IMPACT OF TECHNOLOGY IN PROJECT MANAGEMENT

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ABSTRACT

Business processes and execution strategies are impacted by technology; project management is no exception. In the context of project management, technology tools are utilized regularly for collaboration, communication, Scheduling, budget management risk and mitigation techniques. Technology is helping project managers in the smoother operations and increased productivity. This paper discusses the role of technology in project life cycle and performance. Research analyze the usage of technology and tools by project managers and project team in the organization. The findings exhibit that companies were underutilizing the technologies in the project execution and management. Critical tools and technologies for successful project execution are recommended. the significance of technology in improving project member decision-making is addressed.

Keywords: Information Technology, Team Communication, Project Management

INTRODUCTION

A project is a specific activity or process carried out to achieve a specific output which can be a service, specific product, or the desired result. Project Management is the methodology that details the process, tools and techniques and defines the tasks and activities required to meet the project's deliverables and stakeholder's requirement (PMBOK, 2017).

Project management tools, and techniques are applicable to all types of industries. However, the selection and implementation of the required tools and techniques are specific to the industries and depend on the project manager executing the project (PMBOK, 2017).

For any project, people, processes, and technology are vital success factors. The project manager must integrate these factors and use them efficiently (SPSF) (Dutoit et al., 2006). In the globalized economy, organizations use various methods like outsourcing, remote engineering, and remote testing to optimize cost. Project management is becoming more complex, and managers are compelled to use advanced information technology tools. In addition to information technology tools, previous project lessons learned, historical reports, Know-how are emerging as the key supportive assets for project management (Anantatmula & Kanungo, 2005).

Few major companies like Infosys, Wipro, L&T are widely using project management tools and templates. Organizations are investing heavily in IT infrastructure (Anantatmula & Kanungo, 2005). From a project management perspective, tools are used in advanced schedule computer software and budget monitoring to complex organizational process designs, remote engineering technologies. Even after investing millions of dollars in IT, companies find it challenging to leverage the project's success compared to the investment. The productivity paradox (also the Solow computer paradox) is observed in business process analysis; worker productivity may go down as more investment is made in information technology (Dreyfuss et al., 2021). A research study involving information technology (IT) and knowledge management (KM) in project performance revealed that technology's role is restricted to the assistance of complicated problems and processes in the project. These findings were further supported by Nidiffer and Dolan (2005), both argue that project management should focus on people and processes, not on tools and technology. However, empirical study on modern project management technology reveals that technology and tools are still needed to properly manage teams and projects (Ermakov et al., 2020). With the assistance of the Project Management Information System, 75% of the projects performed are successful in the IT sector (Raymond & Bergeron, 2008).

In the era of the internet and digitalization, manufacturing industries and projects are driven by the fourth industry or industrial revolution 4.0 (Piccarozzi et al., 2018). Changes include process automation by using robotic automation (RPA), digitization, artificial intelligence (AI), Cloud, business intelligence analysis, the internet of stuff, internet of things (IoT), augmented reality, 3D printing, blockchain, digital twins, so on. (Schaede, 2020; Brien, Resnick & Avery, 2018; Ramnarayan & Mehta, 2020). Society is evolving, and businesses are compelled to rethink their business models to adapt to a hyperconnected global economic environment with a commons collaborative economy.

LITERATURE REVIEW

The project management body of knowledge (PMI: project management institute) defines the Project Management (PM) as a temporary endeavor for the creation of a single or distinct product, service, or outcome (PMBOOK, 2017). PM was described by Tengan, C, Thwala. W. Clinton, A. (2021) as a complicated task, which is intended to satisfy the client's requirements. Regarding the definition of this research, PM is a short-term undertaking, restricted by time, money and resources, and scope for the creation of a unique product or service in line with customer needs. Due to these reasons, information technology project management (IT PM) can be defined as a short, time, budgetary, resource undertaken to develop tools for processing information in the organization based on customer expectations, including software, hardware, and communication.

Mcgrath and Kostalova (2020), in the publication: "Project Management Trends and new Challenges", explored the current project management approach and examined required adaptation to remain relevant in the dynamic project-based organization. Both collected data from the PMO show held in Dublin, Ireland, on 7th Nov 2019. They used a qualitative research approach. Data from the literature review was also collected. The results indicate that project managers will need a new skill set in the technology-driven world of the future. The creation and usage of Hybrid mythologies customized to individual project requirements showed the increased project performance results.

In the organization, multiple projects will be running in parallel. In such cases, organizations are constrained with competent resources, the phenomenon referred to as "Resource-Constrained Multi-Project Scheduling Problem (RCMPSP). The publication "Portfolio scheduling: an integrative approach of limited resources and project Prioritization" offers a method to overcome RCMPSP by finding a feasible schedule that guarantees the resources availability during the planned schedule (Felix et al., 2019). Felix and the team used a market-based mechanism and developed the algorithm to priorities the activities while preparing the schedule. This technique was helpful for PMOs, portfolio managers. Before starting the scheduling, processes the portfolio manager identifies which projects are critically urgent for the organization. This approach provides portfolio manager an opportunity to test the impact of priority changes of the organization.

Findings from Henrique (2018) indicated that project management and knowledge management connect to the abilities of the project managers and the organization, the management of knowledge between the projects via the project office, and elements relating to project success. Trends show the significance of knowledge for projects addressing sustainability problems since there is little study on that topic and the creation of virtual teams of dispersed companies. These structures were critical to organizational success and to have a synergy that may help businesses distinguish themselves and get competitive benefits.

Rahmam (2018) and their team empirically studied the project management information system (PMIS) and its impact on the project's success. PMIS is used to plan, monitor, control, and forecast project management activities. Haji and the team used the survey method to collect the data from 179 participants across the Pakistani universities. The results of this research indicate that the quality of the information system for project

management will enhance project success. The utilization of information systems for project management serves to improve the quality of the project management and the project's success. 75% of IT projects that utilize PMIS was successful. It does not mean that using PIMS will also bring success to the project; however, it has a significant contribution to the project success. However, quality PIMS is required to support project managers in decision makings. In conclusion, the company should evaluate the quality and usage of the information system for project management to improve its project success.

Sánchez et al., (2016), did a holistic study of the project management and the role of information technology in project management. Companies undertake various projects to achieve important operating objectives and goals. In today's global world, information technology plays a key role. To deliver IT projects successfully, project managers must be skilled and competent. This paper provides a qualitative investigation on the management of information technology projects published between 2014-2016 in peer review journals. As defined by the Project Management Institute, knowledge domains and critical success criteria are recognized and qualified. The findings offer useful insight into critical areas that IT project managers need to concentrate on to deliver projects effectively, along with suggestions for further study.

Business Dictionary 2016 defines Information Technology as the collection of tools, procedures and processes, and associated devices used for collection, processing, and presentation of information (for example, coding, programming, communication of data, data conversion, storage and retrieval, system analysis and design, and control systems). It covers automation, multimedia, and telecoms. In brief, software, hardware, and communication are used in the business to process data.

Many technologies and tools are available to enable project managers and teams to significantly improve the project process. Trello and Clarizen are the project management platforms that will help the team, project manager, and client communicate instantly. Microsoft team skype and increasingly used for meetings and communication. Storing the data in the cloud or hard disk made it possible to secure backup and storage. PrimaveraRA and InventX Microsoft project portfolio server are useful software for Project Risk management.

BENEFITS OF TECHNOLOGY FOR PROJECT MANAGEMENT

The objective of the project is to complete the project within budget, schedule, with acceptable quality and with customer satisfaction. A software application may make the decision-making process easier and quicker. One argument is that it allows quick access to information about management (stock, sales, available financial resources, etc.). Usage of robotic process automation (RPA) will reduce the significant amount of time employees spend on repeated tasks, and instead team can concentrate on more critical tasks. Software applications enable the continued status of projects to be verified. Software tools are essential if any errors are to be identified and steps taken to rectify them. This measure promotes increased dynamism and provides an atmosphere conducive to innovation. Since the leader doesn't have to worry so much about regular or repeated tasks, they remain more open to seeing different possibilities, aiming to improve the team's performance. Usage of tools prevents time loss and increases production. If managers rely on business

information in an organized and rapid manner, they can better to check what is ideal to achieve more expressiveness (Ahern and & Byrne, 2014).

Many new age technology and tools are available for project managers which can be used in the project management lifecycle. Gantt project is freeware and can be used in project scheduling and resource management. Microsoft project is used for scheduling budgeting, and resource management. Primavera is a powerful tool used in almost all phases of the project, including planning, implementation, monitor, control, and risk management.

Microsoft outlook 365 is used to communicate with clients and other stakeholders. Microsoft team and Skype are used by project team for internal and external communication. Team meetings, videoconference, and teleconference are used to conduct the meetings with project teams and clients. Cloud and shared devices are used for information storage and sharing with team. Workshops and factory acceptance tests conducted using remote headphones (e.g Realwaer headgear) and TeamViewer and Team.

Information sharing creates more excellent knowledge and a better conversation between the teams. This effort also helps to reinforce activities aimed at surprising and devoted customers. Tracking technology developments must be part of the routine of firms who want to be known for their service quality.

RESEARCH METHODOLOGY

The research used survey, interview, and other data collection sources. Academic journals, conference papers, and technical blogs are utilized to collect information, which forms a secondary data source. Data from these sources have been considered trustworthy since they are written by academic scholars and industry experts. The survey served as a primary source of data.

Interviews and questionnaires were used for survey. Data was collected from the 100 employees working in two different firms of IT and non-IT. Participants were junior to senior level employees working as Project managers, Project directors, lead engineers, senior engineers, and other team members. All responses are taken as a separate source of individual data. Data from both IT and Non-IT employees is combined for analysis. The survey is done only for the questionnaires, and beyond that Researcher has not disturbed any employees participated in the survey. The first set of questionaries include basic information of the participants like employee name, age, organization name and years of experience and current position. The second set includes questionaries related to the usage of tools and technology in the project.

DATA ANALYSIS

A. Descriptive Analysis

The research participants were of different age groups and experiences. 50% of the participants were of the age group of 30-39 and had experienced between 8-16 Years, which form the middle -level management of the organization. 25% were of the age group 22 to 30 years with experience of 1-8 Years, who are junior or team members of the organization and project. The remaining 25% were of the age group 40 to 58 years with experience of 15-35 Years. All respondents had a minimum degree in engineering or management, 10%

had a master's degree, and 15% had a professional management certificate like PMP or Prince. More than 60% of the participants had worked on minimum five projects. These participants were project managers, project sponsors, team leads, team members and end-users. Most participants believe that technology is essential for communication, scheduling, monitoring and storage, and sharing of the data.

The findings demonstrate that companies were underutilizing the technologies in the project execution and management. Microsoft outlook was the most widely used tool by the project manager and team for communication. Next to outlook MS Project was the second most used tool and very few used Primavera. Microsoft team, skype, and video conference are gradually picking up but project team still prefers face-to-face meetings. In few cases, Remote testing using Teamviewer and remote headgear was used. Shockingly, even in IT, very few use the Primavera RA, Attask, Yanner, Clarizen or Omnifocus. In the researcher opinion top-down push from the highest management is required to efficiently utilize newly available technology and tools.

B. Statistical Analysis

The data are analyzed as statistical in this part. Statistics is essentially a discipline in which vast data are collected, explored, and displayed to detect underlying trends and patterns.

The numerical and categorical/contextual data are of two different kinds. Numerical data are quantifiable data that are countable, such as time, height, weight, quantity, etc. Numerical data is divided into two categories; the words "yes/no" and "count" were discrete or attributed data, too. The word "measurement" has been used for continuous or variable data. Categorical data gives the context from which a specific data item has been collected. Categorical variable values such as ball color, race, sex, age, and educational standing are defined as names and labels. The research data are mostly categorical.

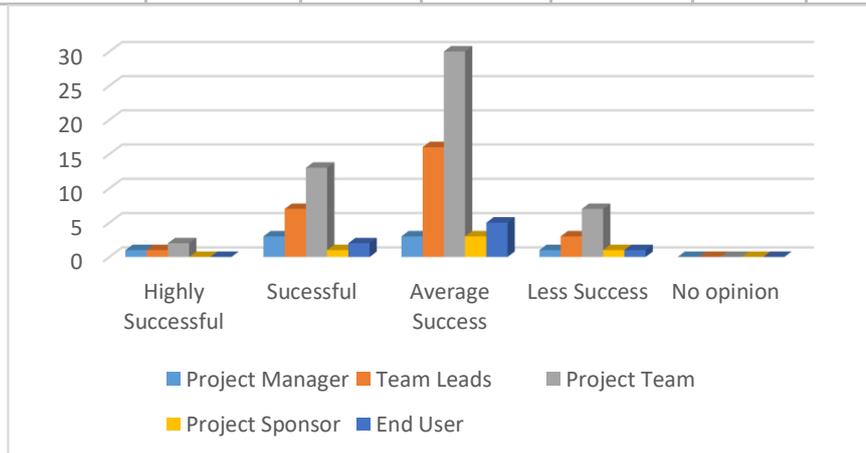The relationship between the data is explored using clustered column chart.

Project Success rate:

From the below table and chart, it is found that project professionals felt that 70% of their projects were either average success or less successful.

Table 1: Project success rate

	Project Manager	Team Leads	Project Team	Project Sponsor	End User	All
Highly Successful	1	1	2	0	0	4
Successful	3	7	13	1	2	26
Average Success	3	16	30	3	5	57
Less Success	1	3	7	1	1	13
No opinion	0	0	0	0	0	0
Total	8	27	52	5	8	100

Figure 1: Project Success rate in Bar Chart

From the above table and chart, it is found that project professional felt that 70% of their projects were either average success or less success. There are fewer team members, and project engineers who believe that the projects were highly successful (Cicmil et al., 2006).

Communication Tool Used by Project Team:

Participants agree that using the communication tool will help internal and external effective and timely communication.

Table 2: Communication tools usage by Project Team

	Project Manager	Team Leads	Project Team	Project Sponsor	End User	All
Strongly Agree	6	20	34	4	6	70
Agree	2	7	14	1	2	26
Disagree	0	0	2	0	0	2
Strongly Disagree	0	0	2	0	0	2
No opinion	0	0	0	0	0	0
Total	8	27	52	5	8	100

Figure 2: Communication Tool usage by Project Team

The E-mail was the most preferred way of communication, and project teams were using outlook. In addition, cloud-based information sharing is slowly picking up. Project teams are using One drive, team, video conference FTP etc.. all were confident and familiar with the usage of E-mail, and outlook and teleconference. Many had limited or no knowledge on advance tools like one drive, FTP and MS-Team.
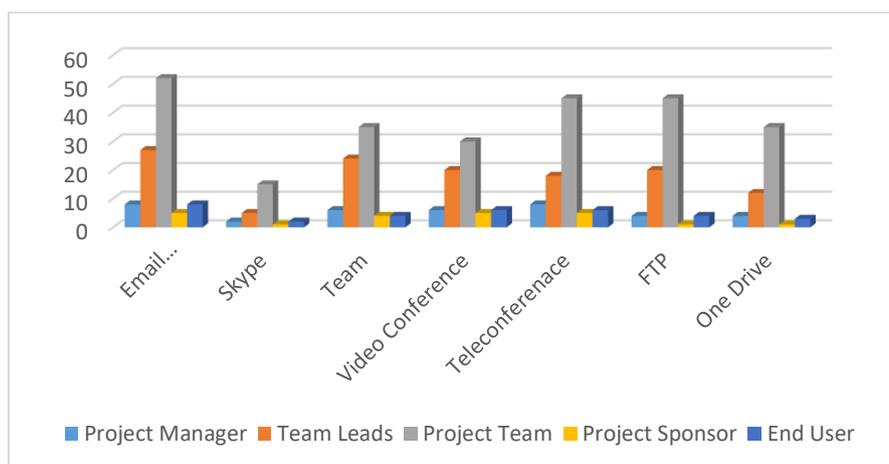

Figure 3: Various Communication Tool usage by Project Team

Participants agree that using the communication tool will help internal and external effective and timely communication.

Tools supports project manager and team for effective execution plan, monitor and control of the project.

Table 3: Project Team usage of the tool for Planning, Monitor, and Control

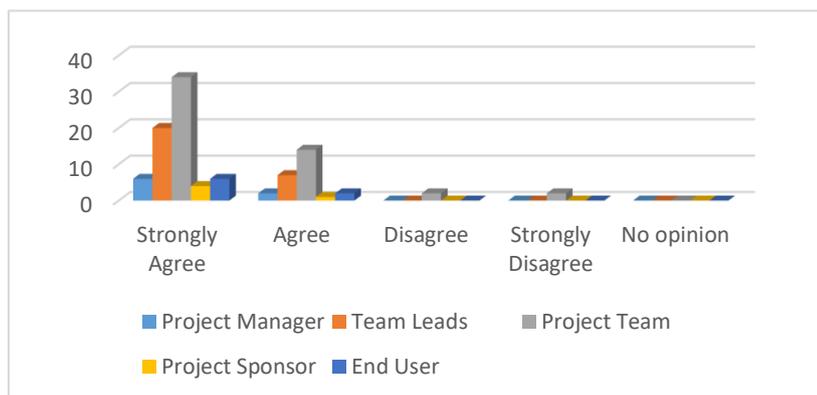|	Project Manager	Team Leads	Project Team	Project Sponsor	End User	All
Strongly Agree	6	16	30	3	5	60
Agree	1	6	15	2	2	26
Disagree	1	4	4	0	1	10
Strongly Disagree	0	1	1	0	0	2
No opinion	0	0	2	0	0	2
Total	8	27	52	5	8	100

Figure 4: Project Team usage of the tool for Planning, Monitor, and Control

The most used tool was the MS project and followed by the Gantt Chart and Primavera. Very few used omni plan or open workbench. Most of the Team members did not provide their opinion as these tools are used mainly by PM and Team leads.
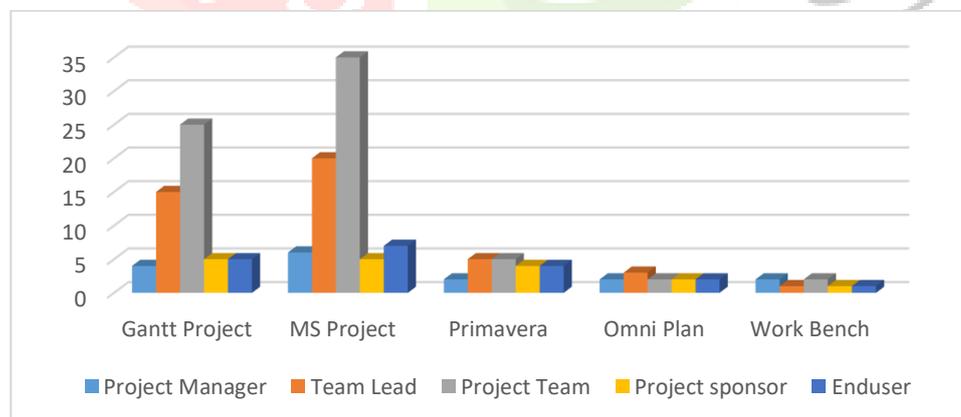

Figure 5: Project Execution tool used by Project Team

Some of the Team members due, to cybersecurity and other concern, disagree with the usage of cloud and other data storage technology. However, most of them agree that they are using cloud-based technology.

Table 4: Project Team usage of Data storage tools

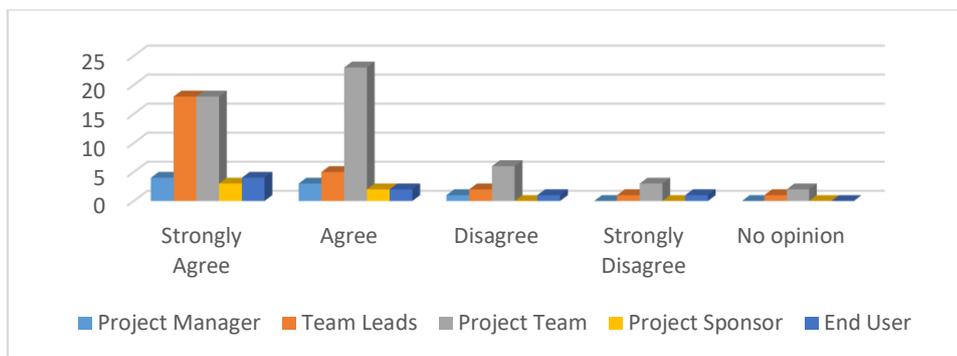|	Project Manager	Team Leads	Project Team	Project Sponsor	End User	All
Strongly Agree	4	18	18	3	4	47
Agree	3	5	23	2	2	35
Disagree	1	2	6	0	1	10
Strongly Disagree	0	1	3	0	1	5
No opinion	0	1	2	0	0	3
Total	8	27	52	5	8	100

Figure 6: Project Team usage of Data storage tools

Fewer project managers and team members feel that the project is not as effective as feasible, while some project members believe it is carried out as efficiently as possible occasionally or consistently.

Table 5: Project team on improvement of execution efficiency after using tools and Technology.

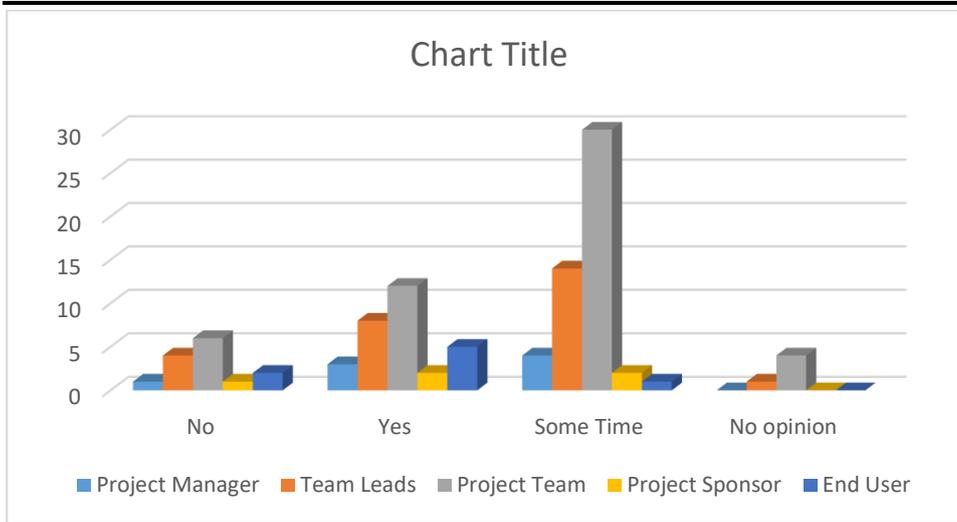|	Project Manager	Team Leads	Project Team	Project Sponsor	End User	All
No	1	4	6	1	2	14
Yes	3	8	12	2	5	30
Some Time	4	14	30	2	1	51
No opinion	0	1	4	0	0	5
Total	8	27	52	5	8	100

Figure 7: Project team on improvement of execution efficiency after using tools and Technology.

CONCLUSION

Projects can be managed efficiently and effectively by using the Project management tools and new-age technology. Although many businesses are solely focused on IT projects, IT is unusual in that most, if not all, and advance project management tools are not used effectively. Cloud technology has become comparatively cheap with innovations in science and advancement in cybersecurity protection. As a result, it is now feasible to change project schedules in real time. Many companies are still under-utilizing available tools and technology while executing the projects. Companies that do not use technology are less likely to be successful. MS-Project, primavera, Gantt chart, RPA, risk analysis are recommended tools that increase project visibility and success rate. Project management and Leadership should have a top-down approach to push team members for efficient and appropriate usage of technology to achieve corporate goals and objectives.

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