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A STUDY OF EFFICIENT PROJECT MANAGEMENT TECHNIQUES ACROSS THE GLOBE

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ABSTRACT

Infrastructural development is essential for a country's economic growth and sustenance, for which efficient project management is required. Therein lies the basis for motivation for this bibliometric systematic literature review paper, where we analyse the research conducted in this field.

India has struggled with project efficiency, wasting essential resources and time, in the public sector in particular. This paper aims to conduct a bibliometric analysis of research papers on optimizing project management. Through this study, we hope to learn about the various quantitative techniques used by project managers across the globe and suggest the implementation of these techniques in Indian project management. The paper uses bibliometric study methods such as co-keyword, and co-authorship analysis to better understand the degree of research done in this field.

The paper identifies operational research techniques and models such as the CPM, CPAD and MP.

Keywords: Optimisation, Sustainability, Efficiency, Project Management, Risk Management.

INTRODUCTION

Why did it take only 10 days to build a hospital in China and it takes years to even fill a pothole in India?

Governments and organisations start a variety of goal-oriented projects to improve the operational effectiveness of current services or to develop new ones. All of these projects call for the right approaches and talents, including technical expertise as well as good and sound abilities to handle constrained budgets, monitor timetables that are shrinking, keep track of unforeseen consequences, and deal with interpersonal and organisational challenges. It has been determined that using project management practises in the public sector is an effective strategy for enhancing management capabilities and enabling the public sector to successfully finish projects and meet development goals.(Pūlmanis, 2021)

Project inefficiencies are a concern in underdeveloped countries; these shortcomings manifest as project inefficiencies and cost overruns due to unethical acts, a lack of integrity, injustice , societal mistrust, and ineffectiveness. According to Mensah and George (2012), emerging economies frequently have resource scarcity, ineffective monitoring and measuring systems, and a lack of openness and accountability. The

absence of specified benchmarks or KPIs for granting payments in PPPs is crucial to the inefficiency phenomena. Additionally, these economies lack adequate measures of input, process, output, and outcome, resulting in inefficiencies.(George, 2019)

The use of project management (PM) methods and practises is becoming more important in countries with emerging markets, such as India, where projects of varying sizes and complexities are regularly carried out. The research examined the usage of project management methods in the public sectors of other countries and how they may be implemented in India. PM Lifecycles, Tools, and Methods were discussed.(Olawale I. et al., 2012)

Application of contemporary project management methodologies and techniques has a significant impact on public institutions, according to studies. Arnaboldi et al (2004) observed that application of project management strategy in public sector was as a result of pressure on governments to abandon bureaucratic organization in favour of leaner structures. (Olawale I. et al., 2012)

Provision of a good quality infrastructure is the most crucial factor in determining whether an economy will continue to grow. Roughly 8% of the gross domestic product must be invested, according to the report of the Eleventh Planning Commission. In order to achieve the projected economy outlined in the 11th Five Year Plan, this would be helpful. According to the Eleventh Five Year Plan, investments of $494 billion have been made (effective from 2007 to 2012). Telecommunications, electric power, transportation (road, rail, air), water supply, and irrigation are among the investment areas under deliberation. (*Effective Project Management in India : A Study on Provision of Infrastructure Services through Public Private Partnerships (PPP)*, 2020)

Project Management is a vital link in the provision of infrastructure services. The Indian government has already committed itself to project management to achieve better service delivery and infrastructure development. Project management is a vital skill which can prepare India for the strategic infrastructure projects. Therefore, healthy project management has an essential role to play in the expansion of Indian infrastructure. The demand for experienced project management to successfully execute various sorts of projects in various business sectors will expand in the near future.(*Effective Project Management in India : A Study on Provision of Infrastructure Services through Public Private Partnerships (PPP)*, 2020)

The strategies planned will only come to fruition if healthy project management principles are implemented by the Government to convert idea into action. India can achieve great heights of infrastructure development if it takes project management seriously. But it can only be possible if both the public and private sectors synergise their efforts. (*Effective Project Management in India : A Study on Provision of Infrastructure Services through Public Private Partnerships (PPP)*, 2020)

Not only have numerous models been developed to comprehend and portray projects, but operational research has also made significant scientific achievements to the effectiveness of it through the creation of algorithms and tools to assist project managers in making decisions. In this paper, the major contributions of OR are presented and discussed.(Tavares, 2002)

Thailand's public healthcare centre, like many other global markets, promotes healthcare administrators from the ranks of medical practitioners, and many administrators lack administrative and business-related expertise, including project management. If components of patient care resemble project criteria, and aspects

of healthcare administration include managing numerous projects, could developing effective skills be advantageous for healthcare managers? Hence, the objective of this paper is to provide some insights as to the Factors that aid and hinder physicians in their roles as hospital administrators with regards to project management and how project management might be able to add values and efficiencies to improve their operations. (Srivannaboon & Southall, 2011)

LITERATURE REVIEW

Project management is the application of methods, tools, techniques and competencies to a project. Processes are used to carry out project management, which integrates the various project life cycle phases. The processes selected to execute a project must be aligned according to a systemic vision, and each phase of the project life cycle must have specific deliverables and results, which should be regularly reviewed during the project life cycle to meet the requirements of the sponsor, customers, and other stakeholders. (Trigo & Varajão, 2020)

The Australian Project Management Research provides an indicative national perspective that could contribute to the global conversation on industry representing organisations' pragmatic global project management research priorities. Project management research has historically and narrowly focused on methods and strategies for creating or developing tangible outputs. Authors like Leehler, emphasized the focus of project management to be strongly about the people centred issues and the organizational context of a project setting.(Owen et al., 2009)

Wu and Lindell (2004) compare how city of Los Angeles and Taichung County in Taiwan manage reconstruction; suggest that having a pre-impact recovery plan appears to increase the speed of housing reconstruction. The central government in Taiwan and city government in Los Angeles adopted similar policies for housing reconstruction, but adoption time in Taiwan was one week to two month later than in Los Angeles and officials in Taiwan took an even longer time to familiar with policies and implementation procedure.(Hidayat & Egbu, 2010)

Under the new public management strategy, the government of Malaysia conducted the government reform initiative. This initiative was titled “One Malaysia, People First, Performance Now.” Under this program, the emphasis was on the need to implement KPIs in seven priority areas within the institution, with the objective of infusing a private sector philosophy in the public sector by measuring and improving government service deliverability.(George, 2019)

Analysts have discovered after conducting years of research that the majority of developing countries just lack the institutional ability or skilled personnel to design and carry out projects in an efficient manner. “In one country after another” former World bank official Albert Waterston contends, “it has been discovered that a major limitation in implementing projects and programs , and in operating them upon completion is not financial resources , but administrative capacity “ (Control et al., 2008)

China still relies on the industrialised nations for funding and technology in many areas of its economy, just like many other developing nations do. The human resource is underdeveloped since inadequate funds are set allocated for training and educational centres.

A chunk of the Chinese population, particularly the people living in rural areas are predominately unskilled.

Growth areas in technology and human resources were located in China due to its closed-door policy. The construction sector of the Chinese economy is just like all the other sectors reliant on foreign cash, technology, and skills. This is especially true for complex industrial and mega-infrastructure projects where the Chinese lack the track record. There are however many characteristics which foreign project managers must be aware of when they function in the Chinese construction industry.(Pheng & Leong, 2000)

The public sector in Nigeria has not fully contemporary project management tools, approaches, and methodologies which has resulted in public institutions and their contractors not being able to fulfil their duties with regards to the budget, requirements and the completion dates of the projects awarded. Studies have identified ineffective social and political structures, cultural restrictions, and a lack of financial support as obstacles to successful project planning and execution in the Nigerian Public Sector. (Olawale I. et al., 2012)

Sarantis and Askounis (2009) and Sarantis, Charalabidis, and Askounis (2011) indicate that successful eGovernment projects, through a specific management methodology, result in a more effective and efficient government. On the other hand, it cannot be overlooked that inadequate implementations of project management procedures and processes in ambitious e-Government projects have failed to deliver on their promises (Furlong & Al-Karaghouli, 2010), showing the need to develop the current conceptual basis and create a research agenda in eGovernment project management (Sarantis, Smithson, & Charalabidis, 2010). Reusing successful practices, through lessons learned, tends to support the overall viability of projects of this nature (Sarantis et al., 2010). Thus, public policy formulation and public project management must go hand in hands for e-Government projects to be made viable and produce the expected results with consequent benefits for governments and the population (Melin & Wihlborg, 2018). The factor has been given the name E-government projects.(Moutinho & Rabechini Junior, 2020)

The expenses associated with implementing public policies are not usually taken into consideration throughout the project appraisal process due to the inherent characteristics of the public sector. Cost management needs to go through an improvement process, and the training of managers is the main point of attention (Adighibe, Skitmore, & Wong, 2010). As in the private sector, governments are under increasing pressure to incorporate economic, environmental, and social performances into decision-making processes (Brent, 2005). The factor has been given the name Performance of public Projects. (Moutinho & Rabechini Junior, 2020).

Despite public administration reforms that have improved the effectiveness of procedures, the lack of a structure specifying the role and responsibility of each government agency involved in the projects stands out. In this sense, the adoption of project management practices by government institutions has contributed to the improvement of project governance as well as to the communication process in the public environment (Dey, 2002). This factor is called Government policies and project management. (Moutinho & Rabechini Junior, 2020)

RESEARCH METHODOLOGY

The project management literature that is currently published in different nations was investigated in this study using bibliometric methodologies. The scientific value and ramifications of publications in a particular study subject are carefully examined and evaluated using bibliometric analysis, which combines simple to complex mathematical and statistical methodologies.

Bibliometric analysis necessitates the retrieval of publications from numerous bibliographical databases, including Google Scholar, Sci-hub, Science Direct, Z library, Research Gate, and Mendeley.

In order to view the cognitive and conceptual framework of a certain topic, the selected texts are analysed using a number of bibliometric approaches, such as co-word and co-authorship analyses.

In project management, bibliometric review studies have used similar metrics to identify and assess the contribution and sway of particular writers, journals, and/or organisations in a particular area of study. The purpose of our study is to appreciate how project management methods are used in diverse countries. As a result, we chose a keyword co-word analysis, which is commonly employed in bibliometric research review projects.

The objective is to grasp the knowledge structure of a certain area of study and to guide plans for future research. For the purpose of this study, Google Scholar was utilised to collect the publications. It is a free search engine that indexes the entire text or other information about scholarly publications. We also utilised sci-hub, science direct, and Z-Library.

These websites are often used to do bibliometric analysis in a range of disciplines, including project management.

Our search criteria included "Project management", "EFFICIENCY", "Operations Research", "OPTIMIZATION", "Project Management Techniques", "Public Sector", "Sustainability", and "Quantitative Techniques". Similar Project Management-related Keywords have already been used.

After applying the inclusion criteria of project management, efficiency, and optimization in different nations, the search yielded 283 journal articles on project management and approaches. Each publication was thoroughly reviewed for relevance to the research, 20 publications were removed to avoid duplication, and 263 articles were used for bibliometric analysis.

In order to understand the paper's principal study areas and to determine the association between the keywords a co-word analysis was carried out mostly on keywords that featured in the article's title, abstract, and author-supplied terms. This analysis was done using VOS Viewer.

The concept behind co-word analysis is that when keywords occur together, they describe the article's substance. In addition, the cooccurrence of keywords in a set of articles illustrates the links between phrases.

Consequently, the keyword pairs with the greatest frequency are aggregated, and a network diagram depicting the relationships between the study subjects is generated.

The bibliographic data was downloaded as a Word document from Google Scholar and entered into VOS Viewer's co-word analysis tool. For further research, terms that frequently appeared in the title, abstract, and author-supplied were taken. The bibliographic data was retrieved from Google Scholar as a Word document and used as input for a co-word analysis in VOS Viewer. Using keywords that appear at least three times across the corpus of articles, a co-word network was constructed; based on this analysis, clusters were formed, which were then segmented into primary themes.(Utkarsh & Sigala, 2021)

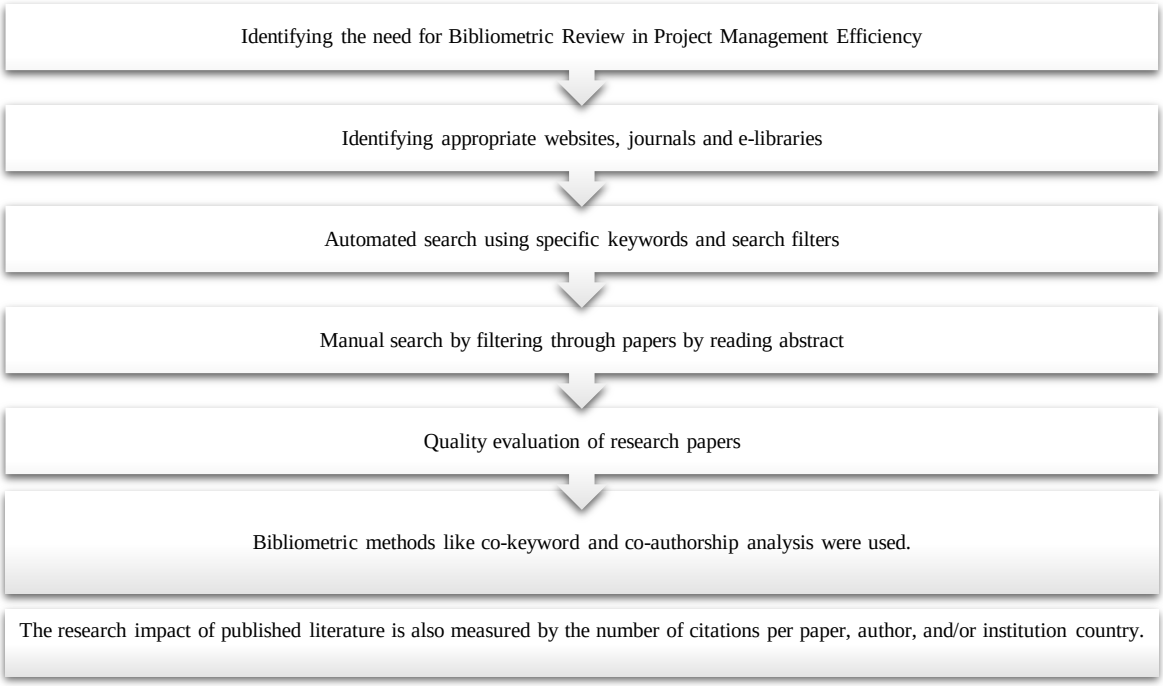

Figure 1: Summary of Research Paper preparation

RESULTS AND ANALYSIS

We attempt to discuss the outcomes of our research in this sections under three general headings: keywords, author, and year-by-year publishing. Data for the analysis was gathered from 263 research publications that

covered the efficient use of project management in various industries. These parameters were used to create the following graphs, the analysis of which is provided below:

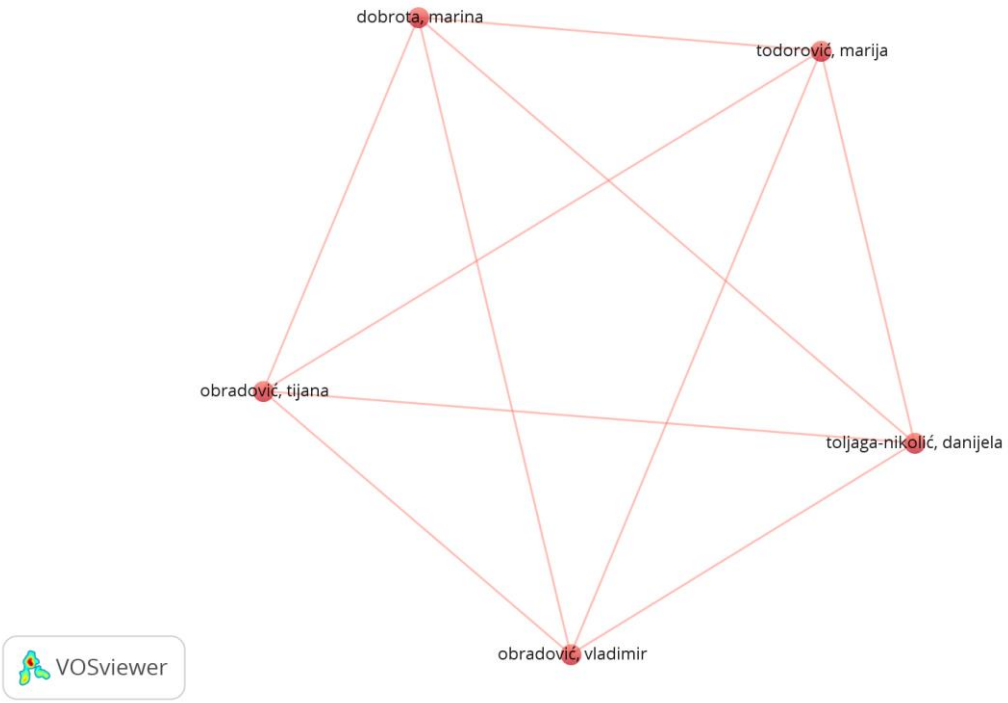

Figure 2: The link between authors and co-authors is shown here.

We can see the relationships between the writers and co-authors in Figure 2. We can see from the figure that all of the authors and co-authors are connected to one another. The conclusion is that this topic has been well discussed and that there has been an extensive amount of open conversation on project management.

Authors	Documents	Total Link Strength
Contexts, different	8	16
Control, project portfolio	8	16
Performance, portfolio management	8	16

Dobrota, marina	2	8
Obradovic, tijana	2	8
Obradovic, Vladimir	2	8
Todorovic, marija	2	8
Toljaga-nikolic, Danijela	2	8
Jugdev, kam	2	4
Morris, peter	2	4
Nedeski, snezana	2	4
Ribeiro-lopes, sofia	2	4
Schipper, ron	3	4
Silvius, gilbert	15	4
Smith, Charles	2	4
Sousa, Paulo	2	4
Tereso, anabela	3	4
Walker, derek	2	4
White, diana	2	4

Winter, mark	2	4

Table 1: Top Authors and Co – Authors

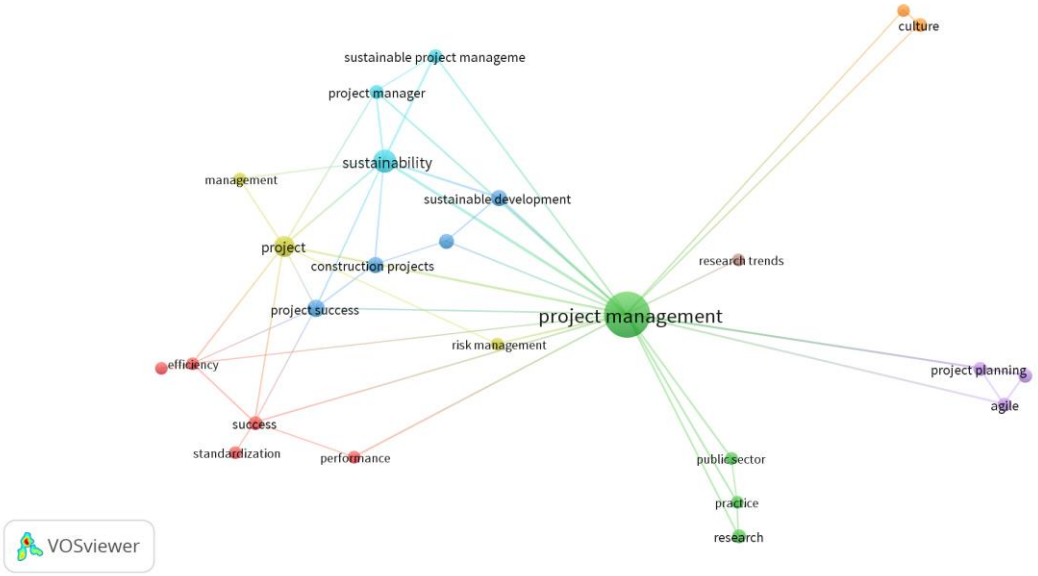

Figure 3: This figure shows the analysis of co-occurrence of keywords.

Keywords	**Occurrences**	**Total Link Strength**
Project Management	96	81
Sustainability	19	38
Project	14	21

Sustainable development	8	16
Agile	5	11
Project planning	5	11
Project Manager	5	10
Scrum	5	10
Project success	9	9
Success	5	9
Sustainable Project management	5	9
Efficiency	4	7
Practice	4	7
Culture	5	6
International	4	6
Construction Projects	7	5
Critical Success factors	6	5
Research	5	5
Risk Management	4	5

Performance	4	4
Public Sector	4	3
Management	4	3
Research Trends	4	2
Managing projects	4	1
Standardization	4	1

Table 2: Occurrences of Keywords

From table 2, we can see that some of the most frequently occurring keywords from the database of research papers created for this paper are project management, sustainability, project, sustainable development, project success, construction projects etc. Therefore, these keywords are the most relevant with respect to the research done for this review paper. For future if any research has to be done on this topic, then the keywords from this table which are occurring the most should be used for the purpose of research as it would enable the researcher to find more relevant data as compared to using keywords which don't occur often according to the table.

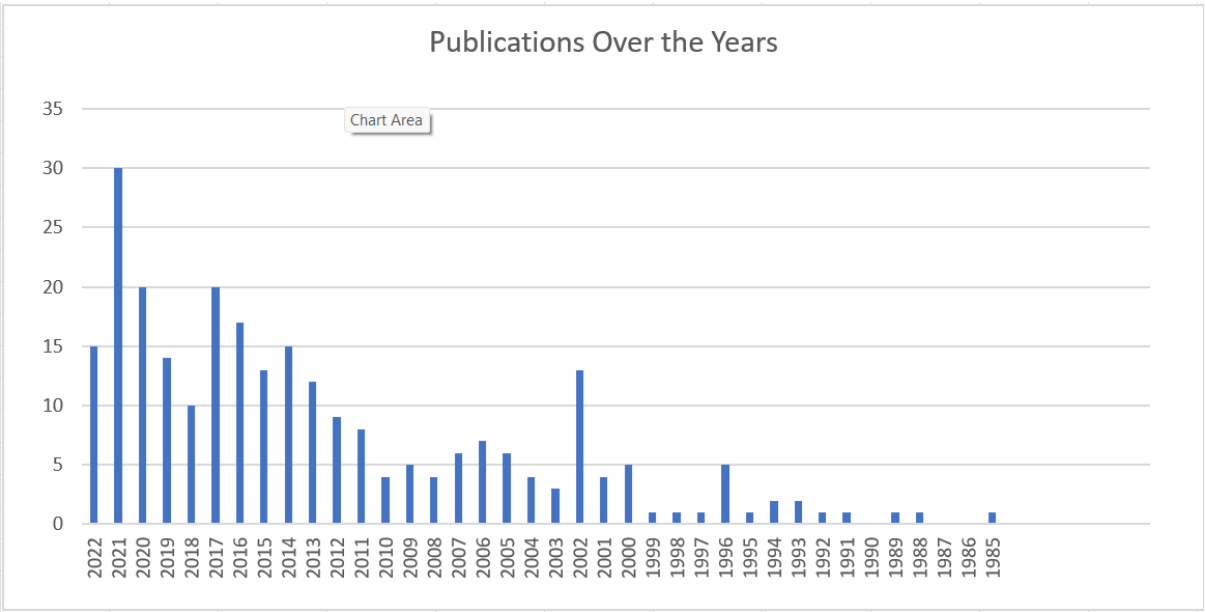

Figure 4: This figure shows the number of publications over the years

According to the trend observed in figure 4, a meagre 18 papers were found to be published talking about the optimization of project management, before the year 2000. This is because of a lack of awareness for the need of using quantitative techniques to optimize processes in projects. As people grew more and more aware of the quantitative approaches available, especially with digital methods being developed, the amount of research being published on the same increased proportionally. Another noticeable point in the trend is the pick-up in the publication of papers post-Covid-19, due to the sudden change in logistics required for projects.

Following are the results of the survey conducted for different countries:

Taiwan: A questionnaire survey was carried out to learn more about the application of management science and operational research in Taiwanese businesses. The goal was to assess the current state and potential developments for OR=MS in Taiwan. 1000 local manufacturing companies were chosen. Questions covered the utilisation of OR=MS methodologies, application areas, reasons, challenges, etc. According to the study, the proportion of businesses using OR=MS procedures rose from 62.7% in 1995 to 76.7% in 2001. Additionally, from 16.1% in 1995 to 11.1% in 2001, the proportion of businesses that had never heard of OR=MS declined. Due to the recent growth of educational and training programmes in OR=MS by the Taiwanese government, it was discovered that the value of OR=MS has been acknowledged by Taiwanese businesses as an effective management tool for economic development, and that OR=MS usage would continue to rise.(Chen & Wei, 2002)

China: Cross-cultural management skills should be developed by foreign project managers overseeing construction projects in China. With particular relevance to China, this article studies essential cross-cultural management principles as well as crucial building project management duties. It was shown how the integration of cross-cultural management and construction project management may affect a project's outcome using a real-world case study of the New Chinese Hotel project in China (PhenPheng, L. S., & Leong, C. H. Y. (2000). Cross-cultural project management for international construction in China. International Journal of Project Management, 18(5), 307–316. https://doi.org/10.1016/S0263-7863(99)00027-7g & Leong, 2000)

Australia: This landscape was found to have the following characteristics: highly diverse researcher backgrounds; project management researchers from a variety of academic fields; a swirl of research topics covering the entirety of the proposed RPM future research directions; researchers who have advanced far beyond traditional project management foundation and who mostly employ interpretivist research approaches in their studies; and prominence. These growth difficulties appear to offer substantial possibilities for professional organisations in the sector to not only support research in the subject more effectively but also act as the field's future development's trigger.(Owen et al., 2009)

Italy:

Since the late 1980s, when governments in Italy came under increasing pressure to abandon bureaucratic organisations in favour of linear structures, project management strategy in the public sector has been the focus of numerous academics. Italy is regarded as a late adopter in this movement, but is praised for its scope, rapidity, and consistency of reforms. Numerous initiatives have been made in this regard in an effort to put the principles of New Public Management (NPM) into practice.

The primary responsibilities of Treasury Departments are to support the government's economic and financial choices, manage public debt, allocate public funds, and deal with international economic, financial, and currency matters. The organisation had to put up a lot of work because choosing the right process to examine, securing and guaranteeing project leadership, and securing and concentrating human resource efforts were all difficult tasks. In the literature on project management, this component is acknowledged as being essential.(Arnaboldi et al., 2004)

Nepal:

The goal of project management is to deliver the project product on time, having the best level of quality, within the budget constraints, and in the safest manner possible which is feasible. Construction delays are a common occurrence worldwide, and Nepal's construction sector cannot be an exception. In Nepalese hydropower projects, this research identified the key project management success elements that aid the project participants in achieving their intended goals.

The top seven success criteria in this study were found to be absolutely essential success factors after they were ranked according to relative importance index (RII) and assembled from a variety of literatures and a pilot survey.

“Based on the 85 responses from project managers and experts working in hydropower projects in the first stage study, top seven success factors of project management were Effective communication between project team members, Job satisfaction of project team members, Timely decision by client, Competence of the project manager, Effective coordination between stakeholders, public institutions, Competence of the project team members, Proper and timely supervision.”(Shrestha, 2019)

The main goal of the majority of models and approaches developed to help with project planning and management has been project scheduling. Initially, the research of project scheduling was conducted without taking into account the resource needs, just taking into account the length and priority conditions. The well-known “Critical Path Method” and the mostly disregarded MP are two fundamental approaches given to schedule a project assuming predictable durations (Method of Potential). Both of these establish the critical route, which yields the project's minimum overall duration, T, as well as the slacks for every node and activity. (Tavares, 2002)

These methodologies set the minimum (or highest) starting and finishing durations for every activity, which is a very essential tool for the project leader in planning each task of the project, given a total project duration, T1, that must be adhered to (=, or <, the minimal total duration). If T = T', the administration has no choice about the scheduling of key activities, but if T' > T, it does. (Tavares, 2002)

In spite of the random nature of the majority of durations, the PERT approach was recommended for estimating the distribution of the total length, T. This strategy is predicated on the assumption that each activity has a fixed time proportional to its average, substituting the network with the CPAD critical route "critical path using average durations". These data are used as the mean and standard deviation of the network's total duration since the mean and standard deviation of the CPAD are calculated by adding the means and standard deviations of its activities. Unfortunately, the real mean, E(T), is more than or equal to this estimate, therefore this is an unduly optimistic supposition. (Tavares, 2002)

CONCLUSION

"India will require 70 lakh new project managers in next 10 years. India will emerge as the fastest growing country in the world for project management-oriented employment," according to “Project Management Institute's (PMI) report - Project Management Job Growth and Talent Gap 2017-2027”.

We can see the expanding scope of project management in the upcoming year, so we conducted a study focusing on efficiency in project management and the issues that need to be resolved for the same, shedding light on how public sector project management techniques are implemented and what they can learn from the private sector. This research used a bibliometric methodology to perform a critical analysis of current project management strategies and successful measures.

Implementing infrastructure projects in the public sector with private sector ideas could provide a framework for effective project monitoring, appraisal, and management of its triple restrictions (cost, time, and quality). The latter mentality is successful in modifying infrastructure project execution, reengineering procedures, updating regulations and administrative norms, and enhancing the efficiency of government and quasi-government projects. The methodical assessment of each phase and sub-phase of infrastructure projects focuses on empirical facts as opposed to conjectural knowledge, resulting in effective evaluation, monitoring, regulating, and future planning. Moreover, a lack of technically qualified personnel and local labour force inhibits the effectiveness of the project, highlighting the need for technical training.(George, 2019)

The assessment of sustainability of a project must be based on performance indicators, resources, and procedures (how it is measured and controlled). This is difficult to do because, among other things, project standards and methods do not involve the preparation of a Sustainability Management Plan as part of the Project Management Plan.(Garc et al., 2021)

While writing this paper we learned that in general, efficiency tools are not as efficient in developing countries relative to developed countries. The main problems with respect to it in developed countries are corruption, a recurrent shift in the accountable officials and political leaders, and a change in management's official decisions and initiatives. Also, in general for developing countries it has been observed that bureaucracy and frequent red tape has entrenched itself in all government business and hence it renders project management plans and efforts to be unproductive and inefficient. It is due to these reasons that projects undertaken by the governments in developing countries like India take several years to get completed even though ideally the project could have been completed in months.(Olawale I. et al., 2012)

To improve project management practises and effectiveness in India's public sector, authors may propose the following:

• Enhance the proficiency and level of professional skills of governmental project management personnel (training programs, supervision).

• Determine the best organisational structure for creating and carrying out projects (matrix or pure project organisation structures).

• Implementation of project management tools and practises should be gradual (should be as an obligatory requirement in big scale public sector projects).(Pūlmanis, 2021)

• It's important to introduce project management tools and procedures gradually, particularly in venerable government organisations where opposition to change is thought to be strong. Avoid drastic application to prevent disruptive changes like power battles, loss of job management etc.

• In developing countries like The United States of America and the United Kingdom PMBOK and Prince2 (Projects IN Controlled Environments 2) respectively are used as the standards for all projects whether they are undertaken by the private sector or the government. These standards are quite advanced as compared to the standards used in developing countries. So the governments of developing countries should also use project management standards that are along the lines of PMBOK and Prince2 so as to improve their project management efficiency.(Pūlmanis, 2021)

Government project administration is more complex than those of other sectors. Managing stakeholders is the most demanding component of managing public projects. Therefore, the public sector should develop methods and strategies unique to this sector for managing projects involving stakeholders. Public institution project managers, other project team members, and decision-makers accountable for the overall framework of project management should be educated differently from their private sector counterparts. To ensure the effective completion of public projects, it is essential to investigate alternatives to the typical client–contractor relationship.(Gasik, 2016)

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