Critical factors for knowledge management in project business

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Abstract

Purpose – The purpose of this study is to identify and examine various factors that influence the success or failure of knowledge management (KM) initiatives in project-based companies.

Design/methodology/approach – Following a literature review, the study proposes a conceptual model of six factors of potential importance to the success of KM initiatives. The model is then examined through an online survey of project managers and assistant managers from project-based businesses in Finland.

Findings – The study finds that a lack of incentives and the absence of an appropriate information system are the most significant barriers to successful KM initiatives in projects.

Research limitations/implications – The findings of the study may be restricted in terms of generalisability because of the limited empirical study.

Practical implications – Project managers should formulate an attractive incentive package to encourage project members to participate in KM initiatives and to suggest ideas for new KM opportunities. Managers should also ensure that an effective user-friendly information system is in place before introducing KM initiatives.

Originality/value – The study proposes a new model of critical success factors for KM initiatives in the context of project-based business.

Keywords Knowledge management, Project management, Critical success factors

Paper type Research paper

1. Introduction

Knowledge is now universally recognised as a critical competitive asset, and interest in knowledge management has therefore increased in most companies. At the same time, more firms are organising their business in terms of projects; indeed, project-based business has become an accepted business strategy among the range of potential business strategies available to firms (Prencipe and Tell, 2001). Taken together, a commitment to effective knowledge management in the context of a project-based business strategy is emerging as a potent means of establishing and sustaining competitive advantage.

It is therefore not surprising that corporate spending on knowledge-management initiatives has increased significantly in all forms of business (including project-based businesses) in the past decade (Ithia, 2003). Organisations are implementing a range of initiatives to identify, share, and exploit their knowledge assets in accordance with a knowledge-based view of the firm in which knowledge is acknowledged as a key sustainable competitive resource (Kogut and Zander, 1992). Nevertheless, many project-based businesses lack the expertise to handle their knowledge assets (especially those gained from experience of previous projects); indeed, most knowledge-management initiatives in project-based firms have failed for a variety of reasons (including technological, cultural, knowledge content, and project management reasons) (Chua and Lam, 2005).

The present study therefore attempts to identify and examine the critical factors that facilitate and/or impede knowledge-management initiatives in the context of physical project teams. The remainder of the paper is organised as follows. The next section presents a literature review of the key concepts of project-based business, knowledge management, and knowledge-management initiatives. Section 3 proposes a model of six critical success factors identified in the literature review. Section 4 presents the methodology and results of an empirical examination of the proposed model in the context of project-based organisations in Finland. Section 5 discusses the significance of the findings. Section 6 suggests certain implications for project managers flowing from the present study. The paper concludes with a summary of the major conclusions.

2. Literature review

2.1 Project-based business

A project involves a group of people working together with shared responsibilities and resources to achieve a collective mission. Briner and Reynolds (1999) differentiated the membership of a project group into two groups:

1. ''visible members'', who are organisational members involved with the project (although they are not necessarily permanent members of the project team); and

2. ''invisible members'' (such as subcontractors and suppliers), who are stakeholders in the project (even though they might not be members of the project organisation itself).

The heart of the visible team is constituted by the core team, which is usually permanent while the project is being undertaken (but not necessarily full-time); other visible team members are temporary. It is thus apparent that the members of a project team might lack mutual social awareness, commitment to a common goal, shared performance norms, and equal liability for the outcomes (Mäkilouko, 2004). Indeed, although most projects have quite specific overall goals or expectations, it is ultimately up to the project members to ascertain how any transient problems that arise in the project should be solved. In doing so, project members typically have a considerable amount of autonomy (within overall limits) (Lundin and Söderholm, 1995; Lindkvist and Söderlund, 2002).

Most project-based firms are engaged in several projects simultaneously. Such projects are typically large, expensive, unique, and high-risk undertakings that must be accomplished with an agreed level of performance within a prescribed timeframe and budget (Pinto and Kharbanda, 1995; Cicmil, 1997; Kerzner, 1998).

2.2 Knowledge management and project-based business

Alavi and Leidner (2001) defined knowledge management (KM) as the systematic process of acquiring, organising, and communicating the knowledge of organisational members so that others can make use of it to be more efficient and productive. Many organisations are launching KM initiatives with a view to:

- improving business processes;
- making financial savings;
- generating greater revenues;
- enhancing user acceptance; and/or
- increasing competitiveness (Chua and Lam, 2005).

However, according to Yeh *et al.* (2006), organisations that embark on KM initiatives must take account the varying conditions of corporate culture, workflow processes, and the integration of group members' knowledge. Moreover, because these factors can provoke internal opposition from organisational members, organisations that embark on KM initiatives require strong moral and budgetary support from senior management. These ''cultural issues'' (of corporate culture, workflow processes, and the integration of group

members' knowledge) are of particular relevance to project-based business in view of its reliance on teams that are typically made up of members from a wide variety of backgrounds.

In addition, the identification of *critical knowledge*, and the ability to exploit it, are particular challenges for project organisations (Kasvi *et al.*, 2003). Because project teams are typically transient in nature, they lack a defined knowledge system and supporting culture to capture and retain knowledge as ''corporate memory''. As a result, critical knowledge assets can be easily lost once a project is completed and the team is disbanded. As Kotnour (2000) observed, this inevitably results in the destruction of organisational knowledge and impaired organisational learning.

Planned management efforts and incentives are therefore fundamental to the creation, capture, and transfer of knowledge in projects. For example, lessons learnt from the experience of a project can be consciously socialised among individuals before they leave the project. In the absence of such planned KM initiatives, the experience gained from projects is incapable of enhancing organisational business processes in subsequent projects (Ajmal and Koskinen, 2008).

2.3 Knowledge-management initiatives

2.3.1 Objectives of KM initiatives. According to Wiig (1997), the objectives of KM initiatives are:

■ to enable an enterprise to act as intelligently as possible in securing its viability and overall success; and

■ to otherwise realise the best value from its knowledge assets.

From a managerial perspective, there are four areas of emphasis for systematic KM (Wiig, 1997):

1. top-down monitoring and facilitation of knowledge-related activities;

2. creation and maintenance of a knowledge infrastructure;

3. renewal, organisation, and transformation of knowledge assets; and

4. leverage of knowledge assets to realise their value.

2.3.2 Assessing KM initiatives. The success of a KM initiative can be assessed on the basis of several different criteria. Davenport *et al.* (1998) suggested four criteria, as shown in Table I. The applicability of these various criteria will vary according to the particular circumstances of a given KM initiative.

2.3.3 Factors affecting KM initiatives. Various researchers have provided different models of ''enablers'' (success factors) and ''barriers'' (failure factors) in KM initiatives. Table II lists some of the suggestions that have been made with respect to so-called ''enablers''.

Although the studies listed in Table III were conducted at different times in a variety of settings, it is apparent that the success factors that they identified are similar, even if the exact terminology differs from study to study. The study by Moffett *et al.* (2003) provides the most comprehensive general framework of enablers of KM initiatives enablers.

Table I	Indicators of successful KM initiatives	
Indicators	*Justification*
Resources growth	Growth in the resources attached to the project, including people and budget
Knowledge content development	Development in the dimensions of knowledge content and usage (i.e. the number of documents or accesses for repositories or participants for discussion-oriented projects)
Project survival	The likelihood that the project would survive without the support of a particular individual or two, i.e. the project is an organisational initiative, not an individual effort
Financial return	Evidence of financial return either for the knowledge management activity itself or for the larger organisation

Table II	Enablers of successful KM initiatives	
Authors and publications	*KM enablers*
Davenport *et al.* (1998) ''Successful knowledge management projects''	1. Technology infrastructure 2. Organizational infrastructure 3. Balance of flexibility 4. Shared knowledge 5. Knowledge-friendly culture 6. Motivated workers 7. Means of knowledge 8. Senior management support, commitment
Ryan and Prybutok (2001) ''Factors affecting knowledge management technologies: a discriminative approach''	1. Open organizational culture 2. Senior management, leadership 3. Employee involvement 4. Teamwork 5. Information systems infrastructure
Moffett *et al.* (2003) ''An empirical analysis of knowledge management applications''	1. Friendly organizational culture 2. Senior management leadership, commitment 3. Employee involvement 4. Employee training 5. Trustworthy teamwork 6. Employee empowerment 7. Information systems infrastructure 8. Performance measurement 9. Benchmarking 10. Knowledge structure
Connelly and Kelloway (2003) ''Predictors of employees' perceptions of knowledge-sharing cultures''	1. Management support 2. Social interaction 3. Technology 4. Demographics
Yeh *et al.* (2006) ''Knowledge management enablers: a case study''	1. Strategy and leadership 2. Corporate culture 3. People 4. Information technology

Table III	Barriers to successful KM initiatives
Technology (refers to aspects of KM infrastructure, tools and technology)	
Connectivity	The technical infrastructure cannot support the required number of concurrent accesses due to bandwidth limitations
Usability	The KM tool has a poor level of usability. KM users find the tool too cumbersome or complicated for use
Over-reliance	An over-reliance on KM tools leads to neglect of the tacit aspects of knowledge
Maintenance cost	The cost of maintaining the KM tool is prohibitively high. Management intervenes and terminates the KM project
Culture (refers to the characteristics or properties of the knowledge itself)	
Politics	KM initiative project is used as an object for political manoeuvring such as gaining control and authority within the organisation
Knowledge sharing	Staff do not share knowledge within the organisation due to reasons such as a lack of trust and a knowledge-hoarding mentality
Perceived image	Staff perceive accessing another's knowledge as a sign of inadequacy
Management commitment	Management appears keen to commence the KM project. However, when problems emerge, commitment to the KM project is quickly withdrawn
Knowledge content (refers to the characteristics or properties of the knowledge itself)	
Coverage	The content is developed fragmentarily from different groups of KM users. Hence, cross-functional content cannot be captured
Structure	The content is not structured in a format that is meaningful to the task at hand
Relevance and currency	The content is either not contextualized or current to meet the needs of the KM users. It cannot help KM users to achieve business results
Knowledge distillation	There is a lack of an effective mechanism to distil knowledge from debriefs and discussions. Hence, valuable knowledge remains obscured
Management of the initiative project (refers to the management of the KM initiative as a project)	
User involvement	There is a lack of KM user involvement in the project. Hence, besides not being able to secure user buy-in when the project is rolled out, the knowledge requirements of the users are poorly understood
Technical and business expertise	When the project is implemented, it lacks staff with the required technical and business expertise to sustain the initiative
Conflict management	Conflict occurs among stakeholders of the KM team but there is no attempt to manage it
Roll-out strategy	The KM project does not have a proper rollout strategy. Specifically, the lack of a pilot phase means that many teething problems that can be mitigated at the initial stage are left unchecked
Project cost	The overall cost associated with the KM project is in excess of what was originally anticipated

A list of ''barriers'' (failure factors) has been suggested by Chua and Lam (2005) after analysis of five case studies of failed KM initiatives. As shown in Table III, these barriers were divided into four categories:

1. technology;

2. culture;

3. content; and

4. project management.

It can be noted from a comparison of Tables II and III that some factors appear as ''enablers'' (success factors) in one table and as ''barriers'' (failure factors) in the other. For example, the factor of ''technology'' is listed as both an ''enabler'' and as a ''barrier''. Similarly, the factor of ''culture'' appears in both tables. The explanation is that a given factor is not an ''enabler'' or a ''barrier'' *per se*; rather, the status of a given factor (as a ''success factor'' or a ''failure factor'') depends upon how it is managed. It is therefore more appropriate to refer to these factors as ''influencing factors'' or ''affecting factors'' with regard to KM initiatives, rather than ''enablers'' or ''barriers''. The key issue is the management or treatment of the factor under consideration.

3. Conceptual framework

On the basis of the literature review presented above, a conceptual model of the factors that influence the success of KM initiatives in a project-based context is proposed by the present study. As shown in Figure 1, the proposed model consists of six distinct factors:

1. familiarity with KM;

2. coordination among employees and departments;

3. incentive for knowledge efforts;

4. authority to perform knowledge activities;

5. system for handling knowledge; and

6. cultural support.

Figure 1 Conceptual model of factors influencing KM initiatives in a project-based context
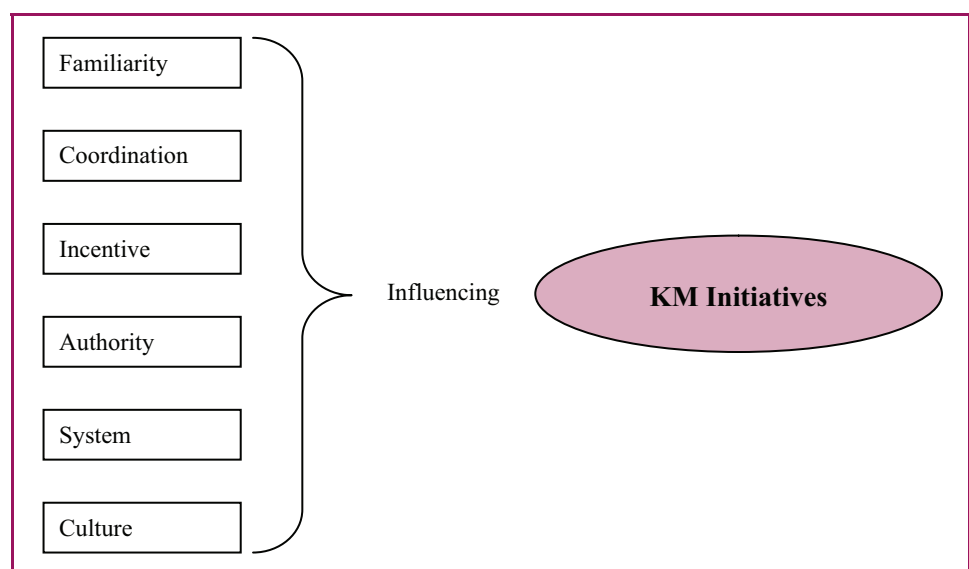
Each of these factors is discussed in more detail as follows.

3.1 Familiarity with KM

If project-based organisations wish to initiate KM initiatives, they must ensure that members of the organisation, especially members of project teams, are familiar with KM and have a clear strategy for contributing to specific KM initiatives (Pieris *et al.*, 2003). Familiarity with KM is essential for the success of KM initiatives in any organisation; indeed, if employees are not familiar with the notion and practices of KM, it is almost inevitable that the firm's KM initiatives will fail.

3.2 Coordination among employees and departments

A key element for success in any KM initiative is encouraging people to communicate and share their knowledge with others (Nonaka and Takeuchi, 1995). Coordination is required to bring together team members to share their best practices with each other. In terms of the well-known four-step model of knowledge creation suggestion by Nonaka and Takeuchi (1995), which included the steps of ''socialisation'', ''externalisation'', ''combination'', and ''internalisation'' (SECI), the factor of coordination proposed in the present model can be said to incorporate the steps of ''socialisation'' and ''combination''.

3.3 Incentive for knowledge efforts

Many studies have suggested that incentive programs play a major role in the success of KM initiatives (Davenport *et al.*, 1998; Jarvenpaa *et al.*, 1998; Liebowitz, 1999; Alavi and Leidner, 2001; Massey *et al.*, 2002). In the proposed model, an ''incentive'' can be understood as any factor (financial or non-financial) that motivates people to adopt a particular action or to prefer one alternative to another. Incentives can be classified into three broad groups:

1. *remuneration* – material rewards (especially money) for acting in a particular way;

2. *moral* – adopting a particular choice because it is considered to be the ''right'' (or admirable) thing to do, or because a failure to act in a certain way is likely to be condemned as improper; and

3. *coercive* – adopting a particular course of action because a failure to act in this way will result in adverse consequences (or ''punishment'').

According to Amabile (1997), an employee can be extrinsically motivated to achieve objectives (that is, offered incentives that are external to the work itself) or intrinsically motivated to achieve objectives (that is, obtaining personal satisfaction from doing the work). Adopting this classification of motivation, Osterloh and Frey (2000) contended that intrinsic motivation is especially significant in promoting knowledge creation and sharing in an organisation.

3.4 Authority to perform knowledge activities

Although the term ''power'' is often used interchangeably with the term ''authority'', their meanings differ. ''Power'' refers to the ability to achieve certain ends, whereas ''authority'' refers to the legitimacy of exercising that power.

Employees are the ''hub'' of creating knowledge (Holsapple and Joshi, 2001) because knowledge is kept within the individual. It is therefore crucial that employees are not only

motivated to create and share knowledge, but also *authorised* to share and utilise it within the organisation.

3.5 System for handling knowledge

According to Ruppel and Harrington (2001), knowledge should be understood as a process rather than an asset. As such, to maximise the value of knowledge, organisations need to create an appropriate system to support the flow of knowledge in KM initiatives. The various parts of an effective KM system must have functional as well as structural relationships among them.

An effective KM system can be the most important KM enabler, but any system can be a barrier if it is not managed properly. In particular, a robust system of information technology facilitates the communication, collection, and re-use of knowledge in project-based organisations.

3.6 Cultural support

Every organisation's culture is distinctive, and this distinctive organisational culture distinguishes the members of one group from another (Hofstede, 1980). The concept of a distinctive organisational culture is especially important in project-based organisations because project teams frequently involve professionals from different cultural backgrounds.

Many studies have contended that culture is a key factor in determining the effectiveness of knowledge sharing (Chase, 1997). The culture of an organisation not only determines the type of knowledge that is managed, but also the value of that knowledge in providing a competitive advantage for the organisation (Long, 1997). According to Alavi and Leidner (2001), who undertook a survey of KM initiatives, the majority of successful initiatives were based on an appropriate organisational culture that was conducive to the collection and sharing of knowledge among the members of the organisation.

4. Empirical study

4.1 Sample and data collection

The research sample of the empirical study conducted to examine the proposed model consisted of project managers and assistant managers working on a variety of projects in Finnish project-based organisations of various sizes. The survey questionnaire was transmitted electronically to 400 potential respondents who were randomly chosen from a list published on the website of the Finnish Project Management Association. Follow-up e-mails were sent at intervals of one, two, and three weeks after the first contact. A total of 41 completed questionnaires were returned, which represents a response rate of 10.25 per cent.

The first page of the questionnaire explained the objectives of the study. In subsequent sections, respondents were asked to use a five-point Likert-type scale (1 = "strongly disagree"; 5 = "strongly agree") to indicate the extent to which the presence or absence of the six factors of the conceptual model (''familiarity'', ''coordination'', ''incentives'', ''authority'', ''system'', ''cultural support'') were barriers to successful KM initiatives in their organisations or in particular projects.

4.2 Results

Table IV shows the detailed results with respect to each of the six factors. The term ''average'' refers to the mean score for a given factor from the 41 responses. ''Variance'' reflects the degree of dissimilarity in the responses. ''Weight'' was calculated by dividing the average response to a given factor by the sum of the average responses of all factors.

Figure 2 shows the weights of the factors in graphical form, thus demonstrating the degree to which each of the six factors was perceived to be a barrier to KM initiatives in the respondents' organisations.

Table IV	Extent to which factors were perceived as barriers					
	Familiarity	*Coordination*	*Incentive*	*Authority*	*System*	*Culture*
Average	3	3.195122	3.634146	2.731707	3.390244	2.853659
Variance	0.85	1.260976	0.937805	0.80122	1.243902	1.378049
Weight	0.159533	0.169909	0.193256	0.145266	0.180285	0.151751

Figure 2 Weights of factors as barriers to KM initiatives
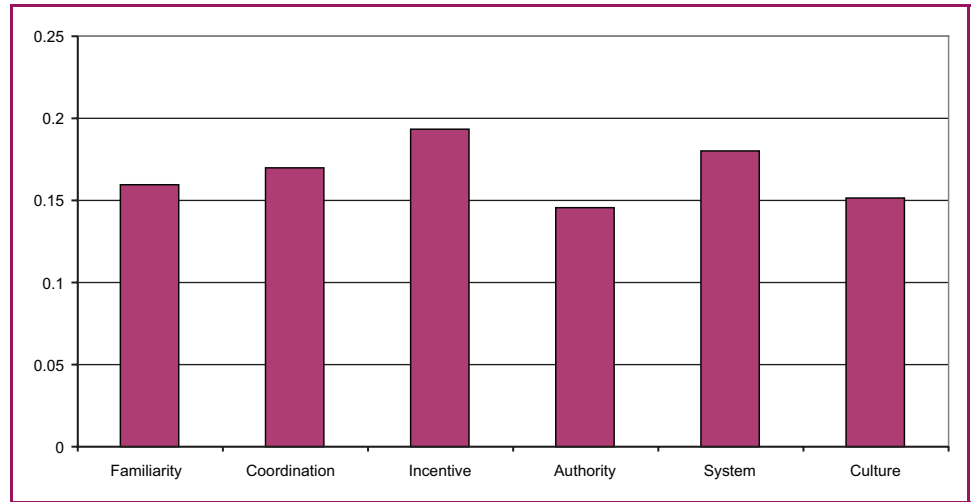
It is apparent from Figure 2 that a lack of incentives and the absence of an appropriate system were perceived to be the most significant barriers for successful KM initiatives in projects. The absence of coordination and a lack of familiarity with KM were of secondary importance as barriers. A lack of authority and the absence of cultural support were considered to be the least significant barriers to the success of KM initiatives in projects.

5. Discussion

The results of the study have revealed that the absence of incentives for employees who engage in KM initiatives was the most significant barrier to the success of such initiatives in the project-based firms studied here. The results suggest that senior management should offer suitable incentive schemes for employees to engage in KM initiatives if they want to increase the likelihood of success in such initiatives.

The second most significant barrier to success in KM initiatives was the absence of a proper system to handle knowledge in the project-based organisations. The majority of respondents felt that there was no adequate system in their organisations to manage knowledge efficiently. It is apparent that appropriate KM systems in project-based businesses would be a significant factor in assisting KM initiatives to flourish. Such a system would facilitate the sharing of experience among employees through an integrated interface platform accessible to all interested participants in a project.

A lack of coordination among employees and departments was the third most significant barrier to KM initiatives, while a lack of familiarity was the fourth most significant. It would seem that proper coordination among employees who are made familiar with the objectives and methods of KM would enhance the likelihood of success in KM initiatives.

A lack of cultural support was only the fifth most significant barrier identified in the present study. It is apparent that a lack of cultural support was not perceived by the present

respondents as being as significant as many of the other factors. Nevertheless, cultural support remains a fundamental element in any successful KM initiative. A culture of mutual trust and assistance encourages team members to depend on one another and the information they share, thus increasing the likelihood that they will communicate openly and effectively to achieve their shared goals.

Finally, a lack of authority to perform knowledge activities was the least significant barrier to the success of KM initiatives. It is likely that the respondents perceived knowledge as a personal resource to use as they saw fit and that they therefore did not see any need for overt authority to share their personal knowledge. Nevertheless, it remains true that senior management should overtly encourage and authorise the sharing of personal knowledge in an attempt to enhance the skills and expertise of as many members of project teams as possible.

6. Implications for project managers

The findings of this study have several important implications for project managers who wish to initiate successful KM practices within their projects.

First, managers should formulate an attractive incentive package to motivate project members to engage in KM initiatives. Such an incentive system should also encourage members to suggest ideas for new KM opportunities for the project team.

Second, managers should arrange seminars or workshops to familiarise project members with the basic objectives and methods of effective KM. It is apparent that employees cannot make meaningful contributions to KM unless they are familiar with the aims and processes that it entails. These seminars and workshops should make team members aware that the knowledge they possess is a valuable resource that must be managed in a sophisticated way to benefit individuals, the team of which they are part, and the organisation as a whole.

Third, KM without coordination is more than difficult; it is almost impossible. Project managers should always ensure interdepartmental coordination to manage their KM initiatives successfully.

Finally, managers need to foster an organisational culture that encourages participation in KM initiatives and assists all project members to perform their activities to the best of their ability.

7. Conclusion

This study has examined the critical success factors for KM initiatives in project-based organisations. Drawing on the suggestions of various researchers in recent years, the study has proposed a conceptual model of such factors. Six factors have been identified and included in the model:

1. familiarity with KM;

2. coordination among employees and departments;

3. incentive for knowledge efforts;

> " **Successful KM initiatives require appropriate incentives for team members and a user-friendly information system that facilitates the sharing and management of knowledge among all project participants.** "

4. authority to perform knowledge activities;

5. system for handling knowledge; and

6. cultural support.

The findings of the empirical study have revealed that the absence of incentives and the lack of an appropriate system are the most significant barriers for successful KM initiatives in projects. A lack of inter-departmental coordination and unfamiliarity with KM were other significant barriers. A lack of authority to manage knowledge and an absence of cultural support were the least-significant barriers to successful KM initiatives in the project-based organisations studied here.

The most important implications for project managers arising from the present study are that successful KM initiatives require appropriate incentives for team members and a user-friendly information system that facilitates the sharing and management of knowledge among all project participants. However the generalization of the findings may be partial by reason of limited empirical study sample.

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