

Assessing the use of Project Management Information Systems and Its Impact on Project Outcome

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Abstract

A Project Management Information System is generally a single or a collection of computerized software applications that provide easier, efficient, and integrated methods for managing project information from their inception through to their completion. Many free project management information systems tools are available for use by project management professionals; however, they do not provide enough support methods to project management. Most of these tools can be useful in managing small projects, with short duration, low budget and simple implementation processes. When the project is broad and diverse, sophisticated tool(s) such as MS Project or Primavera are required. These tools are more expensive; they require skilled project team members and support a single project methodology.

In this paper, we assess the use of project management information systems in projects and its impact on the project outcome. Project management information systems vendors may use this as a guideline to indicate the key things that organization expects from the tool and to address the shortcomings that exist in their tool. Organizations may use the results as guideline in selecting the best set of project management information system tools that would enable success.

Keywords: PMIS; project management methodology; project outcome; PMIS tools

1. Introduction

Since the beginning of the 21st century, global and local markets have rapidly grown while becoming more competitive, leaving corporations with little or no alternatives but to learn to adapt to remain relevant in their respective markets. Advancements in technology and the world becoming more integrated and interconnected has put pressure on companies either to consider and utilize at least some form of information systems or face damaging declines in productivity. Information systems such as Project Management Information Systems (PMISs) are one of the major support providers in the modern business world, helping companies remain relevant and keep-up with the forever-changing market demands.

A Project Management Information System (PMIS) is generally a single or a collection of computerized software applications, which provide easier, efficient, and integrated methods for managing project from their inception through to their completion (Riņģis and Bērziša, 2016). PMIS has become a mandatory tool and a characteristic for successful companies (Raymond and Bergeron, 2008). Light et al. (2005) found that companies that use PMISs have an estimated success rate of 75%.

However, the effectiveness of a PMIS within an organization depends on several aspects. Firstly, it requires thorough training and understanding of its usage. Secondly, and maybe most significantly, the level of experience of the project manager. Nelson (2016), records that only 4% of project failures are due to technological mistakes rather than a 45% failure caused by the lack of PMIS technical expertise as well as low experience in project management. This suggests that the use of PMIS within organizations has a greater impact on its success.

1.1. Research problem

There are free available PMIS, however they do not offer enough support to project management. They can be used to manage small projects with shorter duration, lower budget and simple implementation processes. When it comes to managing diverse and broad projects, it is required that a more sophisticated tool be used such as MS Project or Primavera to name few, even though they are more expensive, requiring skilled project team, and often based on a single project management methodology.

This research seek to uncover the extent to which project management professionals use project management information systems tools, by addressing the following sub questions:

- What PMIS tools are used in organizations?
- What are the most important functions of PMIS from the point of view of project managers?
- Does the information provided by PMIS enable the project team to perform their task efficiently and effectively?
- To what extent does PMIS contribute to the performance of project management methods?

2. Literature Review

The introduction of Information Systems (IS) in Project Management has allowed organisation and individual to manage projects effectively from planning, execution, to the review (Fernandes, 2016). The main aim of PMISs is to provide project managers with integrated tools that allows them to communicate directly and remotely with all stakeholders, while recording project information. PMIS major advantage is their ability to share information, track assignments and keep the team involved and informed of the overall status of the project (Ahleman, 2009).

Furthermore, large and complex projects are often difficult to manage. The utilization of PMIS tools such as computerized software provides an opportunity to frequently identify problems prior them occurring (Caniëls and Bakens, 2012). Even so, there are still companies that use paper-based tools and spreadsheets for project management purposes. This is sometimes due to the high costs of acquiring a suitable PMIS software or the amount of time and costs required for user training. Fernandes (2016), states that other firms are still ignorant of the vast advantages that PMIS tools could bring. He further elaborates that the inconsistency associated with the traditional project management methods, which eventually leads to additional expenses and frequent rework, will eventually lead to the realization of the need to use PMIS.

While PMIS have been highly praised for their effectiveness, some projects still fail to reach their projected success figures. Nelson (2006) records several internationally recognized projects worth over \$100 billion in losses. Tobias (2015) cite a project which was initially allocated a budget of approximately R3.4 billion ended up totalling nearly R3.9 billion. This staggering over spending was blamed on extra features that were mistakenly added onto the initial design specifications by lack of PMIS to manage the scope. Considering the latter reason, this represents a classic example of common mistakes and errors in the utilization of PMIS, which may result into very costly outcomes.

South Africa has also had its stake of project failures. Slabbert (2018) discuss the termination of a contract with PEU Capital by the city of Tshwane after having spent R830 million over a period of just over two years. The lack of proper effective management and utilization of PMIS resulted in inevitable failure. The failure of the abortive social media platforms launched by MTN and Vodacom to provide alternative social services to Mxit (Muller, 2018) resulted in Vodacom discontinuing Meep while surprisingly; MTN still keeps NokNok available for download.

Projects are dissimilar and require different approaches. Therefore, there is no PMIS tool that can be explicitly considered as best suitable for all types of projects (Kahura, 2013). This brings into question the level of project managers' confidence and willingness in spending large amounts of money and time on PMIS software's (Acharya & Velichety, 2011). However, every software ultimately requires time, training as well monetary investment to at least reach acceptable and progressive levels of success through its utilization in attempts to become more efficient and competitive in the market.

2.1. The Features of a Project Management Information System Tool and Its Usage

The monitoring and controlling of a project require the support of an adequate project management information systems (PMIS) tool. Often, using a project management information system to store and update all project

information regularly can assist to achieve successful project monitoring and control across the whole life cycle of a project. Furthermore, it provides adequate support to stakeholders for decision-making. To enable this capability, the project management information system tool should be able to ingest project information at specific intervals, then process it to assess the impact on the delivery of the project on scope, cost and time. The outcome of this result is made available to the project team who will then make decisions about taking the necessary corrective action and their execution thereof.

Most project management information systems have functionality that helps project managers to do planning, resources allocation and budgeting, furthermore most of the PMIS tools can perform analyses functions like performance, variance and forecasting for the project. When using an effective PMIS tool, project managers can proactively identify and manage stakeholder's expectation where they foresee issues within the project long before they happen. The following is a list of some of the kinds of analytical capabilities, outputs, and other features offered by various PMIS tools (Nicholas and Steyn, 2012).

Table 1: PMIS key features

#	Features	Description
1	Budgeting and Cost controlling	Used to link the costing information with an activity and a resource in the project;
2	Calendars	Highlight days and hours worked by single or group of resources on the project
3	Internet Capabilities	Ability of sharing project information online with project stakeholders;
4	Graphics	Involves generation of Gantt charts and network diagrams with critical paths quickly and easier using the available project information;
5	Data Import and Export	Uploading and downloading project information from one application to other applications like excel, word, databases etc.;
6	Generating Reports	Ability to generate reports quickly and easily for efficient reporting;
7	Management of Resources	Ability to have a view of all resources usage, availability or lack of to enable resource optimization;
8	Planning	Ability to pre-define all activities that must be performed in a project;
9	Project Monitoring Tracking	Ability to view project progress in real time.
10	Scheduling	Ability to plan and activate the correct task at a right time.
11	Other systems integration	Ability of the tool to talk with other applications that are used on the organization;
12	Mobility	Ability to access the project information from portable devices for as long as one is connected to the internet.

2.2. The Quality of Software Output

According to Goldsmith (2015), software developers often refer to software quality to mean the software fits system specs, runs efficiently, does not blow up, follows standards, uses current technology and techniques, and can be modified easily. Software developers often feel users and managers do not concentrate on these things and therefore do not care about quality. Users and managers often refer to software quality to mean the software does what needs to be done properly, performs satisfactorily, runs consistently and reliably, it is easy to use, is maintained quickly and correctly, and is delivered on-time and within budget (Rose & Indelicato, 2009) . They feel software developers are not attentive to these things and thus do not care about quality.

However, the user and manager view are more important, because if that view is not satisfied, the software developer view is irrelevant. According to Goldsmith (2015), the product must comply with the criteria of availability, comprehensive, relevance, precision, and reliability. These criteria are described in table 2.

Table 2: Quality criteria

#	Quality	Description
1	Availability	Refers to the PMIS tool being always operational when the user needs it
2	Comprehensive	Refers to the output information from the tool whether users are able to understand it;
3	Relevance	Refer to the information coming out from the tool being appropriate to the situation at hand;
4	Precision	Refers to the correctness and accuracy of the information produced by the tool;
5	Reliability	Refers to whether the project team can rely on the tool to provide the right information always

2.3. The usage of PMIS tools by Project Team

Rozenes (2011) state that there are five main areas of project management that when managed correctly may lead to successful project delivery. Project managers must be able to plan and schedule activities ensuring that the correct activity happen at a right time. The effective monitoring of projects may be able to highlight problematic areas early and allow project team to respond accordingly. The effective use of project resources should be constantly monitored to ensure project does not go out of budget. The correct information must be communicated to the right stakeholder at a right time.

Table 3: PMIS tools usage

#	Function	Description
1	Planning and Scheduling	Involves preparing an overall plan to execute the project
2	Monitoring	Ability to constantly measure the progress of the project
3	Resource Management	Ability to provide assistance to the project manager to effectively and efficiently use project resources
4	Communication	Ability to provide assistance to pass information to the various project stakeholders
5	Reporting	Generating reports that are key to making project decisions
6	Evaluation	Ability to provide historical project information and project audit.

2.4. The conceptual framework between independent variables and dependent variables

Riņģis and Bērziša (2016), defines a hypothesized model as framework that identifies the concepts of study of relationships that exist between variables. It consists of various ideas that are put together to explain the relationship between the independent variables and the dependent variables (Rozenes, 2011). The framework followed by this study is based on three variables namely; The features of Project Management Information System; quality of the information output produced by the PMIS tool; the usage of the project management information systems tool.

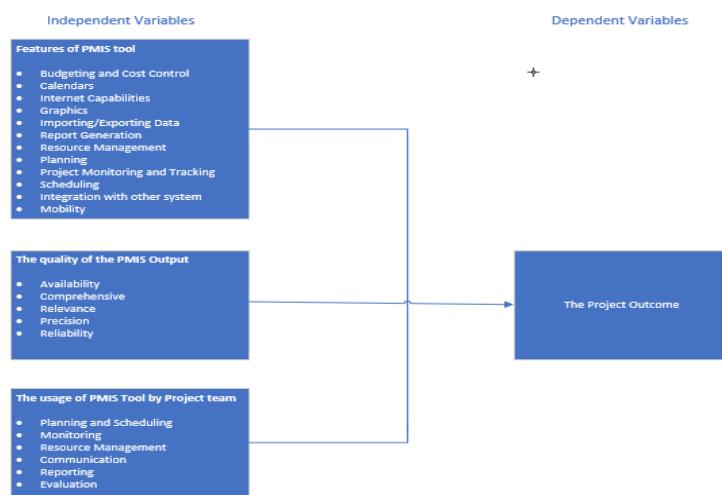


Figure 1: The framework indicating factors that influence project outcome

3. METHODOLOGY

The research followed a quantitative approach, using a survey research design. The self-administered questionnaire hosted on survey monkey was used to collect data from sample respondents using the snowball sampling strategy. It contained both open ended and closed-ended questions. A like rt scale type questions were used where necessary. The targeted respondents were people who work on projects including both project managers and project team members. To assess the use of PMIS on projects and its impact on project outcome three key factors were assessed. These factors are firstly, the features of project management information systems (PMIS); secondly, the quality of the information output produced by the PMIS tool and thirdly, the usage of the project management information system tool by project managers and project team members to perform their tasks.

In order to assess the features of project management information system (PMIS) tool, the research looks at the fifteen most commonly used features provided in the framework. To assess the quality of the output information from a project management information system (PMIS) tool, the four key characteristics of a quality solution were evaluated. In order to assess the usage of a project management information system (PMIS) tool, questions were structured to measure how good does the tool performs its commonly used tasks.

4. RESULTS DISCUSSION

4.1. The respondents profile

Most of the respondents to the survey questionnaire were 70.37% male professionals aged between 20 and 50 years, they hold a graduate or bachelor's degree and comfortable using technology. They work in the IT industry. This is illustrated in Table 4: The gender of respondents, Table 5: The technology competence of respondents, Table 6: The assessed projects, Table 7: The respondents age and level of education and Table 5: The respondents job role/ tittles.

Table 4: The gender of respondents

Gender of Respondents	
Answer Choices	Responses
Female	29.63%
Male	70.37%
Prefer not to say	0.00%

Table 5: The technology competence of respondents

Respondents Technology Competence Level					
	Very Poor	Poor	OK	Good	Weighted Average
Technology	0.00%	0.00%	11.11%	40.74%	48.15%

Table 6: The assessed projects

Respondents Project Types	
Answer Choices	Responses
Building and Construction Development	3.70%
Organisational Change	14.81%
Information Technology	59.26%
Research Development	11.11%
Other (please specify)	18.52%

Table 7: The respondents age and level of education

Respondents Age splits	
Answer Choices	Responses
Younger than 20	0.00%
20 – 29	37.04%
30 – 39	51.85%
40 – 49	7.41%
50 – 59	0.00%
60 or older	0.00%
Prefer not to say	3.70%

Respondents level of education

Answer Choices	Responses
Less than high school degree	0.00%
High school degree or equivalent (e.g., GED)	19.23%
Some college but no degree	15.38%
Associate degree	0.00%
Bachelor's degree	42.31%
Graduate degree	23.08%

Table 8: The respondents job role/ tittles

Job Role/Title?

Answer Choices	Responses
Assistant Project Manager	0.00%
Project Coordinator	7.41%
Project Manager	14.81%
Senior Project manager	3.70%
Project Leader / Project Team Leader	7.41%
Program Manager	0.00%
Portfolio Manager	0.00%
Project Implementation Manager	0.00%
IT manager	3.70%
Business Analyst	18.52%
Project management consultant	11.11%
Other (please specify)	33.33%

4.2. The features of project management information systems tool

When assessing the features of a project management information system (PMIS), the results shows that most project management professionals think that Project Monitoring and Control, Planning, Report Generation and Scheduling are the most important features of a project management information system, as indicate in figure 2.

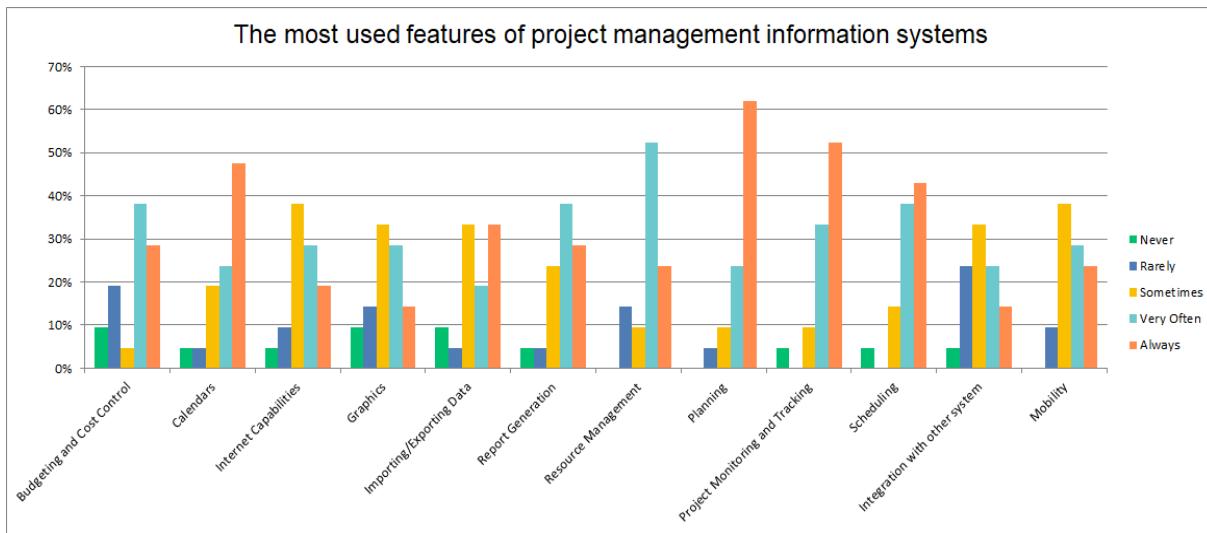


Figure 2: The important features of a PMIS tool

4.3. The quality of the information output of project management information system

When assessing the key quality features of a PMIS tool, the result indicate that most respondents consider the relevance of PMIS tool as an important quality feature. This is because there are many instances where organizations uses PMIS tool that gets imposed on the project team, thus they end up using their own tools or not using a tool at all because the tool does not provide relevant information that is required by the project team. The results also show that the Reliability, Availability and the Comprehensiveness of the tool are Very Important too. This is because it is crucial that the information that is provided by the PMIS tool is always correct as it has the potential to enable project resources to make decisions about the project.

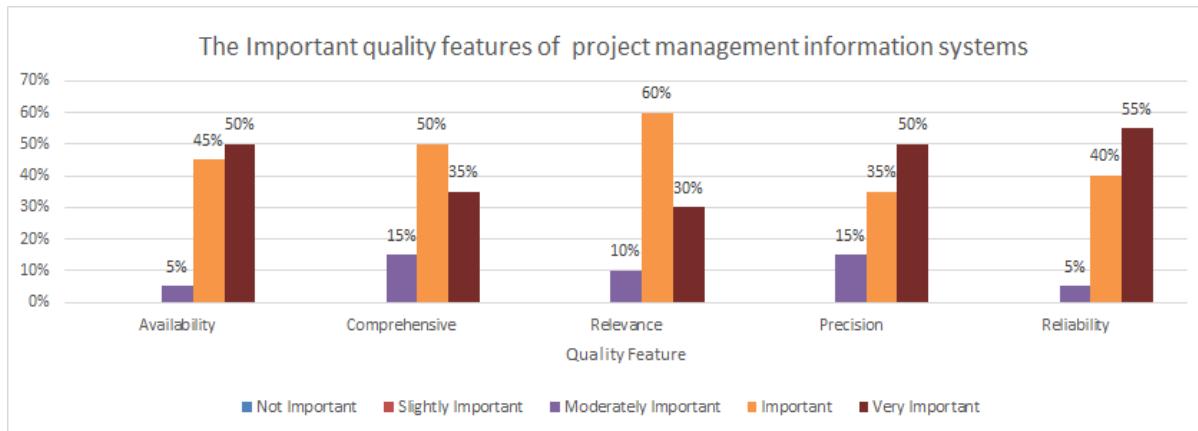


Figure 3: The important quality features of a PMIS tool

BASIC STATISTICS						
	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION	?
Availability	3.00	5.00	4.00	4.00	0.71	
Comprehensive	2.00	5.00	4.00	3.70	0.78	
Relevance	2.00	5.00	4.00	3.80	0.75	
Precision	2.00	5.00	4.00	3.85	0.85	
Reliability	3.00	5.00	4.00	4.00	0.63	

Figure 4: The statics on quality features of a PMIS tool

4.4. The quality of the information output of project management information system

When evaluating the importance of project management information system (PMIS) tool in performing the key project management tasks, the results indicate that Evaluation and Resource Management are rated low as depicted in Figure 5. The respondents have a view that Evaluation is not a crucial project management task. This is because: (1) the evaluation of project management activities is often scheduled to take place at the end of the project. At this point, everyone is on the rush to start another project. (2) At a personal level resources are mostly overworked making them too busy to an extent that they do not get the time to evaluate themselves and see where they can improve. Resource Management is also rated low, this is because people perceived it as policing. Skilled professional project resources prefer to self-manage and deliver on the project on the agreed timelines. Constant request for an update seems to put them off and may be interpreted as time wasting.

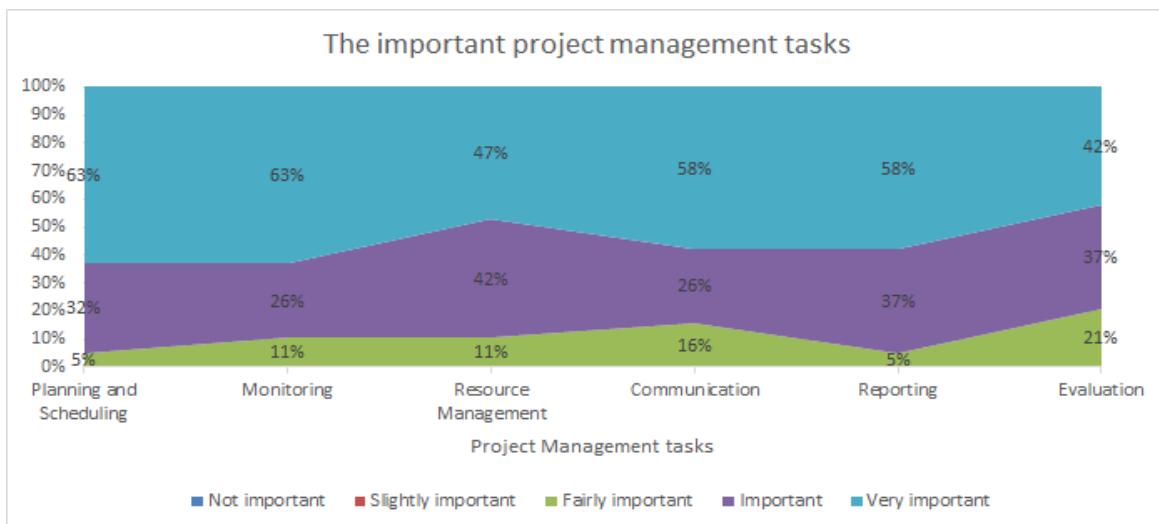


Figure 5: The importance of PMIS tool in performing project tasks

When looking at the basic statistics, it is clear that all project management tasks are important. The median of all the tasks are very close to the maximum value calculated for each task. The mean value of these tasks shows that they are the heartbeat of project management and must be performed efficiently to achieve project success. The standard deviation on these activities is almost a zero making it a non-factor. This is indicated in Figure 6.

BASIC STATISTICS						
	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION	?
Planning and Scheduling	3.00	5.00	5.00	4.58	0.59	
Monitoring	3.00	5.00	5.00	4.53	0.68	
Resource Management	3.00	5.00	4.00	4.37	0.67	
Communication	3.00	5.00	5.00	4.42	0.75	
Reporting	3.00	5.00	5.00	4.53	0.60	
Evaluation	3.00	5.00	4.00	4.21	0.77	

Figure 6: The basic statistics of PMIS tool in performing project tasks

4.5. The other findings

The results indicate that most project management information system (PMIS) tools support the PMI/PMBOK, followed by Agile, Waterfall and Scrum as depicted in Figure 7. This result is in line with the observation that most PMIS tools vendor work very closely with organizations to enable them to provide the features that will benefit these organizations.

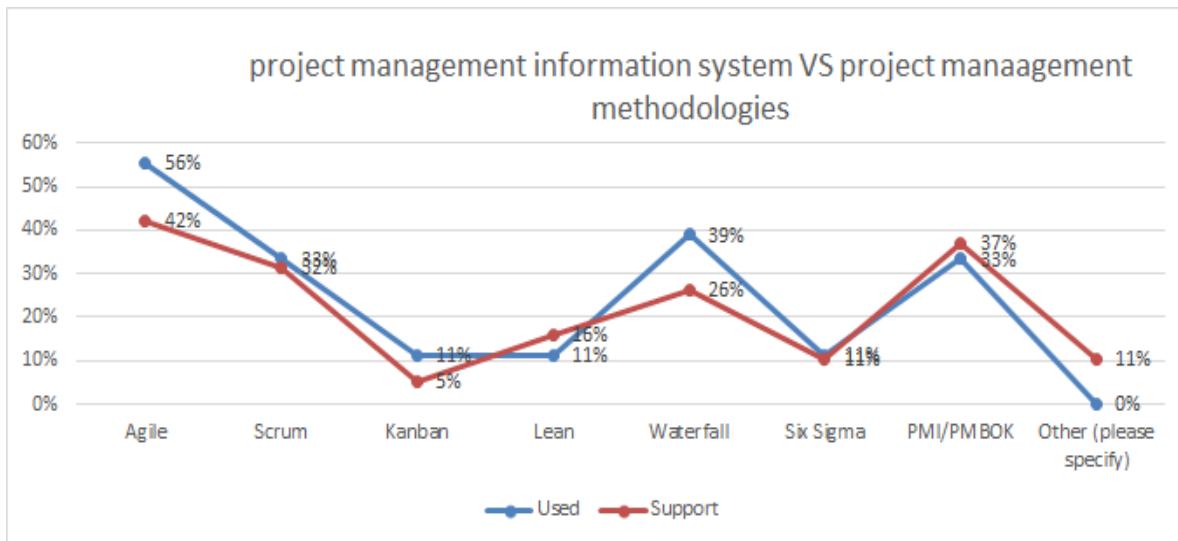


Figure 7: The PMIS tool VS Project Methodology

In Table 7: The Most commonly used PMIS tool, the result indicate that MS Project Standard is the most popular tool. From this we deduce that MS Project Standard supports multiple methodologies which are PMI/PMBOK, Waterfall, Agile and Scrum.

Table 7: The important features of project management information system tool

The usage of project management information systems (PMIS) tools in organizations	
Answer Choices	Responses
MS project Standard	66.67%

Easy Project	5.56%
Monday.com	5.56%
JIRA	11.11%
Clarizen	5.56%
Trello	11.11%
Builder trend	5.56%
Other (please specify)	16.67%

When testing whether the project management information system (PMIS) has an impact on project outcome, over 89% of respondents agree as depicted in Figure 8. Various reason were mentioned. The respondents indicated that project tracking is the main benefit of using PMIS tool, and it is important for the optimal management of the project. However, what stood out was just like a dashboard in the car, the value that the PMIS tool add to the project is the ability to measure, monitor, indicate and alarm project status, without the dashboard it becomes difficult for a driver to effectively and efficiently drive the vehicle.

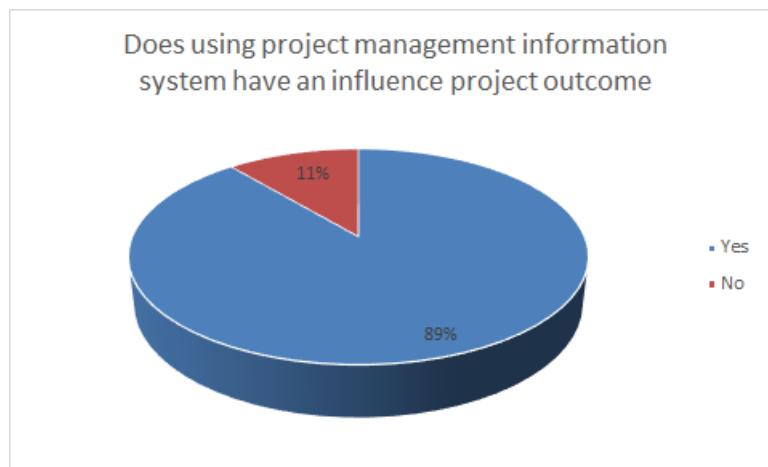


Figure 8: The impact of the use of PMIS tool on project outcome

From the basic statistics of the results, it is a unanimous view that the use of PMIS to manage and track project increases the chances of project success. The standard deviation of 0.31 supports this view.

BASIC STATISTICS				
Minimum 1.00	Maximum 2.00	Median 1.00	Mean 1.11	Standard Deviation 0.31

Figure 9: The basic statistics of the use of PMIS tool on project outcome

5. CONCLUSION

PMIS must provide reliable and accurate information that will enable the project team to perform their tasks efficiently and effectively. It is not the complexity of the software that matters but the quality of the information generated by the system and the ability of the user to use the information to manage the project. This information helps the users/project managers to perform their tasks in a much professional manner. It is recommended that organizations should adopt the use of PMIS in the management of their projects. PMIS guarantees better management of project since it generates quality information needed for the management of the project.

This research has produced three key findings, firstly the results indicate that project management information system tools provide some level of support and makes a major contribution to project success. However due to the rapid changes in technology most of the tools fall behind when it comes to making more features available. Secondly, most users of project management information system tools are project managers because of the features that are available including monitoring and tracking, budgeting and cost control, and planning and mobility. In a traditional project delivery ecosystem, the project manager is the one who is responsible for these activities. Furthermore, they have the responsibility to report to all other key stakeholders.

5.1. Recommendations

This research report recommends that since there is significant relationship between project management information system features, quality of the information output from the project management information system tool, the use of project management information system tool to perform project management tasks, on the project outcome:

1. Organization should start making use of Project Management Information System in the management of their projects. This is because they have the potential to make the management of projects better. Software vendors needs to work very close with organization to enable the exact features that matters to the organization.
2. The project management information system tool itself does not have a direct impact on project success; it is only through its ability to provide quality information output to support project team in tracking their projects better.

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7. Biographies

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Kwete's research interest focus on enlightening organisation effectiveness in deriving, managing, overseeing, controlling and sustaining IT investments through IT projects, programmes, and portfolios, and looks at both traditional and agile project management approaches. He is a reviewer for SAICSIT, SACLA and the African Journal of Information Systems. He supervises masters and honours students.

Jabulani Lubisi is a BCOM Honors IT Management graduate from the University of Johannesburg. He holds a National Diploma in Computer Systems Engineering, Certificate in Business Management Project Management and An Advanced Diploma in Business Information Technology. He is a Systems Engineer for a reputable Telecommunications company in South Africa having worked there for over 12 years working as a Data Analyst, PLSQL Developer, and Application support engineer and now working as a planning engineer for a Customer Value Management system. He has rich experience in working with all sized project from small single domain projects to massive multi domain projects in all phases. He sees Information and Communications Technology is a key to unlock the Africa's potential after Gold and Diamond in the global markets. He describes himself as hardworking, adaptable to change, reliable and prides himself in what he does.