from succeeding systems was the idea of "assuring progress" from three distinct but linked views. A modification was made in 1996 due to the PRINCE approach's reputation for being excessively onerous, constrictive, and restricted to large projects.

Critical Chain Project Management: CCPM (1997)

Goldratt developed Critical Chain Project Management based on techniques and formulas taken from his Theory of Constraints (TOC), which he introduced in his 1984 book *The Goal*. A critical chain project network will keep resources evenly loaded. However, to keep the Project moving forward, it will be necessary for them to be flexible with their start timings and transition between tasks and task chains quickly.

PMBOK (1998)

The PMBOK was recognized as a standard in 1998 by the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers, known as IEEE.

The Agile Manifesto (2001)

Seventeen software developers gathered at The Lodge in Snowbird, Utah, in February 2001 to discuss methods for developing lightweight software. They issued the Manifesto for Agile Software Development to explain the today-known Agile Software Development method. The Agile Alliance, a non-profit group established by some of the manifesto's authors, encourages software development by the document's twelve core tenets.

AACE (2006)

AACE International refers to total cost management utilizing the knowledge and abilities of cost engineering. It is also the first approach or system that integrates portfolio, program, and project management. The idea was invented by AACE, who published the whole process presentation in the "Total Cost Management Framework" in the 1990s.

PMBOK: 4th Edition (2008)



With its improved consistency and clarity, the fourth Edition of the handbook continues PMI's legacy of excellence in project management by making the standard easier to understand and put into practice. The earlier versions of the upgraded version had to include two new procedures.

PRINCE2/ Office of Government Commerce: OGC (2009)

The method has been improved to make it more approachable and readily configurable. Seven important ideas are brand-new to the updated Edition and necessary for projects to succeed. The updated strategy aims to give project managers improved resources so they can complete projects on schedule, within their allocated budgets, and with the required level of quality.

ISO 21500: Standard for Project Management (2012)

The International Organization for Standardization published "ISO 21500: 2012, Guidance on Project Management" in September 2012. Any company can use the standard. Over 50 different countries' experts collaborated on it for five years. These initiatives come from governmental, business, or community organizations, regardless of their complexity, size, or longevity.

PMBOK: 5th Edition (2012)

The fifth Edition of the document, made available in December 2012, provides project management standards, tenets, and characteristics that are regarded as industry best practices. The revised version includes a tenth knowledge area named "Project Stakeholder Management," along with four additional planning procedures.

PRINCE2: AXELOS (2017)

AXELOS purchased PRINCE2 in 2013, and the methodology's following substantial improvement was published in 2017. The updated advice places a strong emphasis on adaptability and scalability. The 2017 update specifies the basic standards a project must meet to comply with PRINCE2. It then offers illustrations, suggestions, and instructions on how to adapt these essential ideas for your Project.

PMBOK: 6th Edition (2017)

Best practices for project management are considered in this version. In the sixth Edition, a section called Approaches for Agile, Iterative, and Adaptive Environments breaks down each knowledge area and discusses how these techniques work in project settings. A major emphasis is placed on strategic and business expertise, including chapters on the PMI Talent Triangle, project management, business documentation, and the abilities required for success in the contemporary workplace.

2018's Prince 2 Agile

Agile projects that use Scrum, Kanban, or another similar Agile technique as their delivery layer should use a modified version of PRINCE2 called PRINCE2 Agile. It adds a management and governance layer to the relatively simple Agile methods focused on the delivery layer.

PMBOK: 7th Edition (2021)

By addressing their existing and future needs, the most recent Edition enables project practitioners to be more proactive, imaginative, and adaptable in attaining desired project objectives. This Edition's significant modification adds a comprehensive section devoted to tailoring the development strategy and procedures to account for the entire range of development methodologies (Haughey, 2021).

Project Management Definition and Concept

Knowing a project's concept and definition and more about project management and approaches can be valuable and beneficial. According to White and Fortune (2002), project management in the context of academic studies tends to be regarded as an adequate solution to the problems raised by innovation. The study of Shenhar and Dvir (2007) explained that project management is one of the fastest-growing disciplines in organizations. Project Management, likewise, is a distinct management area that supports managing projects. Three key features distinguish it from other management forms: a project manager, the project team, and the project management system. The project management system comprises organization structure, information processing, decision-making, and the procedures that facilitate the integration of horizontal and vertical elements of the seven-project organization. The project management system focuses on integrated planning and control. Indeed, the project management approaches are derived from best practices in protection, building, Etc. (Levitt, 2011). As Morris (2011) reported, project management is a social construct. Likewise, Pinto (2000) recognized that successful project management is connected to the capability of

managers project and other essential players to comprehend the significance of organizational politics and how to make them work for project success.

Further, most individuals and organizations have a new or continued interest in project management. Earlier, project management concentrated on providing plan and resource data to top management in just a few industries, such as the military and building industries. Nevertheless, project management involves much more these days, and individuals in every sector and country manage projects. Most delinquent technologies have become a significant factor in multiple businesses, and interdisciplinary and global work teams have radically changed the work environment. For instance, these facts reveal the importance of project management: the top skills employers look for in new college graduates are all related to project management. Verbal communications often ranked at the top of the list, moved down to number four. These top skills are the ability to work in a team setup, make decisions and solve problems, and plan, organize, and prioritize work (Schwalbe, 2009; Schwalbe, 2015).

The importance of project management is transparent, particularly in specific eras and situations; Swart, Bond-Barnard, and Chugh (2022) reported and emphasized the beneficial influence of project management and explained the role of project management in specific situations such as the COVID-19 pandemic. In this regard, Mehrad (2020) likewise emphasized the importance of COVID-19 and the pandemic situation that can influence different aspects of individuals' lifestyles and social life.

Procurement

The business management function known as procurement is responsible for ensuring the identification, sourcing, management, and access to the external resources that a company may require to achieve its strategic goals. Procurement aims to investigate supply market opportunities and implement resourcing plans that provide the organization, stakeholders, and customers with the most significant supply outcome possible (Kidd, 2005). The science and art of managing external resources and supplies are applied through procurement, which uses a body of information that qualified practitioners and experts interpret. Procurement involves various actions firms perform to obtain goods and services. Although "procurement" typically refers to the last buying stage, it can also apply to the complete procurement process. Although organizations can act as buyers and sellers, the corporation doing the soliciting is typically the emphasis. Getting "the five rights"—obtaining an exemplary quality, in the precise quantity, at the right time, for the correct cost, and from the right source—can be summed up as procurement. Procurement offers several advantages. It supports strategic organizational goals, including market expansion and product innovation, cost reduction, and supply assurance.

Procurement Risks

Procurement risk is the possibility of a procurement process failing to buy services, products, or resources. Common procurement risks include compliance concerns, as anti-corruption regulations often govern purchasing procedures. A procurement process could fail, resulting in company losses and disruption (Spacey, 2016; Faith, 2019). Procurement risk management is the process of recognizing internal and external supply chain hazards. Effective risk management necessitates the elimination of circumstances that expose your firm to unnecessary and increasing risk. It also entails identifying methods to reduce both internal and external risks (Shuler, 2021).

Regarding the introductory role of procurement risks and its role in project management in the current research paper, the researchers can mention that in any project, the capacity of the project manager and his team to get a thorough and organized list of all potential risks, typically in the form of a register, to provide a clear vision of its consequences to provide insight into the best migration strategy to adopt. These risks must encompass those under the organization's control and those outside its control. Considering risks, which are all the adverse consequences, and resources available, which are people, assets, and funds, all of which are whipped by the threat's influence, few tools might be used to identify danger. A proper assignment of procurement risk management in project management will assist in cost and time management, demand management, customer service, quality improvement of goods and services, identification, access, and management of external resources an organization demands, and will provide the best outcome to stakeholders, customers, and the organization.

The Importance of Risk Management

By conducting a practical, correct risk analysis, you may reduce risks' consequences and the disruption they cause in your supply chain.

If you effectively manage the risks throughout your procurement process, you can gain the following advantages:



- Responsible handling of resources
- Improved client services
- Improves connections with clients and suppliers
- Increases output and adopts innovation

Challenges Associated with the Procurement Process

The procurement process provides many benefits, but it also faces many difficulties (Jing et al., 2021) claim that these difficulties make it more difficult to reap the rewards of the procurement process. Depending on their industry, size, resources, and demands, every firm in the competitive business environment must deal with unique obstacles. It might be challenging to deal with these negative variables and problems, which prevent the organization from achieving its stated objectives and setting future directions. Uncertainties and difficulties make it challenging to deploy resources in a predictable way, which results in the failure of business objectives and lowers the organization's profitability.

Alaloul et al. (2016) reported some issues that impact the procurement process, including a weak supply chain, risk management, supplier disputes, an inefficient strategy, a lack of control over spending and visibility of spending, improper data, and contract conditions. Every firm must manage various risks that might impair corporate operations, such as fraud, corruption, bribery, market risk, cost volatility, and delivery risk. One of the main issues that significantly affect the company is data inaccuracy. Suppose these issues need to be adequately recognized and investigated, according to (Jiang et al., 2017). In that case, they will influence the corporate vision and make it impossible to get the required outcomes in the allotted time.

Relation between Project Management and Procurement Risks

By recognizing the relationship between project management and procurement risk, researchers found that every field has core project management areas that must be tolerated with a high level of sincerity to avoid poor project execution and undertaking. However, the field type determines the essential project management area. Also, project procurement is the collection of processes to acquire goods and services in performance. Some of the functions are interdependent, while others are not. From its definition, the project manager must recognize the project procurement dimension of project management. To clarify these explanations, scholars in the construction industry mainly use the term 'procurement' when referring to the selection of the lead contractor of the construction project. The procurement dimension of project management in structure projects has been defined as the most influential, affecting almost every other project dimension. Therefore, the victory or loss of a construction project can be specified by how procurement management is performed. According to Frimpong, there is no requirement to worry about a project's quality if procurement is done correctly. This shows the significant dependence of the quality dimension on the significance of procurement management. The reason is that the materials utilized on the project and the quality of service delivered by the hired people or organizations define the overall quality of the project. Thus, the procurement manager must confirm that the parties employed to provide certain services are best suited.

Furthermore, materials must be sourced from the best sources if the sound quality is to be delivered. The impact of project procurement on resource management has likewise been noted. Most structured contracts require the organization to seek the services of internal and external specialists in executing various project duties. As such, the higher number of external parties, the more complex the resource management dimension is predicted to be. Effective procurement is convenient in this case since the functions and duties of external players must be explained at the outsourcing stage. With this, managing external human resources becomes possible. This constructs a need for procedures for the collaboration of internal and external human resources when it comes to the execution of everyday tasks. Communication is an essential dimension of project management.

Nevertheless, difficulties may be encountered if the vendors, contractors, and other external players selected by the organization create unnecessary communication barriers. For instance, suppliers must make it easy for the firm to communicate the number of materials needed, in what form, and when they are required. Winch professed that external parties could influence risk management in any construction project. The practical selection of contractors and other external parties supports the risk management dimension. This becomes notably important regarding risk sharing between the project owner and the external parties. Procurement is an essential dimension in the construction industry for many reasons. When the business deals with large suppliers and contractors, there is a need to make sure that there is an expert who knows the rates of materials and services in the market. With such a individual, the organization can quickly tell when the expenses quoted by the suppliers are unnecessarily high. Again, the procurement team helps to ensure that the business gets the best deal. This further strengthens the argument that the cost dimension is highly



influenced by procurement. The procurement dimension is convenient since the procurement team advises the business on the exact offers on the table. Decisions on the best offer are primarily based on quality and price, the primary responsibilities of the quality and cost dimensions. More significantly, procurements are tasked with reaching the construction industry and providing a report of approved suppliers. Additionally, the procurement team advises the business about the suppliers to consider and suppliers to ignore.

Working as part of the procurement group is more challenging. Even though most businesses consider procurement to be another barrier to bypass when delivering something promised to the client, it is put in place for specific reasons. The significant interdependence between procurement and other project management dimensions should be considered. In a construction business without the procurement team, finance departments would be tasked with managing tenders. The temptation would go for the cheapest applicant in such cases. Alternatively, sales and marketing departments would be required to perform this role. These would decide without thinking about the implications of the project cost. Therefore, the procurement department remains an essential intermediary between different dimensions of project management. The presence of well-developed procurement departments allows decisions to be made with the proper considerations on all the vital aspects, including timelines, company size, reputation, and price.

Generally, the procurement dimension is the most influential area of project management in the construction industry. This knowledge should guide project managers in this industry when prioritizing things and making investments. The primary reason for this view is the excellent relationship between procurement management and most of the remaining project management areas. The effectiveness of the procurement process has been found to resolve the cost allocations in the Project. Furthermore, the employed contractors, suppliers, and other external suppliers determine the project's quality. The procurement team is expected to enter a relationship with external parties that is easy to manage, thereby influencing the human resources aspect of project management. The procurement team ensures it is easy to share with the selected suppliers and contractors. Having in place a procurement team is an assurance that different aspects will be assessed before a determination is made on the most suitable supplier. Therefore, the procurement department is the most impartial link between the project development team and the client (Sariputra, 2019). Procurement risk management has a meaningful impact on procurement performance and process, according to earlier studies such as investigations of Peter, Rotich, & Ochiri (2018) that reported the adoption of various risk management tools such as multiple sourcing, feasibility study, stakeholder management, risk guarantees, risk appraisal, and sharing contribute to the management of procurement risks that include: financial risks, risk of contractor failure, land and wayleave acquisition risks, and technology risks. These researchers explained that there is a need to evaluate the procurement mechanism in the energy sector to improve the ability to collect more accurate and complete information for supplier evaluation and to alleviate the chances of picking and contracting unqualified contractors. The process must collect accurate information for contractor evaluation in procuring mega projects. These researchers also explained that the risk pricing mechanism needs to be evaluated and adjusted accordingly to ensure or reduce the opportunity for political interference in risk pricing.

Conclusion

In this literature review, the researchers reviewed and evaluated earlier studies that focused on project management, procurement, and procurement risks. The researchers likewise consider the histories and theoretical aspects of procurement in project management and how they are related and essential. Overall, by considering the findings, project management has a remarkable role in engineering, industry, and long-term plans, particularly in business and manufacturing. Therefore, adequate information about project management as an essential factor in the industry is thoroughly recommended. According to the findings, one must express that because of the vital role of project management first and then procurement, having or hiring expert and educated employees in a different segment of the industry, factory, company, and any workplaces that somehow relate to projects in different types or categories.

Recommendation and limitation of the study

This study was designed based on earlier research papers and books. Therefore, the current research paper followed the qualitative methods that needed more explanations and investment. For future studies, the researchers sincerely recommended quantitative methods also added in project management research papers and mixed methods. Accordingly, having different methods, ideas and methodologies can develop more knowledge and information. The lack of time and budget guided this study to deliver only as a qualitative research paper, which should be considered for future studies. This type of investigation regards project management and sub-fields that need more investigations and development for better understanding and beneficial performance. In this regard, the researchers sincerely recommended that future investigations have this mindset to do more research and not limit themselves just to studying previous research and books; their studies and knowledge will be helpful for other scholars, as well.



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