



Knowledge Sharing Accelerates Success of Complex Projects: An Evidence from Pakistan

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Abstract

We studies project complexity, knowledge sharing behavior, and project on project success in the context of project organizations in Rawalpindi and Islamabad. The data were collected from 326 employees working on multiple projects using reliable measures. Project complexity showed negative association with project success. Knowledge sharing pointed out a negative relationship with project complexity and a positive relationship with project success. Regression showed a positive contribution of project complexity and a positive role of knowledge sharing behaviour towards project success. We observed a positive interactive effect of knowledge sharing behaviour and project complexity on project success. Results indicate that complex projects are more likely to fail if knowledge sharing behaviours are not practiced at work. We suggest encouraging employees to share their knowledge and experiences for effective decision making and dealing with difficult situations ensuring the success of complex projects.

Key Words: Project Complexity, Knowledge Sharing Behaviour, Project Success.

Introduction

Project management refers to use of proper tools, techniques, and well-structured procedures to manage all phase of projects (Bryde, 2003). Industrial development and globalization have increased the number of projects in different areas of all sectors including social, construction, information technology, human resources, and security sectors (Yatim, Bredilletand, & Ruiz, 2009). Globally, project budgets and project-based management practices are increasing. The past two decades have witnessed quite a large number of projects where project management techniques have become inadequate to heave success (Signori & Vismara, 2018). Especially, many unsuccessful projects have grown in the past ten years (Nawi, Rahman, & Ibrahim, 2011). Increasing projects and associated complexity requires the acquisition of new skills for their management (Eveleens & Verhoef, 2009).

The concept of project success carries greater importance; however, the idea of project management success is ambiguous for certain vague factors (Todorović et al., 2015) as most projects are organized in collaboration with multiple partners and contractors (Vidal, Marle, & Bocquet, 2016). The project complexity is driven by the firm, unavoidable global forces, rapid technical advancements, and political as well as socio-economic change etc. In profit-driven organizations, products decide success or failure of projects. Some recent studies examined outcomes in the context of project complexity (Azim, 2010). While assessing uncertainty and complexity in the project, researchers generally engaged upon the real stages of the grouping of task multifaceted nature and complex framework hypothesis (Gerald & Adlbrecht, 2007). In this context, an instant study predicted project success through the convergence of knowledge sharing and project complexity.

Problem Statement and Research Questions

Project success is likely to diminish with increased project complexity but this lacks empirical supports. Most of the studies supporting this contention lack evidence on this specific relationship which results in the reduced application of such findings (Luo, He, Xie, Yang, & Wu, 2016). Multiple project success factors have been measured in different publications and research works (Cooke-Davies, 2002; Gunduz & Yahya, 2018). However, each factor has generated a different impact on the success of the project. For instance, a study by Turner and Muller, (2005) identified project success factors including project mission, scheduling and planning,

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communication, troubleshooting, and support of top management, etc.; it is, however, imperative to consider that not every factor ensures the success of the project as some factors may lead to project failure. Out of all those factors, project complexity has emerged as a crucial separate factor negatively influencing project success. Over time, projects are expanding in size and becoming technically more sophisticated. Nowadays, the inclusion of diverse employees and stakeholders has increased the complexity of the project due to the addition of dissimilar aspects. That's why complexity in projects has emerged as a fundamental factor that negatively influences success. In project-based organizations, multiple elements of complexity are affecting the performance and success of the project inversely. However, a comprehensive evidence to understand project complexity is required. Accordingly, we posed following research questions: -

1. Whether and to what extent project complexity predicts project success?
2. Whether and to what extent knowledge sharing behaviour predicts project success?
3. Whether and to what extent knowledge sharing behaviour interacts with project complexity to determine project success?

Significance of Study

Our findings redound to project success considering that negative impact of project complexities can be minimized through knowledge sharing behaviour. The more an organization involves complexity in the project, the more the chances of project success reduce, and vice versa. Thus, project organizations practicing knowledge-sharing behaviour may experience increased likelihood of success. For researchers, practitioners, and academicians the study uncovers knowledge sharing behaviour as a possible tool to avoid failures out of project complexity.

Relevance to Literature

Project Success and Project Complexity

Project complexity refers to the difficulty in establishing structures and processes needed appropriate cohesion of parts to articulate a whole and respond to changing conditions during project cycle (Hirschman, 1967). It also considers the number and heterogeneity of different elements that inter-relate in a project (Burke & Morley, 2016). The project success refers to the attainment of goals provided in a project and application of project management tools to achieve those goals within a predetermined scope, time, and cost (De Wit, 1988). The criteria to measure success varies with the size, uniqueness, and nature of complexities experienced by projects (Müller & Turner, 2007).

The quantification of project complexity is difficult (Williams, 1999). The complexity of any type and nature reduces efficiency, effectiveness, and success of the project (Boer, de Bruin, & Verbraeck, 2009). The most common types of project complexities that significantly influence project success are known to be the organizational complexity and technological complexity (Baccarini, 1996). Several factors may lead to failure of projects (Savolainen, Ahonen, & Richardson, 2012). There are six-categories defining project complexity that influence project success directly or indirectly in a negative way; technological, goal, cultural, environmental, information and organizational complexities (He et al., 2015).

Liu (1999) found that project complexity reduces project efficiency and thus project success. An empirical survey by McComb, Green, & Compton (2007) found that flexibility and performance relationship is moderated by the complexity of project. Project complexity also moderates the impact of leadership competencies on project success (Müller, Geraldi, & Turner, 2011). They concluded that with an increase in project complexity the leadership competencies reduce and affect the project success negatively. Williamson (2011) observed that complexity grounds for difficulty of information technology projects which in turn is directly influence their success. Thus, complexity may reduce performance of projects. This offers a proposition that project complexity may be inversely associated with project success.

H1: Project complexity and project success are negatively correlated.

Project Success and Knowledge Sharing Behaviour

Knowledge sharing in the context of project management refers to a mechanism indicating how individuals share, interpret, integrate, and apply their skills and experience to perform project tasks (Boh, 2007). It is explained as a behaviour pursuing exchange of knowledge and it prevails in societies to differentiate the intellectual wealth, intelligence, and competitive edge (Liebowitz, 2001). Organizations need to implement certain policies and practices that are inevitable to achieve success. Knowledge sharing is an organizational tool to help in dissemination and use of such policies and practices to make a project successful (Reich, 2007). Moreover, knowledge sharing also reduces the costs involved in repeating the struggles required for problem-solving (Boh, 2007). It also fosters propagation between project illustrations and the creation of knowledge (Fong, 2003).

Knowledge can't be obtained in isolation, project managers encourage their employees to share their methods, inventions, and tactics they use in doing their tasks which is then practised to resolve organizational issues and work more effectively (Wang, Su, & Yang, 2011). This knowledge sharing behaviour offers employees an opportunity to collectively work throughout the life cycle of project (Wickrama & Widyaratne, 2012). The quality of communication within teams is strongly and positively associated with knowledge sharing and improving team performance (Chen, Li, Clark, & Dietrich, 2013). In any project organization, success for all stakeholders may be achieved by practising knowledge sharing at team levels (Suppiah & Sandhu, 2011; Park & Lee, 2014). Employees attitude towards knowledge sharing encourages the smooth flow of information within and outside the organization and henceforth ensures project success in return. This supports a likely positive association of knowledge sharing behaviour with project success.

H2: Knowledge sharing behaviour has a positive effect on project success.

Moderating Effect of Knowledge Sharing Behaviour

Knowledge management has emerged as an essential apprehension. Development of any complex information system depends of knowledge sharing by those involved in it. In its vastest shape, the subject of the complex nature of development process keeps on pulling in extensive research and re-assessment. The subsequent distributed work is not applied by development experts for its unpredictability or difficulty of use. To analyze this problem, Hussain et al. (2010) found that project complexity could be reduced if knowledge sharing behaviour is facilitated through information modelling at all stages of project management.

In a construction project, the concept of the process of design is rapidly evolving appealing international procedures. It may create further complexity (Austin *et al.*, 2002). Knowledge sharing can address and mitigate the problem of project complexity in any critical project. Choo et al., (2004) noted that challenges of complexity could be managed through a proper flow of information and introducing different software that can assure knowledge sharing and flow of information throughout the project lifecycle. According to Suppiah and Sandhu (2011) project success desired by the stakeholders' may be achieved by sharing proper knowledge with the team members timely. Reich, Gemino, & Sauer (2012) pointed out that project knowledge emerges during activities performed in the organization. The knowledge sharing and coordination within project teams reduce the adverse impact of project complexity at all stages and causes project success. Therefore, organizations need to seek and share new knowledge for sustaining inventiveness (Andreeva & Kianto, 2011). This leads to frame the following proposition:

H3: The link between project complexity and project success is moderated by knowledge sharing behaviour in a way that complex projects are better handled and well managed.

Theoretical Model

Drawing upon relevant literature, we conceptualized that interactive effect of project complexity and employees' knowledge sharing behavior are likely to augment success of complex projects. Figure 1 shows the framework for testing hypothesized relationships.

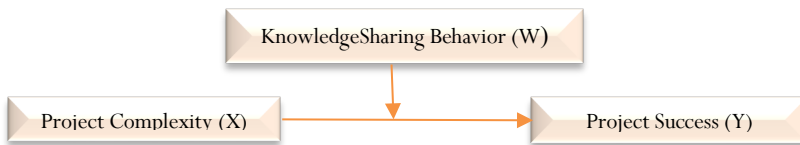


Figure 1: Theoretical model

Methodology

We adopted a quantitative research method to investigate the hypothetical relationships in this study. This approach is considered suitable for analysis of relationships among variables and testing hypotheses (Cooper & Schindler, 2006). The cross-sectional data were collected from project organizations in Rawalpindi and Islamabad using a survey questionnaire filled from management level project employees.

Sampling Procedure and Sample

Population size remained unknown for the unknown number of projects being undertaken during the data collection time. Research suggests a bigger sample size to get more precise estimates which better represent population characteristics (Asiamah, Mensah, & Oteng-Abayie (2017). We administered the questionnaire to randomly selected 500 employees in 10 target organizations; out of which 326 (65%) were received back constituting actual sample in this study; Shahoora Foundation (43), Oxfam (36), Aurat Foundation (35), Adam Smith (32), Globia Technologies (35), Commodity Inside (33), IPRS Consultants (34), PrideSofts (36), Deal and Deals (24), and Tripeworld (18). This was considered sufficient (Blair & Zinkhan, 2006).

Measures and Reliability

We collect data by adopting existing validated measures using a 5-point Likert scale representing 1 for strongly disagree and 5 for strongly agree. Project complexity ($\alpha = .971$) was measured using 15 items (Xia & Lee, 2005). Knowledge sharing behaviour ($\alpha = .855$) was measured using 7 items (Teng & Song, 2011). Project success ($\alpha = .910$) was measured using 14 items (Aga, Noorderhaven & Vallejo, 2016). All measures indicated a good level of reliability ($\alpha > .700$) as suggested by Nunally and Bernstein (1994).

Results

Sample Characteristics

Information on four demographic characteristics was collected to describe the sample; gender, age, education, and experience. Participants included males (85.7%) and females (14.3%) aging from 18 to 25 years (4.9%), 26 to 33 years (28.3%), 34 to 41 years (35.6%), 42 to 49 years (26.4%), and above 50 years (4.9%). The sample indicated a good educational status; graduates (24.6%), postgraduates (54.7%), and others (20.7%). Position level of participants indicated top managers (27.4%), middle managers (55.6%), and lower managers (17%). Participants showed a good level of professional experience as 1 to 5 years (21.9%), 6 to 10 years (17.3%), 11 to 15 years (44.2%), 16 to 20 years (1.8%), and above 20 years (9.7%).

Correlation Matrix

Correlation coefficients (Table 1) were computed using SPSS 22 version to understand the relationships proposed in the study model. Project complexity showed negative link with project success ($r = -.381, p < .01$) meaning that higher the project complexity lower may be the project success. The knowledge sharing behaviour showed a significant negative association with project complexity ($r = -.165, p < .01$) meaning that higher knowledge sharing may lessen the level of project complexity. Knowledge sharing behaviour revealed a positive linkage with project success ($r = .763, p < .01$) indicating that greater the knowledge sharing by employees greater would be chances of project success.

Table 1. Correlational Outcomes (n=326)

Variables	Items	Mean	Std. Deviation	1	2	3
1. Project complexity	15	4.18	.51	1		
2. Project success	7	3.47	1.02	-.381**	1	
3. Knowledge sharing behaviour	14	3.35	.93	-.165**	.763**	1

^a ** Significant at the .01 level (2-tailed).

Relationship between Project Complexity and Project Success

Simple linear regression was performed using project complexity (independent variable) and project success (dependent variable). The outcomes (Model 'a' in Table 2) suggested that project complexity explained 16.2% change in project success ($R^2=.162$, $p<.001$). The model also showed that each additional one-unit change in project complexity has the power to bring 72.6% negative incremental change in project success ($B=-.762$, $p<.001$). Hence, *Hypothesis 1* was accepted indicating decreased project success with increasing project complexity.

Relationship between Project Success and Knowledge sharing Behaviour

Simple linear regression was performed using knowledge sharing behaviour as independent variable and project success as the dependent variable. The outcomes (Model 'b' in Table 2) suggested that knowledge sharing behaviour explained 58.8% change in project success ($R^2=.588$, $p<.001$). The model also showed that each additional one-unit change in knowledge sharing behaviour can positively predict 70.0% incremental change in project success ($B=.762$, $p<.001$). Hence, *Hypothesis 2* was accepted indicating increase project success with increasing knowledge sharing.

Moderating role of knowledge sharing behaviour

Stepwise regression analysis was performed to test the buffering effect of knowledge sharing behaviour on the complexity-success connection in projects. Project complexity, knowledge sharing behaviour, and their interaction term were entered in step 1, step 2, and step 3 respectively. The results as shown in Model 'c' of Table 2 suggested that the model significantly explained 68.3% change in project success ($R^2=.683$, $p<.001$). A significant negative contribution of project complexity towards project success ($B=-.540$, $p<.001$) was observed. Knowledge sharing behaviour indicated significant positive contributions in predicting project success ($B=.786$, $p<.001$). The interaction term of project complexity and knowledge sharing behaviour revealed a positive contribution to project success ($B=.349$, $p<.001$). Hence, *Hypothesis 3* was accepted which means that knowledge sharing buffers the effects of complexity on project success. The interaction plot showing this moderating influence of knowledge sharing behaviour is presented in Figure 2.

Table 2. Regression Outcomes (n=326)

Model	Predictor(s)	Mean \pm SD	R ²	B
a.	Project complexity (PC)	4.18 \pm .51	.162**	-.762**
b.	Knowledge sharing behaviour (KSB)	3.35 \pm .93	.588**	.700**
c.	Step 1: Project complexity (PC)	4.18 \pm .51	-	-.540**
	Step 2: Knowledge sharing behaviour (KSB)	3.35 \pm .93	.660**	.786**
	Step 3: Interaction term (PC x KSB)		.683**	.349**

* $P<.01$, SD = Standard deviation

Dependent variable: Project success (PS)

Equation 1: $PS = -.762(PC) + e$

Equation 2: $PS = .700(KSB) + e$

Equation 3: $PS = -.540(PC) + .786(KSB) + .349(PC \times KSB)$

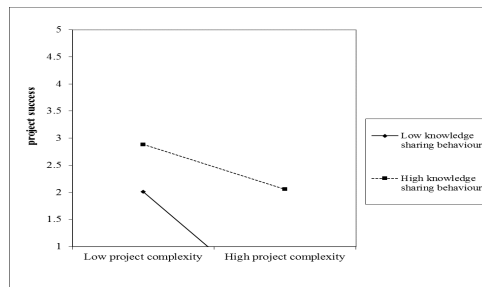


Figure 2: Moderating Effects of Knowledge Management

Model Fit

Model fitness was examined using AMOS software. The results explained that covariance between the variables project complexity (independent variable), project success (dependent variable), and knowledge sharing behaviour (moderating variable) is good being less than the threshold of .800 (Albright & Park, 2009). Factor loadings or regression weights were found to be less than 1 (Yong & Pearce, 2013). The values of TLI (.963), CFI (.972), RMSEA (.054), GFI (.902), and CMIN/df or chi-square value of 1.376 being in respective acceptable ranges showed a good level of model fitness.

Discussion

Project Complexity as A Negative Predictor of Success in Projects

We found that project complexity negatively associates with project success which confirms prior research (Kennedy *et al.*, 2011; Williamson, 2011). Müller, Gerdali, & Turner (2011) identified that any complexity in a project influences the manager’s performance and henceforth reduces the probability of project success. The project managers must develop an effective program to manage project complexity effectively to reach project success. Proper coordination and effective communication among members of project teams are the important tools that could resolve the issue of project complexity at initial stages (Baccarini, 1996; Laufer, Denker, & Shenhar, 1996). Smith & Graetz (2006) suggested that theory of project complexity is ambiguous to understand, but its application can escalate success. The use of complexity theory requires a complete experience to understand the problems that can trigger project failure.

Knowledge sharing as a Positive Predictor of Project Success

Our findings suggest that increasing knowledge sharing behavior increases the chances of project success. This supports previous research showing a positive bond between knowledge sharing behaviour and project success (Niedergassel, 2011). The current study highlights the standing of knowledge sharing in a project organization where people work and interact in teams. These results are in line with the study of (Almeida & Soares, 2014) which concluded that, knowledge sharing throughout the project provides an opportunity to take advantage of situational learning and avoid the repetition of mistake to improve the performance. The mentoring and rotation at job can help transfer of knowledge without involving organizational level mechanisms (Kamara, Anumba, & Carrillo, 2008).

Knowledge sharing behavior as a Moderator

Likelihood of project success can be maximized through knowledge sharing which minimizes negative impacts of project complexity. Knowledge sharing is known to minimize the costs associated with repeated efforts applied for problem-solving in any organization, and henceforth ensures the success of the project (Boh, 2007). This study reveals that knowledge sharing can be beneficial for successful management of project organizations. The person to person knowledge sharing is a critical element to consider. The research finds that knowledge sharing aides in maintaining a strategic distance from the errors and decreases the expense of products or benefit and builds up the ability to develop (Iqbal *et al.*, 2011). The more an organization reduces the errors, the more it gets

successful in eliminating the adverse effects of complexity in the project. This supports social learning theory (Miller & Dollard, 1941). The theory helps in improving learning capabilities i.e. knowledge sharing behaviour needed to improve project performance by reducing project complexities which enable the organization to reach desired project success.

Conclusion

Based on empirical findings derived from this study, we concluded that project complexity has the power to negatively influence project success. Knowledge sharing behaviour has the potential to positively contribute towards project success as well as the power to converge with project complexity in a way that reduces its negative impact on project success by playing a positive moderating role. The study suggests that project managers should encourage employees for sharing their knowledge and experiences to effectively deal with difficult situations at work.

Limitations and Future Research

The sample was drawn from selected project organizations in Rawalpindi and Islamabad only. To gain better insights into the proposed relationship, further research is needed by involving a larger sample size from a diverse set of project organizations in other geographic areas as well especially in Pakistan. Future research is also needed to explore possible mediators to explain the process of how and why project complexity negatively influences project success. There is also a need to examine other possible mechanisms and conditions for a better understanding of complexity-success link, minimizing negative influences of complexity, achieving desired outcomes in projects.

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