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IDENTIFICATION AND ASSESSMENT OF IMPACT OF KNOWLEDGE MANAGEMENT BEST PRACTICES ON PROJECT MANAGEMENT CAPABILITY OF THE ORGANIZATIONS

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ABSTRACT

This study has two broad objectives. First, explore and identify the knowledge management best practices (BPs) for one of the developing countries (Pakistan). Second, analyze the impact of the identified BPs on project management capability of the IT organizations in Pakistan and other countries (USA, Canada, UAE) to contrast the applicability of the BPs in different environments.

The authors have employed a two-phased mixed-methods approach in this study. In the first phase, detailed qualitative interviews were conducted with IT project managers in Pakistan to identify the BPs for the identification, organization and sharing of knowledge of IT projects. In the second phase, the authors quantitatively analyzed impact of the identified BPs on organizational project management capability in Pakistan and other countries. The results show that adoption of the identified BPs can significantly improve organizational project management capability. Also, the BPs are applicable in different countries/environments. An inter-country validation of the identified KM best practices enhances the applicability of the results.

Keywords: *knowledge management for projects, knowledge management best practices, knowledge management for IT projects, competitive advantage.*

INTRODUCTION

In the recent past, gaining a sustainable competitive advantage has been primary focus of the organizations for many reasons (Barney, 1991; Wernerfelt, 1984). Hypercompetitive environment has forced organizations to employ state-of-the-art tools, techniques and methodologies such as, emotional intelligence, value management, project management, enterprise resource planning systems, organizational

restructuring and management by projects etc. Among the above listed methodologies, management by projects is evolving as one of the most important techniques, resulting in the development of project-oriented organizations (POO), to gain competitiveness by successful completion of the projects (PMI, 2008). Although the concept of management by projects and POO is equally applicable and important for any organization, yet it plays a pivotal role for the information technology (IT) organizations. Core products (software or services) of IT organizations are always developed through projects; making existence of the IT organizations dependent on successful completion of the projects. Hence, projects are the primary sources of both the product and cash flows for IT organizations. IT organizations can be distinguished from the others in the way they operate and develop the products. For example, employees of IT organizations can work from anywhere, anytime, for many employers at the same time and both the product and its input material (intellectual capital) are intangible in nature. This unique nature of the products/services poses some distinctive challenges to the IT organizations and their clients. The challenges are, the amount of utilization of intellectual capital to develop the product/service cannot be assessed, the product is intangible because it cannot be touched, seen or smelled even when it has been fully developed etc. After development, these products/services become assets of IT organizations. Such products/assets provide the organizations an SCA over their competitors because intangible assets are considered strategic assets (Eisenhardt & Santos, 2000; Jugdev & Thomas, 2002; Scheraga, 1998).

The role of intangible assets and successful completion of projects in providing **SCA** to the organizations has been reported in many studies (Grant, 1991; Jugdev & Thomas, 2002) (Jugdev, Mathur, & Fung, 2007) and reports (Group, 1999, 2001). We define a project as, "*a need-based temporary endeavor that is completed within time, budget, and scope and delivers business value*". Organizations use a blend of their resources and assets to execute and complete the projects successfully. These resources comprise tangible resources (financial, equipment, human resources etc) and intangible resources (intellectual capital, creativity, innovation, knowledge etc). The question now arises, if all the organizations are utilizing similar tangible and intangible resources then why do projects fail? A straightforward answer may be inferred from the Standish Group study (Group 2001) that the problem lies in the people and the processes (intangible resources) and not in the technology (tangible). Therefore,

organizations need to employ an efficient strategy to utilize their intangible assets to ascertain SCA for them. Therefore, in this study we are interested in the identification and impact of maintenance of organizational project management knowledge (one of the intangible assets) on the organizational project management capability (PMC).

Overall, this paper is organized in five sections, introduction being the first one, then a section presenting the theoretical framework for the study, after this methodology section describes the approach taken to conduct the study accompanying the results and discussions for each phase. Conclusion section follows methodology section and finally, future research being the last section suggesting some potential areas of research that can be carried out based on the results of this study.

THEORETICAL BACKGROUND

This section starts by examining theoretical explanations about what do we mean by knowledge and knowledge management in the context of organizational project management. Then a discussion of the conceptualization of 'knowledge' in the context of IT projects is presented. Discussion of these concepts is imperative if it is intended to identify the BPs for managing knowledge of the projects (KoP).

Knowledge and KM in the Organizational Project Management Context

The term 'knowledge' is widely used in our daily lives, offices, organizations and businesses. It is often used quite vaguely within business and as well as in within the discipline of knowledge management. A dictionary definition of knowledge is "the facts, feelings or experiences known by a person or group of people" (UK, 2010). However, in this study we are interested in the 'organizational project management knowledge' only. Therefore, we will not be looking into the epistemological discussions of knowledge and discuss only the different perspectives of 'organizational knowledge' that exist in the literature and how different organizational theorists have debated on them.

Despite the long, intriguing and epistemologically complex discussions, organizational knowledge still remains an elusive topic. Several authors have argued on this aspect concluding that organizations really have

knowledge which exists in them that needs to be managed as something distinct from the organization itself (Ashkanasy, Wilderom, & Peterson, 2000; Dierkes, Antal, Child, & Nonaka, 2005; Easterby-Smith & Lyles, 2003; Schneider, 2009; Spender, 1992, 1994; Spender & Marr, 2005). Before undertaking any steps to manage organizational knowledge, we need to describe that what does it really include?

Ackoff (1989) was the pioneer to present the first working taxonomy of knowledge known as: Data, Information, Knowledge and Wisdom (DIKW). The technical problem with Ackoff's taxonomy is that they are nested instead of being mutually exclusive. Thus we progress from data, which he argues is 'raw fact', to 'information', which is data with meaning, to 'knowledge', which is information contextualized and 'wisdom', which is knowledge harnessed to the improvement of the human condition. Ackoff's typology fails to provide a system of categories for theorizing knowledge management's problems (Spender, 2008). Due to the challenges of managing knowledge in the organizations, we posit that KM should not be seen as the way of mere identification, organization and sharing of data and information as purported by DIKW framework, rather, it should be based on the way people act in the organizations and projects i.e. the processes (Spender 2008). In this perspective, knowledge can be described as: knowledge-as-data, knowledge-as-meaning, or knowledge-as-practice Spender 2007a. This typology stands specifically against Ackoff's DIKW model but seems more appropriate in the context of organizational knowledge management and knowledge management of the projects. That is why all of the existing organizational project management maturity models (PMMMs) also assess the extent to which any particular organization is following the practices to manage its knowledge (including knowledge of projects). Practices are always followed for a specific organizational need which determines the data and meaning to be combined. Additionally, this typology also caters for the various data and information which organizations possess. Hence, this typology can be considered as more appropriate since it encompasses all the aspects of organizational knowledge by providing a description based on the knowledge resources of the organizations and what they are practicing.

In view of the above discussion, we can describe organizational knowledge management as, the explicit and systematic management of vital knowledge and its associated processes of creating/gathering,

organizing and diffusion. It requires turning personal knowledge into corporate knowledge that can be widely shared and applied throughout an organization (Skyrme, 1998). Hence, KM encompasses both the processes and the knowledge resources in the organizations.

Knowledge in IT Projects

IT projects can be seen as generators of one of the most important intangible assets – the knowledge. Reich (2007) has examined the concept and application of knowledge management for IT projects due to their critical role in maintaining SCA. As discussed earlier, intangible assets are the source of gaining SCA, as such, organizations should establish an efficient strategy to manage their intangible assets. This syllogism necessitates that knowledge, being one of the intangible assets, should be captured, organized and shared (knowledge management). In the IT industry, success of IT projects relies heavily on management of knowledge because very often people who are involved in the implementation of IT projects leave the organization before completion of projects. In Pakistan IT employee turnover rate is 2 years (PSEB, 2009). Moreover, except the equipment, nearly all of the resources used to produce the product are intangible in nature such as intellectual capital, which necessitates that even more attention should be given to the maintenance of this asset. Reich (2007) identified four types of knowledge in terms of IT project management.

Process knowledge-knowledge about the project structure, methodology, tasks and time frames.

Domain knowledge-knowledge of the industry, firm, current situation, problem/opportunity and technical solutions. This knowledge is spread widely within and outside the project team.

Institutional knowledge-knowledge of the history, power structure and values of the organization-which is transferred by means of stories or anecdotes by employees of the organization.

Cultural knowledge-knowledge of how to manage team members of different cultures or from groups such as web designers, IT architects or organizational development experts.

At the later stage of data collection for the first phase of this study, this description of IT KoP was used to minimize the elusiveness and make it easier for the interviewee's to understand what is being asked from them. Otherwise, all four types of the described knowledge can be amalgamated into a single term, 'Knowledge of IT Projects'.

The authors of this paper have been working for two years to identify and explore the best practices in the context of developing countries and validate their applicability in different working environments. This study was conducted as part of a doctoral study and as a multi-phase project. The authors consider researchers and practitioners as the audience of these objectives. The study has following two broad objectives:

i) To identify the best practices for knowledge management pertaining to IT projects.
ii) To verify impact of the identified best practices on the project management capability of the IT organizations in Pakistan and in the other countries**.**

Respective research questions are as follows:

i) What are the best practices for managing knowledge of IT project management in Pakistani IT organizations?
ii) How would the identified best practices affect project management capability of IT organizations in Asian countries?
iii) How would the identified best practices affect project management capability of IT organizations in North American countries (USA, Canada)?

METHODOLOGY

To fulfill the objectives of this study, the research has been conducted in two phases utilizing the mixed-methods methodology. The first and second phases are qualitative and quantitative, respectively. Therefore, methodology section is also divided in two sections-phase one and phase two. The steps for both of the phases are summarized in the table (Table 1) and discussed in the subsequent sections.

Table1: Steps in Research Methodology

Phase one – Qualitative data analysis	
Step 1	Development and administration of interview protocol with 18 senior IT project managers working in different IT organizations in Pakistan to elicit their opinions about the best practices for managing knowledge of IT projects
Step 2	Qualitative data analysis of the interviews to reveal major themes of best practices and the individual best practices
Phase two – Quantitative data analysis	
Step 1	Developing questionnaire using the best practices identified in phase one
Step 2	Administering the web-based survey with project managers working in different industries in Asia (Pakistan, UAE, Saudi Arabia), Europe (UK) and North America (USA, Canada)
Step 3	Quantitative data analysis of results to verify the impact of identified best practices on the organizational project management capability in Asia (Pakistan, UAE)
Step 4	Quantitative data analysis of the results to verify the impact of identified best practices on the organizational project management capability in North America (USA, Canada)

Phase One – Qualitative Analysis

Our first objective necessitated that we should rely more on the primary data to identify and analyze the BPs that IT organizations should follow to manage their KoP. Hence, it was decided to employ qualitative methods because such methods are considered more appropriate when it comes to solicit a wide variety of people's opinions (Babbie, 2003). Below we will be discussing various steps of our qualitative phase.

Step 1: Development and Administration of Interview Protocol

Using the description of knowledge purported by Reich (2007), the authors designed an open-ended interview protocol and selected a sample of senior project managers for interviews. The search for interview participants was focused on finding project managers who

were interested in knowledge management, working in the organizations large enough (having at least 100 employees), had at least ten years of project management experience and who had ample knowledge of the topic. In total, 18 senior project managers were interviewed who were employed by either IT software development organizations or IT departments in the government agencies in two of the largest cities of Pakistan. A sample of 18 respondents is considered a reasonable sample size as similar studies (King & Zeithaml, 2003; Reich, 2007) have shown that even less than 18 respondents is appropriate depending upon the complexity of content, depth, seniority of respondents and the time required to complete the interview.

The duration of interviews varied between 45 to 90 minutes. Before starting the interviews, interviewee's were briefed about the purpose and scope of the study and various technical terminologies to be used. The interview focused on four areas: best practices for process, domain, Institutional and cultural knowledge.

Step 2: Qualitative Data Analysis and Results

A large amount of responses and qualitative data were gathered during step 1. This included the best practices, stories and the learning experiences of project managers while executing projects. This data was transcribed, catalogued, cleansed, and qualitatively analyzed using QDA Miner software. The analysis of interview transcripts was conducted utilizing the prescribed approach by (Strauss & Corbin, 1998): open coding, axial coding, and selective coding. From these, it was possible to assign codes to the common concepts and the best practices that the interviewee's thought could be useful for managing knowledge of the projects. Such coding approach is appropriate (Sage, 2008) and found quite common in studies (Carter, 2003) addressing qualitative data collection and its analysis. The analysis performed after coding provided us with the central themes or categories in which the best practices can be placed (Figure 1).

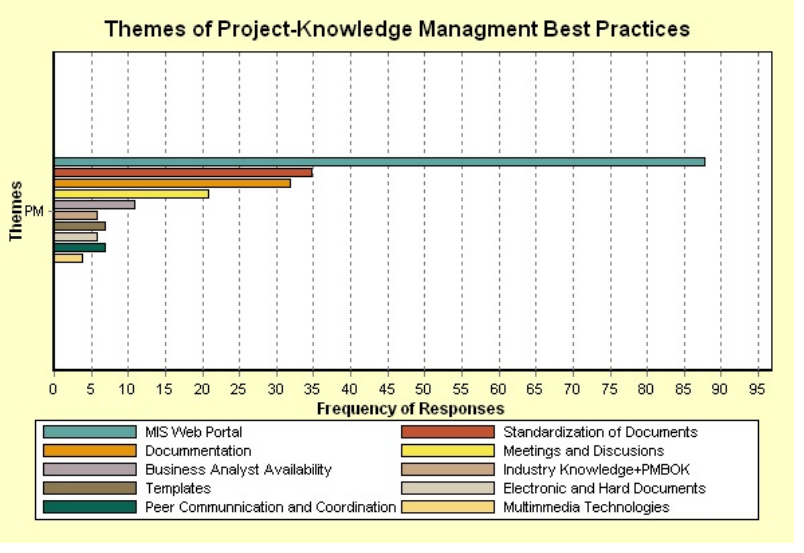

Figure 1: Themes of best Practices for Managing KoP

The analysis revealed eight major themes: (1) maintenance of MIS web portal, (2) standardization of documents, (3) documentation, (4) meetings and discussions, (5) business analyst availability, (6) peer communication, (7) Templates and, (8) industry knowledge + PMBOK. These eight themes were further explored to find distinct best practices in them. This process left us with 17 distinct best practices (Table 2, ID: 1-17).

The table depicts: (1) knowledge capture best practices which refer to the sources that should be maintained by the organizations or where organizational knowledge may reside. As such, organizations should have practices established to manage these sources, (2) knowledge organization practices depict the practices needed to be in place to organize the knowledge gathered from the knowledge sources, (3) finally, knowledge share practices depict the practices which can be used to share the organized knowledge throughout the organizations.

Table 2: Newly Explored KM BPs (by Knowledge Management Process)

Category	ID	Practice (s)	Status
Knowledge Capture	1	Hire, retain and assess business analyst for harvesting his business and requirements gathering knowledge	Newly identified
	2	Consult organizational common repository of project documentations such as plans, schedules, costs, previous project's notes to extract knowledge	-do-
	3	Hire and train knowledge engineers/experts to capture/take notes during regular meetings, coordination, and discussions among stakeholders/teams to share design and solution	-do-
	4	Facilitate and retrieve important information from peer communication from intranet portal groups, forums etc	-do-
	5	Retrieve important information from standardized documents, including but not limited to, policy books, employee handbooks etc.	-do-
	6	Retrieve important information from standardized documents being used for planning and execution of projects	-do-
Knowledge Organizatio n	7	Arrange all material including templates, project relevant documents, requirements specifications, functional specifications etc. on MIS web portal in access-restricted forums & groups in easy-to-find categorical manner	-do-
	8	Develop documentation of all activities including minutes of meeting on MIS web portal in a linked and hierarchical manner	-do-
	9	Organize documented policies, value books on MIS web portal	-do-
	10	Document horizontal & vertical communication channels	-do-
	11	Develop documents listing human and other resources such as equipments, machinery, tools. team structures, their expertise, schedule of tasks, roles & responsibility etc on MIS web portal in a linked, easy-to-search manner	-do-
	12	Develop best practices templates for project planning, execution and monitoring on MIS web portal in a connected and referable manner with past best practices	-do-
Knowledge	13	Facilitate discussions, orientations sessions and	-do-

Category	ID	Practice (s)	Status
Share		virtual meetings	
	14	Share documents & organizational structure through project-specific restricted access central repository	-do-
	15	Use web portal having facilities such as wiki, e-diaries forums, articles, documents, email lists, code of conduct	-do-
	16	Use web portal for discussions with all stakeholders	-do-
	17	Arrange orientation meetings to familiarize new employees with the organization	-do-

Phase 2 – Quantitative Analysis

This section draws from the findings of first phase of the study. In this phase an intra-country and inter-country survey was conducted to validate results of the first phase. In the first phase, we collected data from the IT organizations only but during the coding process it was ensured that the data should not lose its context/depth and codes should also be generic enough to validate the best practices for their applicability to the other industries as well. In the following sections we will discuss details of this phase. Two major propositions were developed to answer research questions of this phase. These propositions were developed to test the impact that the BPs will have on the organizational project management capability. The propositions were as follows:

P1: BPs for managing KoP will not affect project management capability of the organizations in Pakistan

P2: BPs for managing KoP will not affect project management capability of the organizations in other countries

Following predictor and outcome variables were identified to answer these propositions (Figure 2).

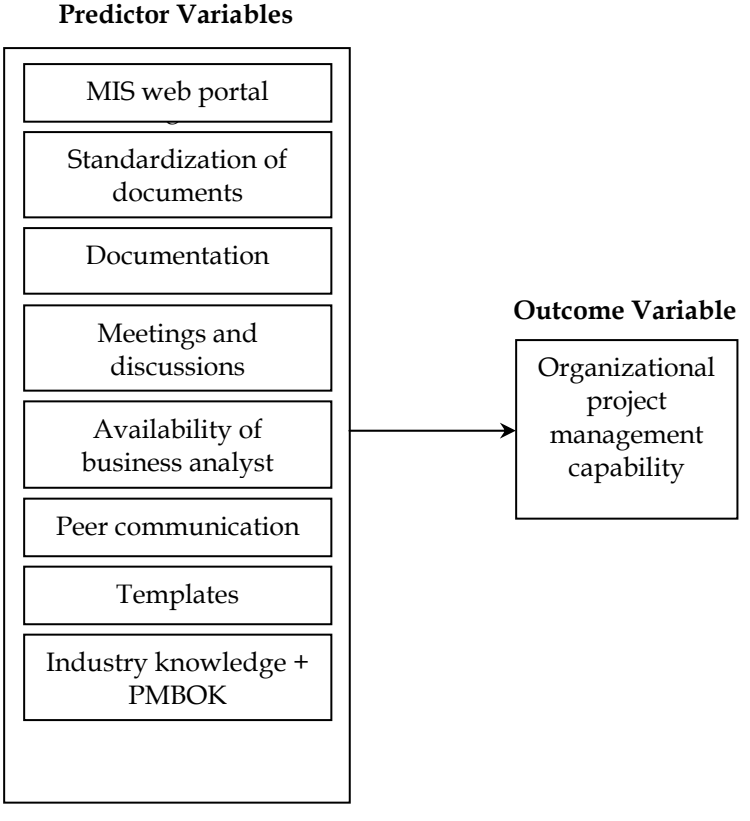

*Figure 2: **Predictor and Outcome Variables***

Step 1 – Questionnaire Development and Sampling Process

In this step, eight themes identified as the outcome of first phase were used to develop a web-based questionnaire. Each theme was operationalized to see the extent to which it can affect project management capability of the organization - where project management capability was described as, "*capability of the organizations to complete the project within time, budget and scope*". All the questions were mandatory to answer to ensure that there is no missing data.

Step 2 – Administering the Survey

The questionnaires were sent to approximately 550 people including the respondents (who participated in the first phase), IT software project managers and project management consultants in Asia (Pakistan, UAE)

and North America (USA, Canada). A total of 132 (24%) responses were received out of which 23 incomplete responses (having 75% missing data) were ignored, gaining a response rate of 20% (109) - which meets the required sample size of absolute minimum of five times the number of predictors (Brace, Kemp, & Snelgar, 2003; Miles & Shevlin, 2001). Hence, a sample size of 109 is considered enough to predict the model. The breakup of these 109 responses was such that 67% (73) responses were from Pakistan while 33% (36) were from the other countries. However, the informants represent a generous cross-section of small, medium and large organizations based in different countries and from two industries (IT, PM consultancy). The authors used the concepts to study the impact of knowledge management BPs on project management capabilities of the organizations while phrasing our questions in such a way that if given a high score, it would be considered depicting a high degree of project management capability of the organization. A likert scale of five choices, ranging from ''strongly disagree'' (1) to ''strongly agree'' (5), was adopted to measure the responses.

Step 3 – Quantitative Data Analysis

The authors conducted multiple regression tests to analyze the collected data as we wanted to assess how all the eight themes of the BPs, collectively, will affect project management capability of the organizations. Questionnaire items were checked to meet the assumption of internal consistency - Cronbach's alpha value was .756 which showed that there existed a reasonable internal consistency among the items (Field, 2009). All the predictors were also checked for the existence of multicollinearity among them as the existence of multicollinearity could make the model unreliable. It was found that although there existed some multicollinearity, as its existence is virtually unavoidable, but due to its less impact (mean VIF $\approx$ 1) on the overall fit of the model no specific treatment was needed (Bowerman & O'Connell, 1990; Field, 2009; Myers, 1990).

RESULTS

Results of multiple regression are suggested to be reported in the form of tables and not in the text because it makes easier to reproduce them (APA, 2010; Field, 2009). The authors found good overall model fit (R=.797) and R^2 (.691) statistics for proposition one (P1). Other important statistics are shown in the table (Table 3). VIF statistics are calculated to check for the existence of multicollinearity. It can be noticed that VIF statistics are close to one and in the valid range (Field 2009).

Table 3: Multiple Regression Results (for Asia)

Model	**Unstandardized Coefficients**		**T**	**Sig.(*p*)**	**Collinearity Statistics**
	b	**SE B**			**VIF**
(Constant)	8.831	.770	11.469	.000	
Business Analyst	4.007	.551	7.272	.000	1.132
Meetings and Discussions	4.122	.638	6.461	.012	1.109
PMBOK & Experience	5.681	.751	7.565	.000	1.102
Peer Communication	3.165	.766	4.132	.000	1.111
Templates	4.398	.687	6.402	.000	.659
Standardization of Documents	3.032	.574	5.282	.002	.193
Documentation	4.014	.695	5.776	.001	1.239
MIS Webportal	5.010	.754	6.645	.000	1.020

a) Dependent variable: project management capability

Results for the second proposition (P2) are also narrated in the table (Table 4). The authors found good overall model fit (R=.801) and R^2 (.764) statistics for proposition two (P2). Unlike proposition one, important statistics are shown in the table (Table 4). VIF statistics are close to one and are in the valid range (Field 2009). The high t-values also show that the predictors can predict the PMC significantly.

Table 4: Multiple Regression Results (for North America)

Model	Unstandardized Coefficients		t	Sig.(*p*)	Collinearity Statistics
	b	SE B			VIF
(Constant)	10.793	.481	21.814	.000	
Business Analyst	4.116	.454	9.066	.001	1.011
Meetings and Discussions	3.151	.507	6.215	.000	1.124
PMBOK & Experience	5.089	.546	9.320	.002	1.141
Peer Communication	5.924	.534	11.094	.000	1.255
Templates	3.108	.477	6.516	.003	1.132
Standardization of Documents	4.132	.550	7.513	.002	1.224
Documentation	4.102	.474	8.654	.003	.171
MIS Webportal	6.006	.639	9.399	.000	.828

a) Dependent variable: project management capability

From the tables (Tables 3-4) it can be inferred that there exists a positive relationship between BPs to manage KoP and PMC. Therefore, we reject the null hypothesis and accept the alternative which proposes that the identified BPs will have a positive effect on PMC. Also, it was found that there existed a good overall model fit (R, R^2) for both of the propositions, which depicts the overall validity of the models.

DISCUSSION OF RESULTS

The analysis for assessing perceptions of the project managers about impact of KM BPs on organizational project management capability makes novel and important contributions to both the existing body of knowledge of project management and knowledge management. First of all, it is found that the identified BPs showed a significant effect on the outcome variable: project management capability. We posit that the BPs found to have a statistically significant impact on the PMC will have equally significant impact in the real world as well because other researchers (Bhirud, Rodrigues, & Desai, 2005) have found similar BPs (collaborative technologies, central repositories, communication and coordination among peers and organizational intra-employee meetings) significant in their study. Therefore, the authors are confident enough about validity of the results.

CONCLUSION

If the organizations desire to maintain a sustainable competitive advantage by increasing the number of successful projects while not losing their learning, they should not only rely on the traditional project management improvement techniques but also act to manage their KoP. To manage their KoP, organizations need to: (1) establish practices to identify their sources of knowledge and capture knowledge from those, (2) organize the captured knowledge and, (3) share the knowledge throughout the organization. To fulfill these objectives organizations need to adopt some practices i.e. BPs to manage KoP. This study was partly conducted in the context of a developing country, Pakistan, and provides the international research community an insight into the perceptions of the IT project managers about BPs of KM in PM domain. This study followed a mixed-methods methodology, hence its findings can be treated real and original. In this scenario, our work can be supplementary to the existing KM BPs. Finally, we suggest that to extend the benefits of this study to a wider range of organizations, our suggested BPs could be included in some of the existing project management maturity models such as organizational project management maturity model (OPM3®) as well. It will enable the organizations to assess their KM capability and hence, be more competitive.

FUTURE RESEARCH

By conducting this inter-country study the authors have demonstrated the differences between the perceptions of IT project managers about management of knowledge of the projects. Future studies may extend the findings of the study by replicating it in the other countries. Secondly, in this study we have identified the best practices for the identification, organization and sharing of knowledge of the projects only while organizations are managing the projects through program and portfolio management as well. Therefore further work is needed to identify or expand the current BPs for these domains too. Thirdly, if these BPs are needed to be incorporated in any of the existing project management maturity models, further work will be needed to revise these BPs as required by the structure of that maturity model. For example, for OPM3®, the researchers will need to find the capabilities, outcomes and KPIs for these BPs to meet the structural requirements of OPM3®.

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