Project Success in the Eyes of Project Management Information System and Project Team Members

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Abstract

Project management information system is used to plan, track, measure, analyze and forecast all project activities to enhance project success. Hence the quality of project management information system is the key to project success in terms of time, cost, and scope/quality. The nature of this study is quantitative based on deductive approach. Survey method is used to collect data through questionnaire technique from education sector in Pakistan. Simple random sampling technique. The analysis has been rum on only 179 respondents from the targeted universities of Pakistan. Results of this study shows that the quality of project management information system will increase the project success. In addition, intention to use project management information system has the mediating effect between the quality of project management information system and project success. On the other hand, project team members' involvement has not moderated the success level. It is concluded that organization must consider the quality and use of project management information system to enhance their project success. This study opens the new horizons in literature and can improve the quality of Projectized education in Pakistan, if considered.

Business enterprises are entering in the era of competitive pressures in globalized and international markets. This results in organizations to undertake projects that are performance specific. Projects of any kind, such as IT projects, construction, Education, and Healthcare, must be well-planned, staffed, well-organized, monitored, controlled and evaluated (Fallah & Gholipour-Kanani, 2016; Liberatore & Pollack-Johnson, 2003). In order to achieve success in projects, firms must complete and deliver projects within stipulated time frame, scope, budget, and in a risk-free manner. In the Information Technology industry, 75% of the undertaken projects are succeeded with the support of Project Management Information System (Kostalova, Tetrevova, & Svedik, 2015; Raymond & Bergeron, 2008). Although using Project Management Information System (PMIS) is not a surety of project success, yet has become a necessity and has a significant contribution in project success in public as well as private firms whether they are small or large.

In order to have efficient and effective coordination collaboration, communication processes, Information Technology is routinely and extensively used in projects. In this respect, powerful PMIS and its quality has become a prerequisite to effectively and efficiently manage the projects as well providing support to project managers in making decisions (Havelka & Rajkumar, 2006; Tobias & Kairu, 2015). However, the involvement of project team members can induce in obtaining management support by taking Cognitive and Emotional reactions to persuasive communication (Ngwenyama & Nielsen, 2014). In this respect, they involve themselves in embedding the external knowledge of other projects into the existing knowledge by interpreting and translating the knowledge in their own words. In doing so, projects are become more understandable (G. H. Liu, E. T. Wang, & C. E. Chua, 2015).

Pakistan is under developing country that's why most of the projects are working on traditional system. In traditional system all project activities are managed through hard copy files. Most of time project components are not clearly communicated with each other. Furthermore, no proper planning, controlling, analysing and forecasting is possible in this system, so such a system is prone to failure. Second, traditional system is not enough capable to integrate all project team members, stake holders, resources, processes and activities in a single platform to enhance project performance and project success rate.

This study has focused to highlight the benefits of PMIS. This system integrates all project team members, stake holders, resources, processes and activities in a single platform to enhance project performance and project success rate. The authors are intending to measure the project success in terms of quality of PMIS which is moderated by Project Team Members Involvement and mediated by Intention of PMIS Use.

Therefore, this study aims at examining the moderating effect of Project Team Members Involvement and mediating effect of Intention of PMIS Use between PMIS Quality and Project Success which will open new horizons in literature and will be a beneficial source for the professionals of the field.

Research Model and Hypotheses Development

PMIS Quality

System Quality is referred to as quality of information systems processing itself which encompasses both Software and Hardware components. In this study, technical soundness factors is also include as part of system quality (Fuller, Valacich, George, & Schneider, 2017; Seddon, 1997). Previous literature on factors of system quality developed and validated include Ease of Use and Learning, requirements of users, features of exiting system, Accuracy, flexibility, customization of interfaces, integration of modules and Sophistication (Kerzner & Kerzner, 2017; Sedera & Gable, 2004). Moreover, attributes such as interoperability, flexibility, and system's functionality are also measured as system's quality (Bernroider, 2008; Raymond & Bergeron, 2015). Further, system quality is recognized as including of six attributes like correct operations of system, coordination, security, quick recover of errors, fast access and balanced payment (Fallah & Gholipour-Kanani, 2016; Liu & Arnett, 2000). In this study, system quality is operationalized as Connectivity (described as the compatibility with the information technology tools and other software) and Usability (Ease of Use, Accessibility, and stability in its use).

Information systems quality dimensions include defining Accuracy, Complexity, Consistency, and Timeliness (Ballou & Pazer, 1987; Teixeira, Xambre, Figueiredo, & Alvelos, 2016). Accuracy is defined as the correctness in representing the information by mapping the stored information to the appropriate extent into real-world (Delone & McLean, 2003; Nelson, Todd, & Wixom, 2005; Son, Hwang, Kim, & Cho, 2016; Wang & Strong, 1996). Timeliness implies the recorded value is not out of date. Data must be available in time to influence the decision. The information may vary according to the need and purpose.

The researchers in the marketing field include the service quality to have a successful information systems (Kettinger & Lee, 2005; Obeidat & Aldulaimi, 2016; Pitt, Watson, & Kavan, 1995). Liu and Arnett (2000) identified service quality as an important measure of website success. Previous studies also recognized the importance of service quality in project success and includes Responsiveness, Follow-up service, assurance, and Reliability (DeLone & McLean, 1992; Lee & Yu, 2012; Liu & Arnett, 2000). Responsive is defined as service provider's reaction in a critical situation so that quick technical support, maintenance, or repair could be provided. Follow-up services is described as providing education and manuals of PMIS users for guidance to use the system. Assurance is defined as faithfulness and knowledge of the PMIS service providers. Reliability means perception of data security, and trust on PMIS service provider. Based on the literature, the following hypothesis is formulated.

H1: Project Management Information System Quality has positive impact on Project Success.

Intention of PMIS Use

System's quality contributes to project's success through increase in intention to use of that system. One of the major objectives of information system is the smooth sharing of information to its all stakeholders without any difference among them. Therefore, when there is an increase in use of information system, there is increase in project success. In other words, system quality affect the system use. Intention to use the PMIS is the measurement of one's behaviour strength to perform a specified behaviour (Ajzen & Fishbein, 1980; Son et al., 2016). Earlier researchers have recognized the behavioural intention an important factor to the acceptance of an innovation or technology (Lean, Zailani, Ramayah, & Fernando, 2010; Weerakkody, Kapoor, Balta, Irani, & Dwivedi, 2017). In this research, intention of PMIS Use is defined as users' efforts and attitudes to expand its use (Lee & Yu, 2012; Obeidat & Aldulaimi, 2016). The users according to their previous experience recommend others to continuously reusing the system and use that system. Therefore, this study includes two factors to evaluate the intention of PMIS Use which are Intention to Use and Recommendations to others. On this basis in the existing literature, the following hypothesis is formulated.

H2: Intention of Project Management Information System use plays the mediating effect between Project Management Information System Quality and Project Success.

Project Team-Members Involvement

Involvement refers to the degree of user's relevance and their importance to engage in persuasion communication (Nguyen, Nguyen, & Nguyen, 2015; Park & Young, 1983). It denotes the user's ability

and/or ability to incline to the persuasion communication in terms of either cognitively or emotionally. Therefore, this study defines the involvement of project team members as having two psychological reactions which include Cognitive and Emotional. These two psychological reactions give rise to persuasion communication. Because cognitive and emotional processes lead to an audience's favourable and unfavourable attitude to an object (Kostalova et al., 2015; Liu, Wang, & Chua, 2015).

Following the definition of (Liu et al., 2015), cognitive involvement is the degree of connection that the project team members make between the individual/departmental objectives and information technology projects when exposed to persuasive communication. It shows the project members mental process of elaboration that integrate external knowledge to the existing knowledge (Hasan et al., 2017; Petty & Cacioppo, 1986). Team members of IT project put efforts in attracting management's attention to involve (Dutton & Ashford, 1993; Elbanna, 2013). Management demonstrates high cognitive involvement where they actively request more information and feedbacks about the project, translate project values into their own words and engage in confirmatory activities such as envisioning active plans to realize project goals.

On the other hand, emotional involvement occurs when an IT project meets management's social or emotional needs, such as affiliation, identification or gratification of ego (Hasan et al., 2017; McGuire, 1974, 1976; Park & Young, 1983; Ratchford, 1987). Emotional involvement is a subjective reaction to affective cues which have no intrinsic link to an issue but can influence feelings or thoughts of the target (Zhang, 2013). The authors propose that management's emotional involvement will likewise positively influence management support for an IT project. Changed behaviours arising from management's emotional involvement have been documented in studies on employee performance appraisal (Le Roy & Fernandez, 2015; Wayne & Liden, 1995), interaction quality with subordinates (Wayne & Ferris, 1990), and investment decisions (Keil, 1995; Teixeira et al., 2016). Thus, the authors posit that as management likes the project more, they are more likely to feel that the project is important, take on personal responsibility for the outcome of the project, and thus increase their support for the project. Thus, following hypothesis is developed:

H3: Project Team Members Involvement has moderating effect between Project Management Information System Quality and Project Success.
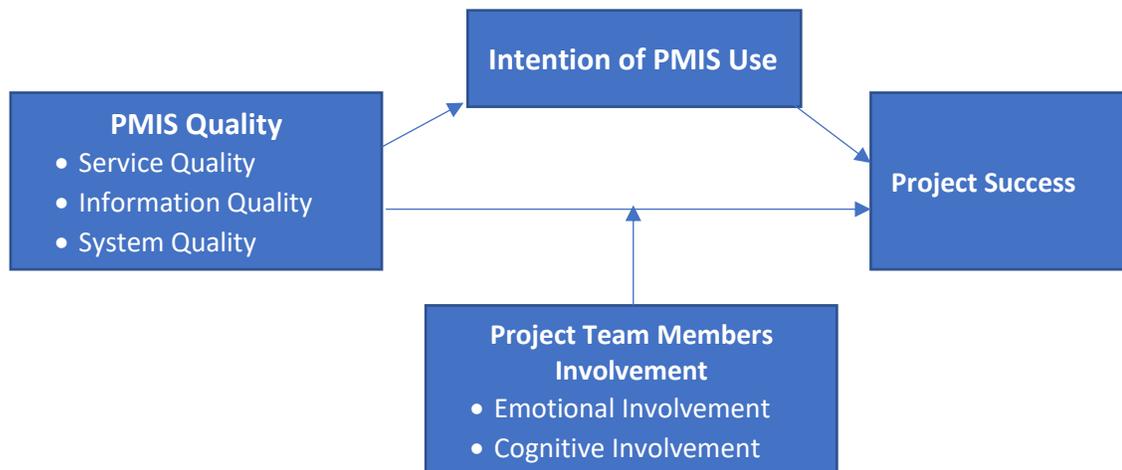

Figure 1. Project Success Model

Research Methodology

Research methodology is consisting of overall set of activities perform during the study. It is based on operationalization of variables, instrument and measurement, data collection, population, sample and its characteristics, and data collection techniques.

Operationalization of Variables

Operationalization is the most important process to define the variables in to quantitatively measurable factors. Because it is difficult to measure the subject variables without setting a specific criterion. So, all the variable in this study have been operationalized.

PMIS Quality. Project management information system quality is independent variable in this study which is based on three dimensions. First is service quality, the service quality of project management information system is measured in terms of responsiveness, follow up services, assurance and reliability of service provider can elaborate the service quality of PMIS. Second dimension of PMIS Quality is information quality. Information quality of PMIS is based on the format, accuracy and relevance of information. Third dimension of PMIS Quality is system quality which is measured through connectivity and usability of system (Lee & Yu, 2012).

Intention of PMIS Use. The intention to PMIS Use can be operationalized in term of current use and have the intention to use in future. Furthermore, it is also recommendation to other for the use of PMIS (Liu et al., 2015).

Project Team Members Involvement. This variable is divided in to two dimensions. The one dimension is emotional involvement which is related to feelings and emotions of team members while the cognitive involvement is the thinking of team members about project. So, the emotions and thinking regarding the project are best identifier of project team members involvement (Liu et al., 2015).

Project Success. It is the dependent variable for this study. The project success can be operationalized in to three major components these are delivery on time, complete work in specified budget and fulfill the requirements of project. So, if any project fulfills these three basic requirements then this project is successful. The operationalization process provides the guideline for instrument development or adoption to design survey (Raymond & Bergeron, 2008, 2015).

Instrument and Measurement

The instruments can be used to measure the subjective variables quantitatively. In this study, adoptive instrument from previous studies have been used to measure the variables. Three dimensions of PMIS Quality is judged. Service quality, is measured in four sub dimensions. Responsiveness, follow up service, assurance and reliability. Each dimension has been measured with two items each. The total items to measure the service quality are 8 items. These items have been adopted from the study of Lee and Yu Lee and Yu (2012). Information quality of PMIS is also measured in four dimensions of format, currency, accuracy and relevance. Format and currency both are measured with two items each. While accuracy and relevance both measured with three items each. So, total number of items for PMIS information Quality are ten which were adopted from the study of Lee and Yu (Lee & Yu, 2012). PMIS System Quality is measured in two dimensions connectivity and usability. Connectivity is based on two while usability is measured through 3 items. Total items for PMIS Quality are five which were also adopted from same study (Lee & Yu, 2012).

Intention of PMIS Use is measured through 2 items which were adopted from previous study (Lee & Yu, 2012). Project team members' involvement have two dimensions. One is emotional involvement which is measured through 5 items. While cognitive involvement is measured through four items. Total 9 items are used to measure the project team members involvement which were adopted from previous study (Liu et al., 2015). Project success is dependent variable which is measured through 3 items adopted from previous study (Raymond & Bergeron, 2008).

Data Collection

Primary data has been collected through survey method. A questionnaire was designed to collect the data from respondents. This questionnaire is based on two parts. First is based on demographic variables and second part is related to research variables. In this study total 5 demographic variables have been considered. While in second part of questionnaire total 37 questions have been included. The scale for demographic variables is categorical while for research variables ratio scale is used based on five point Likert Scale anchor.

Online and offline both data collection techniques have been used in this study. In online method, online questionnaire is developed and sent to respondents through email. While in offline questionnaire, university students are hired to do survey because the population of this study is educational institutes.

Population & Sampling

In this study education sector in Pakistan have been focused. There are two universities, Virtual University of Pakistan and COMSATS Institute of Information Technology are providing online education. The justification of population of this study is that both Virtual University of Pakistan and COMSATS Institute of Information Technology have completely using their customized PMIS to handle all the

educational activities. Students, administration and faculty are fully utilizing computer applications, there is no any traditional file system in both organizations. So, both organizations are perfect population for this study. Both universities have completed all their educational projects by using their customized developed project management information system with different names. Simple random sampling method is used to collect data. Sample is taken from these universities. Total 300 questionnaires were disseminated in these universities. While total complete responses we have received back were only 179, with a response rate of 59.66%.

The maximum respondents were male with 151, 84.4% of total respondent. While the dominant age of respondents were between 30-39 years, 118 respondents having 65.9%. The dominant education level is master level education having 94 respondents those are 52.5%. Most of respondent have 6-10 years' experience are 129 which are 72.1%.

Reliability Assessment

Reliability of data has been assessed through Cronbach Alpha test. The reliability value of each variable is mentioned in Table 1.

Data Analysis

A number of statistical tests have been used to analyze the collected data to accept or reject the hypotheses. Reliability, mean, standard deviation and correlation of variables have been analyzed and interpreted in Table 1.

Table 1: *Means, Standard Deviations, Correlations, and Reliabilities (N=179)*

	Mean	**S.D**	**Quality**	**Use**	**Invol.**	**Success**
PMIS Quality	3.00	.906	(.966)			
Intention of PMIS Use	2.73	1.183	.746**	(.760)		
Project Team Involvement	3.03	1.055	.843**	.743**	(.928)	
Project Success	2.85	1.033	.710**	.706**	.835**	(.750)
**** Correlation is significant at the 0.01 level (2-tailed).						
Reliability estimates in parentheses.						

All the Cronbach Alpha values are higher than 0.7. So, this data is reliable for further statistical analysis. The mean values show the central tendency of respondents about research variables. The coded values of 3 shows the neutral behavior and 2 shows disagree. The mean values of each variable are near to 3. Standard deviation shows the difference from mean point, and the values are near to zero. These values show very less deviation from mean point. Every variable has a moderated correlation with each other at highly significant level.

Linear regression test is used to calculate the effect of PMIS Quality on project success. The results of regression test in mentioned in Table 2.

Table 2: *Regression Analysis between PMIS Quality and Project Success (N= 179)*

Model	R^2	ΔR^2	β	t	Sig.
PMIS Quality	.504	.504	.710	13.399	.000

Dependent Variable: Project Success

The values of R^2 shows variance between PMIS Quality and Project Success which is 50.4%. While the β value shows the standardized coefficient, which is 71.0%. While the t value show the difference. This effect has been accepted at highly significant level.

The mediation effect of intention of PMIS Use between PMIS Quality and Project Success can be checked through the Hayes mediation effect by using Hayes model 4. The results of this test is mentioned in Table 3.

Table 3: *Hayes Mediation Analysis (N= 179)*

Model	Effect	se	t/z	P
Direct Effect	.470	.0842	5.582	.000
Indirect Effect	.3384	.0669	5.055	.000
Total Effect	.8085	.0603	13.399	.000

Dependent Variable: Project Success

In the above table, direct, indirect and total effect have been analyzed. The results show clearly that direct effect of PMIS Quality on Project Success is 47% but when intention of PMIS Use is added as mediator then the effect on Project Success is increased up to 80%. Standard error is also near to zero and values of t test have also show very small differences. All the results are at highly significant. So, results show that mediation is effecting on dependent variable.

Project team members' involvement has the moderation effect between PMIS Quality and Project Success which will be tested through Hayes moderation effect using model number 1. The results have been mentioned in Table 4.

Table 4: *Hayes Moderation Analysis (N= 179)*

Model	Coefficient	se	t	p
Involvement	0.5985	0.2037	2.938	0.003
Quality	-0.1879	0.2190	-0.858	0.392
Quality * Involvement	0.0707	0.0667	1.059	0.290

Dependent Variable: Project Success

In the above table, the individual effect of project team members' involvement and quality have been observed and the Hayes plugin make interaction term for moderation effect automatically. The p or significant values shows insignificant. So, the moderation effect of this study was rejected. So, project team members' involvement have no moderation effect between PMIS Quality and Project Success.

Discussion and Conclusion

This explanatory study which is correlational in nature proves that Project Management Information System quality has positive impact on project success which was tested through linear regression. The results of regression accept this hypothesis at highly significant level. First hypothesis of this study is "Project Management Information System Quality has positive impact on Project Success." In previous studies, the relationship between PIMS quality and project success has tested (Lee & Yu, 2012; Raymond & Bergeron, 2008), hence this study strengthen that relationship. Now it can easily be concluded that if an organization increase their PMIS service, information or system quality, they would automatically increase the success rate of such projects.

The second hypothesis of this study is "Intention of Project Management Information System use plays the mediating effect between Project Management Information System Quality and Project Success." This hypothesis was tested through Hayes mediation analysis and the results shows the change in direct and indirect effect at highly significant level. So, the mediation has been accepted which was established in previous studies (Lee & Yu, 2012; Raymond & Bergeron, 2008).

Third hypothesis of this study was "Project Team Members Involvement has moderating effect between Project Management Information System Quality and Project Success." The moderation effect is also tested through Hayes moderation analysis. The results have showed the non-significance. Hence this hypothesis was not accepted. So, Project Team Members Involvement has no moderating effect between Project Management Information System Quality and Project Success. It needs further elaboration because the existing literature supports while the data of this endeavor contradict.

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